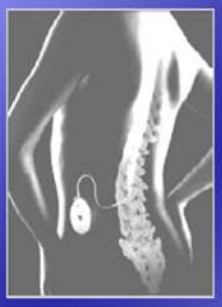
Indian Journal of Cerebral Palsy

(The official Journal of Indian Academy of Cerebral Palsy)
ind.jcp.iacp@gmail.com www.iacp.co.in

IndJCP, Volume 1, Issue 1 June 2013

SynchroMed® Infusion System

Components

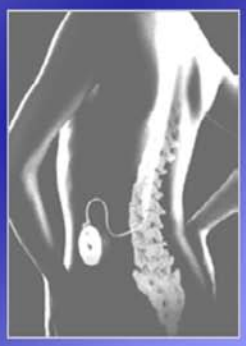


- SynchroMed ® Pump
- Indura Intraspinal catheters.
- Refill kit
- Pump Programer

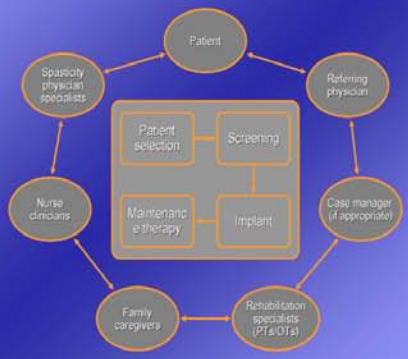
Spasticity

Intratecal Baclofen Therapy

- Baclofen is infused into Intratecal Space.
- Using SynchroMed® Programmable Infusion Pump.
- The infusion place makes the difference.
- High efficiency at low doses, therefore low side effects.

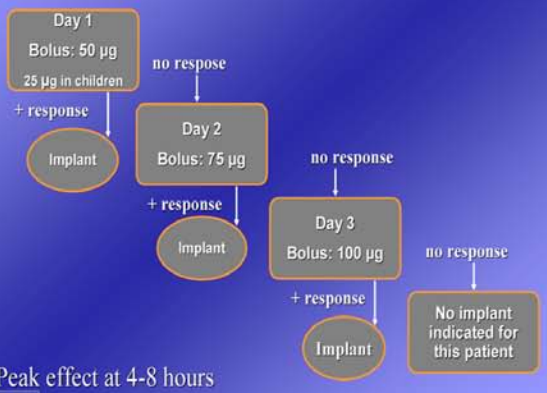


The Team Approach to Spasticity Management

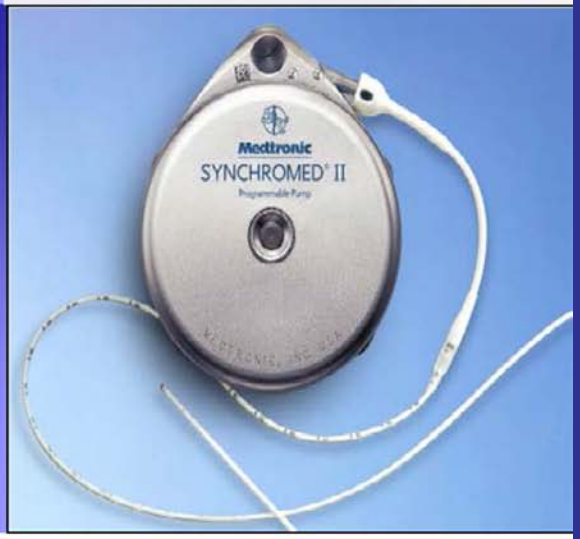


ITB Therapy

Screening Test



Peak effect at 4-8 hours



India Medtronic Pvt. Ltd.
1241, Solitaire Corporate Park,
Building No 12, 4th Floor,
Andheri - Ghatkopar Link Road, Andheri (E)
Mumbai - 400093, India.

Regional Contact:
AP & Chennai: Kishor -09959005670
Kerala & Karnataka: Raju-08861200997
North: Nikhil-09958093152
West: 07738101750

Medtronic
Alleviating Pain Restoring Health Extending Li

Cover Page picture source: http://uldissprogis.com, http://www.traumaticbraininjury.net

Indian Journal of Cerebral Palsy

(The official Journal of the Indian Academy of Cerebral Palsy)

Editorial Board

Indian Journal of Cerebral Palsy

Information about the journal

Indian Journal of Cerebral Palsy is the official scientific journal of the Indian Academy of Cerebral Palsy. It focuses information derived from clinical, human and other sources so as to optimize the communication between clinical and basic science on the following main motor and associated disorders (special sections) of cerebral palsy:

Connotations / Commentories
Original Research Papers
Review Articles
Basic Science Research Articles
Case Reports
Short Case Reports
Letter to the Editor
Long Clinico-imageo-pathological Case Discussion with Videos

CP Images and *Picture Quizes*
Debate on Previous Articles

Abstracts of Annual IACP Conferences
Inspirational Medical History
Guide Lines and Protocols
Annoucements and News
Forthcoming Conferences
Events
Research Grants
Study Groups
Awards
Media News and Scientific Responses

The editorial process

The manuscripts will be reviewed for possible publication with the understanding that they are being submitted to one journal at a time and have not been published, simultaneously submitted, or already accepted for publication elsewhere. The Editors review all submitted manuscripts initially. Manuscripts with insufficient originality, serious scientific flaws, or absence of importance of message will be rejected. The journal will not return the unaccepted manuscripts. Ther manuscripts are sent to two or more expert reviewers without revealing the identity of the contributors. Within a period of eight to ten weeks, the contributors will be informed about the reviewers' comments and acceptance/rejection of manuscript.

Types of manuscripts and word limits

Original Research Papers: Randomised controlled trials, intervention studied, studies of screening and diagnostic test, outcome studies, cost effectiveness analyses, case-control series, and surveys with high response rate. Up to 2500 words excluding references and abstract.

Review Articles: Systemic critical assessments of literature and data sources. Up to 3000 words excluding references and abstract.

Case reports: new/interesting/very rare cases can be reported. Cases with clinical significance or implications will be given priority, whereas, mere reporting of a rare case may not be considered. Up to 1000 words excluding references and abstract and up to 10 references.

Short case reports: new/interesting/very rare cases with clinical significance. Up to 600 words excluding references and abstract and up to 5 references.

Long Clinico-imageo-pathological Case Discussion (should be submitted with Videos).

Letter to the Editor: Should be short, decisive observation. They should not be preliminary observations that need a later paper for validation. Up to 400 words and 4 references.

CP Images and *Picture Quizes*: Classical clinical/radiological/pathological image Up to 250 words and 4 references.

Announcements of conferences, meetings, courses, awards, and other items likely to be of interest to the readers should be submitted with the name and address of the person from whom additional information can be obtained. Up to 100 words.

Limits for number of images and tables: for all the above-mentioned categories the number of images and tables should not be more than one per 500 words.

Disclaimer

Indian Academy of Cerebral Palsy and Indian Journal of Cerebral Palsy publishing group and editors are not responsible for the views and opinions published by the authors of articles published in this journal. The publication of advertisements does not mean endorsement of products by theis publishing group

Mailing the Manuscript

Mail three copies of the manuscript along with a covering letter, contributors' form signed by all the contributors, checklist and floppy. Place the photographs in a separate envelope. The covering letter must include information on prior or duplicate publication or submission elsewhere of any part of the work/study; and a statement of financial or other relationships that might lead to a conflict of interest.

Copies of any permission(s) to reproduce published material, and to use illustrations or report information about identifiable people must accompany the manuscript. The manuscript should be sent to the editor:

Dr. A.K. Purohit
408, Amrit Apartments, Phase II, Kapadia Lane,
Somajiguda, Hyderabad -500082
Tele. No. 91- 40 - 23312292,
Mobile: 98490 54600 (SMS only)
ind.jcp.iacp@gmail.com

Please see more details on last pages of the journal.

Indian Journal of Cerebral Palsy

(June 2013 Volume 1, Issue 1)

CONTENTS

CP field is indeed in need of scientific deeds

Editorial

AK Purohit

We the members of the editorial board are extremely happy to present the ever wanted first scientific journal on cerebral palsy in India, the Indian Journal of Cerebral Palsy (IJCP), to the scientific community of the world so as to contribute the hard core science on all the aspects of CP by all the methods of medical management mainly to resolve the issue of

professional bias and
confusion in families,
as to what is best for their child.

The idea to publish the journal has emerged out of confusion with *innumerable methods* (Allopathy and Non-Allopathy) that are practiced in India and abroad wherein no one knows which method works for which patho-physiological and demographic group of cerebral palsy (motor component) and whether it really works or not. Obviously, then to apply a particular method to individual child becomes extremely difficult.

Not only this (motor disorder) various associated disabling disorders (that also play important role to decide the prognosis) of cerebral palsy are also taken care of in India and abroad by many different Allo and Non Allo pathy practitioners, need to be scientifically explored.

Most of the practices are based on anecdotes of success and indifference to the series of failures . In fact, the failure is masked by the natural development of the brain and a pseudo success feelings lead to continuation of the wrong medical method. Their (the practitioner's) heart beats with happiness (pseudo) and scientist's mind weeps on ignorance and innocence of them and of families. We need balance of heart and mind in the management of our children and adults.

Innumerable painful heart breaking sufferings of such children and their families has given rise to the idea to collect and produce the scientific information and therefore we present to you this journal. The journal, therefore, would include some articles related to these associated disorders also for the benefit of practitioners and scientists working in the field of cerebral palsy. Indeed the idea is to scientifically resolve "the bias and the confusion".

Allopathy has emerged mainly from the technology, the power of tools, the power from outside (of human body). No one from all the practical points of view can stop substantial rapid development of these powers. It surely has strong scientific basis, of course a marketing sell bias too. The ancient traditional indigenous low tech medical practices are, although, based on intuitions, help to develop power from within(hidden potential natural biological powers of human body). The modern scientific studies should explore well the outside and within power to heal the human body, the children and adults with cerebral palsy. Indeed, this is the aim of IACP and the journal is to have worldwide discussion on such studies.

Indeed, the scientists with the use of modern technology can make non allopathic practices also more appropriate. What is mostly lacking in present day practice is neglect of these methods (practices). The Academy is firm to scientifically study and ethically apply Allo and Non- Allopathy methods holistically to make sure all the impairments of the child improve and habilitated to meet the present stream of the social and other aspects of the life. Let all the eastern and western methods amalgamate and become one pathy for the benefit of our children.

In India, the suffering with small pox was considered a curse of Goddess (Devi, Mata). Therefore, the afflicted people were taken to such holy places and were fed cold food stuffs for a few weeks. I do not know what had happened to the curse following the development of Small Pox Vaccine(faith needs scientific truth).

his “millennium of neurosciences” would surely discover (through basic and clinical research) the miraculous hidden potential physiological powers of the human brain. The systematic study and understanding of the growing (of course damaged) brain of these children would unveil many mysteries.

India can contribute enormously at global level for having huge number of such children and meticulously studying both success (never ending) and failures (never final and inherently has a strong feedback potential if one wants to explore) of various indigenous methods. Painful scenario is that these children are left untouched from both the medical and social point of view. Wisdom lies in improving this, grey area of the medical and social field.

To perform research one does need facilities. Yes, agreed. However, the person thrilled to unveil the mysteries does not look for facilities. In fact facilities follow him. What matters is strong aptitude and motivation (heart to help these children) would open all the doors to go ahead with discoveries / researches. Remember, in India many research grants are not being availed by us. Either no one is to take or the projects are not prepared well for proper scientific study. Let’s avail these opportunities and perform the scientific studies.

Once the opportunity for publication, through a journal, is provided and encouraged, the approach of the clinicians and scientists while practicing also become more systematic in data collection and then they are able to provide perfect information on the subject. This journal is presented to you to fulfil this idea hoping useful application of the intellectual information with wisdom (knowledge) would indeed lead us to success.

The world is becoming smaller with geographical boundaries coming closer. Soon it will be one world, one nation, one society. A new world. A new society. Hopefully best of all the cultures will amalgamate and we the human beings and all other animals will have the best new culture to live. Therefore let’s develop one pathy, the Holisto-pathy, to be designed to treat various disorders scientifically, more so children having multiple impairments causing multiple disabilities.

Let’s amalgamate eastern & western strengths
to meet the challenges of cerebral palsy.

Most children undergo only Non – Allopathy complementary and alternative medicine (CAM) Treatment or None

A: Acupressure, Acupuncture, Affirmative prayer, Alexander Technique, Apitherapy, Applied kinesiology, Aromatherapy, Astrology, Auriculotherapy, Autogenic Training, Autosuggestion, Ayurveda.

B: Balneotherapy, Bates Method, Biodanza, Bioresonance therapy, Blood irradiation therapies.

C: Chelation therapy, Chinese food therapy, Chinese martial arts, Chinese medicine, Chinese pulse diagnosis, Chiropractic, Chromotherapy, Coding (therapy), Coin rubbing, Colloidal silver therapy, Colon hydrotherapy, Color therapy, Craniosacral Therapy, Creative Visualization, Crystal healing, Cupping.

D: Dietary supplements, Dowsing.

E: Ear Candling, Electromagnetic therapy, Energy therapies.

F: Faith healing, Fasting, Feldenkrais method, Fengshui, Five Elements, Flower essence therapy, Functional medicine

G: GuaSha.

H: Hair analysis, Hatha yoga, Hawaiian massage, Herbalism, Herbal therapy, Herbology, Holistic living, Holistic medicine, Homeopathy, Home remedies, Hypnosis, Hypnotherapy.

I *Iridology, Isopathy; J: Journaling, Jin Shin Jyutsu[1]; K: Kampo; L: Light therapy.*

M: Macrobiotic lifestyle, Magnetic healing, Manipulative therapy, Massage therapy, Medical acupuncture, Medical intuition, Meditation, Meridian (Chinese medicine), Mindfulness meditation, Transcendental meditation, Mega-vitamin therapy, Mind-body intervention, Moxibustion, Music therapy.

N: Natural Health, Natural therapies, Naturopathic medicine, New Thought, Neuro-Linguistic Program,Nutritional healing, and supplements

O: Orgonomy, Orthomolecular medicine, Osteomyology, Osteopathy.

P: Pilates, Polarity therapy, Pranic healing, Prayer, Psychic surgery.

Q: Qi, Qigong, Quantum Healing; R: Radionics, Rebirthing, Reflexology, Reiki, Rolfing.

S: Seitai, Self-hypnosis, Shiatsu, Siddha Medicine, Sonopuncture, Sound therapy, Spiritual Mind Treatment, Support groups.

T: T'ai Chi Ch'uan, Thai massage, Thalassotherapy, Therapeutic horseback riding, Therapeutic Touch, Tibetan eye chart Traditional medicine (Chinese, Japanese, Mongolian, Tibetan) Trager Approach, Transcendental meditation, Trigger point, Tui Na.

U: Unani medicine, Urine therapy; V:Visualization (cam), Visualization; W:Water cure (therapy), Wellness (alternative medicine).

Y:Yoga, Ashtanga Yoga, AshtangaVinyasa Yoga, Bikram Yoga, Hatha yoga, Iyengar Yoga, Kundalini Yoga, Power yoga, Siddha Yoga, Sivananda Yoga, Tantric Yoga, Viniyoga, Vinyasa yoga, Hatha yoga; Z: Zang Fu theory.

(Source of methods: Wikipedia)

CP field is indeed in need of scientific deeds.

Developmental disability in the 21st century: New ideas for a new millennium

Connotation

Peter Rosenbaum

Introduction

The purpose of this essay is to share some thoughts and perspectives accumulated over the past 40 years as I have travelled through the Land of Childhood Disability. This is a thought piece – an expression of personal beliefs and emerging awareness – rather than a scientific report. As such I will refrain from providing references to the things I say, but will add some general citations at the end of the piece. It is my hope to challenge my colleagues to reflect on some of the 'received wisdom' we all acquired in our training, and to encourage everyone to question some of the assumptions we have made about our field. However, rather than simply arguing that we should discard what I believe are many 'old' ideas, I propose to offer some new ways by which we can think about child development, childhood 'disability', the lives of the families raising these children, and our roles as professionals in promoting functioning in the face of impairment. I hope to provoke readers to think about where we have come from, where we might be going, and how we might get there. I will conclude by arguing that there has never been a more exciting time to be working in or studying the field of childhood disability, and that opportunities abound to move the field forward.

Where have we come from?

In considering one's direction forward during any journey it is always useful to look back at where we have come from. Not only does this remind us of the distance we have already travelled, it also helps us see the features of the landscape that have influenced our thoughts and actions to this point.

1. Much of our approach in clinical medicine, including the full range of professionals that are involved in our field, has been built on ways of thinking that derive from acute care clinical experiences. When a condition starts relatively quickly (over hours, days or weeks) we usually expect to make a correct 'diagnosis' as a basis for finding the right 'treatment' to cure, or inhibit, or at least control that condition. We anticipate finding a reasonable clear connection between diagnosis and treatment, and we usually have some experience with expected outcomes of those treatments for those conditions.

2. 'Rehabilitation' medicine concerns the efforts of professionals and families to help restore functional well-being to a person after an illness or injury has created problems that limit usual function. Based on a combination of the best scientific and clinical experience, coupled with knowledge of the person's previous functional status and their own desired goals for rehab, the directions of intervention are often relatively clear, even if the outcomes are less certain.

3. In childhood disability our efforts have traditionally been directed at trying to promote 'normal' function, and trying to discourage children from developing bad habits that are considered 'abnormal'.

4. There has in the past been a sense of pessimism, perhaps even fatalism, about childhood disability ("But what can you do for them?..."). Parents have been counselled about what medicine cannot 'fix' and at times have even been encouraged to abandon an impaired infant and simply have another 'healthy' infant.

The concepts that underlie the World Health Organization's 1980 International Classification of Impairment, Disability and Handicap (ICIDH) provide a guide to past conceptual connections. In this frame of thinking any disease or condition was associated with 'impairments' in body structures or functions, leading to restrictions in activities that produced 'disabilities', the social consequences of which led to social restrictions that produced 'handicap'. Although this dissection of a condition into its several parts was useful in many ways, the compartmentalization and especially the implication of inevitability of the disorder to produce 'handicap' were rather negative.

How might we rethink where we have come from, and challenge these assumptions?

In light of modern ideas about these issues it is important to reconsider how this inheritance of medical thinking has influenced our thought and action – both what we said, and did, and taught, and what we did not do or consider acceptable.

(i) It has become apparent that unlike acute-care medicine, in chronic conditions (particularly those requiring 'rehab') there is rarely a clear diagnosis or a direct path and connection to treatment. In fact when people have chronic conditions there is often a multiplicity of issues that creates 'complexity', and for which the specific approaches to 'treatment' and management may not be apparent. Furthermore, it can often be difficult to find and formulate a specific clear 'diagnosis'. This is especially true in childhood disabilities, where we often assume, for example, that 'cerebral palsy' or 'autism spectrum disorder' describes a specific diagnosis. In reality these labels, and so many others in developmental medicine, are names given to categories of impairments that have certain clinical features in common but which

can vary enormously in their underlying causes and the ways they manifest in children's development and function and the impact these conditions have on children's (and families') lives.

Another consideration of these realities – an axiom in a way – is that the 'treatments' we offer in the field of chronic conditions like the developmental disabilities are rarely specific and virtually never curative. Most of our approaches are very well-intentioned and address one or more specific elements of the conditions we treat (e.g., managing spasticity in CP) – but even the best management of particular manifestations of a condition does not necessarily lead to improved functioning in the way the person with that condition might hope and expect. In fact, as will be suggested later in this essay, this approach to 'treatment' may distract from the broader goals that 'developmental rehabilitation' should really be about.

(ii) The concept of **RE**habilitation makes sense for people who have lost function and for which interventions are aimed at restoring those abilities as well as possible. However, in developmental impairments of childhood this idea – in which we have all been trained for the past 50 years or more – really doesn't make sense! Young children have not yet had time to develop their capacities, or to show us who they are and who they want to be. Rather, they are at the beginning of their journey into life, and almost certainly require that we think about, and strive to enhance, their processes of 'being, belonging and becoming' based on a quite different set of ideas about child and family development. For this reason, as discussed below, we need to put a major emphasis on child development.

(iii) The concept of 'normal' is another notion worth reconsidering. What is 'normal' anyway? Think of left-handedness, which characterizes 15-20% of the population. There was a time when children were forced to switch from using their left hand to trying to use their right, and left-handed people were considered 'sinister' (from the Latin word for 'left')! In today's world we are far more tolerant of this 'difference' or 'variation', reflecting, I believe, that there is almost always more than one way to do things, and no one way is invariably correct or 'normal'. Thus, I contend that our approach to promoting child development in the face of impairments has traditionally been too strict and severe, assuming that there were right and wrong ways to do things rather than different but acceptable and functional ways.

(iv) Our sense of pessimism has been based in large part on these traditional notions of what rehabilitation of children could and could not accomplish. We also have believed we could read the book by the cover – what I believe is an arrogant and inappropriate way to think and act. By our pessimistic prognostications we may have encouraged families to achieve self-fulfilling prophecies, based on our (often very misguided) belief that we could read a child's future functional status from their early developmental issues. Insofar as 'normal' was rarely achievable, people too easily assumed that nothing could be done and that a child's fate was sealed from early life. With an expanded recognition of how variably and creatively people can accomplish the things they want to do (think of people's achievements at the Paralympics!) and a widened range of expectations of people to succeed on their own terms, we now know that this blanket pessimism was inappropriate and misplaced.

Where are we now, and where might we be going?

In 2001 the WHO revised its original ICIDH to create the International Classification of Functioning, Disability and Health (known familiarly as the ICF). This framework for health addresses several of the concerns raised by critics and commentators of the ICIDH, as is evident in Figure 1. The ICF framework represents a huge leap forward from the ICIDH in several ways. First, the language used is neutral rather than negative – 'impairment' is replaced by 'body structure and function'; 'disability' is now referred to as 'activity' (with the possibly of activity restriction); and 'handicap' becomes 'participation' (with a risk of participation restriction). Second, the ICF recognizes the roles of 'contextual' factors that can and do influence health, including 'environment' and 'personal factors' as components of everyone's life. Third, and in many ways most important, the elements of the framework are all interlinked into a 'dynamic system' of elements, change in any one of which is likely to have impacts on the others. In other words this is a modern and importantly updated approach to the issues with which ICIDH was originally concerned. Finally, the ICF framework provides a strengths-based way to 'rule in' relevant aspects of the life and functional issues of a child and family in ways that allow us both to see the larger picture – beyond the 'diagnosis' – and to identify possible avenues for intervention. In many ways using ICF thinking is entirely opposite to an approach that encourages finding a diagnosis (when that may be elusive) and bemoaning the absence of specific treatments.

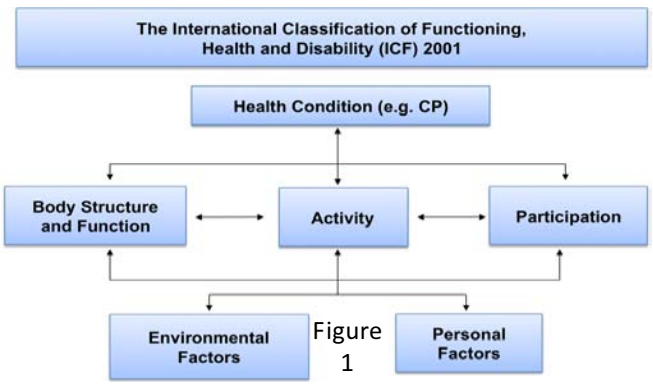


Figure 1

One approach that our research group has taken to recalibrate and refocus the language we use in discussing childhood disability was to identify a series of "F-words" that can be situated within the elements of the ICF framework; these can serve to remind us of the areas of focus to which we should be attentive in our work with children with impairments and their families. As shown in Figure 2, these words are 'Functioning' (what 'activity' is about); 'Family' (the essential 'environment' for all children); 'Fitness' (in disability, an often-neglected aspect of 'body structure and function'); 'Fun' (an essential 'personal factor'); and 'Friends' (needed for full 'participation' in life). The ICF provides a point-in-time perspective on a person's status, so we have added the word 'Future' to remind us that children with impairments grow up and become adults with those impairments, and that part of our work with children with impairments and their families needs to be directed toward the adult lives these young people will one day experience.

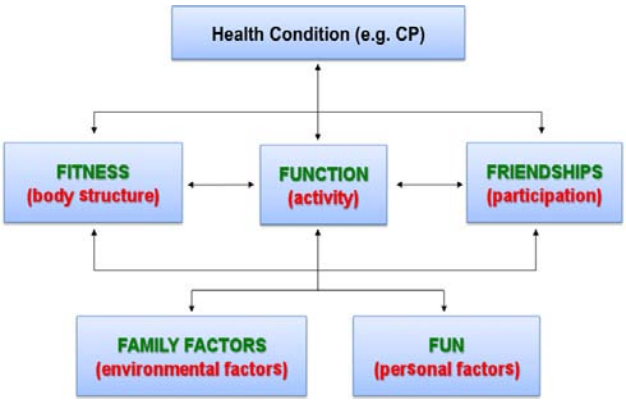


Figure - 2

Since these ideas were presented in the autumn of 2011, and published in mid-2012, many people have responded well to them. Parents in particular have been excited with what they see as a positive and hopeful orientation to promoting function in their children with impairments 'despite' the likelihood that their children may experience their lives and their accomplishments in a way that is different from 'typical'. As a result of the enthusiasm that these ideas have generated *CanChild*, in collaboration with some parent consultants, is now embarking on a program of research to study these notions in action.

Needless to say, even apparently good ideas are only as good as the evidence that they 'work' – so the next several years will be involved with studying whether aggregation of these ideas actually makes a difference for families and professionals who buy into them. We plan to package these ideas in plain language and to implement them systematically with families. We are especially interested to evaluate the extent to which adoption on a 'F-words' approach to raising their child might have impacts on parental understanding of conditions like CP, on parental well-being and sense of control and empowerment, and the extent to which professionals can adopt these ideas and work with parents in ways that are 'family-centred'.

Another concept that we believe should inform our approach to our work with children with developmental impairments in the 21st century is a major emphasis on child development. Virtually all the so-called 'disabilities' of childhood have a neurological basis, and the brain is the primary organ of development. In fact people increasingly refer to these conditions as 'developmental disabilities' to reflect our awareness that all of them – CP, intellectual disability, autism spectrum disorders, and many more – do, or are likely to, influence the patterns and trajectories of the lives of the children who have them, and of their families.

It was noted earlier that many of our impairment-based 'treatments' may lead to changes in body structure or function without accompanying changes in activity or participation. There is also, in some traditional schools of thought, an imperative to try to promote 'normal' function' and inhibit or prevent children from doing things in ways that are considered 'abnormal'. An example would be the discomfort of some professionals with 'allowing' children with spastic diplegic CP to W-sit or to walk with what is considered to be an 'abnormal' gait – crouched at hips and knees, up on the toes, and in-toeing. The 'developmental' counterargument is that, to the extent that these postural and gait patterns enable children to be stable, to be active, to explore, to learn about themselves and their world, to get into what adults call 'mischief', even these apparently disordered postures and gait patterns serve an essential and irreplaceable function in promoting a child's development – and as such should be celebrated. We believe that there will be time – once a skill like walking is acquired – to help improve the quality of the skill if and when the child is interested to try to do so.

Thus, a primary focus of modern thinking and action should be to promote child development, without regard to whether things are done well, or 'nicely', or 'normally'. As with all aspects of typical children's development, things are in a constant state of flux and change, so that being able to do something – however it is done – should trump other considerations when children are young. Development begets further development, and empowering children to acquire and practice new skills should be our primary goal in developmental intervention.

Another perspective that is worth considering is that our traditional approaches to developmental intervention, applying ideas from adult care and rehabilitation, are likely naïve. The child's brain, and thus their readiness to learn, is fundamentally different from the ways that adults

learn. Think, for example, of an adult trying to acquire a new language. We will use any of a host of cognitive strategies – mnemonics, memorization, sound patterns, application of rules about prefixes and suffixes, etc – whereas children 'simply' absorb language 'naturally'. Of course this is not 'simple' at all! This kind of learning is possible because the child's brain structures and receptivity are fundamentally different from the brain structure and function of the adult brain. Hence, what often works for adults may be inappropriate for children – and, more importantly, failing to take account of the learning capacity of the young brain may be a serious omission on our part!

Summary

In this thought-piece I have argued that, with the best of intentions, our work in developmental disability has been influenced by forces and concepts imported from acute care thinking and from adult rehabilitation medicine. I have suggested that there are serious limitations to these models of thinking and action as they concern childhood disabilities. On the other hand, I firmly believe that we should be relying on the new WHO ICF framework as a guide to thought and action; that we should promote a major emphasis on child development and achievement without regard to 'quality' in the course of early development; and that we should adopt a strengths-based frame of mind in our work with children with impairments and their families.

The challenges for all of us include applying these and other ideas critically and analytically, and study everything we do carefully so we do not simply replace one orthodoxy with another, but rather advance the science and service of developmental disability!

General References

1. Ronen GM and Rosenbaum PL. Chapter 2. **Concepts and perspectives of 'health' and 'outcomes' in young people with neurological and developmental conditions.** In: Gabriel M Ronen, Peter L Rosenbaum (eds) (2013) Life quality outcomes in children and young people with neurological and developmental conditions: concepts, evidence and practice. Clinics in Developmental Medicine No. 196. London: Mac Keith Press.

2. Rosenbaum PL. **Cerebral Palsy in the 21st Century: Is There Anything Left To Say?** Neuropediatrics 2009 Apr;40(2):56-60

3. Rosenbaum PL, Gorter JW. (2012) **The 'F-Words' in Childhood Disability: I Swear This is How We Should Think! Child: Care, Health and Development.** Jul;38(4):457-63.

4. Rosenbaum PL and Ronen GM. Chapter 6. **A developmental perspective on childhood neurological conditions**. In: Gabriel M Ronen, Peter L Rosenbaum (eds) (2013) ***Life quality outcomes in children and young people with neurological and developmental conditions: concepts, evidence and practice***. Clinics in Developmental Medicine No. 196. London: Mac Keith Press.

5. Rosenbaum PL and Rosenbloom L. (2012) **Cerebral Palsy: From Diagnosis to Adult Life**. London: Mac Keith Press.org

Address for correspondence and details of author:
Peter Rosenbaum, *MD, FRCP(C)*
Professor of Paediatrics, McMaster University
Canada Research Chair in Childhood Disability
IAHS Building, Room 408, 1400 Main Street West
Hamilton ON L8S 1C7,

Results of selective motor fasciculotomy in spastic upper limbs due to cerebral palsy (a review of 30 children and adults)

Clinical article

Srikanth Reddy, AK Puligopu, AK Purohit

Abstract

Objectives: To assess the outcome of selective motor fasciculotomy in relieving upper limb harmful resistant spasticity and thereby to improve motor functions in persons with cerebral palsy.

Materials and Methods: Thirty people having cerebral palsy (16 males and 14 females) age ranging from 5 to 35 (mean - 12.66) years with upper limb resistant spasticity were studied.The participants having spastic hemiplegia (n=11), triplegia (n=9) and quadriplegia (n=10) were assessed using Modified Ashworth Scale (MAS), Selective Voluntary Control Grade (SVC), Wee FIM Scale and hand function evaluation. Selective motor fasciculotomy (SMF) was performed on musculocutaneous nerve (n=15), median nerve (n=35) and ulnar nerves (n=3) for elbow flexors, pronators & radial wrist flexors and ulnar wrist flexors spasticity respectively. Pre and post op therapeutic exercises were performed.

Results: Statistical analysis using Wilcoxon Signed Ranks test showed significant reduction in spasticity and improvement in selective voluntary control, hand functions (grasp to hold a rod) and Wee FIM self care domain. There was no recurrence in spasticity and no complications following surgery.

Conclusions: The Selective Motor Fasciculotomy of musculocutaneous, median and ulnar nerves significantly reduces spasticity in the affected muscle groups and thereby improves the self care (motor) functions in selected people with cerebral palsy who have harmful resistant spasticity without any organic shortening of the muscles. The procedure is safe and the spasticity does not recur.

Key words: • *upper limb spasticity* • *fasciculotomy* • *neurotomy* • *cerebral palsy*

Abbreviations: SMF - Selective Motor Fasciculotomy, MAS - Modified Ashworth Score, SVC - Selective Voluntary Control, FIM - Functional Independence Measure, MA - milli ampere.

Introduction

Spasticity and dystonia involving upper limb in non-progressive neurological disorders are challenging to treat, as these impairments not only produce pain and are cosmetically unacceptable but also functionally restrict activities of daily living and vocational skills. Permanent relief using treatment modalities like therapeutic exercises, botulinum toxin etc. is unlikely[1-5]. Surgical procedure like selective motor fasciculotomy (SMF, also known as selective neurotomy) may have benefit in managing these resistant cases[6-14], in which the nerve fascicles carrying excessive impulses are ablated there by permanent relief in harmful spasticity is obtained without losing control and balance.

Materials and methods

This is a prospective study of randomly selected 30 subjects who underwent selective motor fasciculotomy (SMF) for the treatment of spasticity in upper limbs due to cerebral palsy from January 2008 to January 2013.

Exclusion criteria

1. Poor motor control in upper limbs.
2. Moderate to severe contractures in upper limbs.
3. Severe mental sub-normality.

Preoperative evaluation

Subjects with upper limb spasticity were evaluated using Modified Ashworth's Scale and Selective Voluntary Control Grading. The upper limb motor functions were evaluated using Wee FIM Scale and Hand function assessment, which assesses opposition, pinch and grasp[15-18]. Outcome of Hand function assessment was classified into good, fair and poor, where good means near normal function, fair was impaired function but still the function was possible and poor when the subject could not attempt the function.

Once subjects develop resistance to non ablative therapies, they were taken up for surgery. The goals of surgery and further treatment including the need to continue therapeutic exercises were discussed in detail with the parents. All subjects were also explained regarding the possibility of requirement of second-stage surgery which may include more ablation of the same nerve or the ablation of another nerve of the affected muscle group in cases who have residual spasticity.

All subjects planned for surgery were admitted and routine blood investigations were performed. Subjects were kept fasting 6 hours prior to surgery. On the day of surgery thorough bath was given and the limbs were wrapped with povidone iodine soaked gauge bandages.

Surgery

On day of surgery all subjects had an intravenous line placed in non-operative limb prior to shifting into operation theatre and antibiotics were given. The subject was positioned supine with arms abducted by 45° and placed over sidearm rest. Induction was carried out by single low dose of vecuronium. Reassessment of the contractures was performed and angles of contractures noted. Operative limb was cleaned with povidone iodine scrub and solution, and the body was draped keeping operative limb fully exposed so that the movements of the limb could be observed during electrostimulation of the nerve. Intradermal infiltration of lignocaine mixed with adrenalin (1 in 200,000) was used to raise a peau-de-orange patch along the line of incision. Care was taken to avoid injecting the drug into the deeper planes so as to prevent infiltration of the underlying nerve, as this may otherwise lead to erroneous findings during the stimulation of the nerve.

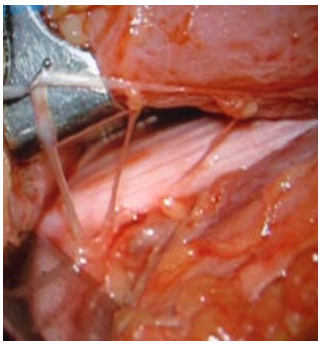


Fig. 1- Nerve with its branches and fascicles entering into muscles.

Musculocutaneous nerve

The skin was incised at a point 2 ± 1 cm distal to the tendinous lateral-most end of the anterior axiliary fold and carried up to 6 ± 4 cm distally. The skin, subcutaneous tissue, superficial and deep fascia were incised along the line of incision and glistening aponeurosis of the biceps brachii was exposed. It was incised longitudinally and the muscle was split along the long axis of its fibers (muscle splitting approach) with the help of artery forceps and right-angled Langen Bach retractors. The index finger was also used to split the muscle and palpate the nerve that feels like a cord. The nerve was found underneath the biceps brachii and over the brachialis. The nerve was further dissected along its long axis with the help of small size cottonoids. The epineurium was incised along the long axis of the nerve. The branches were dissected till their entry into the muscles.[Fig-1]

Median nerve

A horizontal skin crease incision was given in the cubital fossa. Skin, subcutaneous tissue, superficial and deep fascia were incised along the line of incision and bicipital aponeurosis was exposed. It was incised transversely toward the medial aspect up to the pronator teres muscle leaving the main tendon intact. The nerve was found between the two heads of pronator teres. It was further dissected along its long axis with the help of peanut size cottonoids. The epineurium was incised along the long axis of the nerve. A proximal branch exiting from the main trunk proximal to the transverse elbow line, running medially and entering into the muscle, was split into its component fascicles and a distal branch running along the ventral aspect of the main trunk, which could be easily lifted away from the main trunk, was found disappearing at the distal end of the wound under the muscles of the forearm, and was also dissected into its component fascicles.

The wrist flexor branch(s) exiting medially from the main trunk, distal to the transverse elbow crease, was also dissected into its component fascicles.

Ulnar nerve

The skin was incised longitudinally, one-fourth above and three-fourth below the transverse elbow line, in the groove between the medial epicondyle and olecranon process. The subcutaneous tissue, superficial and deep fascia were incised along the line of the incision. The ulnar nerve was dissected in between the two heads of flexor carpi ulnaris. The epineurium was incised along the long axis of the nerve. The dissection was performed from the trunk of the nerve along its branches till its ramification as fascicles into the muscle. The branch at the site of its entry into the muscle was found as the ideal site for dissection, as the natural process of separation into fascicles was observed clearly at this site.

Each fascicle was stimulated using bipolar current starting from 0.1 mA, gradually increasing by 0.1 mA, up to 2 mA. Fascicles, which showed intense contraction with a lower threshold and correlating clinically with severity of spasticity and voluntary control, were considered for ablation. About one-third (1/3) to three-fourth (3/4) of the fascicles of the dissected branches were ablated. The proximal stump was clipped using a silver clip. All the dissected neural tissue, prior to coagulation, was dipped in saline to avoid heat dissipation and then the sectioned proximal stumps were coagulated using bipolar coagulation to make the stump brown colored. If the stump is under-coagulated (white) it may regenerate and if the stump is over coagulated (black) then it may get auto amputated and may re-grow. Clipping of the stump was performed to identify the dissected branches in cases of re-exploration and may also probably help in decreasing the incidence of the re growth. The limb was immobilized using slab across the joint. The slab was applied for a period of 2 weeks and gradual active exercises were begun later[19].

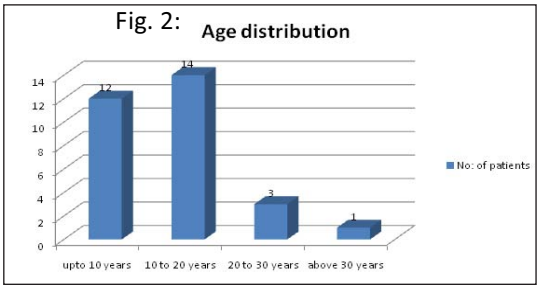
Results

Out of total 34 randomly selected subjects from January 2008 to till January 2013, subjects who were operated, 4 did not complete six months of follow-up. The results of 30 subjects who completed follow up were analyzed and are as follows:

Age and gender distribution

Out of total 30 subjects who had undergone surgery, 26 were under and 4 were above the age of 18 years [age ranging from 5 to 35 (mean - 12.66) years [Fig. 2]. The male to female ratio was 1.2:1.

Fig. 2:



Subjects

Thirteen (43%) subjects underwent musculocutaneous nerve SMF for elbow flexor spasticity, n = 15 (2 subjects had undergone bilaterally). 30 (100%) subjects underwent SMF of the median nerve for pronator spasticity, n = 35 (5 subjects had undergone bilaterally). 29 (96%) subjects underwent SMF of the median nerve for wrist flexor spasticity, n = 34 (5 subjects had undergone bilaterally). 3 (10%) subjects in the same group also underwent SMF of the ulnar nerve, n = 3.

The outcomes of spasticity on various targeted muscles, selective voluntary control and functions have been shown in the table 1, Fig: 3 to 8.

Table 1: Outcome of spasticity on various muscle groups with mean pre and post operative values, mean change and p-values

	Mean Pre Op	Mean Post Op	Change in Mean	p value
MAS in Elbow flexors	1.96	0.7	1.26	0.00042
MAS in Pronators	2.16	1.36	0.8	0.00039
MAS in Wrist flexors	2.06	0.739	1.32	0.00047
SVC in Elbow Flexors	4.01	5.23	1.22	0.00034
SVC in Pronators	3.1	4.04	0.94	0.00021
SVC in Wrist Flexors	3.06	4.87	1.81	0.00024
Grasp to hold a 2 inch rod	1.6	2.3	0.7	0.00012
Self-care domain of WEE FIM	32.15	35.45	3.3	0.0009

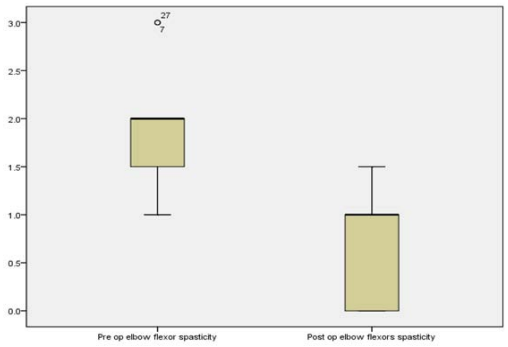


Figure 3: Change in pre and post operative elbow flexor's spasticity.

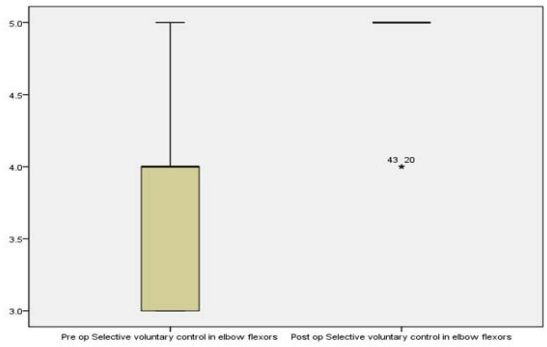


Figure 4: Change in pre and post operative elbow flexor's selective voluntary control.

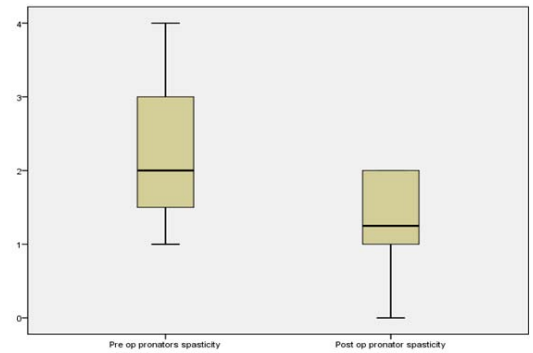


Figure 5: Change in pre and post operative pronator's spasticity

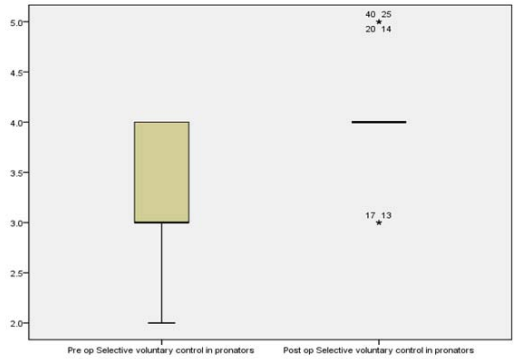


Figure 6: Change in pre and post operative pronator's selective voluntary control.

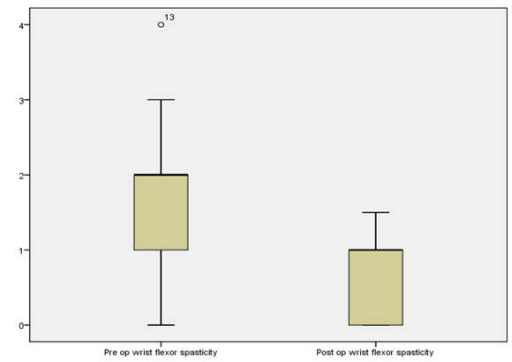


Figure 7: Change in pre and post operative wrist flexor's spasticity

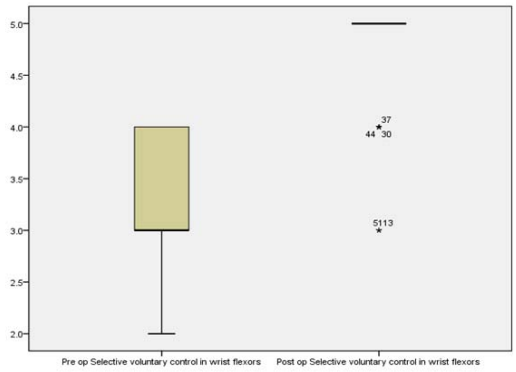


Figure 8: Change in pre and post operative wrist flexor's selective voluntary control.

Results of SMF on functional evaluation

Wee FIM Scale was impaired in 16 children. The mean pre-op and post-op Wee FIM scores were 105.7 and 110.5 respectively. The mean increase in score was 4.85 (p= 0.001). Self-care domain of Wee FIM scale was also analyzed to meet with the objectives of the study. The mean pre-op and post-op scores of this domain were 32.15 and 35.45 respectively. The mean increase in score was 3.3 (p = 0.0009).

The functions of the intrinsic muscles of the hand (opposition, pinch and grasp) were evaluated. There was improvement in opposition and pinch functions in second and third fingers. However, it did not reach statistical significance. The p value for the ability to grasp a 2" rod was significant (0.0012). The ability to grasp a rod lower than 2" diameter was not significant (p = 0.072 for 1 inch rod and p = 0.32 for half inch rod).

Complications & Recurrence

None of the subjects had any complication and there was no recurrence of spasticity till the present follow up period.

Discussion

In general the recommended treatment of spasticity is to try intially with non-ablative measures like therapeutic exercises, use of splints and orthotics, usage of medications, nerve blocks and muscle injections to produce helpful muscle tone. However, the surgical measures like soft tissue release and motor fasciculotomies (neurotomies) are necessary only when the spasticity does not respond to these modalities[3-5]. All subjects in the study were planned for surgery when they showed no further reduction in harmful spasticity to nonablative measures.

In this series (n=30) all subjects had spasticity due to cerebral palsy. Most of the subjects were under 18 years of age. Many of them have come late (later than 4 to 6 years age) because of late referrals and various socio-economical, educational and geographic constraints. All subjects in this series had normal intelligence or minimal mental sub normality.

Spasticity outcomes

Elbow flexor spasticity

The reduction in elbow flexor spasticity following SMF of the musculocutaneous nerve (n=15) was significant in all the subjects (n=13) with six achieving normotonia. All subjects had improvement in selective voluntary control and cosmetic appearance. There were associated benefits of surgery on shoulder joint movements and adjacent joints. There was relief in elbow flexion dynamic (on activity) spasticity (n=5), which manifested during activities like walking.

Garland et al. performed complete musculocutaneous neurectomy in adult subjects with stroke by which they produced complete denervation of biceps and brachialis. They showed improvements in spasticity, cosmetic appearance, and personal hygiene[13]. In recent studies, preoperative planning and perioperative electrostimulation helped to quantify the fascicular ablation rather than complete neurectomy to achieve better results. The senior author of the present series had reported 36% of residual spasticity following musculocutaneous nerve SMF with limited (50% or less) fascicular ablation[14]. In the present series we report greater reduction in spasticity (mean postoperative Modified Ashworth's Scale - 0.73), which was comparable with Marrawi et al. (mean postoperative Ashworth's Scale - 0.8) following more fascicular ablation[7,8].

Pronator spasticity

The reduction in pronator spasticity following SMF of the median nerve (n=35) was significant in all the subjects (n=30), however, not to the extent of elbow flexor spasticity reduction. The mean postoperative spasticity on Modified Ashworth's Scale was 1.36, which was higher when compared to that of Marrawi et al. (Ashworth's Scale was 0.6)[7,8]. Even then there was improvement in selective voluntary control and self-care domain on Wee FIM Scale in the present series.

Wrist flexor spasticity

The reduction in wrist flexor spasticity following SMF of the median (n=34) and ulnar nerves (n=3) was significant in all the subjects. The mean postoperative spasticity on Modified Ashworth's Scale was 0.74 (whereas on Ashworth's Scale 0.48 in Marrawi et al. series)[7,8]. This has resulted in improvement in selective voluntary control and self-care domain of Wee FIM Scale, i.e., eating, dressing, grooming, toileting, and bathing.

Functional outcome

Hand functions

Distal effects of surgery on the pronators and wrist flexors were seen in the form of improved hand functions like opposition, pinch and grasp. Grasping to large objects improved more than other functions. Improvements were noted more often in the index and the middle finger (median nerve) than the ring and the little finger (ulnar nerve). This could be explained because we have performed median nerve SMF more often than both median and ulnar nerves together.

Functional activities

The self-care activities improved following surgery in all subjects. Thirty-three percent of subjects showed improvement from dependence to complete independence in performing self-care activities.

Cosmetic outcome

All subjects improved cosmetically following the reduction in spasticity. They were having better look of the limb while performing self-care activities, walking and during leisure time.

The operative scars of musculocutaneous nerve SMF were cosmetically acceptable as they were hidden under the arm sleeves.

In the present series the SMF of the median nerve was performed by a horizontal skin crease incision unlike the linear incision parallel to long axis of the limb carried across the joint as

described in other series. There was hardly any visible scar in most of the subjects of the present series.

Follow-up

There was no recurrence during the mean follow-up period of 10 months (ranging from 6 to 24 months) despite ablating the fascicles close to the muscle.

Complications

The incisions and the tissue (including neural) handling techniques described earlier prevented development of any scar contractures and wound complications.

Acknowledgements

We thank Naveen Kumar Balne and colleagues, Department of Physiotherapy, for their pre and postoperative evaluation and training of subjects.

We also thank Dr. Dilip Kulkarni, Dr. Padmaja Durga and their colleagues of the Department of Anesthesia for challenging non-curare muscle relaxant free anesthesia. We are grateful to our study group children and adults along with their families for giving us this opportunity and providing their consent to participate in this research.

References

1. Ronan S, Gold JT. **Non-operative management of spasticity in children**. Childs Nerv Syst. 2007; 23:943-56.
2. Steinbok P. **Selection of treatment modalities in children with spastic cerebral palsy.** Neurosurg Focus. 2006; 21:24.
3. Schwerin A, Berweck S, Fietzek UM, Heinen F. **Botulinum toxin B treatment in children with spastic movement disorders: a pilot study**. Pediatr Neurol. 2004; 31:109-13.
4. Halpern D, Meelhuysen FE. **Duration of relaxation after intramuscular neurolysis with phenol**. Jama. 1967; 200:1152-4.
5. Verotti A GR, Spalice A, Chiarelli F, Iannetti P. **Pharmacotherapy of spasticity in children with cerebral palsy.** Pediatr Neurol. 2006; 34:1-6.
6. Decq P, Filipetti P, Cubillos A, Slavov V, Lefaucheur JP, Nguyen JP. **Soleus Neurotomy for treatment of the spastic equinus foot. Groupe d'Evaluation et de Traitement de la Spasticite et de la Dystonie**. Neurosurgery. 2000; 47:1154-60. discussion 60-1.
7. Maarrawi J, Mertens P, Luaute J, Vial C, Chardonnet N, Cosson M, et al. L**ong-term functional results of selective peripheral neurotomy for the treatment of spastic upper limb: prospective study in 31 patients**. J Neurosurg. 2006; 104:215-25.
8. Sindou M, Mertens P. **Selective neurotomy of tibial nerve for treatment of spastic foot.** Neurosurgery. 1998; 23:738-44.
9. Sindou MP, Simon F, Mertens P, Decq P. **Selective peripheral neurotomy (SPN) for spasticity in childhood**. Childs Nerv Syst. 2007; 23:957-70.
10. Fève A. **Physiological effects of selective tibial neurotomy on lower limb spasticity**. Journal of Neurology, Neurosurgery, and Psychiatry. 1997; 63:575-8.
11. Steinbok P. **Selective dorsal rhizotomy for spastic cerebral palsy: a review**. Childs Nerv Syst. 2007; 23:981-90.
12. Collado H. **Does Fascicular Neurotomy Have Long-Lasting Effects**.J Rehabil Med. 2006; 38:212-7.
13. Garland DE, Thompson R, Waters RL. **Musculocutaneous neurectomy for spastic elbow flexion in non-functional upper extremities in adults**. J Bone Joint Surg Am. 1980; 62:108-12.
14. Purohit AK, Raju BS, Kumar KS, Mallikarjun KD. **Selective musculocutaneous fasciculotomy for spastic elbow in cerebral palsy: a preliminary study.** ActaNeurochir (Wien) 1998; 140:473-8.
15. Scholtes V. **Clinical assessment of spasticity in children with cerebral palsy: a critical review of available instruments**.Developmental Medicine and Child Neurology. 2006; 48:64-73.
16. Koman LA. **Quantification of upper extremity function and range of motion in children with cerebral palsy**. Developmental Medicine & Child Neurology. 2008; 50:910-7.
17. Chan V. **Selective control assessment in cerebral palsy (Lower Limbs) : A clinical approach**. The Journal of The Hong Kong Physiotherapy Association. 1985; 7.
18. JF L. **Spasticity quantitative measurements as a basis for assessing effectiveness of therapeutic intervention**. Arch Phys Med Rehabil. 1989; 70:6-15.
19. Kumar AP, Purohit AK. **Outcome of selective motor fasciculotomy in the treatment of upper limb spasticity**. J PediatrNeurosci. 2011 October; 6(Suppl1): S118-25.

Address for correspondence and details of authors:

Srikanth Reddy MS, Senior Resident
Aneel Kumar Puligopu MS, MCh, Assistant Professor
[c]***Aniruddh Kumar Purohit*** MS, MCh, Senior Professor & Head of the Department
Department of Neurosurgery, Nizam's Institute of Medical Sciences, Panjagutta, Hyderabad, AP, India 500082.
©Corresponding author's email I'D:
AK Purohit - akpcpcp@gmail.com

One stage soft tissue release, open reduction, femoral shortening, osteotomy and peri acetabular augmentation for spastic dislocated hip- early results

Clinical article

Sakti Prasad Das, Sudhakar Pradhan, PK Sahoo, Shankar Ganesh, RN Mohanty, SK Das

Abstract

Objectives: *The goals of hip surgery in cerebral palsy are to maintain adequate reduction of the femoral head, prevent pain, improve sitting balance and maintain motion and the ambulatory status of the patient. It is now well accepted that soft tissue release, open reduction and femoral shortening were necessary for a stable hip along with some type of pelvic osteotomy. We evaluated the clinical and radiological results of one-stage correction of hip dislocation for cerebral palsy patients.*

Material and Methods: *We reviewed clinical outcomes and radiologic indices of 32 dislocated hips in 24 children with cerebral palsy (13 males, 11 females; mean age, 8.6 years). All 32 hips had dislocation. Preoperative Gross Motor Function Classification System (GMFCS) scores of the patients were as follows; level V (13 patients), level IV (9), and level III (2). The combined surgery included release of contracted muscles,(adductors, rectus femoris, iliopsoas) open reduction of the femoral head, femoral shortening varusderotation osteotomy and the modified Dega osteotomy along with shelf procedure. Hip range of motion, GMFCS level, acetabular index, center-edge angle, migration percentage, neck shaft angle, Sharp's angle was measured before and after surgery. The mean follow-up period was 38.1 months.*

Results: *Hip abduction (median, 40°), sitting comfort and GMFCS level were improved after surgery, and pain was decreased. There were no femoral head avascular necrosis, no infection or nonunion. There was no redislocation. All radiologic indices showed improvement after surgery.*

Conclusions: *So, we believe that a combined approach of muscle releases, open reduction, femoral shortening varus-derotation osteotomy, Dega osteotomy and penicapsularacetabular augmentation was a highly effective method for the treatment of spastic dislocated hips in our patients.*

Key words: • *cerebral palsy* • *hip dislocation* • *dega osteotomy* • *pericapsular osteotomy* • *acetabular augmentation.*

Introduction

Subluxation and dislocation of the hip is a major source of disability for children with cerebral palsy, with the incidence ranging between 3% and 75%[1-4]. Hip dislocation and subluxation are caused by multiple factors including contraction of muscles, a deformed proximal femur and acetabular deficiency[5-6]. Contraction of the adductor and flexor muscles leads to disturbances of the muscular balance of the hip joint region, to deformation of the acetabulum and proximal femur such as coxavalga[7,] increase of ante version and to subsequent hip subluxation and dislocation[8]. These issues gradually worsen the acetabular deformity and deficiency, aggravating the hip dislocation and subluxation. Dislocation of the hip is associated with poor sitting balance, pelvic obliquity, scoliosis and difficulty in perineal care[1, 9-12]. Therefore, preventive treatment for dislocation of the hip is important, and if the hip is dislocated, treatment of the cause and stable reduction of the dislocated femoral head are necessary[1,11-13]. It has been suggested that all these problems can be improved with one-stage correction[9, 10]. We have done open reduction in all our cases along with capsulorrhaphy due to high resubluxation in high Reimer's migration percentage cases reported previously[10].

Due to the global deficiency of acetabulum in long standing dislocated cases , and reported subluxation post operatively by various authors, we have combined the Dega osteotomy with acetabular augmentation.

We evaluated the results of spastic hip dislocation which included soft tissue release, open reduction, femoral varusderotation osteotomy and the modified Dega osteotomy along with Staheli type acetabular augmentation[9-10].

Material and methods

From October 2006 to March 2012, we performed soft tissue release, open reduction, femoral derotationvarus osteotomy and pericapsularacetabular augmentation along with Dega osteotomy for dislocation of 32 hips in 24 patients. The mean age at the time of surgery was 8.6 years (range, 2 to 13 years) and the mean follow-up period was 38.1 months (range, 12 to 45 months). There were 13 males and 11 females; 21 of these patients had quadriplegic and 3 had diplegic type of cerebral palsy. All 32 hips were having dislocation and we have excluded cases having subluxation. Eight cases were bilateral. Preoperative Gross Motor Function Classification System (GMFCS) was level V in 13 patients, level IV in 9, and level III in 2. One patient with

level III could walk for short distances with hip pain with a hand-held mobility device. Nine patients who were scored at GMFCS level IV could walk for short distances with a walker before onset of hip problems, but all these patients had difficulty in walking after hip dislocation. All of the other patients (13 in level V) were unable to walk because of muscle contracture and hip discomfort associated with instability, and had difficulty in maintaining a seated position.

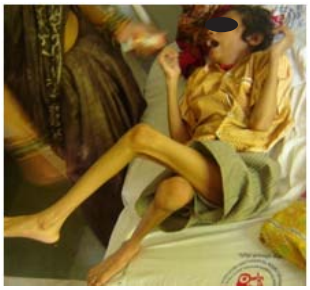


Fig. 1. Clinical photograph of a quadriplegic cp child (GMFCS V) prone for dislocation

All patients were treated with single event surgery including open reduction of the dislocated femoral head, release of contracted muscles, varus-derotation-shortening femoral osteotomy and the modified Dega osteotomy along with acetabular augmentation. For the patients with bilateral involvement, the more painful and deformed side was treated first, except that release of contracted muscles was performed for both legs in the first operation. After application of a hip spica cast for 6 weeks and rehabilitation with physical therapy for 2-4 weeks, surgery was then performed on the contra lateral hips.

Following surgery, a hip spica cast applied. Physical therapy was started after removal of cast and union of osteotomy site which is approximately 6 to 8 weeks. We evaluated the improvement in hip range of motion (ROM), the degree of pain, comfort while sitting and complications such as postoperative infection during follow-up. For assessing comfort while sitting, we checked whether patients could maintain a seated position without body support; for estimating discomfort or pain, the patients' parents were asked whether the pain had decreased worsened or remained about the same. We also evaluated changes in the acetabular index, center-edge angle, migration percentage, neck shaft angle, redislocation, and nonunion on a postoperative anteroposterior radiograph of the pelvis.

A. Soft tissue release and open reduction

After the assessment of contracture in the adductors, iliopsoas, rectus femoris, hamstrings, and achilles tendon during preoperative physical examinations, lengthening procedures for contracted soft tissues were performed selectively. Among the adductors, tenotomy was first performed in the adductor longus, next in the adductor brevis and finally in the gracilis in sequence until the hip could be abducted normally. The second incision is made parallel to the iliac crest with use of salter's variation of the smith-petersen approach; the iliac apophysis is divided and the iliac wing is stripped subperiosteally down to the sciatic notch both medially and laterally, for better visualization of the notch during the osteotomy. The medial exposure allows visualization of the anterior inferior iliac spine where the osteotomy will be done and appreciation of the thickness of the iliac wall during the osteotomy. Straight head of rectusfemoris was released and attached temporarily to silk.then reflected head of rectus released from capsule retaining its superior attachment. Then fractional lengthening of the tendinous portion of the iliopsoas at the pelvic brim is done. 14 then capsule is opened through a t-shaped incision after exposure from anterior, superior and posterior aspects.. Next, the ligamentum teres is removed, the contracted transverse acetabular ligament is cut, and the acetabulum is cleared of any remaining obstructions (fatty tissue or additional capsular adhesions).

Before proceeding, the femoral head is carefully inspected to assess deformity and loss of articular cartilage. If there are severe changes in the shape of the femoral head and loss of more than 50 per cent of the articular cartilage, reduction of the hip is not carried out. Instead valgus osteotomy done. Then femoral head is reduced and capsular repair done

B. Varus derotation shortening osteotomy

With a lateral approach to the proximal femur, femoral shortening and a varus derotational osteotomy (VDRO) was performed at the level of subtrochantericregion and fixed with 4.5 mm thick recon plate. The amount of femoral shortening was equivalent to the overlapped distance of the proximal and distal portions of the osteotomized femur during slight traction of the leg. The femoral neck-shaft angle was corrected to 115-120° and the ante version was corrected to 15-20°.

C. Modified dega osteotomy along with acetabular augmentation

Bicortical cuts were made anteriorly over the anterior inferior iliac spine and posteriorly at the greater sciatic notch with the osteotome . A unicortical cut was then made through the outer cortex of the ilium between these two points passing approximately 1-2 cm above the lateral margin of the acetabulum. Under image-intensifier control, the curved osteotome was directed halfway between the inner and outer iliac cortices. Care was taken to stop the osteotome above the triradiate cartilage. Then the acetabulum was rotated laterally and downward using a lamina spreader, hinging on the triradiate cartilage to correct the dysplasia until the acetabular angle was decreased to 15°. The bone graft (usually obtained from the femoral shortening osteotomy) was then placed into the osteotomy site. The placement of the bone graft corresponded to where the major acetabular deficiency was found . In this manner, we could decrease the acetabular angle, increase the coverage of the femoral head and reshape a trough-like deformed acetabulum . Then slice of bone taken from ilium and pushed in the trough created above the supra acetabular area. Gouged out cancellous bone taken from ilium was placed on the graft. Then graft was fixed by joining both heads of rectus femoris above it. Wounds were closed in layers after application of romovac negative pressure drain.

Post operative management

After closure of the operative wounds, a hip spica cast was applied for 6 weeks.

Results

CLINICAL-The median postoperative range of abduction of the hip improved from 21.8° (range, 5° to 35°) to 40.0° (range, 30° to 50°) Following surgery, 12 (75%) out of the 16 patients who could not maintain a seated position preoperatively were able to sit without a body supporter. Nineteen patients (83%) reported a decrease in pain, 4 (17%) experienced about the same level of pain pre- and postoperatively, and one reported a worsening of pain following treatment which was for two months and relieved by physiotherapy. The 6 (26%) patients who were scored at GMFCS level V preoperatively almost improved to level 4 postoperatively. The GMFCS levels of the other 18 patients stayed the same There was no infection or wound problems after surgery.

RADIOLOGICAL-The median acetabular index improved from 35.7° before surgery to 19.0° postoperatively; the median center-edge angle changed from 1.1° to 31.5°; and the migration percentage improved from 74.2% to 10.6% after surgery. All radiologic results improved significantly . There were no hip redislocation and no nonunion of the osteotomy site were observed. Avascular necrosis (AVN) of the femoral head was not observed .

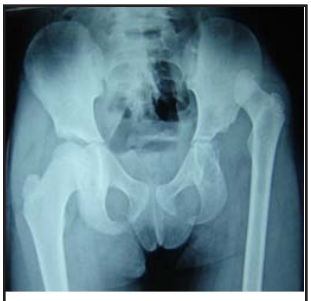


Fig.2. preop. case 8.X Ray - Spastic quadriplegic had Right side hip dislocation.

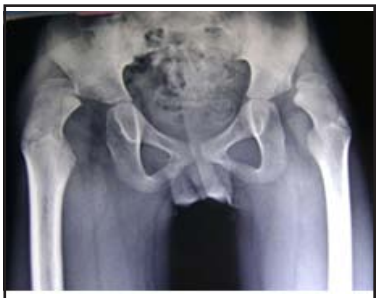


Fig 4. Preop X Ray of case 2. This spastic quadriplegic cerebral palsy had bilateral hip dislocation.

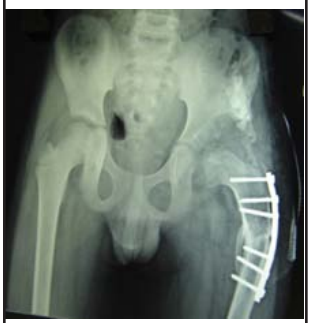


Fig 3.Post operative x-ray-case No 8 after a follow up of two years. There is improvement of radiological indices.

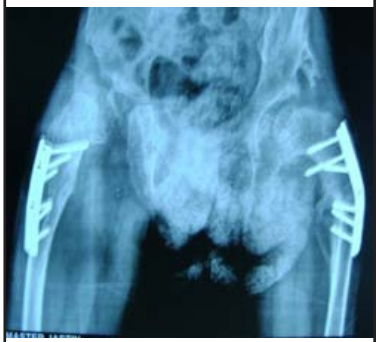


Fig 5.Post operative x-ray after two and half years showing improvement of radiological indices.

Discussion

Early acetabuloplasty, in addition to soft tissue lengthening and VDRO of the proximal femur greatly improves the chances for prolonged hip stability for patients with spastic dislocated hips[6,9,15-18]. Many acetabular indices are difficult to measure in cerebral palsy due to hip flexion contracture and the resulting increases in pelvic tilting. Therefore, many authors believe the migration percentage is the most accurate way to monitor hip instability in such patients. It has been recommended that acetabular correction should be performed when the migration percentage is over 50-70%, because the more serious the dislocation of the femoral head, the more likely it is accompanied by acetabular deficiency[19,20]. McNerny et. al[10] found resubluxation rate of 60% in hips that did not undergo open reduction in migration percentage of 70% in comparison to 3% in hips that had got open reduction with capsulorrhaphy. So, they recommend open reduction with capsulorrhaphy in patients with migration percentage of Reimer's more than 70%. Our cases include all dislocations when presented to us. So, we have done open reduction along with capsulorrhaphy in all our cases.

Apart from the Dega osteotomy, pelvic osteotomies for the treatment of the dysplastic hip in cerebral palsy include the Salter innominate osteotomy[21] Pemberton acetabuloplasty[17].C hiari osteotomy[22,23] and the shelf procedure[18]. However, the Salter innominate osteotomy and Pemberton acetabuloplasty are not suitable for all dysplastic hips in cerebral palsy because they are designed mainly to correct anterolateral acetabular deficiency [9] while acetabular deficiency in cerebral palsy exists in various locations. With 3D CT, Kim and Wenger[5] demonstrated the variable locations of acetabular deficiency in cerebral palsy: anterior in 29%, superolateral in 15%, posterior in 37%, and mixed in 19%. They reported that the acetabulum showed a trough-like elongated deformity. The Chiari osteotomy and shelf procedure do not use the articular cartilage of the acetabulum to cover the femoral head[9,10],and do not correct the elongated, trough-like deformity of the acetabulum. The modified Dega osteotomy is ideal for these hips by providing selectively improved coverage based on the main area of deficiency (anterior, superiolateral, or posterior) and by reshaping the elongated acetabulum directly. We have added the shelf procedure after Dega to increase the coverage which prevents redislocation.

Since the Dega osteotomy[24,25] was first introduced in 1969, many studies have been conducted using this technique[25,27] However, the procedure as originally described did not sufficiently increase coverage of the femoral head, because the posteromedial cortex of the ilium and the greater sciatic notch were not cut [25-27] . To produce better results, Mubarak et al.[9]and McNerney et al.[10] described the modified Dega osteotomy in which bicortical cuts were made in the anterior inferior iliac spine and the greater sciatic notch. With this modified procedure, posterior coverage of the femoral head is increased by placing a larger bone graft in the posterior part of the osteotomy . Moreover, while other pelvic osteotomies require internal fixation, more stability is obtained without internal fixation by inserting autologous bone fragments

from the the proximal femoral shortening osteotomy into the osteotomy site. Elasticity of the osteotomized iliac bone with a hinge at the triradiate cartilage enhances the stability of the bone graft. Chung et al.[28] demonstrated the morphometric changes in the acetabulum after Dega osteotomy which is similar to the osteotomy we used. They reported that the anterosuperior, superolateral and posterosuperior covers had improved significantly and the mean acetabular volume increased after the osteotomy. Ostercamp et al [29] performed Chiari osteotomy in 12 CP patients in a series of 13 hips and concluded that it is effective in mild and moderately subluxated hips but insufficient in global deficiency. They concluded that the dislocated cases to be treated by combined Chiari and shelf procedure. Because the location of the acetabular deficiency is variable, we believe that our combined acetabuloplasty is ideal.

Open reduction helps us in visually inspecting the acetabular deficiency and cartilage damage in the femoral head. Cases having damage to articular cartilage of femoral head were excluded from our study and treated with some other procedures.

Although the variation of the proximal femur itself naturally introduces a shortening component and relieves tension around the hip in many cases. Still, we added a shortening osteotomy in cases of dislocation in order to avoid excessive varization of the femur and to reduce the pressure caused by the Dega osteotomy. Harvested material from the shortening procedure was used for the bone graft in the Dega pelvic osteotomy. Open reduction with capsulorrhaphy was performed in all the cases. In all cases, the hamstrings were lengthened because the soft tissue procedure was conducted before the proximal femoral procedure.

The current concept in correction of unstable hips in cerebral palsy maintains bilateral procedures, especially including the contralateral femoral side, to prevent eventual contralateral hip instability and windswept hip. With our approach, usually involving no more than soft tissue correction in the less severely affected hip, we have not observed significant suluxation on the contralateral side to date. When further subluxation occurs, a femoral side procedure may be required without delay. All patients in this study showed a coxavalga deformity and increased anteversion of the proximal femur by soft tissue contracture from the first visit. All of them were treated with single event multilevel surgery. Simultaneous correction of multiple problems could extend the operation time, increasing the likelihood of complications. However, if the surgeons are experienced, patients would benefit from the shortened hospitalization and rehabilitation times.

In our patients, stable reduction of the femoral head was followed by a remarkable improvement in abduction. Furthermore, this was achieved without increased pain because of the release of contracted muscles and the increased stability of the hip joint as well as improved comfort in the seated position. The four patients who failed to achieve comfortable sitting experienced the same degree of pain as they had preoperatively. However, all of them were GMFCS level V and were considered to have an abnormal sense of balance caused by the cerebral palsy apart from the problems in their hips. Some of them had scoliosis with fixed pelvic obliquity. The patients who could not maintain a stable seated position solely due to contracted muscles and hip pain, were able to sit comfortably after the operation. As it was difficult to determine the degree of pain or discomfort quantitatively (for example with a VAS score) for our young patients, we interviewed parents about the patients' pain (decreased, maintained or increased). The pain that patients complained of in this study may be considered to be irritability caused by hip motion when the hip is unstable. We believe that this irritability and the contracted soft tissues are the major causes preventing ambulation and of comfort in the seated position. After stable reduction of the hip joint, some of the patients were able to walk again with a walker for short distances, and most could sit comfortably.

We had noted no AVN of the femoral head in hips.

Conclusions

In summary, we believe that a combined approach of muscle releases, open reduction, femoral-shortening varus-derotation osteotomy, and penicapsularacetabular augmentation was a highly effective method for the treatment of spastic dislocated hips in our patients.

References

1. Samilson RL, Tsou P, Aamoth G, Green WM. **Dislocation and subluxation of the hip in cerebral palsy: pathogenesis, natural history and management.** J Bone Joint Surg Am. 1972; 54(4):863-73.

2. Boldingh EJ, Jacobs-van der Bruggen MA, Bos CF, Lankhorst GJ, Bouter LM. **Determinants of hip pain in adult patients with severe cerebral palsy.** J PediatrOrthop B. 2005; 14(2):120-25.

3. Hodgkinson I, Jindrich ML, Duhaut P, Vadot JP, Metton G, Berard C. **Hip pain in 234 non-ambulatory adolescents and young adults with cerebral palsy: a** cross-sectional multicentre study. Dev Med Child Neurol. 2001; 43(12):806-8.

4. Noonan KJ, Jones J, Pierson J, Honkamp NJ, Leverson G. **Hip function in adults with severe cerebral palsy**. J Bone Joint Surg Am. 2004; 86(12):2607-13.

5. Kim HT, Wenger DR. **Location of acetabular deficiency and associated hip dislocation in neuromuscular hip dysplasia: three-dimensional computed tomographic analysis.** J Pediatr Orthop.1997; 17(2):143-51.

6. Gamble JG, Rinsky LA, Bleck EE. **Established hip dislocations in children with cerebral palsy. ClinOrthop Relat** Res. 1990; (253):90-9.

7. Minear WL, Tachdjian MO. **Hip dislocation in cerebral palsy.**

J Bone Joint Surg Am. 1956; 38(6):1358-64.

8. Fabry G, MacEwen GD, Shands AR., **Jr Torsion of the femur: a follow-up study in normal and abnormal conditions. J Bone Joint Surg Am.** 1973; 55(8):1726-38.

9. Mubarak SJ, Valencia FG, Wenger DR. **One-stage correction of the spastic dislocated hip: use of pericapsularacetabuloplasty to improve coverage.** J Bone Joint Surg Am. 1992; 74(9):1347-57.

10. McNerney NP, Mubarak SJ, Wenger DR. **One-stage correction of the dysplastic hip in cerebral palsy with the San Diego acetabuloplasty: results and complications in 104 hips.** J Pediatr Orthop.2000; 20(1): 93-103.

11. Pritchett JW. **The untreated unstable hip in severe cerebral palsy**. ClinOrthopRelat Res. 1983; (173):169-72.

12. Hoffer MM. **Management of the hip in cerebral pals**y. J Bone Joint Surg Am. 1986; 68(4):629-31.

13. Baker LD, Dodelin R, Bassett FH., **2nd Pathological changes in the hip in cerebral palsy: incidence, pathogenesis, and treatment: a preliminary report.** J Bone Joint Surg Am. 1962; 44(7):1331-1411.

14. Kay RM, Rethlefsen SA, Ryan JA, Wren TA. **Outcome of gastrocnemius recession and tendo-achilles lengthening in ambulatory children with cerebral palsy**. J Pediat Orthop B. 2004; 13(2):92-98.

15. Gordon JE, Capelli AM, Strecker WB, Delgado ED, **Schoenecker PL. Pemberton pelvic osteotomy and varus rotational osteotomy in the treatment of acetabular dysplasia in patients who have static encephalopathy**. J Bone Joint Surg Am. 1996; 78(12):1863-71.

16. Root L, Laplaza FJ, Brourman SN, Angel DH. **The severely unstable hip in cerebral palsy: treatment with open reduction, pelvic osteotomy, and femoral osteotomy with shortening**. J Bone Joint Surg Am.1995; 77(5):703-12.

17. Shea KG, Coleman SS, Carroll K, Stevens P, Van Boerum DH. **Pemberton pericapsular osteotomy to treat a dysplastic hip in cerebral palsy.** J Bone Joint Surg Am. 1997; 79(9):1342-51.

18. Zuckerman JD, Staheli LT, McLaughlin JF. **Acetabular augmentation for progressive hip subluxation in cerebral palsy**. J PediatrOrthop. 1984; 4(4):436-42.

19. Noonan KJ, Walker TL, Kayes KJ, Feinberg J. **Varusderotation osteotomy for the treatment of hip subluxation and dislocation in cerebral palsy**: statistical analysis in 73 hips. J PediatrOrthop B.2001; 10(4):279-86.

20. Song HR, Carroll NC. **Femoral varusderotation osteotomy with or without acetabuloplasty for unstable hips in cerebral palsy.** J PediatrOrthop. 1998; 18(1):62-8.

21. Salter RB. **Innominate osteotomy in the treatment of congenital dislocation and subluxation of the hip. J Bone** Joint Surg Br. 1961; 43(3):518-39.

22. Dietz FR, Knutson LM. **Chiari pelvic osteotomy in cerebral palsy.** J PediatrOrthop. 1995; 15(3):372-80.

23. Osterkamp J, Caillouette JT, **Hoffer MM. Chiari osteotomy in cerebral palsy. J** Pediatr Orthop.1988; 8(3):274-77.

24. Dega W. **Selection of surgical methods in the treatment of congenital dislocation of the hip in children.** Chir Narzadow Ruchu Ortop Pol. 1969; 34(3):357-66.

25. Grudziak JS, WT Ward **Dega osteotomy for the treatment of congenital dysplasia of the hip.** J Bone Joint Surg Am. 2001; 83(6):845-54.

26. Jozwiak M, Marciniak W, Piontek T, Pietrzak S. **Dega'stransiliac osteotomy in the treatment of spastic hip subluxation and dislocation in cerebral palsy.** J PediatrOrthop B. 2000; 9(4):257-64.

27. Reichel H, Hein W. **Degaacetabuloplasty combined with intertrochanteric osteotomies. Clin Orthop Relat Res.** 1996; (323):234-42.

28. Chung CY, Choi IH, Cho TJ, Yoo WJ, Lee SH, Park MS. **Morphometric changes in the acetabulum after Dega osteotomy in patients with cerebral palsy**. J Bone Joint Surg Br. 2008; 90(1):88-91.

29. OstercampJ,CaillloueteJT,hoffer MM. **Chiari osteotomy in cerebral palsy.** Journal of Paed Orthop.1988; 8:274-77.

Address for correspondence and details of authors:

Sakti Prasad Das- *Asst. Professor*
Sudhakar Pradhan- *Lecturer*
PK Sahoo- *Asst. Professor*
Shankar Ganesh, *MPT*
RN Mohanty- *Asso. Professor & Offg. Director*
SK Das- *Ex. Director*

SV Nirtar, Olatpur, Bairoi, Cuttack, Orissa, India

Distant motor & nonmotor gains of botulinum toxin therapy- A hypothesis on the role of spasticity indevelopmental processes

Clinical article

G Shashikala, Pranali Somkuwar, Puja Dhande

Introduction

From the times of Dr. William Little and Dr. Sigmund Freud, the management of cerebral palsy has almost become synonymous with the management of the primary disorder of movement, particularly the tone aspect of it under the presumption that a change in hyper tonus in cerebral palsy will result in improvement of walking and or other aspects of motor function.

Many treatment modalities have come up since then in medical, surgical and physical therapies which aim at improving motor function by reducing spasticity[1] although it is only an epiphenomenon. Even after more than six decades of work, we still do not have universally accepted instruments of measurement and defining the role of spasticity in the total movement deficit seen in these children although the recent method of path analysis[2] has tried to correlate the relation among the variables of motor function like spasticity, strength and function as a recursive model.

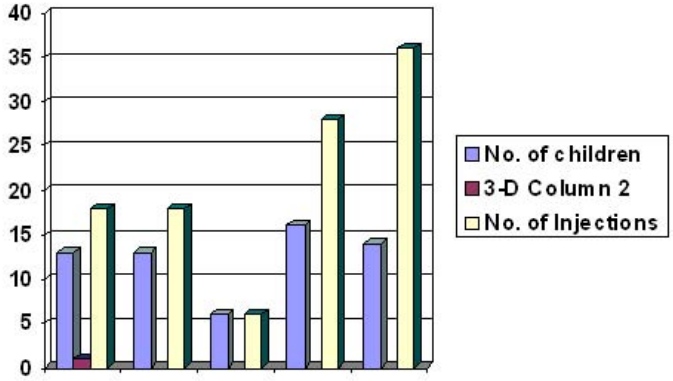
While appreciating the nonlinear nature of relation among tone, strength and functional efficiency in the motor facet of neural function, a road map for managing spasticity has been initiated. The initiation by neurologists[3], orthopedicians[4] and neurosurgeons[5] without ignoring biomechanical considerations of movement. Indeed, it is an essentially temporal event subjected to changes due to growth, plasticity, maturation, experience & environment according to dynamic systems theory[6]. Yet, the inter relation between the various domains and developmental trajectories are often not realized as important outcomes in cerebral palsy management. This aspect has been reinstated in the new definition of cerebral palsy[7] but the interdisciplinary nature of child developmental processes are still not appreciated and hence the lessons of caring for these children and outcomes of significance are often by passed[8].

We have earlier reported the non motor gains and distant effects of botulinum toxin therapy for decreasing spasticity[9]. Salient details are given as follows

Materials and methods

Table1- SAMPLE DETAILS

No. of children	GMFCS level	No. of injections
13	I	18
06	II	06
16	III	28
14	IV	26
TOTAL ; 49		Total : 78

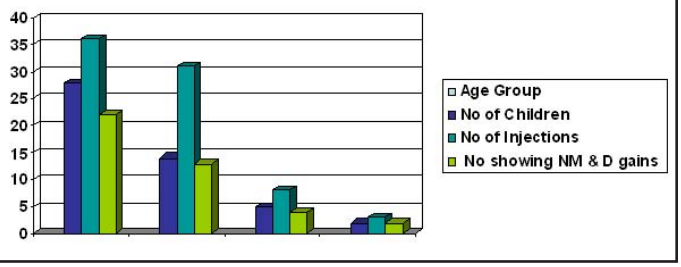


Results

Our sample predominantly had GMFCS111 children who also received maximum no of multilevel injections after evaluation with Dynamic EMG. Muscles were selected as per distribution of spasticity, co spasticity and overflow spasticity. All the children had hip surveillance. The goal was improvement in function and not just decreasing tone.

Table 2. Age and correlation

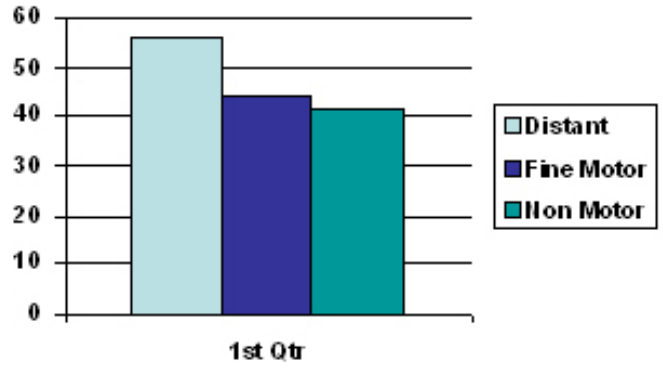
Age group	No. of children	No of injections	No of children showing non-motor/ distant gains
2-5	28	36	22
5-10	14	31	13
10-15	05	08	04
15-25	02	03	02
TOTAL	49	78	41

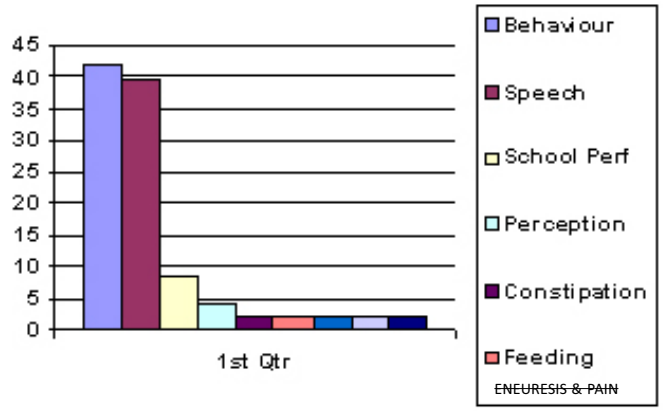


These gains were predominantly seen in the younger age group [2-5 yrs.] but there was no correlation with either the dose, type and severity of cerebral palsy, strength and gross motor functional improvement and could not be anticipated .Interestingly, 40% showed speech, behavioral and fine motor improvement.56% showed distant gains.

Type of gains	Percentage
Distant	56.03
- Fine motor *(without upper limb injection)*	44
- Non-motor	42
" Behavior	39.5
" Speech	8.3
" School Performance	4.2
" Perception	2.08
" Constipation	2.08
" Feeding	2.08
" Startle response	2.08
" Enuresis	2.08
" Pain in back ,thighs	2.08

Profile of gains





Analysis

There were no specific interventions in these domains other than the regular eclectic model we use which covers both activities and socialization skills and were same before and after injections The only difference was in the intensiveness as all the children were given daily 1-11/2 hr therapy for 6 days in a week which by itself may not be contributory as the other 50% children in the injected group who received the same intensity of therapy did not show these gains. Interestingly, younger age [2-5yrs] showed greater response supporting Kennard principle [Increased plasticity in younger age][10]

There are also a few more reports of improvements in speech, hand function, drooling, etc. [11,12] but I would like to look at the reasons behind such gains being reported by only few in spite of neurotoxin therapy almost becoming the first option in the management of both spastic, mixed and dystonic varieties of cerebral palsy world over with documented benefit of improvements in gait parameters & long term safety[13]. Botulinum injections for spasticity treatment in cerebral palsy is the second commonest indication in many institutions[14] across the world.

Instead of brushing away such surprising outcomes with a "three for the price of one effec"[11] attitude, we have tried to explain such gains more on a process based neuro physiological phenomena. Improved speech and hand function are phenomena which have been described earlier also after selective posterior rhizotomy[15], ITBP[16] and even inhibitive casting[17] but the effect occurs so rapidly with botulinum therapy that it becomes all too obvious.

In our experience for the past decade of botulinum therapy, we have been observing both distant and non motor gains regularly. Distant motor effects are those which are not directly due to the decreased spasticity of injection to targeted muscles like improved fine motor performance in upper limb after lower limb injections. Non motor gains are improvement in speech [both in flow as well as clarity] with or without spastic dysarthria, perception or school performance, emotional blooming and decreased pain.. While it is easy to explain effects like decreased pain in legs and constipation due to the anticholinergic effect of botulinum toxin, it is not easy to explain speech or fine motor effects.

Discussion

Neuro physiologically speaking, this may be due to the coupling of developmental events because of parallel information processing and cross talk between the processing pathways due to either cross modal plasticity or due to the global effects or generalisation of motor learning gains. The distant effects may be because of the free flow of information across the nervous system facilitated by the decreased spasticity influencing motor neuron pools both at supra segmental and segmental spinal as well as at the cerebral cortical level by extension of motor maps and exploitation / excitation of hitherto inactive neural networks The persistence of an infantile spinal cord with excessive inter segmental connections have been a well documented feature in Cerebral Palsy.

Similarly fine motor improvement without upper limb injection when lower limb muscles alone are injected may be due to -

- Reflex inhibition
- Stable background posture
- Decreased overflow spasticity and associated reactions.
- Neuro-mechano-temporal advantage because of improved motor recruitment due to increased muscle length, firing & adequate bias angles at joints[18]
- Improved freedom of movement due to reciprocal

innervation..

" Improved motor strategies and motor learning

We can also postulate that this may be because of facilitation of other developmental processes due to gating mechanism or decrease in auto inhibition at spinal level. Such a possibility can also be explained by the principle of Emergence [the whole is always bigger than the sum of the parts] using either the dynamic systems theory[6] or the distributed control theory of motor development or developmental coupling] due to gestault processes inherently operant in developmental processes.

While one can argue against the cost benefits of such modalities, the question does spasticity matter[19] needs to be modified- is spasticity a developmental constraint for all domains in Cerebral palsy? What is the mechanism of developmental domain interlinking or how and why are they interlinked? More than the static and dynamic components in spasticity, are co contraction and overflow spasticity more important to normal muscle and motor ability? Our botulinum injections predominantly are multilevel and the criteria are both individual muscle & antagonist spasticity and overflow detected by dynamic EMG. Do these selection criteria contribute to our observations?

Considering the small reports available on such effects, does a global approach to post intervention therapy as in our setup be the cause of such effects? Can there be a better argument for interventions adapting ICF model of activities and participation done in a group setting which is also inclusive, eclectic, context oriented, family centered and child motivational for functional gains? Isn't it time we look at the other mechanisms co existing with spasticity and their cumulative consequences and decode underlying pathways? There seem to be more facets to spasticity than we really know for now! We hereby propose a new hypothesis by name CHIN-INDIA PHENOMENON to explain the inter linking of developmental domains. Future work can be directed towards decoding the underlying mechanisms.

References

1. William Landau **Causal relation between spasticity, strength, gross motor function & functional outcome in children with cerebral palsy: a path analysis** Letter to the editor DMCN 2011; 53:-8-768.
2. Kim WH, ParkEY**; Causal relation between spasticity, strength, gross motor function& functional outcome in children with cerebral palsy: a path analysis**'DMCN 2011; 53-1-68-73.
3. Jean-Pierry Lin; **The assessment & management of hypertonus in cerebral palsy: A physiological Atlas[road map]- Management of motor disorders of children with cerebral palsy**- 84-104-CDM no161-2nd edition Ed by David Scrutton, Diane Damiano &Margaret Mayston 2004.
4. H. Kerr Graham- **Mechanisms of deformity**-105-129- CDM no161-2nd edition Ed by David Scrutton, Diane Damiano &Margaret Mayston 2004.
5. Kristina Tedroff, Kristina Lowing Dan NO Jacobson, Eva Atrom- **Does loss of spasticity matter?A 10 year follow up after SDR in cerebral palsy** DMCN 2011-724-729 -8-53.
6. Beverly D Ulrich-**Dynamic Systems theory & skill development in infants & children- 319-345-Neuro physiology & Neuro psychology of motor development -**CDM143/144- 1997- edited by Kevin J.Connolly & Hans Forssberg.
7. Peter Rosenbaum, Nigel Paneth, Alan Leviton, Murray Goldstein, Martin Bax-**The Definition & Classification of Cerebral Palsy-April 2006- 8-14** DMCN supplement Feb. 2007- 109-49.
8. Gillian Baird, Elizabeth Andrews- **Outcomes & process in the care of the disabled child**- DMCN 2012-195-3-54.
9. G. Shashikala, Pranali Somkuwar, Vandana Giri & Ujwala Mangrulkar-**Non motor & distant gains of botulinum toxin therapy** www.iacp.co.in.
10. Ingeborg Krageloh-Mann **Cerebral Palsy: Towards Developmental Neuro science** 435- DMCN July 2005 vol 4 no7.
11. Jean-Pierre Lin-**Localised & distant actions of BTX-A injections**- DMCN2007-885 -12-49.
12. T. Keren-capelovitch, T Jarus A , Fattal-valevsk, **Upper extremity function & daily functioning in children with spastic cerebral palsy following lower extremity botulinum toxin injections.**, DMCN 2007 supplement.
13. K.Desloovere, G Molenaers, J De Cat , P Pauwels, A VanCampenhout, E Ortibus, G Fabry, P De Cock-**Motor function following multilevel BotulinumToxin Type A treatment in children with Cerebral Palsy** DMCN20071-49- 56-61.
14. John R Mcguire- **Epidemiology of spasticity in the Adult & child-pg 6 in Spasticity- Diagnosis & Management -Allison Brashear & Elie Elovic -** special pharma edition- demosmedical. 2011.
15. N. Bilodeau, K. Montpetit-**Impact of selective dorsal rhizotomy on quality of movement of the upper extremities of children with spastic diplegia** DMCN 2007 supplement no111-52-10- 49.
16. R. Ayyangar, L. Enebak, Hugh Garton, M Fox- **Relationship between health-related Quality of life, spasticity & function in children with cerebral palsy undergoing Intra thecal baclofen therapy,** DMCN 2007 Supplement.
17. Jean -Pierre Lin-**Interaction of muscle maturation with movement & posture-124 -144- Neuro physiology & Neuro psychology of motor development**-CDM143/144 - 1997- edited by Kevin J. Connolly & Hans Forssberg.
18. Jean -Pierre Lin-**The contribution of spasticity to the movement disorder of cerebral palsy using pathway analysis: Does spasticity matter?** DMCN2011-7-9, 1-53.

Address for correspondence and details of authors:

- **G. Shashikala - Developmental Neurologist**
- **Pranali Somkuwar and Puja Dhande: Developmental therapist**

Centre for Developmental Neurology, Nagpur, India.

E-mail - shashi_kola@rediffmail.com

Standing posture and physiotherapy following ablative neuro and orthopaedic surgeries for knee flexion in spastic diplegia (a preliminary study of 60 cases)

Clinical article

Naveen Kumar Balne, Prasanthi Vemulamanda and AK Purohit

Abstract

Introduction: *Children with Spastic Diplegia having resistant spasticity do improve following surgical procedures like SPR (Selective Posterior Rhizotomy), SMF (Selective Motor Fasciculotomy) and STR (Soft Tissue Release). However, even then they may have disability and variations in their postural control leading to compromise in standing posture and dynamic mobility.*

Purpose and Objectives: *To investigate further benefits of Physiotherapy for correction of knee flexion deformity, Standing postural alignment, Voluntary control, Dynamic mobility (transitions from one position to another) and Functional ability following SPR, SMF and STR.*

Material and Methods:

Study design: Experimental strip plot design

Sampling: Non-probability within group randomization

Study settings: Departments of Physiotherapy and Neurosurgery, NIMS.

Participants: Three experimental groups (SPR, SMF and STR) were selected: Each group had10 samples and for control group the retrospective data were collected from those who were operated 6 months to 1 year back and did not undergo present Physiotherapy protocol.

Interventions: *A structured physiotherapy protocol following each surgery was implemented for each of the experimental group.*

Results: *There was significant improvement in all the parameters studied from 4th week to 8th week and the trend followed even up to 12th week. From 0 to 4th week improvement was low.*

Conclusions: *Children with spastic diplegic cerebral palsy who undergone ablative neurosurgical procedures like SPR, SMF and STR do improve in their motor function. However, further improvement can be brought by a Physiotherapy protocol. That includes gradually enhancing the intensity of passive and active exercises to improve each milestone with emphasis on production of helpful tone out of residual hypertonia, reduction in knee flexion deformity, improvement in standing postural alignment, voluntary control, dynamic mobility and Functional ability within 12 weeks of surgery.*

Key words: *• fasciculotomy • physiotherapy • posture • rhizotomy • spastic diplegia • neurotomy*

Abbreviations:

MAS	Modified ashworth scale	HF	Hip flexors
SP or SPR	Selective posterior rhizotomy	HE	Hip extensors
SM or SMF	Selective motor fasciculotomy	HAM	Hamstrings
ST or STR	Soft tissue release	Kf	Knee flexors
GMFC or gmfc	Gross motor function classification	KE	Knee extensors
VCG	Voluntary control grading	Wk	Week
Tar	Tardieu score	R	Right
PG	Posture grid	L	Left
Po	Post-operative	C	Control group
Pre op	Pre-operative	E	Experimental group

Introduction

The brain damage results in disorganized and delayed development of the neurological mechanisms of postural control, balance and movement. This leads to inefficient and uncoordinated muscle activation. Change in motor components also depends on how the child uses his body. However, the brain damage is not progressive, though the motor behaviour changes [1]. The child with spastic diplegia is not completely paralyzed, but his or her movements are impaired.

Spastic diplegia affects the leg muscles more than the arm and facial muscles.To reducephysical disability surgical procedures like SPR (Selective Posterior Rhizotomy), SMF (Selective Motor Fasciculotomy) and STR (Soft Tissue Release) are performed depending on the need and their suitability[2]. Children with Spastic Diplegia having resistant spasticity do improve following surgical procedures like SPR (Selective Posterior Rhizotomy) [3], SMF (Selective Motor Fasciculotomy aka Selective Neurology) [4, 5] and STR (Soft Tissue Release) [6, 7].

In SPR and SMF the sensory nerve roots and in SMF motor fascicles of a nerve are partially ablated. In STR: The muscle and

tendon lengthening is performed based on severity of joint deformity and spasticity[8]. The two joint muscles and the muscles inserted at a more distal portion in the same muscle group lengthened preferably[9]. Following these procedures, physical therapy helps to learn habits of movement and daily tasks in a body without significant hypertonia and deformities[10].

The purpose of this study was to find out whether physiotherapy was effective in correcting the postural deviations in standing, improving motor function and performance in children with spastic diplegia who undergo surgeries.

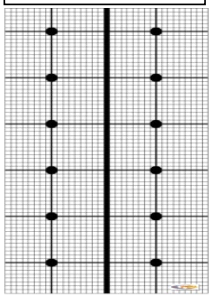
Material and methods

Materials used:
Posture grid
Radium stickers, Goniometer
Mats, Swiss ball
Weight cuffs, Thera bands

Posture grid: this method of measurement is used to assess posture. A postural analysis chart is used in conjunction with a plumb line, which is a straight line that suspends a weight or "Bob" on its end(Picture 1)

•Posture chart is ensured that it is hanging straight;
•The case is viewed from a 90- degree angle;
ªThe subject's feet placed prior to taking posture analysis photos; and visual reference of the mid sagittal and coronal planes of posture photos are taken

Picture 1



The sample taken for the study is 60. Assessment for experimental groups was done one day before surgery and then once every 4 weeks for 12 weeks for spasticity, level of voluntary control, postural deviations and functional ability by using Modified Ashworth scale, Tardieu scale, voluntary control grading, posture grid and Gross motor function classification respectively at the end of 4th week, 8th week and 12th week. Same measures were taken for control group for comparison once in late follow up period.

Three experimental groups (SPR, SMF and STR) were compared with control groups; each experimental group had 10 subjects. Retrospective data were collected from the patients who underwent SPR, SMF and STR surgeries 6 months to 1 year back who did not undergo present physiotherapy protocol. All the STR groups have undergone spasticity relieving procedures (SPR or SMF) prior or during this procedure.

Inclusion criteria for physiotherapy following SPR

Diagnosis of spastic diplegia.
Age group of 3-15 years.
MAS 2 following surgery.
Voluntary control grading score 3 following surgery
Patients with postural deviations in standing.
Presence of independent mobility in the form of at least crawling before surgery.

Inclusion criteria for physiotherapy following SMF

Presence of knee flexion deformity.
Popliteal angle 50 degrees following surgical intervention
MAS 2 or less following surgery

Inclusion criteria for physiotherapy following STR

Good trunk control
Static contracture of knee before surgery

Exclusion criteria

Children with mental retardation.
Other than spastic diplegic type of cerebral palsy.
Postoperative MAS 3 or more following all three surgeries
Significant hypertonia following surgery
Sensory disturbances following surgery
Post-operative infections ,Spondylolisthesis following SPR

Physiotherapy protocol: Post SPR:

0-4 days (1st week)
Immobilization, Log rolling,Ankle toe movements
Active movements for bilateral upper limbs
Avoid pillow under the head
Place pillow between two legs in supine lying
Chest Physiotherapy twice daily
Deep breathing exercises

5 - 30 days (2nd to 4th week)
Sitting with legs sole supported on cushion and legs hanging at the edge of couch encouraged
Backward Inclined sitting (back is prevented from bending forwards and sideways)
Pelvic bridging for 10 repetitions twice daily
Active ROM exercises for bilateral knees andankles
No weight bearing till 1 month

31-60 days (5th to 8th week)
Active range of motion exercises for 10 repetitions thrice daily
Controlled sustained passive stretching for hamstrings for 10 repetitions twice daily
Mat activities- gradually one followed by another, milestones are kept in mind, rolling, prone on elbows, prone on hands, quadruped- kneel sitting, kneel standing- kneel walking, half kneeling, standing and walking.
Weight bearing exercises for both lower limbs in the form of transient weight shifts

61-90 days (9th to 12th week)
continue the above regimen along with Strengthening exercises for hip flexors, abductors and knee extensors using 1kg weight cuff for 20 repetitions twice daily
Once full range of movement is achieved using 1kg weight cuff, esistance is progressed to 2kg

Swiss ball activities for balance training and active stretchings functional activities like bathing, dressing are encouraged independently
Gait training using assistive devices

Physiotherapy protocol: POST SMF:
0-30 days (1st month or 1st to 4th week)
Application of slab for 30 days wherever indicated
AROM exercises for the opposite limb and bilateral upper limbs
Ankle toe movements, Deep breathing exercises
Sitting is encouraged with involved limb supported
Single limb pelvic bridging

3-45 days (first 15 days after slab removal)
Removal of slab,AROM exercises for the involved limb
Mat activities - quadruped, kneel sitting, kneel standing, kneel walking, half kneeling, standing(partial weight bearing) and walking

46-60 days (15th to 30th day after slab removal)
Full weight bearing standing
Passive stretching for hamstrings

61-90 days (3rd month or 8th to 12th week))
Strengthening exercises for hip flexors, abductors and knee extensors
Swiss ball activities for active stretchings
Gait training using assistive devices

Physiotherapy protocol: POST STR: Immobilisation in slab for 3 weeks

0-20 days (1st to 3rd week)
Immobilisation of the involved limb
Active toe movements
Active movements for bilateral upper limbs and contra lateral lower limb, Bed mobility
Sitting with involved limb supported

21-60 days (4th to 8th week)
Removal of slab
Active range of motion exercises for the involved limb
Weight bearing on the involved limb
Mat activities

61-90 days (8th to 12th week)
Active stretching for hamstrings
Strengthening exercises for hip extensors, abductors and knee extensors
Gait training

8-12 weeks re-education program also included alignment of body segments, use of inclined surfaces to position pelvis for functional training, head and spinal stabilisation strategies and sensory cues with emphasis on proprioception and manual contacts to guide the movement are provided to all three experimental groups.

Outcome measures:

Modified Ashworth Scale (MAS)
Tardieu Scale
Voluntary Control Grading (VCG)
Gross Motor Function Classification (GMFCS)
Posture Grid (picture 1)

} Appendix 1

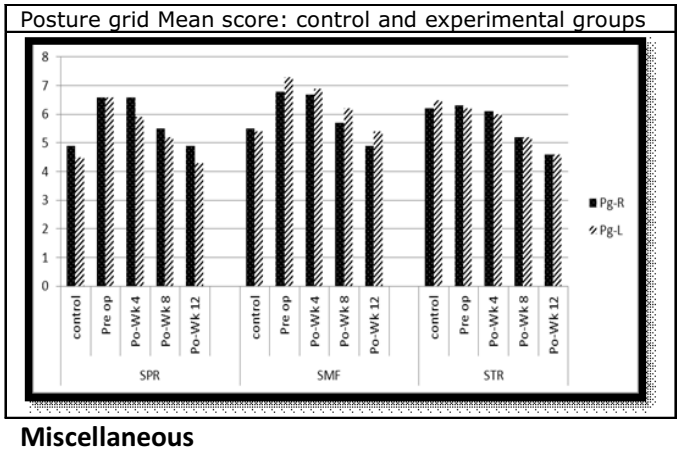
Results

Friedman test mean rankings of SPR, SMF and STR groups showed between group differences on MAS scores, Mean rankings on friedman test in hip flexors and hamstrings shown in table (Table 1). The results of Friedman test indicate that significant ($p<0.05$) differences do exist in MAS across time conditions Three experimental groups showed difference in study variables over 12 week period(Table 2, 3). Difference between control and experimental groups is significant in SPR, STR group Hip flexors than SMF but SMF group showed equal improvement in Hamstrings.

Tardieu mean scores in experimental groups showed significant improvement from 4th week to 12th week in hip flexors and hamstrings in all three experimental groups with inter group variations.

Motor Functions of all groups showed significant improvements with 12 weeks of physiotherapy protocol in VCG (Table 2), GMFCS scores and posture grid plumb line evaluation (Table 3). When compared to control group all experimental groups showed significant improvement during wk 8 and wk 12 in GMFCS scores; in case of posture grid STR group showed more significant improvements than SPR and SMF groups alone.

Posture grid Mean score: control and experimental groups

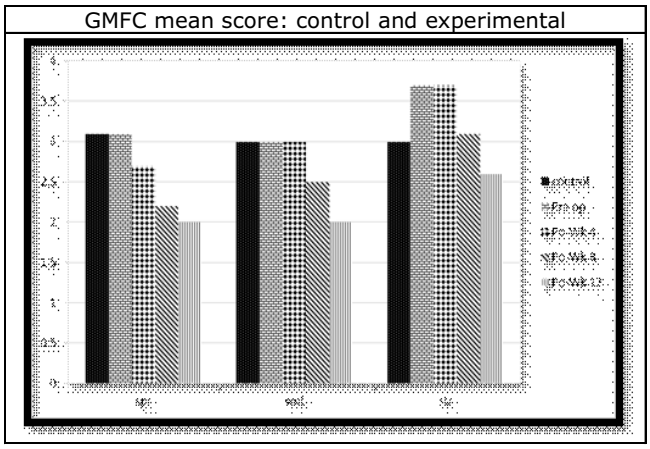


Miscellaneous

Discussion

Significant difference in mean spasticity scores and tardieu of the experimental group when compared to control over a post-operative period of 12 weeks of intensive structured physiotherapy suggests that the exercises do reduce effectively the pre-operative resistant spasticity if it has been reduced by neurosurgical ablative procedures (and STR in muscle contractures). Complimentary role of surgery and physiotherapy is obvious from the fact that all the children who developed resistance to physiotherapeutic improvement pre operatively were only taken for relief of spasticity in this study. However, lesser relief in spasticity observed in first 4 weeks of period may be because of nociception and apprehension in the child. However, Physiotherapeutic mechanisms to improve the hypertonia (hyper reflexia) is also obvious from the fact that all the measures like passive and active controlled stretching and positioning in conjunction with interventions such as splints and orthoses must have helped to maintain the optimal muscle length so as to avoid muscle shortening that increase spindle sensitivity (stretch reflex).

Significant trend of improvement in selective voluntary control and GMFC levels between the 4th to 12 week (more obvious during this period) is likely to be unmasking of motor functions by spasticity relief and vaning of neuropraxic effect of non-ablated motor fascicles and re-education of entire musculoskeletal and neuronal pathways by acting on both the motor and sensory pathways.



Relief in crouch is the result if relief in spasticity making knee flexors to easily get stretched but the children would not be able to sustain more erect posture if voluntary control and balance is insufficient. Progressive post-operative improvement more so in experimental group is likely to be a reflection of unmasking of pre-operative motor functions by resistant spasticity, vaning of neuropraxic effects and re-education of motor system by physiotherapy. Further, studies with more number of children, more control groups and follow up for longer duration would help unveiling various above mentioned mechanisms.

Conclusion

The selected children with spastic diplegic cerebral palsy who underwent ablative neurosurgical procedures like SPR (Selective Posterior Rhizotomy), SMF (Selective Motor Fasciculotomy) and STR (Soft Tissue Release) do improve in their motor function. However, further improvement can be brought by a Physiotherapy protocol. That includes gradually enhancing the intensity of passive and active exercises to improve each milestone with emphasis on production of helpful tone out of residual hypertonia, reduction in knee flexion deformity, improvement in standing postural alignment, voluntary control, dynamic mobility and functional ability within 12 weeks of surgery.

References

1. Levitt S. **Treatment of Cerebral Palsy and Motor Delay.** Wiley, 2010**.**

2. Patrick E, Ada L. **The Tardieu Scale differentiates contracture from spasticity whereas the Ashworth Scale is confounded by it**: *Clinical Rehabilitation* 2006; 20: 173- 82.

3. Steinbok P, McLeod K. **Comparison of motor outcomes after selective dorsal rhizotomy with and without preoperative intensified physiotherapy in children with spastic diplegic cerebral palsy.** *Pediatric Neurosurgery* 2002; 36:142-47.

4. Puligopu A K, Purohit A K: **Outcome of selective motor fasciculotomy in the treatment of upper limb spasticity**: *J Pediatr Neurosci*. 2011 October; 6 (Suppl1): S 118–25.

5. Sitthinamsuwan B. Chanvanitkulchai K, Phonwijit L**. Surgical Outcomes of Microsurgical Selective Peripheral Neurotomy for Intractable Limb Spasticity**: *Stereotact Funct Neurosurg* 2013; 91:248-57 .

6. Gupta A, Srivastava A, Taly A B, Murali T : **Single-stage multilevel soft-tissue surgery in the lower limbs with spastic cerebral palsy: Experience from a rehabilitation unit**: *Indian journal of Orthopaedics*: 2008/42:4 : 448-53.

7. Kondo I, Hosokawa K, Iwata M et. al. **Effectiveness of selective muscle. Release surgery for children with cerebral palsy: longitudinal and stratified analysis**. *Dev Med Child Neurol* 2004; 46:540-47.

8. McLaughlin J, Bjornson K, Temkin N et al. **Selective dorsal rhizotomy: metaGÇÉanalysis of three randomized controlled trials**. *Developmental Medicine & Child Neurology:* 2002; 44:17-25.

9. Abdennebi B. **Selective neurotomies for relief of spasticity focalized to the foot and to the knee flexors. Results in a series of 58 patients** *Acta Neurochir (Wien)*: 1996; 138(8):917-20.

10. Saraph V, Zwick EB, Zwick G, Steinwender C, Steinwender G, Linhart W. **Multilevel surgery in spastic diplegia: evaluation by physical examination and gait analysis in 25 children**. *J Pediatr Orthop* 2002; 22:150-57.

(Appendix: 1) - Outcome measures

Modified Ashworth scale:

0 *No increase in muscle tone*

1 *Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) is moved in flexion or extension*

1+ *Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM*

2 *More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved*

3 *Considerable increase in muscle tone, passive movement difficult*

4 *Affected part(s) rigid in flexion or extension*

Tardieu scale:

The aim of the modified Tardieu scale is to quantify the presence of dynamic muscle tone by establishing the proportion of change between the slow passive stretch and a fast velocity stretch. Such a calculation is termed the R2–R1 difference. R1 value (the angle of the first catch in the muscle following a fast velocity stretch) being subtracted from the R2 value (the joint angle following a slow stretch). An R2–R1 value greater than or equal to 15°, suggesting a dynamic component to the muscle tone.

Velocities:

V1: As slow as possible, slower than the natural drop of the limb segment under gravity

V2: Speed of limb segment falling under gravity

V3: As fast as possible, faster than the rate of the natural drop of the limb segment under gravity

Scoring:

0 No resistance throughout the course of the passive movement

1 Slight resistance throughout the course of passive movement, no clear catch at a precise angle

2 Clear catch at a precise angle, interrupting the passive movement, followed by release

3 Fatigable clonus with less than 10 seconds when maintaining the pressure and appearing at the precise angle

4 Unfatigable clonus with more than 10 seconds when maintaining the pressure and appearing at a precise angle

5 Joint is immovable

Voluntary control grading:

This grading of voluntary control includes 6 levels where 6 indicate performance of movement in full range in a position of maximum selective control with no contra lateral or unilateral association mass or primitive movements. 1 indicates movement which is only a reflex action

Grade O – No Contraction or Flicker or Initiation.

Grade I – Flickes of Contraction Present or Imitation of Movement.

Grade II – Half Range of Motion in Synergy or Abnormal Pattern.

Grade III – Full Range of Motion in Synergy or Abnormal Pattern.

Grade IV – Initial Half Range Is Performed in Isolation and the Latter Half in Pattern

Grade V – Full Range Of Motion In Isolation But Goes Into Pattern When Resistance Is offered.

Grade VI – Full Range of Motion in Isolation against Resistance.

Gross motor function classification:

This is a scale which predicts the level of performance of gross motor function. Level 1 means walking without Limitations and level 5 means Transported in a Manual Wheelchair.

Level- I - Walks without Limitations

Level -II - Walks with Limitations

Level-III - Walks Using a Hand-Held Mobility Device

Level-IV - Self-Mobility with Limitations; May Use Powered Mobility

Level -V - Transported in a Manual Wheelchair

Tables and Graphs are on next 2 pages.

Address for correspondence and details of authors:

- **Naveen Kumar Balne**, *MPT (Neuro), Lecturer*[1], suninaveen@yahoo.co.uk
- **Prasanthi Vemulamanda**, *MPT (Neuro)*[2] Department of Physiotherapy
- **Aniruddh Kumar Purohit**, *MCh,* Senior Prof. and Head Department of Neurosurgery[3]

Departments of Physiotherapy[1, 2] and Neurosurgery[3] Nizam's Institute of Medical Sciences, Panjagutta, Hyderabad, Andhra Pradesh, India.

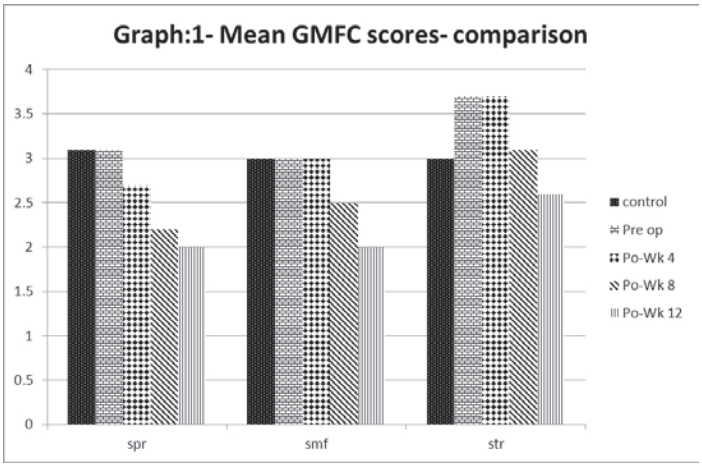
Tables

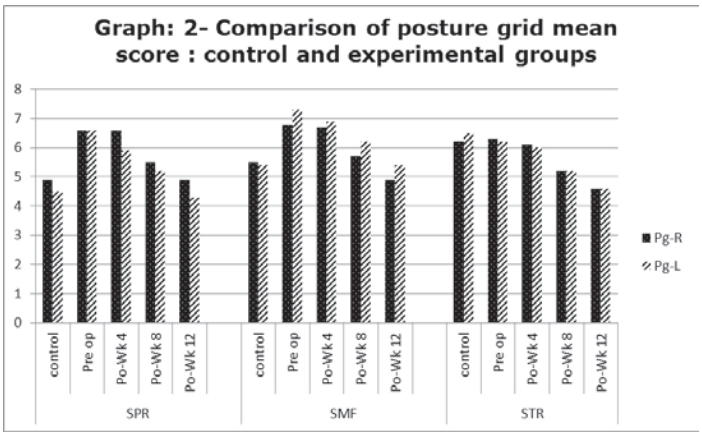
Table 1: Friedman test - MAS mean rank												
	SPR				SMF				STR			
	HF– R	HF- L	HE- R	HE- L	HF– R	HF- L	HE- R	HE- L	HF– R	HF- L	HE- R	HE- L
Pre op	3.25	3.25	3.40	3.40	3.20	3.30	3.35	3.45	2.95	3.00	3.50	3.50
Po-Wk 4	3.10	2.85	3.40	3.25	2.95	3.30	3.35	3.15	2.95	3.00	3.50	3.50
Po-Wk 8	2.35	2.45	1.65	2.15	2.20	2.15	1.85	2.35	2.15	2.40	1.65	1.50
Po-Wk 12	1.30	1.45	1.55	1.20	1.65	1.25	1.45	1.05	1.95	1.60	1.35	1.50

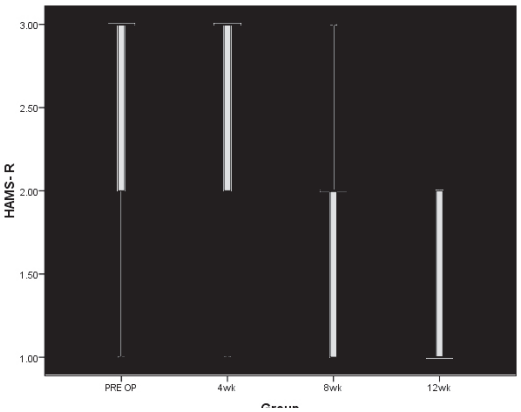
Table 2: Voluntary Control Grading Scores													
	Mean MAS scores-					Mean VCG scores							
		HF– R	HF- L	HE- R	HE- L	HF – R	HF- L	HE- R	HE- L	KF– R	KF- L	KE- R	KE- L
SPR	control	1.2	1.15	1.1	1.1	3.6	3.4	2.5	2.4	3	3	2.5	2.6
	Pre op	1.4	1.45	1.8	1.8	3.5	3.3	2.9	2.8	3.3	3.3	2.9	2.9
	Po-Wk 4	1.4	1.35	1.8	1.7	3.5	3.3	2.9	2.9	3.4	3.4	2.9	3.1
	Po-Wk 8	1.2	1.3	1.35	1.45	3.6	3.8	3	3.5	3.8	4	3.3	3.5
	Po-Wk 12	0.8	0.95	1.3	1.15	4.2	4.2	3.5	3.6	4.2	4.2	3.8	3.8
SMF	control	1.1	1.05	1.45	1.4	3.6	3.7	2.5	2.4	3.2	3.3	2.7	2.7
	Pre op	1.3	1.5	1.75	1.85	3.5	3.3	2.6	2.5	3.2	2.8	2.5	2.5
	Po-Wk 4	1.25	1.45	1.75	1.75	3.5	3.4	2.6	2.6	3.4	2.8	2.5	2.56
	Po-Wk 8	1.05	1.2	1.35	1.4	3.9	3.8	2.8	3.1	3.5	3.5	3.2	3.3
	Po-Wk 12	0.8	0.9	1.2	1.05	4.4	4.1	3.5	3.5	4.1	3.7	3.5	3.6
STR	control	1.15	1.05	1.5	1.5	3.4	3	2.4	2.6	3	3	2.7	3
	Pre op	1.2	1.3	1.85	1.8	4.2	4	2.6	2.4	2.3	2	2.3	2
	Po-Wk 4	1.2	1.3	1.85	1.8	4.2	4	2.6	2.5	2.3	2	2.3	2.3
	Po-Wk 8	1	1.15	1.4	1.3	4.2	4.2	2.9	2.7	3	2.3	2.6	2.6
	Po-Wk 12	1.15	1	1.25	1.3	4.6	4.6	3.6	3.6	3.3	3	3.3	3.3

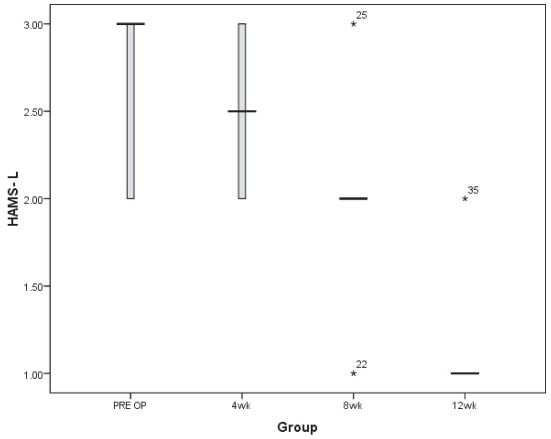
	Table 3							
	Mean Tardieu (R2-R1) scores					Mean Posture Grid and GMFC scores		
		HF– R	HF- L	HAM- R	HAM- L	PG-R	PG-L	GMFC
SPR	control	7	8	15	14.5	4.9	4.5	3.1
	Pre op	12.5	13	18	20	6.6	6.6	3.1
	Po-Wk 4	12.5	11	17.5	17.5	6.6	5.9	2.7
	Po-Wk 8	8.5	9	14	13	5.5	5.2	2.2
	Po-Wk 12	7	6	10.5	12	4.9	4.3	2
SMF	control	5.5	5	13.5	13.5	5.5	5.4	3
	Pre op	10	12	16.5	18.5	6.8	7.3	3
	Po-Wk 4	10	9.5	15	15	6.7	6.9	3
	Po-Wk 8	7	7.5	11.5	12.5	5.7	6.2	2.5
	Po-Wk 12	4.5	5	8.5	8.5	4.9	5.4	2
STR	control	6.5	7.5	13.5	15	6.2	6.5	3
	Pre op	7	8	18	17.5	6.3	6.2	3.7
	Po-Wk 4	7	8	17.5	17.5	6.1	6	3.7
	Po-Wk 8	5	4.5	13	15	5.2	5.2	3.1
	Po-Wk 12	3.5	3.5	9.5	10.5	4.6	4.6	2.6

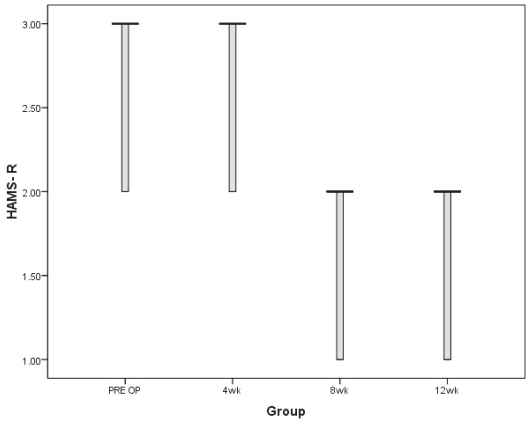
Graphs and charts:

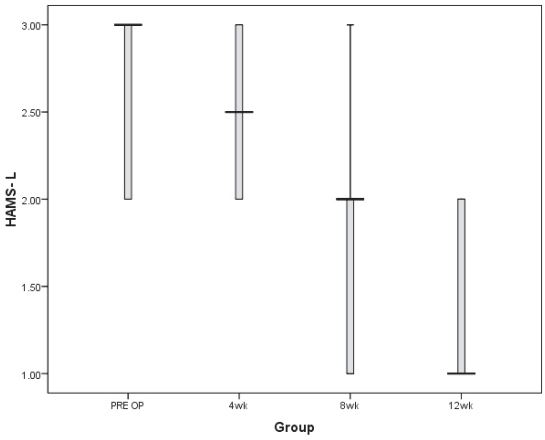


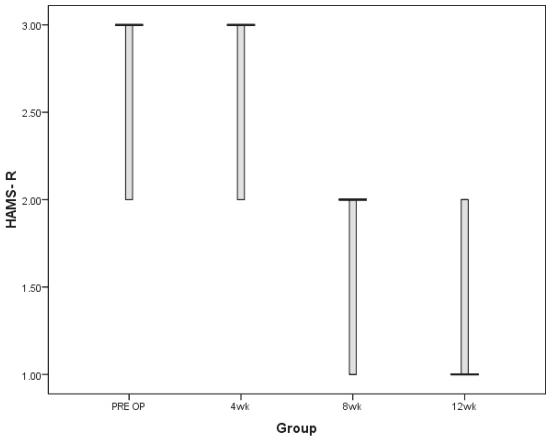


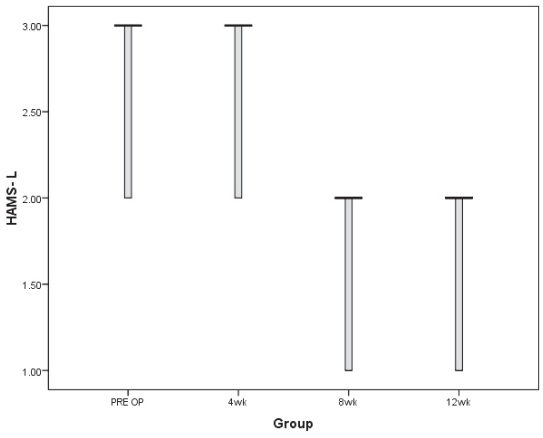












Single event multi level surgery in a teenager having spastic triplegic cerebral palsy

Case report

Jitender Jain, Varidmala Jain, Vinai Shrivastav

Abstract

An 18 year old boy with spastic triplegic cerebral palsy was not able to stand or walk without support (GMF Score level-4) and even not able to hold things from right hand. He had undergone orthopedic surgeries previously twice in both the lower limbs and in right upper limb. He also underwent SMF of median nerve for pronator and wrist flexor spasticity in right upper limb.

Single Event Multilevel Orthopedic Surgeries (SEMLOS) were performed in both the lower limbs and in Right upper limb with derotational osteotomy on right proximal femur and fixation with DHS.

On complete reassessment one month after the surgery it was found that he also had lots of trouble in sensory feedback. He was given first sensory integration then other therapeutic exercises. Now, he is fully independent and is able to walk with elbow crutches as well as two stick support for a long distance (GMF Score- level 3). Grip as well as release of fingers in right hand have also improved.

Key words • Cerebral Palsy • Spastic • Osteotomy

Introduction

Adolescent children with cerebral palsy develop significant contractures and deformity1. Their lives become more and more miserable with increasing age, but now with the latest advancements in therapeutic techniques and sophisticated surgical techniques are being proved very promising. All these children require single event multilevel surgery2 to help them from repeated hospital admissions and mental trauma. This concept of single event multi level orthopedic surgery along with well structured therapy programme gives rise to desired result in most of the properly selected patient with fixed contracture. In recent years concept of OSSCS3 has given new insight in SEMLOS (author would prefer this word instead of SEMLS). By this concept balancing of muscle tone is possible by selective lengthening of multi-articular muscle and sparing of monoarticular muscles of the limbs. Second add on in SEMLOS is lever arm restoration by correction of bony torsion by derotational osteotomy4. It is very important to have repeated and thorough evaluation of the child beforehand for getting best result.

Case history

An eighteen year old boy with spastic triplegic cerebral palsy consulted us with the complain of not being able to stand & walk without support and very poor right hand function.

In the neonatal period itself his parents realized that his right side was not working properly, and after some time they observed that he could not grip the things properly. At the age of one year he was diagnosed having cerebral palsy & pediatrician advised physiotherapy. But, his parents could not follow the therapy for long time. He underwent orthopedic surgery (hamstring and gastrocnemius lengthening) in both the lower limbs at 8 years age and selective motor fasciculotomy of the right median nerve for relief of spastic pronator and wrist flexor at 14years age.

During his first visit at the authors centre in year 2010 he was on wheel chair and could walk for a few meters with support (GMF Score- level 4). He was even not able to hold things from right hand. On gross examination right upper limb was pronated group 4 (Gschwind Classification system), and hand function was class 3 House Functional Classification System with wrist extensor Grade 2a (Zancolli Classification System). Overhead abduction of shoulder was possible upto 80 degree. He could walk with very poor pelvic balance, had bilateral hallux valgus, clawing of second toe bilateraly, limited planti-flexion of feet (50), fixed flexion deformity at hip joint (150), out toeing & hip internal rotation on right side was minus 100. Quadriceps muscle power was grade 4 on both sides.

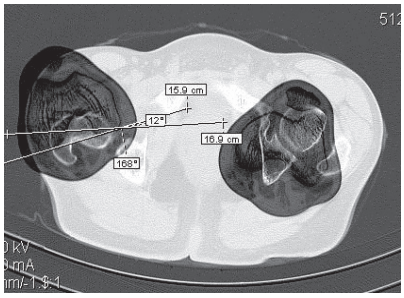


Fig-1 CT-scan of bilateral hip and knee revealed neck anteversion of minus 120 on right side (retroversion of 120) and plus 170 on left side

CT-scan of bilateral hip and knee revealed neck anteversion of minus 120 on right side (retroversion of 120) and plus 170 on left side (Fig. 1).

After detailed observational gait analysis and musculoskeletal examination preoperatively and under anesthesia it was decided to perform single event multilevel soft tissue corrective surgery in both the lower limbs along with de-rotational proximal femoral osteotomy on right side on first day and SEMLOS on right upper limb after three days.

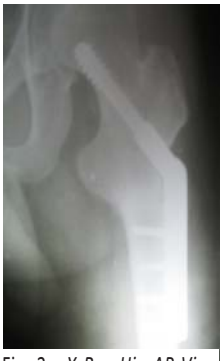
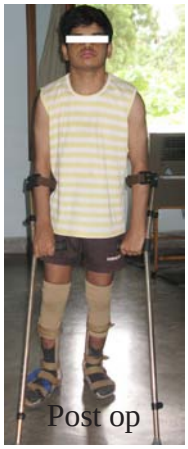


Fig. 2 - *X Ray Hip AP View derotational osteotomy fixed with dynamic screw.*

SEMLOS was performed in both lower limbs. Surgical procedures performed were
Bilateral (B/L) psoas tenotomy at pelvic brim,
B/L Tibialis Anterior IML,
B/L oblique Head of Adductor brevis of great toe IML,
B/L flexor digitorum longus of second toe fractional lengthening, derotational osteotomy on right proximal femur with dynamic hip screw fixation.
In right upper limb surgical procedures performed were lattismus dorsi distal tenotomy,
pronater teres re-routing,
palmaris longus tenotomy,
aponeurotic release of flexor carpi radialis, flexor digitorum profundus, flexor digitorm superficialis and flexor policis longus.

Total duration of surgery was 5 hours on first day and 3 hours on fourth day. Surgery was performed by mini incision technique. Below knee plaster on both sides and above elbow plaster on right side was applied for two weeks. Stitches were removed after 10 days. Joint mobilization, relaxation and strengthening exercises were started just after removal of the plaster. Supinator splint, and bilateral articulated poly-propylene AFO were given.


Preop


Post op

He was re-evaluated after one month of surgery. He was not able to extend the right knee fully. On complete reassessment it was found that he also had lots of trouble in sensory feedback (proprioception) in right lower & upper limb. Therapists were guided to focus more on sensory feedback system along with strength training exercises during first two months after surgery. Osteotomy segment united within 2 months of surgery. Pelvic control exercises and gait training were started after getting sufficient strength and improvement in sensory feedback problems.

He improved in walking with the help of the walker within four months of surgery and with elbow crutches & two sticks after seven months of surgery. Now, in 6 months follow up he developed walking with elbow crutches as well as two stick support for a long distance (GMF Score- level 3). Hand functions also improved appreciably (Clasp 6 by House Classification System). He is able to supinate forearm till neutral rotation (group 2 by Gschwind & tonkin). Now he is able to manage all his activities with minimum support.

Discussion: Single event multi level orthopedic surgery is a well established procedure in the management of spastic cerebral palsy. This concept of surgery along with well structured therapy programme gives rise to desired results in most of the properly selected patients with fixed contracture. In most of the cases, only selective spasticity controls by soft tissue balancing surgery (OSSCS) suffice to give good outcome. Children and adults with severe torsional abnormality4 of bone require derotational osteotomy4 to correct lever arm dysfunction. Usually children with spastic cerebral palsy have increase in anteversion of femoral neck due to muscular imbalance but in our case it was retroversion4 on right side, which is very rare in the case of cerebral palsy. It may be due to sever sensory feedback problem on right side that may have caused severe muscular imbalance in right lower extremity that would have been one of the cause of this problem.

We have observed that sensory problem may be unnoticeable with the passage of time & during therapy but whenever child becomes very ill or undergoes surgical intervention, it may reappear and interfere in therapy programme and recovery.

As in our case there was no noticeable sensory problem on preoperative assessment but when reassessment was performed after 4 weeks of surgery, there was sever propioceptive feed back problem. We were able to start proper therapy only after 3 months of surgery, when sensory feedback problem was solved by sensory integration programme. That's why we could not get response before 4 month post operatively otherwise in most of our cases we start getting good response within 2 months of surgery.

In our surgical technique we utilized concept of OSSCS3 which is based on the concept of spastic long multi articular5 & short antigravity monoarticular muscle. In this technique by selective release of multiarticular muscle (intramuscular tenotomy) at all level & leaving monoarticular muscles we can balance the muscle tone in much better way. This surgical technique does not require any tendon transfer or tendon lengthening, so patient doesn't require bed rest or plaster for too long and therapy can be started within 2 weeks of surgery and child can have good recovery within 8 weeks of surgery. Till now, muscle weakening has not been observed by this concept.

Surgeries by this concept give rise to excellent result when it is performed in single stage surgical event at an in early age when child develops sufficient maturity of gait (6 year) and have already developed or start developing contracture or sever spasticity that can not be managed by therapy. Ideal age for surgical intervention is 6-9 year6. Surgical intervention in selected older age children also gives good recovery if they have good ability of standing with support, fully matured neck holding and good spinal balance7,8,9.

Our case had already undergone three time surgeries before coming to our centre. Single or two level surgical interventions don't help much, as children with cerebral palsy always have multi level deformity10 and to get best result we have to manage every level of deformity in single event anesthesia setting so that

the child can be saved from psychogical trauma of repeated admissions.

Result after SEMLOS5 is always better than single or two level surgeries. Repeated musculoskeletal examination preoperatively as well as under anesthesia, detailed gait analysis along with radiological evaluation of any torsional deformity8 of bone is very important for correct surgical procedure. We also have to check remaining deformity after finishing one level of surgery per-operatively, so that we can have control over the under as well as over correction of the deformity. Otherwise balancing of muscle tendon length and tone will not be possible and child will have residual problem that will need another surgical intervention and also can harm the child7. Result after surgical intervention is based on quality of therapy programme. Children, who have undergone surgery require good therapy programme6 including strength training, pelvic balancing, functional electrical stimulation and gait training. In therapy programme parents participation is also very important.

References

1. Ganjwala D. Multilevel orthopedic surgery for crouch gait in cerebral palsy: **An evaluation using functional mobility andenergy cost. Indian J Orthop**. 2011 Jul-Aug; 45(4): 314-19.
2. Zorer G, Dogrul C, Albayrak M A. Bagatur E. **The results of single-stage multilevel muscle-tendon surgery in the lower extremities of patients with spastic cerebral palsy.** Acta Orthop Traumatol Turc 2004; 38(5): 317-25.
3. Kondo I, Hosokawa K, Iwata M , Oda A, Nomura T. **Effectiveness of selective muscle release surgery for children with cerebral palsy: longitudinal and stratified analysis**. Dev Med & Child Neurology 2004; 46: 540-547.
4. Muharrem ?, Faik A, ?lay D. **The evaluation and management of rotational deformity in cerebral palsy**. Acta Orthop Traumatol Turc 2009; 43(2):106-12.
5. Metaxiotis D, Wolf S, Doederlein L. **Conversion of biarticular to monoarticular muscles as a component of multilevel surgery in spastic diplegia**. J Bone Joint Surg [Br] 2004; 86-B:102-9.
6. Gough M, Schneider P, Shortland A P. **The outcome of surgical intervention for early deformity in young ambulant children with bilateral spastic cerebral palsy.** J Bone Joint Surg [Br] 2008; 90-B:946-51.
7. Khan M A. **Outcome of single-event multilevel surgery in untreated cerebral palsy in a developing country.** J Bone Joint Surg [Br] 2007; 89-B:1088-91.
8. Thomas S. Renshaw. Cerebral Palsy: **Orthopaedic Management.** J Bone Joint Surg Am. 1995; 77: 1590-06.
9. Selim Y, Baris K, Nadire B, Bülent E. **Surgical management of orthopedic problems in adult patients with cerebral palsy.** Acta Orthop Traumatol Turc 2005; 39(3):231-36.
10. Dobson F, Graham H K, Baker R, Morris M E. **Multilevel orthopaedic surgery in group IV spastic Hemiplegia.** J Bone Joint Surg [Br] 2005; 87-B: 548-55.

Address for correspondence and details of authors:

Jitender Jain, MS (Orthopaedic),E mail: jjain999@gmail.com

Varidmala Jain, *MD, Assistant Professor, Faculty of Health Sciences, Sam Higginbottom Institute of Agriculture Technology & Sciences, Allahabad , UP*

Vinai Shrivastav, *BPT, Therapist Incharge, Samvedna, Allahabad, UP*

Use of the parenting stress index (psi) in mothers of children with autism

Clinical article

Kanaka Latha Abbagani, Usha S Naik & Hannah Anandaraj

Abstract

Families in which a child is diagnosed to have autism experience considerable stress in comprehending and coming to terms with the diagnosis, finding suitable and affordable treatment services, and handling the behavioral and communication issues of the disorder itself. The Parenting Stress Index (PSI) is a scale specifically developed to assess the magnitude of parental stress in various disorders. In this study it was used to quantify stress experienced by 51 mothers of children with autism before and after psychosocial and other interventions, with a follow-up period of 18 months.

Significant improvement was seen in the Parental sub-domains of Competence, Attachment, Role Restriction, and Depression, Isolation and Health ratings following intervention, suggesting the usefulness of this tool in measuring change in parental stress.

Introduction

According to previous researchers, parents of children diagnosed with Autism Spectrum Disorders (ASD) consistently report more stress than parents of typically developing children[1,2] and children with other developmental disorders (e.g., Down Syndrome).[3,4] Parenting stress is an important variable to consider when providing services for children with autism and their families. The level of strain on the family system is greater in the families with a child with an autism spectrum disorders compared to families of non-autistic children.[5] Parents of newly diagnosed toddlers and young children with autism spectrum disorders reported elevated parenting stress. Children's regulatory problems were associated with maternal stress, whereas externalizing behaviors were associated with parental stress.[6]Mothers may be particularly affected as they serve as child's primary care takers, and see themselves as being controlled and dominated by their children's demands and needs.[7] Mothers experience the parental role as restricting their freedom and frustrating them in their attempts to maintain their own identity.[8]

Given the unique challenges inherent in raising a child with autism, particularly during the time of diagnosis and beginning of interventional services, it may be helpful in developing parent-focused interventions. The aims of this paper therefore are: 1) to find out the nature of parenting stress of mothers having child with autism spectrum disorders; 2) to determine the difference in maternal parenting stress before and after psychosocial intervention.

Methodology

Selection Criteria

i) Fifty one children attending a Government Hospital Psychiatry Department were selected for the study if they fulfilled the DSM IV Criteria for Autism
ii) If they were local and
iii) If parents were willing to participate in the study.

Tools

1) A detailed Interview schedule was used to study the socio-demographic details and other variables of study.
2) Childhood Autism Rating Scale [9]
3) Psycho-Educational Profile Revised[10] ,and
4) Parenting Stress Index[11]

1) Demographic information of children was collected from the interviews of mothers. A majority of children (53%) were between 19-36 months of age at the time of the study and 86% of them were boys and more than three quarters (84%) of the children were from upper and upper-middle socio-economic class.

   A majority of mothers (67%) were between the age range of 24-30 years at the time of study and a significant number of mothers (94%) were graduates and post graduates with some having a professional degree. However, a large majority (84%) of the mothers were housewives.

   Fifty one percent of the children were the only children to their parents.

2) The Childhood Autism Rating Scale[9] is a 15-item behavioral scale developed to identify children with autism and to distinguish them from developmentally handicapped children without autism. It further distinguishes the severity of children with autism in moderate to severe range. Each of the 15 items is given a rating from 1 to 4. A total score is computed by adding all the 15 individual ratings. Children with scores below 30 are categorized as non-autistic while those with 30 and above are categorized as autistic.

3) The Psycho Educational Profile Revised, (PEP-R)[10]offers a developmental approach to the assessment of children with autism or related developmental disorders. The PEP-

R is an inventory of behaviors and skills designed to identify uneven and idiosyncratic learning patterns. The test is used with children of age group 6 months to seven years. There are 131 items in the PEP-R Developmental Scale and are divided into seven developmental areas, e.g. Imitation, perception, fine motor, gross motor, eye-hand integration, cognitive performance, and cognitive verbal. The total time required to administer and score the test is 45 minutes to one-and-a-half hours.

4) The Parenting Stress Index-Long version[11]is a 120-item questionnaire that measures the amount of stress in the parent-child system). It provides scores for Total Stress and scores on two subscales, The Child Domain (CD) and the Parent Domain (PD) and an optional Life Stress (LS). The Child Domain measures the behavioral and temperamental qualities of the child that make it difficult for parents to fulfill their parental role. It consists of six subscales: Adaptability, Acceptability, Mood, Demandingness, Distractibility, Hyperactivity and Reinforcement of Parents. The Parent Domain assesses the degree to which stress is related to parental functioning across seven domains: Depression, Attachment, Role Restrictions, Sense of Competence, Social Isolation, Relationship with Spouse, and Parent Health. The Parent and Child Domain scores are then summed to yield a Total Stress score. Parents rate their agreement with each item on a 5 point Likert scale from 1(Strongly Agree) to 5 (Strongly Disagree).It can be used with parents of children as young as 1 month to 12 years of age.

A brief description of the Parent domain and its sub-domains is given here to understand the interpretation and validation of this scale.

Parent Domain
High scores in the Parent Domain suggest that the sources of stress and potential dysfunction of the parent-child system may be related to dimensions of the parent's functioning.

Competence (CO)
High scores on the Competence subscale may be produced by a number of factors. For example, it is expected that young parents of an only child will earn somewhat higher scores than multiparous parents. Parents who are lacking in practical child development knowledge or who possess a limited range of child management skills will also earn high scores. High scores will be found among parents who do not find the role of parent as reinforcing as they had expected. The Competence subscale assesses the parent's sense of competence in relation to his or her role as parent. It relates to knowledge of how to manage the child's behavior and comfort in making decisions, such as when and how to discipline the child.

Isolation (IS)
Parents who earn high scores in this area are under considerable stress. These parents are often socially isolated from their peers, relatives, and other emotional support systems. In many instances, their relationships with their spouses are distant and lacking in support for their efforts as parents. The Isolation subscale examines the parent's social isolation and the availability of social support for the role of parent.

Attachment (AT)
The presence of a high score on this subscale suggests two possible sources of dysfunction. The first source may be that the parent does not feel a sense of emotional closeness to the child. This absence of emotional bonding may be reflected in the rather cold pattern of parent-child interaction. The second source of dysfunction may be the parent's real or perceived inability to observe and understand that child's feelings and/or needs accurately. The Parental Attachment subscale was designed to assess the intrinsic investment the parent has in the role of parent. This subscale was expected to determine the parent's motivation level to fulfill the role of parent.

Health (HE)
High scores are suggestive of deterioration in parental health that may be the result of either parenting stress or an additional independent stress in the parent-child system. The Health subscale assesses the impact of the parent's current physical health in terms of his or her ability to meet the demands of parenting.

Role Restriction (RO)
High scores on this subscale suggested that the parents experience the parental role as restricting their freedom and frustrating them in their attempts to maintain their own identity. Parents in this category see themselves as being controlled and dominated by their children's demands and needs. Role Restrictions, addresses the impact of parenthood on the parent's personal freedom and other life roles. This subscale assesses the negative impact, losses, and sense of resentment associated with the parent's perceptions of loss of important life roles.

Depression (DP)
High scores on this subscale are suggestive of the presence of significant depression in the parent. There are some items on this subscale that relate to guilt and unhappy feelings, which, although often associated with depression, may be responded to primarily out of dissatisfaction with self and life circumstances and may not signal clinically significant depression. The Depression subscale assesses the extent to which the parent's emotional availability to the child is impaired and the extent to which the parent's emotional and physical energy is compromised. To some degree, the subscale also captures the impact of guilt upon the parent.

Spouse (SP)
Parents who earn high scores on this subscale are those who lack the emotional and active support of the other parent in the area of child management. In some instances, this is related to an overly strict sex-role definition on the part of the father that

child care is women's work. The Spouse subscale assesses the emotional and physical support provided to facilitate functioning in the parenting role. It also determines the level of conflict in the relationship related to parenting.

Research design

Intervention

Baseline assessments of children's CARS, and PEP-R, and mothers' Parent Domain scores of Parenting Stress Index were done at the beginning of the study to assess the baseline scores and were repeated after 18 months of intervention to measure the post intervention scores.

A psycho educational intervention based on the TEACCH approach for children with autism which involves an individualized, one on one session with the child, was given by the researcher and the mother was asked to observe, implement the individualized therapy at home and come for weekly follow-up. Mothers were asked to maintain an observation and monitoring chart.

Follow up

In this study the Parenting Stress Index[11] was used to quantify the Parent Domain stress experienced by 51 mothers of children with autism before and after psychosocial and other interventions, with a follow-up period of 18 months for each child. Mothers were tested once before and once after the intervention to observe the difference in the stress levels before and after intervention.

Analysis of data

Data was analyzed by using the test of significance of means. The results are discussed.

Results and Discussion

For the present study the pre intervention and post intervention means of Parenting Stress Index involving the Parent Domain Stress of mothers is presented to observe the difference in the stress levels before and after intervention. The student test was used to calculate the significance between the means of the pre and post intervention scores.

The results of Parenting Stress of mothers on applying test of significance of mean revealed that there was a great reduction in the Parent Domain scores with a significant reduction of stress in the dimensions of the mothers' functioning on the sub scales of Competence, Attachment, Depression, Isolation, Health and Role restriction($p<0.001$).

The results of this study add to a large body of research documenting high levels of parenting stress among mothers raising a child with ASD.[12] The Parenting Stress Index (PSI) is an excellent example of a tool that had been used to quantify parenting stress in a wide variety of situations including child abuse, antisocial behavior, feeding disorders, learning disorders, and in this study autism.

Comparison of Mothers' Pre and Post Intervention - Parenting Stress Index (PSI) Mean Scores of the Parent Domain

Parent Sub-Domain	Pre and Post test	N	Mean Scores	SD	Mean diff	t-value	P Value
Competence	Pre	51	42.49	4.77	2.07	3.82	0.002 S
	Post		40.41	4.92			
Attachment	Pre	51	19.76	4.54	1.88	3.94	0.001 S
	Post		17.88	3.71			
Role Restriction	Pre	51	22.47	5.44	1.31	2.18	0.034 S
	Post		21.16	5.82			
Depression	Pre	51	25.94	6.51	2.72	3.81	0.001 S
	Post		23.22	7.4			
Spouse	Pre	51	18.55	5.6	0.6	1.09	0.27 NS
	Post		19.94	6.18			
Isolation	Pre	51	17.94	4.14	1.54	5.04	0.001 S
	Post		16.39	4.46			
Health	Pre	51	15.39	15.39	0.7	2.15	0.03 S
	Post		14.69	14.69			
Parent Domain Total	Pre	51	162.54	24.6	10.86	4.84	0.001 S
	Post		151.68	27.2			

Keen et al.,[13] found that the professionally supported intervention for parents of recently diagnosed children resulted in reduced child-related parenting stress and increased parenting self-efficacy. Post intervention adaptive behavior scores were greater than the pre-intervention adaptive behavior scores for children in the professionally supported intervention program. On the sub scale, Spouse, the mothers did not experience a significant reduction in stress($p<0.27$). As regards the sub scale 'Spouse', mothers with high scores on this sub scale were those who lacked the emotional and active support of other parent in the area of child management.[14,15]In some instances this is related to an overt gender bias definition on the part of the Father that child care is women's responsibility.

Following these families over time will be necessary to determine whether mothers become more stressed as their children get older, as studies of older children would suggest,[16] , and/or whether parenting stress diminishes over time as parents adapt and make family accommodations to the demands of raising a child with autism spectrum disorder.

Salt et al[17] evaluated the effectiveness of a developmentally based early intervention program for a group of children with treatment and another group without treatment. They were matched for age, mental age, socioeconomic status and number of hours of non-experimental therapy. Children in the treatment group improved significantly more than those in the control group on measures of joint attention, social interaction, imitation, daily living skills, motor skills and an adaptive behavior composite. The total stress index reduced for treatment group parents and increased for the control group parents. The results of the present study are considered to support the efficacy of this treatment approach.

During the present study, individual counseling was given to mothers and this proved therapeutic to most mothers who were depressed. Most of them needed supportive counseling. Parents felt empowered by the treatment process which focused on parent training and individual sessions. The group sessions helped mothers feel less isolated and mothers continued to interact outside the treatment settings as well. They came to terms with current role restriction as some children moved towards inclusive education. Individual sessions were used for depressed mothers. As children improved clinically, attachment issues also began to resolve. This shows that there was a significant reduction in stress on most of the sub scales of Parent Domain for mothers brought about by the psychosocial intervention. There is evidence that stress experienced by the parent decreases with effective treatment, even if parental stress is not the direct focus of treatment. [18]

Conclusion

It is possible to evaluate an abstract concept like stress by understanding the expressed concerns of care givers into important sources of distress. By further quantifying these elements through questions whose responses are provided numerically in a Likert manner, scores can be obtained. The Parenting Stress Index is an excellent example of a tool that had been used to quantify parental stress in a wide variety of situations.

In this study it was possible to demonstrate a significant improvement in many areas of maternal stress by the conclusion of an18 month intervention period.

References

1. Dyson, L. L. (1993). **Response to the presence of a child with disabilities: Parental stress and family functioning over the time. American Journal on Mental Retardation,** 98, 207-18.
2. Wolf, L. C., Noh, S., Fisman, S. N., & Speechley, M. (1989). **Brief report: Psychological effects of parenting stress on parents of autistic children. Journal of Autism and Developmental Disorders**, 19, 157- 66.
3. Boyd, B. A. (2002). **Examining the relationship between stress and lack of social support in mothers of children with autism. Focus on Autism and Other Developmental Disabilities,** 17, 208 -15.
4. Sanders, J. L., & Morgan, S. B. (1997). **Family stress and adjustment as perceived by parents of children with autism or Down syndrome: For intervention. Child and Family Behavior Therapy,** 19, 15-32.
5. Sivberg, B. (2002). **Family system and coping behaviors: A comparison between parents of children with autistic spectrum disorders and parents with non-autistic children.** Autism, 6, 397-409.
6. Davis, N.O., Carter A. S. (2008). **Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. Journal of Autism and Developmental Disorders**, 38, 1278- 91.
7. Hauenstein, E. J., Marvin, R. S., Snyder, A. L. & Clarke, W. L. (1989) **Stress in parents of children with diabetes mellitus. Diabetes Care**, 12, 18-23.
8. Matthews, L. G., (1989) **Parenting stress, role conflict and husband supportiveness in dual career families with preschool-aged children.** Unpublished doctoral dissertation, University of Virginia, Charlottesville.
9. Schopler E., Reichler R.J., and Renner, B. R (1988).**The Childhood Autism RatingScale.(CARS).Los Angeles: Western Psychological Services.**
10. Schopler, E., Reichler R.J.,Bashford, A., Lansing, M. D., and MarcusL. M (1990).**Individualized assessment and treatment for autistic and Developmentally Disabled Children** Vol.1 Psychoeducational Profile-Revised (PEP-R).

11. Abidin, R. R. (1995) **Parenting Stress Index, 3rd edn. Psychological Assessment Resources,** Odessa, FL, USA.

12. Schopler E., & Mesibov G. (Eds.). (1984). **The effects of autism on the family.** New York: Plenum Press.

13. Keen, D., Couzens, D., Musprspratt, S., and Rodger, S. (2010). **The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence**. Research in Autism Spectrum Disorders, 4, 229-41.

14. Russ, H. G. (1988). **The effectives of adoption on pre-oedipal mother-child interaction. Unpublished doctoral dissertation.** Adelphi University, Garden City, NY.

15. Webster-Stratton, C. (1989). **The relationship of marital support, conflict, and divorce to parent perceptions, behaviors, and childhood conduct problems.** Journal of Marriage and the Family, 51,417-30.

16. Moes, D., Koegel, R. L., Schreibman, L., & Loos, L.(1992)**Stresspro?lesfor mothers and fathers of children with autism**.Psychological Reports, 7, 1272-74.

17. Salt, J., Shemilt, J., Sellars, V., Boyd, S., Coulson, T., McCool, S. (2002). **The Scottish Centre for Autism preschool treatment program: II: The results of a controlled treatment outcome study.** Autism, 6, 33-46.

18. Kazdin, A. E, Wassell, G (2000). **Predictors of barriers to treatment and therapeutic change in outpatient therapy for antisocial children and their families.** Mental Health Services Research, 2, 27-40.

Address for correspondence and details of authors:

Kanaka Latha Abbagani *Ph.D.*
Developmental Therapist, Sankalp Center for Autism and Related Disorders &Hon. Visiting Consultant, Dept. of Psychiatry, Niloufer Hospital, Hyderabad
Usha S. Naik *MD*
Former Proffessor and Head, Dept. of Psychiatry, Niloufer Hospital,Hyderabad
Hannah Anandaraj *Ph. D,*
Reader, RM Collage of Social Work, Hyderabad

Study on available support systems in inclusive setting for the students with mental retardation

Clinical article

Jayanti Pujari, M Annapurna

Abstract

This is a study on the available support system in inclusive setting for the students with mental retardation in the primary schools The focus of this study was exploration of the existing support system in the schools of Rangareddy District. The aim of the study was to report the available support system which facilitates the learning of children with mental retardation in primary school. The main objective of the study was to find out the academic support system available for the students with mental retardation in inclusive setting in the primary schools.

To find out the social support system available for the students with mental retardation in inclusive setting in the primary schools.

To find out the emotion support system available for the students with mental retardation in inclusive setting in the primary schools .

To find out the physical support system available for the students with mental retardation in inclusive setting in the primary schools .

A total number of 100 teachers (both regular and resource teacher), 50 students and 20 primary school were selected by purposive sampling procedure. The data was generated with the help of 4 type of questionnaire. The major findings of the study show that the academic and social support as perceived by regular teacher was in average level where as academic and social support perceived by resource teacher are in high level. The emotional support provided by peer is high level. The physical support was studied under three catogerise i.e. toilet and sanitation facilities, mobility and barrier free environment are in low level.

Conclusion: Adequate support system is essential or the success of inclusive education.

Introduction

Inclusion is an educational approach and philosophy that provides all students with community membership and greater opportunities for academic and social opportunities. Inclusion is about making sure that each and every student feels welcome and that they are unique needs and learning styles are attended to and valued.

Motshekga1 emphasizes the point that without a new mindset and right support system in place inclusive education system will remain no more than idealist education system. Thus one of the major tasks is to successfully change the character of our school and ensure the establishment of inclusive education with necessary support system.

The aim of inclusive education is to identify and reduce barriers. Kapp2 describes that the term barriers of learning as a generic term referring to heterogeneous group of deviations. These barriers to learning are barriers which arise from impairment, negative attitude, in flexible curriculum inadequate support system. These barriers do have an impact on emotional behavioural and social wellbeing of the learner.

In Andhra Pradesh the inclusive education has been implemented by SSA under Rajiv Vidya Mission3. Resource teachers are appointed in the mandals which are divided into different divisions. The resource teacher's prime duty is to guide the regular teacher on educating the children with disability and to provide home based training.

The focus of this study is exploration of the existing support system in the schools of Ranga Reddy District. The aim of the study is to report the available support system which facilitate the learning of children with mental retardation.

Objectives

To find out the academic support system available for the students with mental retardation in inclusive setting in the primary schools of Ranga Reddy District.

To find out the social support system available for the students with mental retardation in inclusive setting in the primary schools of Ranga Reddy District .

To find out the emotion support system available for the students with mental retardation in inclusive setting in the primary schools of Ranga Reddy District.

To find out the physical support system available for the students with mental retardation in inclusive setting in the primary schools of Ranga Reddy District .

Material and methods

Sample: A total number of 100 teachers (both regular and resource teacher), 50 students and 20 primary schools were selected by purposive sampling procedure. Four categories of samples were used for the study. They were:

- Teachers working in government primary schools (Regular teachers) of Ranga Reddy and Hyderabad District
- Resource teacher appointed under SSA(Resource Teachers) of Ranga Reddy and Hyderabad District
- Students of 4th and 5th class of government primary schools(students) of Ranga Reddy and Hyderabad District
- Government primary schools woking under Sarva Shiksha Abiyaan(SSA) of Ranga Reddy and Hyderabad District

The data was collected with the help of 4 types of Questionnaires. There were 19 questions in academic support system,10 questions in social support system,15 questions in emotional support system and 19 questions in physical support system which is divided into three categories toilet and sanitation facilities, mobility and barrier free environment. Total 63 questions were there in the questionnaire.

Data was generated with the help of questionnaire. Collected data was tabulated and analysed with the help of percentages

Results

Table 1: Percentages showing the level of academic support from regular teachers of Rangareddy and Hyderabad districts

Level of Support	Ranga Reddy	Percentage (%)	Hyderabad	Percentage (%)
High	11	40.74	5	21.73
Average	16	52.25	17	73.91
Low	0	0	1	4.34
	N=27		N=23	

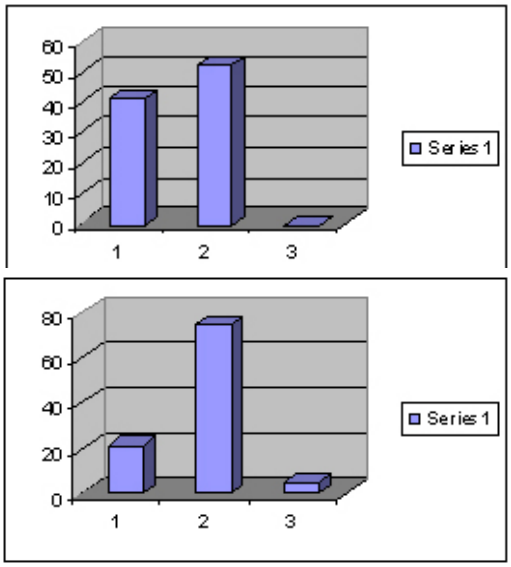


Figure 1: Percentages showing the level of academic support from regular teachers of Rangareddy and Hyderabad districts

The Table & Graph 2 shows the different levels academic support provided by the regular teachers to the students with mental retardation in Government primary schools of both Ranga reddy and Hyderabad districts. The percentages shows that in Rangareddy out of total sample of 26 teachers, 52.25% of sample shows average level of Academic support and 40.74% sample shows high level of academic support. Where as in Hyderabad district out of total sample of 23 regular teachers 73.91%of sample shows average level of academic support.

Table 2: Percentages showing the level of academic support from resource teachers of Rangareddy and Hyderabad districts

Level of Support	Ranga Reddy	Percentage (%)	Hyderabad	Percentage (%)
High	22	84.6	16	66.66
Average	4	15.38	8	33.33
Low	0	0	0	0
	N=26		N=24	

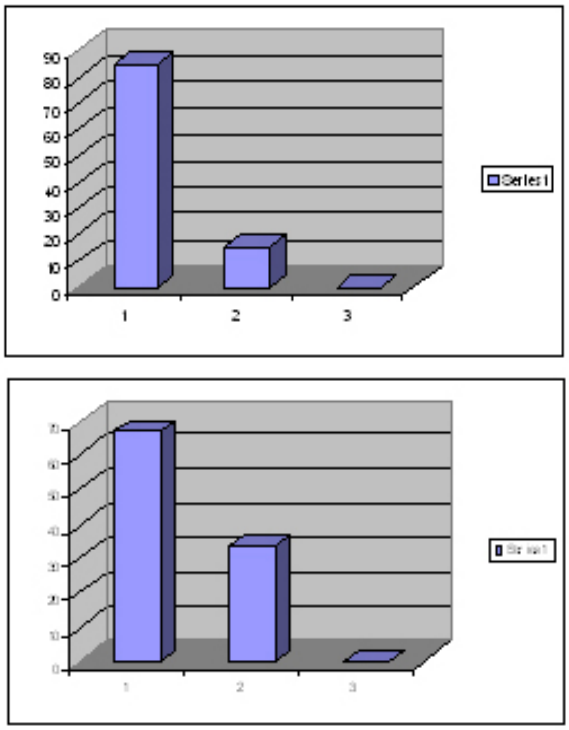


Figure 1: showing the different levels of Academic support provided by the Resource teachers working in different mandals of both Rangareddy and Hyderabad districts.

The result of the study shows that out of the total sample of 26 teachers in Rangareddy district 84.6% sample shows the high level of social support and 15.38% sample shows the average level of support. Whereas in Hyderabad district out of the total sample of 24 teachers 66.66% of the sample shows the high level of support and 33.33%.of the sample shows average level of support.

Analysis shows that two districts were showing the high percentages in the high level of academic support.

Table 3: Percentages showing the level of social support from regular teachers of Rangareddy and Hyderabad districts

Level of Support	Ranga Reddy	Percentage (%)	Hyderabad	Percentage (%)
High	10	37.03	5	21.73
Average	17	62.96	15	65.21
Low	0	0	3	13.04
	N=27		N=23	

The Table shows the different levels of social support provided by the regular teachers to the students with mental retardation in the Government primary schools of Rangareddy and Hyderabad districts. The results of the study shows that in the total sample of 27 teachers in Rangareddy district 62.96% of the sample shows average level of support , and 37.03% of the sample shows high level of social support. In Hyderabad district from the total sample of 23 teachers 65.21% of the sample shows average level of support and 21.73% sample shows high level of support and 13.04% of the sample shows low level of support.

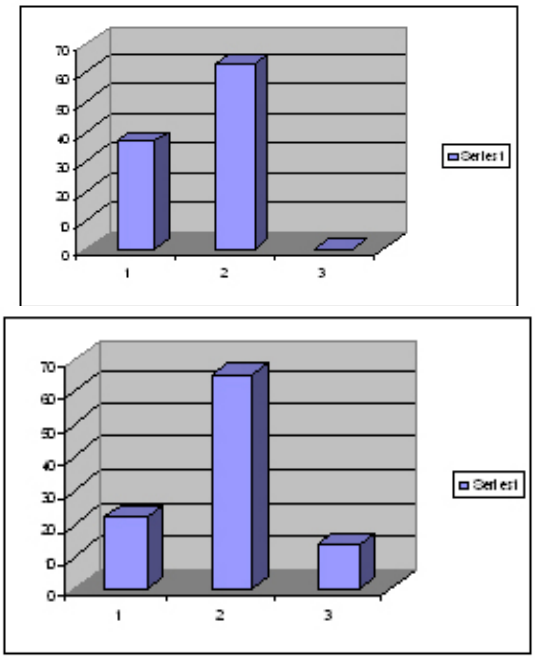


Figure 3: Percentages showing the level of social support from regular teachers of Ranga Reddy and Hyderabad districts

Table 4: Percentages showing the level of social support from the resource teachers of Rangareddy and Hyderabad districts

Level of Support	Ranga Reddy	Percentage (%)	Hyderabad	Percentage (%)
High	22	84.6	9	37.5
Average	4	15.38	14	58.33
Low	0	0	1	4.16
	N=26		N=24	

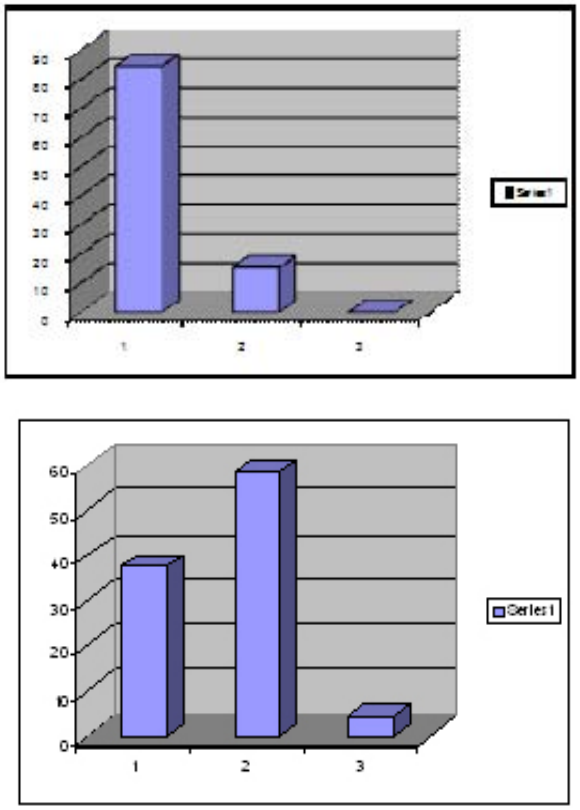


Figure 4: Percentages showing the level of social support from the resource teachers of Rangareddy and Hyderabad districts

The Table & Graph shows the different levels of social support provided by the Resource teachers in the primary schools of different mandals of both Rangareddy and Hyderabad districts . Out of the total sample in Rangareddy district 84.65% of the sample shows high level of support, and 15.38% of the sample shows low level of support .In Hyderabad district out of the total sample of 24 teachers 58.33% of the sample shows average level of support and 37.5%of the sample shows high level of support and 4.16% of the sample shows low level of support.

When we compare the percentages of both districts there is so much variation between the high level of social support given by the Resource teachers. Rangareddy district shows more high level of social support than Hyderabad district and Hyderabad district shows more average level of support than Rangareddy district.

Table 5: Percentages showing the level of emotional support of Rangareddy and Hyderabad district

Level of Support	Ranga Reddy	Percentage (%)	Hyderabad	Percentage (%)
High	35	100	14	93.33
Average	0	0	1	6.66
Low	0	0	0	0
	N=35		N=15	

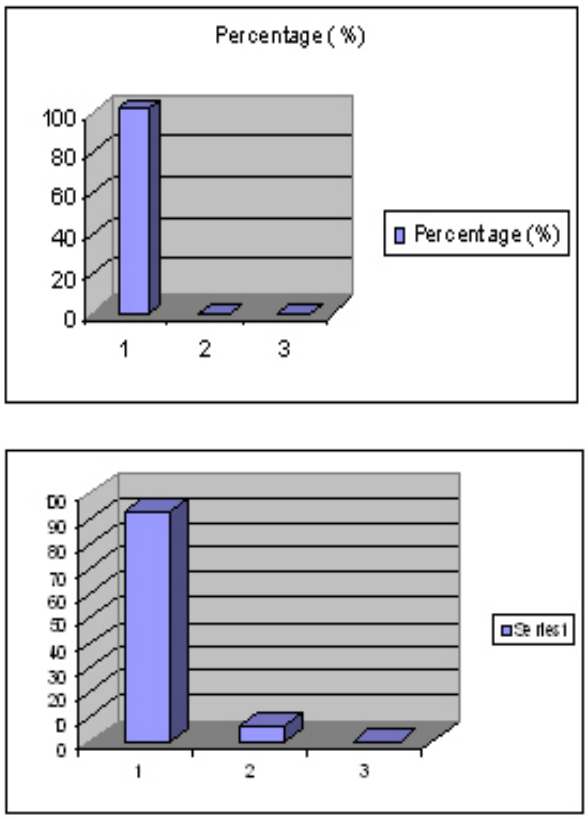


Figure 5: Percentages showing the level of emotional support of Rangareddy and Hyderabad district

The Table & Graph shows the different levels of emotional support provided by the students of 4th and 5th class of both the districts - Ranga Reddy and Hyderabad. The result of the study shows that all the 35 students in the schools of Ranga Reddy district show high level of emotional support to their peers with mental retardation. And among the students in the schools of Hyderabad district, from the total sample of 15, 93.33% show high emotional support and 6.66%. shows average level of support .

When we compare the scores and percentages of the students of two districts, the percentages the difference is very small and negligible. All the students show high level of emotional support for their peers with mental retardation.

Discussion

The first objective is to find out the level of the Academic support for the students with intellectual impairment in inclusive setting. The academic support by the regular teachers is very important for the success of inclusion. In the present study Academic support has been studied with the help of questions pertaining to

- Resource teacher and resource room facilities in the schools
- Training programmes related to special education
- Assessment for the students with intellectual disability
- Individualized educational programme implementation
- Curricular adaptations

All the above mentioned areas are very essential for academic support. For successful inclusion, the regular teacher in the classroom should know the assessment procedures for the children with intellectual impairment, about IEP, using resource room and resource teacher facilities, using specific teaching learning material, reinforcements etc. then only it will be the successful inclusion.

The findings of the study shows that the academic support provided by the regular teachers in both Rangareddy and Hyderabad districts are in average level. This may be due to

- Adequate training needed by regular teachers to improve their knowledge in teaching special skills to the children with M. R.
- Resource room facility is not available in the primary schools.
- The guidance of the Resource teacher in not sufficient as he visits as per his schedule.
- The student teacher ratio in the government primary schools is also another reason for non-availability of adequate academic support in primary schools for the children with intellectual impairment. It is difficult to take individual care of the child where strength of the class is more.

This finding also supports the finding of Coates4 who emphasizes about the need of techniques and further preparation and training will lead to meet the educational needs effectively.

Studies by Soodak, Podell and lehman5 and Fox and Yesseldyke6 Conducted studies and emphasized that teachers who possessed low teaching efficacy, who lacked experience in teaching or who had low use of differentiated teaching practices and teacher collaboration were found to be less receptive in inclusion. Inadequate training and lack of administrative leadership, general education teachers did not make significant medications in their teaching strategies to address the needs of students with disabilities.

The second objective is to find the level of social support available to the students with Mental Retardation impairment in the inclusive setting in the primary schools of Rangareddy and Hyderabad districts. Social support has been studied with the help of questions pertaining to

- greeting and responding appropriately to others
- wait for his turn and standing in a line
- interacting with opposite sex properly
- providing time tables in school rules in pictures of easy understanding
- Using pictures and drawings to teach daily routines
- Providing models to improve behavior like sharing, caring to others
- Try to enhance the self esteem and self confidence by the teacher
- Setting play groups
- Giving opportunity to participate in school functions

By knowing and implementing all these things, then only the regular teachers gives adequate social support in the school . Then only it will be the key for successful inclusion.

Stephanny et al7 have conducted a study on Academic and Social attainments of children with mental retardation in General education and special education settings. They found that when comparing children with mental retardation in general education and special education classrooms, integrated students perform better than their comparable segregated students on measures of academic achievement and social competence.

The findings of the study shows that the social support given by the regular teachers to the children with intellectual impairment in an inclusive setting is average level.

Above discussed reasons for academic support also may leads to the average level in the social support.

The academic and social support shown by Resource teachers of the Rangareddy shows high level whereas in Hyderabad district, resource teachers show high level in academic support and average in social support.

The study of Minke et al8 conducted on the colloborative teaching in inclusive educational setting founds that general special educators working collaboratively in inclusive setting had higher levels of personal efficacy and higher self-ratings of competence and satisfaction in teaching students with disabilities than general educators who taught in traditional classroom arrangements.

The Resource teachers are special educators and they have the knowledge about curricular adaptations, assessments and IEP and the effect of reinforcements for the students with Mental Retardation. Resource teachers came from different disciplines like visual impairment, hearing impairment, mental retardation. SSA conducting multi disability training programmes and they are trying to give the professional knowledge about all categories of disabilities to the Inclusive education resource teacher. Then it will be easy for him to deal with all the students with disabilities. But quality and quantity of these training programmes should be improved by SSA. Then only the successful results come through inclusion.

" The adequate supervision is also needed on these inclusive educational programmes by the authorities of SSA.

The other objective is to find out the emotional support system available in primary schools for the children with Intellectual impairment.

The results show that the emotional support given by the peers of children with intellectual impairment shows high level in the primary schools of both districts of Hyderabad and Rangareddy. The findings of the study supports the study of Gregor and Forlin9 who conducted study on the attitude of the students towards peers with disabilities, the result show that there is an increased acceptance of students with disabilities by their mainstream peers.

Judith, Tamura10 have conducted a study on Effective social interaction strategies for inclusive setting. Interactions and social skill strategies for use with children with and without disabilities for the purpose of increasing social interactions between children with and without disabilities in educational setting.Rebecca11 conducted a study and found that Latina girls were more favourable towards children with disabilities before and after the intervention.

The fourth objective is to find out the level of physical support system in inclusive setting to the children with intellectual impairment. The questions based on under different categories like:

" Toilet facilities and sanitation
" Mobility support
" Barrier free environment.

The above points are very important for the students with disabilities to cope up within the inclusive setting. If all the supports and facilities related to infrastructure and physical environment in the school are provided it will be more accessible for the students with intellectual impairment which leads to success in inclusive setting.

The results show that both in Rangareddy and Hyderabad districts show low level of physical support. In Toilet and sanitation facilities, only two schools have aaya facility that provided by the school headmaster at his personal interest and pay but SSA is not providing this facility.

In mobility the schools show the average level of support and only some of the schools have ramps without railings. In some schools only, the class rooms are adequately wide for moving wheel chairs. There are no directional arrows in the schools.

In barrier free environment, total sample shows low level of support. In many schools drinking water and electric switches are not reachable for the students with intellectual impairment. The physical support system is not adequate in the primary schools of Rangareddy and Hyderabad.

SSA is now concentrating to construct the school buildings with ramps and other facilities like toilet and sanitation and with barrier free environment in the primary schools. But it will take some time and they should do the effort quickly and effectively. Then only the aim of universalization of elementary education fulfils successfully and we get the fruits of inclusion.

The major findings of the study are:

" In academic support system, among the regular teachers of both Rangareddy and Hyderabad districts, 52.25% and 73.91% of the sample show average support, 40.74% and 21.73% of the sample shows high level of support respectively.

- In social support system 62.96% and 65.21% of the samples show average level of support and 37.03% and 21.73% of the sample shows high level of support.
- In academic support system resource teachers shows 84.60% and 60.66% of high level of support and 15.38% and 33.33% of average level of support respectively.
- In social support system 84.6% and 37.50% of the sample shows high level of support and 15.38% and 55.33% of the sample show average level of support.
- In emotional support system 100% and 93.33% of the sample show high level of emotional support.

Limitations of the study

1. The findings of the study cannot be generalized because the size of the sample is small.

2. If the questionnaire was prepared in multiple choice type questions or open ended questions then there will be possibility for getting accurate data.

3. If the researcher took the combined sample of private and government schools then it will be better.

4. The study is done only for the students with intellectual disability if the researcher took into consideration of other disabilities, then the study will be very meaningful.

Recommendations

Research study should include children with different disabilities such as hearing impaired, visual impaired, orthopedic handicapped, multiple disability, children with behavioural problem, learning disability and others.

Research study should include all the Government schools up to high schools.

Research study should include all the private and government schools with inclusive setting.

References

1. Coates Peer acceptance of included students with disabilities as a function., The journal of special education, vol.33,p50-61 1989.

2. Fox and Yesseldyke Fox N.E &Yesseldyke J.E (1997) **Implementing inclusion at the middle school level,Lessons from a negative example, Exceptional children**,64,81-98, (1997).

3. Gregor and Forlin The search for a model of effective inclusive practice through the Inclusive school,British journal of special education,32(1),42-45India 2005.

4. **Judith, Tamura. The special/general education integration initiative for students with specific learning disabilities : A "snapshot" of program change, Journal of learning disabilities**,27,435-53, 2007.

5. Kapp Inclusive teacher's attitudinal ratings of their students with disabilities .The journal of special Education,vol.40,p230-238, 1994.

6. Minke et al Integrating students with disabilities in Hong Kong, classroom teachers attitudes and beliefs, Journal of International special needs education ,p 7-11, 1996.

7. Motshekga Effective teaching in inclusive classroom. The University of New England,Armidale,NSW2351,Australia, 2010.

8. Rebecca A study on the importance of awareness and communication for the inclusion of disabled students with life-limiting and life threatening conditions in mainstream schools, British journal of special education,33(1),15-17,2007.

9. Sarva Shiksha Abhiyaan - Education For All,Guidelines of the government of India, 2002.

10. Soodak, podell and Lehman cultural perspectives on the effect of cultural attitudes towards inclusion for children with intellectual disabilities ,International journal of Inclusive Education,vol.8,p311-28, 1998.

11.Stephanny,Freeman,Alkin,MarvinGetting along with classmates in regular schools, Areview of the effects of integration on the development of social relationships. International Journal of inclusive education,vol12,p-47-61, 2002.

Address for correspondence and details of authors:

Jayanti Pujari[1], Ph.D.

M. Annapurna[2], M.Ed. (Spl Edn).
Reader and Principal [1], Consultant Special Educationist[2]

Department of Special Education, Sweekar Academy of Rehabilitation Sciences, Secunderabad, A.P., India 500009.
E mail: jayantipujari@gmail.com

Participation and restrictions in a teenager with Down Syndrome: A nine year follow up case study

Case report

Asha chitnis, Reena Mody, Gajanan Vithalrao Bhalerao, Sujata Noronha, Madhavi Kelapure, Kruti Shah

Introduction

This is a case report of Aadyant, a child with Down syndrome[1], across his life so far from age 8 to 17 years. Although Aadyant (name changed) had a sound immediate postnatal period, he was diagnosed with Down syndrome at birth. He suffered from convulsions at the age of six months. He had subluxation of the Right Hip joint. Being the only child of his parents, his family wanted to give him the best possible medical care, and they started therapy for him immediately.

Abhyant at the age of eight

Abhyant was brought to our therapy centre by his parents with the chief concerns of inability to sit, stand, and walk. He would try to assume sitting from a lying down position with assistance of a caregiver. When assisted to sit (against a wall or furniture), he could maintain sitting for a few minutes under supervision. For mobility he had to be carried manually or in a wheelchair.

He was completely dependent on parents for feeding, bathing, and toileting.

Abhyant demonstrated poor ability to reach for and grasp objects with either of his upper extremities. Bi-manual and bilateral tasks were also extremely difficult. He also disliked the sensation of anything in his hands. Abhyant had difficulty eating solid foods and he was fed puréed food. He had very poor verbal as well as non-verbal communication skills. He did not participate in any kind of symbolic or imitative play.

Abhyant showed a decreased ability to regulate his physiological arousal in the environment and great difficulty modulating himself to task and place. Abhyant was usually up-regulated and showed clapping, mouthing, rocking, and at home, screaming as self stimulating behaviour. He had a poor ability to visually focus and orient himself to the environment. His hearing was found to be within normal limits. He showed poor somatosensory, kinaesthetic, and proprioceptive awareness throughout his body. Abhyant's general understanding was poor for his age, and his cognitive abilities were challenged.

In the neuromuscular system, he had difficulty in recruiting postural muscle activity. Abhyant could initiate postural muscle activity in sitting better than he could in standing but had difficulty sustaining it. His alignment and ability to sustain posture was poor in vertical postures. He could perform concentric and to some extent isometric muscle work, but he had extreme difficulty performing eccentric muscle work, with the trunk more affected than the extremities, and the lower extremities more affected than the upper extremities. Abhyant demonstrated decreased co-activation of abdominal and back extensors, thus making it hard to assume and maintain vertical postures. As for the musculoskeletal system, he had poor strength generally in all postural muscles of the body.

As per the scales of evaluation, Abhyant scored 13.59% on the Gross Motor Function Measure (GMFM). He was on Gross Motor Functional Classification System (GMFCS)[2] Level V, as he was transported in a manual wheelchair. His Functional Mobility Scale (FMS) scores were 1, N, N; as he could barely stand for transfers and could not walk when supported for a distance of 50 and 500 metres respectively.

Abhyant had a family that was financially and emotionally strong and devoted to his progress. In spite of his immense problems, his hearing was normal, and he did not have additional associated health problems such as heart defects. His parents wanted him to sit on his own and at least walk inside the house with minimal support. Unfortunately, due to his physical impairments, cognitive and social development, were not given a major priority by the family.

Key components of Abhyant's intervention plan

His therapist followed a specific treatment program based on Neurodevelopmental Treatment Approach[3]. This approach is directed not only towards physical independence, but it also targets child's emotional, social, sensory, perceptual aspects so that he or she becomes an active member of the society and can fulfil his duties like any other individual. Treatment by the approach does not stop at achieving physical improvement; but assures that the child is able to use the same to accomplish his age- appropriate roles and occupational performance[3] . He also participated in a speech therapy program from the age of one year on and off until about age seven.

Strategies were designed to organize and modulate the behavioural responses in his environment and were targeted towards specific impairments of the sensory, neuromuscular, and musculoskeletal systems to improve his postural control, strength, and graded mid-range control using functional activities. He had one hour of therapy five times a week. During his therapy intervention, specific home activities were given to enhance motor learning.

Working on Abhyant's regulatory system

At the beginning of each treatment session, an optimum arousal was pre-requisite for Abhyant to follow and actively perform all further activities. When he came in for each session, he showed self- stimulating behaviour (clapping, screaming, or rocking) with poor attention to activities. We started with vestibular and proprioceptive input. This was done by using suspended equipment such as the platform and bolster swing. We also used vestibular and textured balls to give him whole body compression. Wrapping him in textured mats and applying vibration also helped to calm him down. These activities also allowed him to slowly accept therapeutic input. They were combined with visual and auditory tracking and focusing using appropriate toys. This combination assisted him with regulation of his arousal and improved attention, which in turn helped to engage him in activity, follow commands, and achieve better postural muscle sustaining during activity.

Improving Abhyant's gross motor function

After working on his arousal, the next step was to improve his gross motor function. He then worked on a larger ball to address his system impairments and his posture and movement goals. On the ball, we worked for sustained isometric contractions of the trunk extensors to improve postural control. We worked for proximal stability by asking him to push bolsters in front of him to facilitate sustained isometric contractions of the shoulder girdle muscles and activation of hand muscles to work for grip later. In prone, he was given elastic bands to pull. From prone, he was placed in sitting on the ball, and we worked for sustained sitting with hands pressed on the ball and reaching in different directions to incorporate rotation. The movement of the ball activated his vestibular system and allowed him to work for balance as he learned to anticipate and correct his posture accordingly.


Obstacle crossing training over bolster

Abhyant worked on a bolster swing that was slightly tilted to improve alignment and to sustain his postural system. We worked for forward weight shifts and loading of the feet to initiate standing as he achieved sustained co-activation of the trunk muscles and concentric work in the lower limbs. Stand to sit facilitated eccentric control of the gluteals and quadriceps. Sitting or standing with hands holding the chain in front of the bolster encouraged sustained grasp and symmetrical posture. To assist him to transition from the floor independently holding on to furniture, we incorporated the above movements, simulated in the clinic by using an appropriate height bench. The transitions required frontal and transverse plane movements with isometric and eccentric contractions of the trunk and lower extremities as he moved stand to floor, and concentric intra-limb dissociation, which is necessary to further his gross motor skill of ascending and descending stairs.

In standing, we worked for sustained postural control and balance on moving support surfaces, incorporating heightened vestibular and tactile system input. We worked for step standing with one leg on a tilt board or bolster to facilitate inter- and intra- limb dissociation and reach forward to ascend the tilt board. We later incorporated this movement into stair climbing. Placing a squeaky toy underneath his feet gave him auditory feedback when he pressed his leg down. We worked in standing, asking him to place a foot on specific colours of a mat to facilitate stance and swing phase of gait. We facilitated kicking a ball or crossing obstacles, helping to elicit single limb stance, which is required for assisting in lower body dressing.


Using the tilt board for weight shifts

Working simultaneously on the motor and sensory systems

At every point during the intervention, meaningful sensory information was a part of the strategies to improve his motor function. His visual, auditory, tactile, and vestibular-proprioceptive systems were engaged as appropriate. As he achieved sitting, we challenged him by having him sit on movable surfaces, i.e. a platform swing with feet on a textured surface for tactile input with his feet forming part of his base of support (BOS). We engaged him in activities such as tracking light and sound objects, teaching him directionality, and we practiced balancing to allow him to develop anticipatory balance. Activities such as sit to stand were done on various heights and textured surfaces so that he had to use his muscles in different ranges and perceive height, depth, and texture.


Use of suspended equipment

Progressing towards mobility training

Mobility involved working on the movement system as well as posture. First, we assisted him to achieve antigravity control of his posture. That assisted him to achieve vertical postures such as supine to sit. He also worked on mid-range and end range activities to improve eccentric control of the trunk and lower extremities. Activities such as one leg standing, stepping up and down on different heights, and partial squats were very helpful. Assisted walking on slant surfaces such as wedges, walking through a course of obstacles, and climbing a series of steps

with varying heights enhanced the strength and control of his lower extremities and also facilitated use of his vision for orientation and height and depth perception. Practice through repetition was essential to ensure motor learning.

function
Communication training: saying 'yes'

Fine motor function and cognitive-perceptual training

As Abhyant improved with his gross motor function, we designed tabletop activities for him to encourage reach and grasp. We used textured grains, theraputty, elastic bands, and objects such as spoons, glasses, and plates to enhance his fine motor function.

Abhyant is a visual learner and enjoyed playing with flash cards, colours, and pegboards. Picture flash cards and action cards were used to improve his visual memory and sequencing. This also helped teach him communication skills, although he needed assistance to point with his fingers. As Abhyant understood colours, we used colour coding - green for yes and red for no to teach him to express his likes and dislikes.

While still at the age of eight, as his physical activity improved, he started standing with support. His orthopaedic surgeon felt this was the time to re-locate his right hip surgically without fear of the femoral head subluxing again. He had corrective surgery at eight years and plate removal at the age of nine.

Abhyant at present

Today Abhyant is 17 years of age. He is a sweet teenager who greets everyone he is familiar with. Occasionally, he exhibits bouts of shouting or screaming when he is excited or angry. He can attain sitting from supine independently, can maintain sitting and can also raise himself to standing by pushing on furniture or floor. Abhyant can walk independently in his house from one room to another but needs supervision because of poor directionality4. Abhyant can walk on level surfaces in the home environment but cannot cross or manoeuvre around furniture, objects, or people in his way. In the community, he needs one hand held for walking. He needs minimal assistance to get in and out of a car and to ascend stairs but needs maximum manual assistance to descend stairs because of poor eccentric control and depth perception.

As for fine motor functions, Abhyant can reach for objects with minimum help (he requires manual assistance to move his hand in space), and he has poor mass grasp. Although he needs help for feeding, he takes part in the process by trying to hold a thick spoon and taking his hand up to his mouth. He has also initiated taking part in ADLs like dressing, undressing, bathing, and toileting. He interacts with or greets people he knows well. Abhyant can identify known flash cards. He can scan alphabets, numbers, and cards. He shows good visual memory and sequencing skills. For example, Abhyant can recall phone numbers and spelling of objects once shown.

On standardized scales of functioning, Abhyant scores 42.89% on the GMFM and is on GMFCS3 Level III. On the Functional Mobility Scale, he scores 5, 5, 5 (with breaks); as he can walk distances of 5, 50 and 500 metres with help of another person and needs a rail for stairs. Thus, Abhyant shows considerable improvement in his function and mobility.

Schooling and social participation

Abhyant attended a special school for a few years but had to discontinue due to difficulties of transportation, adjustment of his schedules to school timing etc/ His social development and interaction with peer groups were also affected.

Cultural barriers and contextual factors

Over a period of nine years, Abhyant has shown improvement in his functional abilities and mobility. he still has some limitations of participation in society. He has difficlulty sitting on the floor for family functions, eating, prayers. Toilets are not accessible and designed for people with disabilities in the community. Transportation facilities are not accessible for people with disabilities. Public places like shopping malls and restaurants have poor accessibility, lacking wheelchair ramps and separate elevators with poor infrastructure and space. This situation brings a big challenge for Abhyant to be able to perform his duties like any other citizen.

Abhyant still has a long way to go and we continue our efforts to treat him to:

1. Improve basic life skills such as eating with a spoon and holding a cup to drink water and basic dressing/ undressing for toileting
2. Be able to communicate his basic needs using gestures, pointing, or using an iPad
3. Ascend and descend stairs with minimal assistance and assist in car transfers

Summary

Abhyant, through a span of nine years, has gained functional abilities. Nevertheless, he is still dependent on caregivers for certain tasks at home as well as for outdoor ambulation. The focus of his abilities now needs to be participation in home and community to the best of his abilities. We are working towards current functional outcomes with the ultimate goal of improving the quality of life in his adulthood.?

References

1. McClure HM, Belden KH, Pieper WA, Jacobson CB. **Autosomal trisomy in a chimpanzee: resemblance to Down's syndrome**. Science. 1969; 165(3897):1010.
2. Palisano R, Rosenbaum P, Walter S, Russell D, Wood E, Galuppi B. **Development and reliability of a system to classify gross motor function in children with cerebral palsy.** Dev Med Child Neurol. 1997; 39(4):214-23.
3. Case-Smith J, Frolek Clark GJ, Schlabach TL. **Systematic review of interventions used in occupational therapy to promote motor performance for children ages birth-5 years.** Am J Occup Ther. 2013 Jul-Aug; 67(4):413-24. doi:10.5014/ajot.2013.005959.
4. Bull MJ; Committee on Genetics. **Health supervision for children with Down syndrome.** Pediatrics. 2011 Aug;128(2):393-406. doi: 10.1542/peds.2011-1605. Epub 2011 Jul 25. Erratum in: Pediatrics. 2011 Dec; 128(6):1212.

Address for correspondence and details of authors

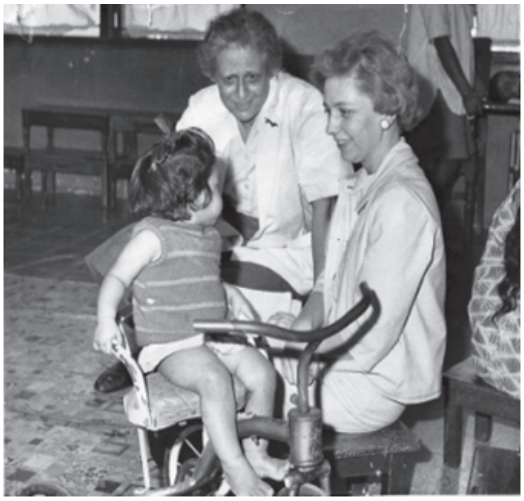
Asha Chitnis *MPT,*
Vedanta Paediatric Centre, Mumbai, India.
ashachitnise@yahoo.com
Gajanan Bhalerao *MPhTh, Assistant Professor*
Sancheti Institute of Physiotherapy, Pune, India.
gajanan_bhalerao@yahoo.com
Sujata Noronha BPT
Vedanta Paediatric Centre, Mumbai, India.
sujata.noronha@gmail.com
Madhavi Kelapure *BPhT*
Consultant in Paediatric Physiotherapy, Deenanath Mangeshkar Hospital, Pune, India.
mkelapure@gmail.com
Reena Mody *BPTh,*
Vedanta Paediatric Centre, Mumbai, India.
reenumody@yahoo.co.in
Kruti Shah *BPTh,*
Vedanta Paediatric Centre, Mumbai, India.

Dr. P K Mullaferoze

Motivational biography

(3rd October 1910 - 24thNovember 2008)

It is an attempt to share the life and work of Dr. PK Mullaferoze
to take a leaf out of noble and far reaching work and to create similar models which could address the total needs of children with cerebral palsy and their families.



Albert Einstein paying tribute to Gandhiji's life and work said, 'future generations would scarce believe that such a man like him walked on the face of the earth in flesh and blood '. In the similar context one can say future medical fraternity would scarce believe a person like Dr Perin Kavas Mullaferoze indeed lived and could with such passion, perseverance and purpose kindle and create a team, an Institution, a unique model for management of Cerebral Palsy at Mumbai in India and the first of its kind in South-East Asia.

She who 60 years aged addressed the needs of the children with cerebral palsy, developed multiple facilities a multi speciality for a team just in her 5th decade of life when there was no awareness in society about CP and hardly any knowledge amongst medical fraternity, more so when resources were meagre and people were not interested to join the field, thought it is not a green pasture to work, developed an institution of par-excellence - the Children Orthopaedic Hospital (COH) in HaziAli, Mumbai.

Dr. Mullaferoze sowed seeds of uncompromising care for habilitation and rehabilitation of children, created an Institution- the Cerebral Palsy Unit in Children's Orthopedic Hospital where for more than 50 years the children and families from Mumbai, different states of India and abroad got guidance, support and strength, were holistically managed by the team she created to enhance their function and quality of life.

Dr. Mullaferoze was born on 3rd October 1910, at 127, Cumballa Hill, Mumbai to Kavas and Tehmina Mullaferoze. The family was poor. Dr. Mullaferoze was a sickly child, had fevers very frequently, was educated till 4th Std. at home in Gujarati. Then, she did her schooling from Queen's Mary's School,Byculla, Mumbai. She became Head Girl of the school. She then studied at Elphistone college, Mumbai where she was an Inter-college Badminton Champion also.

She passed M.B.B.S. in 1935 from Grant Medical College and J.J. Group of Hospitals, worked as a House-Surgeon (the first woman House-Surgeon under Dr. S.J. Mehta at J.J. Hospital for one year. She then went to England and did the L.R.C.P. and M.R.C.S. in 1937 and then F.R.C.S. (England) in 1940. Subsequently she returned to India. She was offered post at All India Institute of Medical Sciences and Lady Hardinge Hospital but she declined and joined the Cama Hospital as an House Surgeon.

From 1943-1947 she offered her services for the Army. In May 1943 she joined the Indian Army Medical Corps as a surgical specialist with the rank of Major during the World War 2.

In March 1946 she was appointed Officer-In-Charge Surgical Division with the rank of Lt.Colonel. She worked in Alipore, Asansol, Ranchi, Dacca and Batavia (Indonesia), in extremely difficult circumstances, overcoming personal health problems. At one point of time in a span of 2 months she performed 530 surgeries. The recommendation of the superior Officer was O.I.C. 'Surgical Division- Skill and organizing ability of a higher order, sound diagnostician, skilful operator, unlimited capacity for hard work, excellent teacher. In administration of her Division, she showed firmness and ability. I can confidently recommend her for a surgical appointment at a teaching hospital'. She along with 3 doctors managed the 1,500 bedded surgical division in Dacca(77 IGH).She worked in Alipore and Asansol 1 year; Ranchi and Dhaka 3 months .

In 1947 for her medical services during the world war she was awarded a Military- 'Order Of The British Empire'.

In 1947 she returned to Cama Hospital, in May 1948 was appointed Hon. Asst. Surgeon, J.J. group of Hospitals. In Jan. 1950 she was appointed as Hon. Asst.Orthopedic Surgeon at J.J. Hospital, when Orthopedic department got started with Dr. Parmar as Head. She became Hon. Orth. Surgeon in November 1952 when Dr. Parmar retired.

She joined the Children's Orthopedic Hospital (COH) as Hon. Orth. Surgeon along with Dr K.T. Dholakia,working under Dr. M.S. Keni. She was later appointed Hon. Officer-In-Charge in 1953. She became Medical Director and Chief Orthopedic Surgeon of COH from 1956.

She took great pains and worked relentlessly to upgrade the Hospital and provide the best facilities for the patients. Initially she dedicated all her

expertise as an Orthopedic Surgeon in the treatment and prevention of Poliomyelitis and Congenital deformities. From 1956 children with Cerebral Palsy at COH showed a phenomenal rise and Dr. Mullaferoze felt a proper well co-coordinated set up of professionals was the need of the hour.

To learn more about Cerebral Palsy she travelled far and wide, saw the work of Bobath and Eirene Collis(U.K), Prof. Guy Tardieu (France), MilaniComparetti (Italy), Dr.E.Kong, Dr.U.Aebi (Switzerland) Dr.H.Narabayashi (Japan).

In 1962 she visited with Ella D'Souza (Physiotherapist) centers of excellence working for Cerebral Palsy in the USA for 2 months, in an exchange of persons programme sponsored by Department of Health, Education and Welfare, Washington D.C., Institute of Rehabilitation, New York and State Rehabilitation Hospital, West Haverstraw(Residential) were visited.The emphasis on team approach, interacting at meetings, case discussions which were held regularly to evaluate and plan the treatment programme of each child impressed Dr. Mullaferoze. She liked this approach where each staff member's contribution and evaluation was duly considered.

In 1963 at COH the pilot project of Cerebral Palsy unit got started. On 1st January 1969 the first fully staffed Cerebral Palsy, the first of its kind in India and South-East Asia took roots because of vision of Dr. Mullaferoze. In a short time it became a model Institution where Cerebral Palsy children got the best care from a dedicated team under Dr. Mullaferoze's guidance, for all in India, Asia. Even families from abroad, far and wide came for their child's treatment.

In COH there were paediatricians, ophthalmologists, ENT doctors, orthopadic surgeons, neurologists, psychiatrists, psychologists, visiting physiotherapists, occupational therapists, speech therapists (with special acoustic rooms and audiometry), medical social workers,special educators, orthotists, prosthetists and , visiting dermatologists. There were places for hydrotherapy, plaster rooms, surgery, dental dept. There was a special day for taking clinical photographs initiated by Dr. Mullaferoze.

She was among the first 6 doctors who were instrumental in starting Bombay Orthopadic Society

She was very strict and her focus was the growth and development of the child and well-being of the family. The problems of children with disability touched the core of her heart. The rich and the poor all got her equal attention and care.

She started counselling sessions and subsequent re-assessment sessions for monitoring the child's progress with her whole team of therapists, psychologists, social workers, special educators. She emphasized detailed documentation, and wanted her staff to be precise and thorough in their documentation and wanted the files neatly written. She started Brace Clinics and case conferences and aimed for high standards.

She wanted those working for children and for the Institution to give their best. She used to challenge her therapist, inquiring, probing and taking them to greater heights of excellence. She wanted them to see different Institutes and broaden their horizon.

She instilled a sense of hope, promise and compromising care. She gave insights that were simple, practical and meaningful for families.

She innovated splints, surgical techniques, adopted phenol technique to reduce spasticity. Those who saw her operating have found her extremely methodical and quite tender in handling tissues.

She wanted aids and appliances in the neatest of condition; in fact there was a special shoe-shine day for those who were admitted in the wards.

She would personally taste the food that would be served to the children in the wards. She would readily admit a child in the wards when they had to come for therapy from too long a distance.

She would encourage therapists to make children as independent and functional as possible and would just facilitate a little to do their activities of daily living themselves.

She would share insights as to how she attended a conference internationally which was totally organized by persons with Cerebral Palsy.

She would go out of her way and help those who were poor and those children who needed nutritional supplements and families who needed conveyance help but to those who were really motivated and showed involvement in the treatment of their children.

She would take feedback from the social workers of the families. She would counsel and speak to their families who are regular and involved in the care of the child. She used to ask them to work whole heartedly with dedication or leave if they worked haf heartedly.

She would write compassionate letters to employers/work places from where the father-mother had come for treatment for their child which are situated far away from Mumbai and suggest for longer leave or if child needed long term care, even transfer of job.

She wanted her staff to link up with doctors of other hospitals if they were referred for an opinion there.

She also encouraged the teachers (special educators) to start a school for Remedial Education-a first of its kind, a school for children with learning disabilities, a school on the Hospital campus. Many children attended therapy and attended school simultaneously. Because of the trust the school created even many final exams of children studying in other schools, but admitted at COH for treatment were taken at the Hospital.

She could speak fluently in 5 languages i.e. English, Gujarati, Marathi, Hindi and Konkani.

She also conducted regular courses for therapists and doctors, held seminars and wrote several papers on Cerebral Palsy which she read at National and International Conferences. She would be heartened if some Cerebral Palsy services started in small town/city and would enthusiastically ask how these centers are running. She felt that there should be centers of excellence for Cerebral Palsy in most cities and towns and they should have satellite/ peripheral centers and all should reach out to rural areas.

She motivated parents to come together and have support groups, and write their accounts to motivate other parents.

Children who grew up always came to thank her and meet her over the years. When you touch lives at such a level it is bound to leave with a sense of satisfaction.

Dr. P.K. Mullaferoze's vision, sincerity, dedication, tenacity and zeal to serve and ameliorate the problems of children with cerebral palsy and other disabilities is indeed beyond measure, beyond words.

She lived simply, was a very private person, never married kept a low profile. She was an avid reader- of books-fiction, history, and life's of people, abhorred the television, was a lover of animals.

She was a champion of nobility of the medical profession-blessed are those who were treated by her and those who trained under her. Her passion and intensity transformed the lives of patients, families and medical people who trained with her.

She was elected Fellow of the British Orthopadic Association in 1963. She was the only Indian member of the World Commission for Cerebral Palsy. She was selected as a special member of the International Cerebral Palsy Society (ICPS) and attended the first Congress of ICPS held at Arhem, Netherlands in 1971.

She retired in 1985, but continued to work in advisory capacity till 1995 when she gave up due to health reasons. She after a brief period of illness passed away at Bombay Hospital, where her immediate family of Dr's Bharucha had got her admitted. She passed away on 24th Novembor 2008.

The Indian Academy Of Cerebral Palsy (IACP)has indeed given a fitting tribute to Dr. Mullaferoze by observing her birthday (3rd October - the week) as National Cerebral Palsy Day/ week and that she was made the Founder President of IACP to which she reluctantly agreed apprehending the commercialization of the medical service. Our collective responsibility lies in creating holistic models like the one Dr. Mullaferoze created so that at one place most of the needs of children with cerebral palsy are addressed and met, the wellness of families and care-givers gets enriched. It was such a rare coincidence that the first national Cerebral Palsy Day observed by the IACP was Dr.P.K.Mullaferoze's centenary year.

May we carry on the work that she lived for all her life, the flame of Cerebral Palsy care that you lit, we should with similar passion and intensity nurture it and see that it keeps illuminating brightly so that it can to touch the lives of children and families and then pass it on to the next generation.

Insights of Dr. PK Mullaferoze

Always at the back of my mind was there, how much good I can do.

To do good is my Religion.

Make therapy for children fun and functional.
Be simple, try and do things with your hands, and improvise.

Work with passion, pay attention to the smallest details so that the whole picture will have order.

Listen to the silliest complaint of the patient, a good medical history is half the battle won, and also the family's heart.

Make your children meet the challenges of daily living, do not handle them like glass, take care but teach them how to fall and rise.

Simplify things, the most illiterate and rural person should understand what you are saying and want to carry out.

Do not use too much gadgetry, a clean bed, a clean bed sheet, healing hands and a committed heart is what is needed.

Do not make money for the Institution by dragging on therapy, call families till a point where you attain optimal functionality.

Treat children in the context of their cultural situations, work with things of the earth, the mud-grass, sand, water.

Be informed, read, travel and see different centers, broaden your horizon, but then leave the book and read the child.

Work in harmony as a team to give best to child with cerebral palsy and the families.

Be meticulous, be intense, do not be mediocre and do things half way, get involved totally or not at all.

Parents should not lose heart, lament at the lack of services in their cities. Create a team after learning from experts here. I too am a battle scarred soldier, let us confront the system and create a better future.

Hospitals should be accessible, never high rise, spacious for walking-non slippery, wheel-chairs/trolleys can easily move and there should be ramps.

Hospitals are the mandir, masjids why our politicians do not want to work deeply for the sick and needy.

Anecdotes

- I believe (though you may confirm with Dr. Chawara) she had applied at JJ Hospital for the post of Orthopaedic Surgeon, but was not called for the interview !!!! She went anyway. At the end of the interview, she walks in and asks the interviewers why she was not called. She was told that being a lady she would not have been able to handle car loads of patients that were expected at the hospital emergency. She promptly replied "I am use to treat train loads of patients". She got the job.

- She had an imposing personality and people were awed by her presence. Some were scared, some were honoured, some were unsure of her reaction, but everyone wanted her attention. She instilled an army like discipline in COH where the wardboys had to salute with their arm horizontal and not half heartedly.

- A child with Koch's spine was admitted one afternoon when I was a resident. The next morning she asked me if the 1st dose of Inj. Streptomycin has been administered. I had not been able to and got slapped for it. I thought of an excuse and said I would put in an indent for it immediately. That's when she told me she had kept a sum of Rs. 5000/- from her personal money for any delay in management. The medicines were to be bought with that money at any time of the day or night and she would be re-imbursed whenever convenient. The Matron was also her blasted for not informing of this arrangement. That was the kind of dedication she had to her patients.

- She would bully everyone in the department, but was actually hoping to improve performance, and change their way of thinking and approach to a patient. She was very conservative in her views regarding treatment options, and took a long time to accept surgery as a frequent option in treatment of cerebral palsy.

- Her association with Dr. Mrs. Gulbanu Premji helped bring up the institution, as the doctors and management were friends and got things done, not stalled at every step.

- She tasted the food given to the inpatients everyday (non-veg. and veg.) and would have an entire batch thrown away if she thought it was not fit for consumption. The matron would always ask resident doctors if they wanted more food, as she was instructed to see that they do not go hungry.

- "British" style tea was served with a kettle covered with a Tea Cosy, milk and sugar separate, in a tray covered with a cloth to keep the flies away.

By: ***Dr. Rakesh R. Bhansali***
Orthopededician
Cerebral Palsy Unit In Charge at COH,
He took charge from Dr. PKM.

- Dr. Mullaferoze was of an international repute. Dr. W.J. Peacock when conducted second time workshop in NIMS Hyderabad, in 1989, he made it sure that he would meet Dr. Mullaferoz (first time). He indeed met her in Mumbai while returning to USA and was highly impressed with her.

- She was quite skepticalregarding various surgeries being developed for CP. She use to say these surgeries just enjoy honey moon period, after wards keep dragging because nothing else is available. So was her doubt about SPR and therefore invited me to discuss about it. She participated in the discussion during CME and perhaps understood the fact that reduction in harmful spasticity might help to improve the child's disability .

- I was highly impressed with her lifelong dedicated services to children with cerebral palsy. Therefore, I wanted her to be the founder member of the IACP, I with the help of Dr. Fatema Jetpurwala could convinced her. She did sign. But, wanted to withdraw looking to her doubt about commercial aspect of various associations. We at her home again tried to convince, but she remained skeptical. I am sure today her soul will feel happy to see the growth and advancing services of the Academy.

Dr. AK Purohit

A few Papers/ presentations by Dr. Mullafroze

1. Diagnosis of Cerebral Palsy, E.P. Bharucha, P.K. Mullaferoze at 1st Asian Pediatric Congress- Delhi 1961.
2. Cerebral Palsy, at the Pan-Pacific Rehabilitation Conference, Tokyo; April 1965.
3. Surgery in Lower Limbs in cerebral palsy, P. K. Mullaferoze, P.H. Vora; 1969.
4. R.J.Katrak Oration -Western India Regional Conference at Bombay; December 1974.
5. Needs of the child and team approach towards the management with special reference to India, read at the International Cerebral Palsy Society Conference, New Delhi; Nov. 1977.

Summary of some of the papers cited above

3.

Surgery in Lower Limbs in Cerebral Palsy
Dr. P. K. Mullaferoze, Dr. P. H. Vora, 1969.

Surgery in lower limbs in cerebral palsy Dr. Mullaferoze medical Director and chief Orthopedic surgeon and Dr. P.H. Vora asst. Orth. surgeon. Paper is the research project of CP unit, demonstration and research centre, report of 1953 to 1969,230 operations on 93 children with spastic cp. Age 3 to 14 analysed and their results evaluated, follow up ranged from 1 to 17 years. An attempt is made to give aims and indications for surgery in these patients. Short descriptions are given of the more commonly performed operations with their rationale. Over the years how selection of the operative procedures changed and which deformity to tackle first in a patient with multiple deformities is discussed. Very good results in 12(very good meaning walks independently and confidently without aids, in 51 there were good results (good meaning walks independently with crutches,21 fair (fair meaning walks but needs orthosis and aids, 9 poor(meaning slight or no improvement). There was satisfactory improvement in those who were mentally challenged if adequate pre and post op training is given, supervision done and parents take interest. If patient becomes ambulatory it solves many problems as wheelchair living is not compatible in the Indian scenario. Periodic check-ups, counselling needed, in the language the parents understand.

4.

Dr. R.J. Katrak Oration 1974
Delivered at Western India Regional Orthopedic Conference, Bombay 1st December 1974.

In the Dr. Katrak Oration Dr. PK Mullaferoze reported about the work done from 1953 to 1973, 6500 children with cerebral palsy were seen.139 underwent surgery, majority in the lower limbs. Pre- op PT/OT/Speech therapy was performed for 3-6months.

Besides surgeries mentioned in the first paper at Ankle also transfer of peroneii done, lengthening of extensor tendons and anterior capsulotomy, at Knee semitendinosus transfer to anterolateral aspect of lower end of the shaft of femur, hamstring release

Hipsurgeries done 75, 17 unilateral, 29 bilateral. at knee94 surgeries 12 unilateral, 41 bilateral.at ankle 173 surgeries, 61 unilateral and 56 bilateral. Thus a total of 342 surgeries, 90 unilateral and 126 bilateral.

Team approach was emphasized, doctors from different disciplines (even dental surgeons) therapists, nurses, social workers, special educators, vocational guidance persons should be on the team. Home visits of social workers were encouraged, and repeated counselling done. We are not doing treatment, but we are doing training. Therapists who are trained in the treatment of cerebral palsy are absolutely necessary. Surgery should enhance overall function; person should improve as a whole not just that part that was tackled. Comprehensive assessment by team is needed before surgery.

5.

Needs of the cerebral palsy child and team approach towards the management with special reference to India,
International Cerebral Palsy Society Conference,
New Delhi Nov. 1977

Dr PK Mullaferoze stressed on team approach, partnering with parents, working with enthusiasm and coordination. Counselling from time to time and in their language. We have to spread awareness of cerebral palsy, approach early and demand early treatment for the child.

Education should be vocationally oriented and not purely academic. Education should be in mother tongue.

People have to migrate from villages and small towns to cities for jobs that would not be possible for persons with cerebral palsy so emphasis should be on vocation as much as academics. We have to create interest in the medical profession and make them realize that no one specialist can care for all the needs of the child with cerebral palsy and that team work is necessary.

We have to provide better facilities for prevention, and major cities should have centres working for cerebral palsy so families do not have to travel long distances and spend so much money. Efforts should be made to organize a team and evaluate cerebral palsy and guide parents. General hospitals have a team, interest in the subject is needed. An Orthopedic surgeon or pediatrician can take initiative and form a team. We start from zero, but a beginning has to be made.

References/Sources

1) **Cerebral Palsy Unit- Demonstration and Research Centre, Social and Rehabilitation Service,** Washington D.C. Final report; 1963-1970.

2) **Multi-disciplinary Management of Cerebral Palsy,** G.S. Chawra; 2005/2006.

3) Articles by N. E. Bharucha, Ella D'Souza, P. C. Shastri, Asha Dangarwall, Fatema Fatehi 2010.

Acknowledgements

This article is an compilation of articles and thoughts of:
Dr. Dhruv Mehta,
Dr. Nadir Bharucha,
Dr. G. S. Chawra,
Dr. Rakesh R. Bhansali
Mrs. Ella D'Souza,
Dr. P. C. Shastri,
Dr. G.S. Shashikala,
Ms. Asha Dangarwalla,
Dr. Fatema Jetpurwalla,
Dr. AK Purohit.

Fellowships/ Student Scholarships/Awards

1. Early Career Fellowships

The Cerebral Palsy Alliance Research Foundation is offering a new Fellowship in the areas of biomedical, clinical or population health, in partnership with the NHMRC. This Fellowship can be an overseas or Australian fellowship. The Cerebral Palsy Alliance Research Foundation offers a range of grants to support cerebral palsy research and more information can be gained about the Cerebral Palsy Alliance Research Foundation's research priorities on their website.

The successful applicants will have a commitment to and a track record in, research on cerebral palsy. In the case of a part-time Health Professional award, the clinical or Health Professional practice component must be related to, or relevant to, cerebral palsy or related conditions.

The Cerebral Palsy Alliance Research Foundation may call upon fellows to provide assistance with publicity, education and other events. It also requires acknowledgment of its support for the research in any publications or media publicity, and requires a copy of any published articles arising from the supported research. Successful candidates may also have the opportunity to acquire research leadership experience through voluntary involvement in the Cerebral Palsy Alliance Research Foundation.

Details and further information visit their website www.cpfoundation.com.au

2. Student Scholarship

The American Academy for Cerebral Palsy and Developmental Medicine Scholarship Program supports the mission of the AACPDM to improve the health and general status of children and adults with cerebral palsy, developmental disorders and other childhood onset disabilities. Two types of scholarships are offered for each year's Annual Meeting: International Scholarships and Student Scholarships.

The Academy seeks applicants who are full-time students or trainees to apply for this scholarship. Scholarship applicants must be AACPDM members or applicants, and must have submitted an abstract to the Annual Meeting. Scholarship applicants are not required to be the first author on the abstract. Preference will be given to scholarship applicants whose abstracts have been accepted.

3. International Scholarship

The 2014 application will open on December 1, 2013. To qualify for the International Scholarship, applicants must meet the following criteria:

o Be able to speak and understand English to such a degree as to participate easily in clinical discussions.
o Be attending from outside of North America.
o Not have received an International Scholarship within the last five (5) years.
o Be directly involved in research or care of individuals with cerebral palsy, developmental disorders, or other childhood acquired disability
o Have a substantial need for financial assistance to make attendance possible
o Have a university level degree (or country equivalent for their profession) which qualifies them for their specialty, or be in a pre or post doctoral program, residency or fellowship
o Be a current AACPDM member, or have applied for membership in AACPDM

Research Funding Opportunities

The Dystonia Medical Research Foundation (DMRF) encourages and supports research related to the causes, mechanisms, prevention, and treatment of all forms of dystonia, the third most common movement disorder.

Types of Awards Available

Fellowships

A two-year Fellowship is designed to assist post-doctoral fellows establish careers in research relevant to dystonia.

Funding for fellowships is $50,000 per year for two years.

Research Grants

Research grants are available in support of hypothesis-driven research at the genetic, molecular, cellular, systems, or behavioral levels that may directly or indirectly lead to a better understanding of the pathophysiology or to new therapies for any or all forms of dystonia.

Funding for grants is available up to $65,000 per year for 1 or 2 years

Letters of intent for grant and fellowship applications are accepted in the fall, with full proposals typically due in December.

Questions should be directed to Jody Roosevelt at 312-447-5150begin_of_the_skype_highlighting 312-447-5150 FREE end_of_the_skype_high lighting or jroosevelt@dystonia-foundation.org

Conferences

1. 21st World Congress of Neurology 2013

21st World Congress of Neurology, 21 -26 September 2013 in Vienna, Austria. The congress theme is "Neurology in the Age of Globalization". We will discuss the major breakthroughs and developments in the field of neurology - from clinical practice to research and technology. In addition to a top-rate scientific program, there will be many

opportunities for hands-on learning and networking as well as exciting social events. Austrian Society of Neurology, EFNS - The European Federation of Neurological Societies and the World Federation of Neurology (WFN) - For details visit http://www2.kenes.com

2. AACPDM Annual Meeting

Milwaukee's AACPDM Annual Meeting
October 16-19, 2013
Delta Center
400 W Wisconsin Ave, Milwaukee, WI 53203
Further information and details http://www.aacpdm.org

3. World Congress

8th World Congress - 9-12 October 2013
Rhythm and Balance, 8th World Congress on Conductive Education,Munich,Germany

4. International Convention

7th International Convention on Rehabilitation Engineering and Assistive Technology (i-CREATe 2013) August 29-31, 2013
Seoul, Korea
Contact: START Centre
i-CREATe 2013 c/o START Centre,24 Sin Ming Lane, #02-105, Midview City, Singapore 573940 Tel: +65 66943402, FAX: +65 66943403

5. 2nd International Conference Disability Studies

2nd International Conference Disability Studies "The Art of Belonging". The conference will take place October 31 - November 2, 2013 in Amsterdam, The Netherlands.

6. 25th European Academy of Childhood Disability

The 25th European Academy of Childhood Disability three day conference will be hosted at The Sage in Newcastle-Gateshead from10th-12th October 2013.
Further details visit http://eacd2013.org/

7. 21st Conference Asian Federation on Intellectual Disabilities

Samadhan, New Delhi is hosting 21st Conference of the Asian Federation on Intellectual Disabilities towards Dignity and Quality of Life. 7-11 October 2013, Venue: India Habitat Centre, New Delhi, India. Further Details visit www.afid 2013.in

Course

NDT/Bobath Certificate Course
in the Management and Treatment of Children with Cerebral Palsy and
Other Neuromotor Disorders

Paediatric Therapy Services, Mumbai, India and Paediatric Neuro Rehab Centre, Goa, India, Mumbai

Course Dates: 16-9-2013 to 30-10-2013
Course Instructors: Ms. Jane L. Styer-Acevedo, PT, C/NDT CI,Lezlie J. Adler, OT, C/NDT, Mrs. Monica M Wojcik, SLP, CCC-SLP, C/NDT

Course Contact:
Dr Medini Padhye
Phone: 9122 23885181
paeds_ndtc@yahoo.co.in

International Conference

"Developmental Pediatrics and Childhood Disability in 21st century -A New Beginning with Innovative Approaches"
18th December to 20th December 2013
&
A Pre- conference Workshop on
"FUNCTIONAL CLASSIFICATION OF CEREBRAL PALSY : UTILITY IN INDIAN SCENARIO"
17th December 2013 (Tuesday).

International Speaker – Dr. Peter Rosenbaum, MD, FRCP(C)
National Speakers

1. Dr. Madhu S Mahadeviah, M.B,B.S, D.A.B.P (Diplomate of the American Board of Pediatrics)
2. Dr. U.V. Shenoy, M.D, D.C.H., Ph.D.
3. Dr. (Mrs.) Gopalswamy Shashikala, MD

Venue: Department of Physiotherapy Kasturba Medical College, Manglore, India.

Preparation of the Manuscript

Send laser printout, on white thick paper, of A4 size (212 o 297 mm), with margins of 25 mm (1 inch) from all the four sides. Type or print on only one side of the paper. Use double spacing throughout. Number pages consecutively, beginning with the title page. The language should be American English.

Title Page

1. The title page should carry
   Type of manuscript (Original/Review/Case)
2. The title of the article, which should be concise, but informative;
3. Running title or short title not more than 50 characters;
4. The name by which each contributor is known (Last name, First name and initials of middle name), with his or her highest academic degree(s) and institutional affiliation;
5. The name of the department(s) and institution(s) to which the work should be attributed;
6. The name, address, phone numbers, facsimile numbers and e-mail address of the contributor responsible for correspondence about the manuscript;
7. The total number of pages, total number of photographs and word counts separately for abstract and for the text (excluding the references and abstract).
8. Source(s) of support in the form of grants, equipment, etc.; and
9. If the manuscript was presented as part at a meeting, the organisation, place, and exact date on which it was read.

Abstract Page

The second page should carry the full title of the manuscript and an abstract (of no more than 50 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Material, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 key word. =

Introduction

State the purpose of the article and summarize the rationale for the study or observation.

Methods

Describe the selection of the observational or experimental subjects (patients or laboratory animals, including controls) clearly. Identify the age, sex, and other important characteristics of the subjects. Identify the methods, apparatus (give the manufacturer's name and address in parentheses), and procedures in sufficient detail. Give references to established methods, including statistical methods; provide references and brief descriptions for methods that have been published but are not well known; describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used, including generic name(s), dose(s), and route(s) of administration.

Reports of randomised clinical trials should present information on all major study elements, including the protocol, assignment of interventions (methods of randomisation, concealment of allocation to treatment groups), and the method of masking (blinding), based on the CONSORT statement (Moher D, Schulz KF, Altman DG: The CONSORT Statement: Revised Recommendations for Improving the Quality of Reports of Parallel-Group Randomized Trials. Ann Intern Med. 2001;134:657-662, also available at http://www.consort-statement.org).

When reporting studies on human, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 (available at http://www.wma.net/e/policy/17-c_e.html). Do not use patients' names, initials, or hospital numbers, especially in illustrative material. When reporting experiments on animals, indicate whether the institution's or a national research council's guide for, or any national law on the care and use of laboratory animals was followed.

When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Report losses to observation (such as dropouts from a clinical trial). Put a general description of methods in the Methods section. When data are summarized in the Results section, specify the statistical methods used to analyse them. Avoid non-technical uses of technical terms in statistics, such as 'random' (which implies a randomising device), 'normal', 'significant', 'correlations', and 'sample'. Define statistical terms, abbreviations, and most symbols. Use upper italics (P = 0.046).

Results

Present the results in logical sequence in the text, tables, and illustrations. Do not repeat in the text all the data in the tables or illustrations; emphasise or summarise only important observations.

Discussion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Include in the Discussion section the implications of the findings and their limitations, including implications for future research. Relate the observations to other relevant studies.

In particular, contributors should avoid making statements on economic benefits and costs unless their manuscript includes economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such.

Acknowledgements

As an appendix to the text, one or more statements should specify 1) contributions that need acknowledging but do not justify authorship, such as general support by a departmental chair;

2) acknowledgments of technical help; and 3) acknowledgments of financial and material support, which should specify the nature of the support. This should be the last page of the manuscript.

References

References: The Vancouver system to be followed for this purpose (see details in next few paes)

Contributors should obtain written permission and confirmation of accuracy from the source of a personal communication.

Tables

- Tables should be self-explanatory and should not duplicate textual material.
- Tables with more than 10 columns and 25 rows are not acceptable.
- Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.
- Place explanatory matter in footnotes, not in the heading.
- Explain in footnotes all non-standard abbreviations used in table.
- Obtain permission for all fully borrowed, adapted, and modified tables and provide a credit line in the footnote.
- For footnotes use the following symbols, in this sequence: *, †, ‡, §, ||, , **, ††, ‡‡

. Illustrations (Figures)

- Submit three sets of sharp, glossy, un-mounted, colour photographic prints, with height of 4 inches and width of 6 inches.
- Figures should be numbered consecutively according to the order in which they have been first cited in the text.
- Each figure should have a label pasted on its back indicating the number of the figure, the running title, top of the figure and the legends of the figure. Do not write the contributor/s' name/s. Do not write on the back of figures, or mark them by using paper clips.
- Symbols, arrows, or letters used in photomicrographs should contrast with the background and should marked neatly with transfer type or by tissue overlay and not by pen/marker/pencil.
- If a figure has been published, acknowledge the original source and submit written permission from the copyright holder to reproduce the material. A credit line should appear in the legend for such figures.

Legends for Illustrations

Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations. When symbols, arrows or letters are used to identify parts of the illustrations, identify and explain each one clearly in the legend. Explain the internal scale and identify the method of staining in photomicrographs.

Protection of Patients' Rights to Privacy

Identifying information should not be published in written descriptions, photographs, CT scans, etc., and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives written informed consent. Informed consent for this purpose requires that the patient be shown the manuscript to be published. When informed consent has been obtained, it should be indicated in the article and copy of the consent should be attached with the covering letter.

Electronic Version

- The manuscript must be accompanied by a 3.5 inch (1.44 MB) floppy containing the manuscript.
- Do not use 'oh' (O) for 'zero' (0), 'el' (l) for one (1). Do not use space bar for indentation. Do not type headings or any other text in ALL CAPITALS. Do not break words at the end of lines. Do not use an extra hard return/enter between paragraphs. Do not insert a tab, indent, or extra spaces before beginning of a paragraph. Do not use software's facility of automatic referencing, footnotes, headers, footers, etc.
- Use a hyphen only to hyphenate compound words. Use only one letter space at the end of sentence. Use hard return/enter only at the end of paragraphs and display lines (e.g. titles, headings and subheadings). Incorporate notes or footnotes in the text, within parentheses, rather than their usual place at the foot of the page.
- Provide the tables and charts at the appropriate place in the text and not at the end of the manuscript.

Care should be taken to prevent damage during transit.

Mailing a revised manuscript

While submitting a revised manuscript, contributors are requested to include, along with single copy of the final revised manuscript, a photocopy of the revised manuscript with the changes underlined in red and copy of the comments with the point to point clarification to each comment. The manuscript number should be written on each of these documents.

If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks from submission. Hard copies of the images (one set), for articles submitted online, should be sent to the journal office at the time of submission of a revised manuscript.

Reprints

Journal does not provide any free printed reprints. Reprints can be purchased at the time of submitting the proofs.

Copyrights

attribution of authorship and ownership of the rights. The journal also grants the right to make small numbers of printed copies for their personal non-commercial use.

Check list

To be tick marked and one copy attached with the manuscript

Covering letter

" Signed by all contributors
" Previous publication / presentations mentioned
" Source of funding mentioned
" Conflicts of interest disclosed

Authors

" Middle name initials provided
" Author for correspondence, with e-mail address provided
" Number of contributors restricted as per the instructions
" Identity not revealed in paper except title page (e.g. name of the institute in material and methods, citing previous study as 'our study', names on figure labels, name of institute in photographs, etc.)

Presentation and format

" Double spacing
" Margins 2.5 cm from all four sides
" Title page contains all the desired information (vide supra)
" Running title provided (not more than 50 characters)
" Abstract page contains the full title of the manuscript
" Abstract provided (not more than 150 words for case reports and 250 words for original articles)
" Structured abstract provided for an original article
" Key words provided (three or more)
" Introduction of 75-100 words
" Headings in title case (not ALL CAPITALS, not underlined)
" References cited in superscript in the text without brackets
" References according to the journal's instructions.

Language and grammar

" Uniformly American English
" Abbreviations spelt out in full for the first time
" Numerals from 1 to 10 spelt out
" Numerals at the beginning of the sentence spelt out

Tables and figures

" Number within specified limits.
" No repetition of data in tables/graphs and in text
" Actual numbers from which graphs drawn, provided
" Figures necessary and of good quality (colour)
" Table and figure numbers in Arabic letters (not Roman)
" Labels pasted on back of the photographs (no names written)
" Figure legends provided (not more than 40 words)
" Patients' privacy maintained (if not, written permission enclosed)
" Credit note for borrowed figures/tables provided
" Manuscript provided on a floppy (with single spacing)

(Courtesy Neurology India).

The Vancouver system

The Vancouver system will be used in this journal. It is also known as the "author-number" system, is a way of writing references in academic papers. It is popular in the physical sciences, and is one of two referencing systems normally used in medicine, the other being the author-date, or "Harvard", system.[1][2]

Sample usage

Labelling citations

References are numbered consecutively in order of appearance in the text - they are identified by Arabic numerals in superscript.

Format of citations

Different formats exist for different types of sources, e.g. books, journal articles etc. Author names are abbreviated to at most two initials.[10] Although Citing Medicine does not explicitly mandate merging initials (e.g. "R. K." would be merged into "RK"), the examples used throughout the book do.

Journal articles

Standard journal articles

" Leurs R, Church MK, Taglialatela M. H1-antihistamines: inverse agonism, anti-inflammatory actions and cardiac effects. ClinExp Allergy. 2002 Apr;32(4):489-98.

As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do), the month and issue number may be omitted:

" Thomas MC. Diuretics, ACE inhibitors and NSAIDs - the triple whammy. Med J Aust. 2000;172:184-185.

If there are more than six authors, the first six authors are listed followed by "et al.":

" Guilbert TW, Morgan WJ, Zeiger RS, Mauger DT, Boehmer SJ, Szefler SJ, et al. Long-term inhaled corticosteroids in preschool children at high risk for asthma. N Engl J Med. 11 May 2006;354(19):1985-97.

Personal author(s)

" Rang HP, Dale MM, Ritter JM, Moore PK. Pharmacology. 5th ed. Edinburgh: Churchill Livingstone; 2003.

Editor(s) or compiler(s) as authors

" Beers MH, Porter RS, Jones TV, Kaplan JL, Berkwits M, editors. The Merck manual of diagnosis and therapy. 18th ed. Whitehouse Station (NJ): Merck Research Laboratories; 2006.

Authored chapter in edited publication

" Glennon RA, Dukat M. Serotonin receptors and drugs affecting serotonergic neurotransmission. In: Williams DA, Lemke TL, editors. Foye's principles of medicinal chemistry. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2002.

Contributors' form

(to be modified as applicable and one singed copy attached with the manuscript)

Manuscript Title :_____

Manuscript number :_____

I/we certify that I/we have participated sufficiently in the intellectual content, conception and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript, to take public responsibility for it and have agreed to have my/our name listed as a contributor. I/we believe the manuscript represents valid work. Neither this manuscript nor one with substantially similar content under my/our authorship has been published or is being considered for publication elsewhere, except as described in the covering letter. I/we certify that all the data collected during the study is presented in this manuscript and no data from the study has been or will be published separately. I/we attest that, if requested by the editors, I/we will provide the data/information or will cooperate fully in obtaining and providing the data/information on which the manuscript is based, for examination by the editors or their assignees. I/we also certify that we have taken all necessary permissions from our institution and/or department for conducting and publishing thepresent work.

Financial interests, direct or indirect, that exist or may be perceived to exist for individual contributors in connection with the content of this paper have been disclosed in the cover letter. Sources of outside support of the project are named in the cover letter.

I/We hereby transfer(s), assign(s), or otherwise convey(s) all copyright ownership, including any and all rights incidental thereto, exclusively to the Indian Journal of Cerebral Palsy (IndJCP), in the event that such work is published by the Indian Journal of Cerebral Palsy. IndJCP shall own the work, including 1) copyright; 2) the right to grant permission to republish the article in whole or in part, with or without fee; 3) the right to produce preprints or reprints and translate into languages other than English for sale or free distribution; and 4) the right to republish the work in a collection of articles in any other mechanical or electronic format.

We give the rights to the corresponding author to make necessary changes as per the request of the journal, do the rest of the correspondence on our behalf and he/she will act as the guarantor for the manuscript on our behalf. All persons who have made substantial contributions to the work reported in the manuscript, but who are not contributors, are named in the Acknowledgment and have given me/us their written permission to be named. If I/we do not include an Acknowledgment that means I/we have not received substantial contributions from non-contributors and no contributor has been omitted.

Name with signature and date

1_____

2_____

3_____

IACPCON - 2013

8th Annual Conference of Indian Academy of CerebraL Palsy

20th, 21st & 22nd December 2013, Ahmedabad.

Venue
AHMEDABAD MEDICAL ASSOCIATION HALL
Opp. H.K. College of Commerce
Ashram Road, Ahmedabad - 380009.

Hosted By

Polio Foundation

INSTITUTE OF COMMUNITY HEALTH CARE AHMEDABAD

CONFERENCE SECRETARIAT
Polio Foundation
Pavansutspciety, opp. Rajvadu,
Jivrajpark, Ahmedabad - 380 051
Ph. No: 079 - 26610801/02/03, +91 9879505507,
Email: iacppf@gmail.com

*I*ACPCON - 2013 *WIDEN YOUR HORIZONS*

Certify Cerebral palsy is currently a leading cause of disability in children. Rehabilitation of these children requires special knowledge and training.

***Indian Academy of Cerebral Palsy (IACP)** is a national body of professionals working for children with cerebral palsy. The annual conference of IACP - IACPCON provides a national forum for sharing, spreading and exchange of knowledge, ideas and educational information. Experts from all disciplines who work for prevention, diagnosis and management of children with cerebral palsy and other childhood-onset disabilities attend this meeting. This conference is also a platform to interact with the national and international experts of this field. These meetings are organized in different parts of country to spread knowledge to every corner of India.*

This year IACPCON will be at Ahmedabad from 20th to 22nd December'13. Its scientific program is designed with the objective of providing current and upcoming information regarding diagnosis and treatment of cerebral palsy. For all those who want to remain updated with current concepts and recent advances in the subject, IACPCON 2013 is a rare opportunity. Like previous IACPCONs, this year meeting will also facilitate budding and practising therapists to improve their skill and knowledge. The scientific program will provide 360 overview of management. Guest lectures, interactive sessions, debates and 'how I do it differently' are the special features of this conference.*
Everyone who is practising in this field or willing to pursuit this specialty should not miss this unique opportunity.
Organising team
IACPCON 2013

Scientific Program of IACPCON 2013

21st & 22nd December, 2013, Saturday & Sunday

Venue of conf.: Ahmedabad Medical Association Hall, Opp. H. K. College, Ashram Road, Ahmedabad

CONFERENCE

Day 1: 21st December, 2013, Saturday

09.00 am	*Guest lectures: Theme - Strengthening exercises*		
09.30 am	*Guest lectures: Theme - How does GMFCS help in management?*		
10.00 am	*Guest lectures: Theme - Early intervention*		
11.30 am	*Key note address: Eastern and western strengths to meet the challenges of CP Prof. AK Purohit*		
12.30 pm	*Controversies in management of CP*		
02.30 pm	*Interactive session*		
03.30 pm	*Scientific paper presentation*		
04.30 pm	*Guest lectures*	*05.30 pm*	*General body meeting*

Day 2: 22nd December, 2013, Sunday

09.00 am	*Scientific paper presentation*		
10.00 am	*How I do it differently- Innovative ideas*		
11.30 am	*Guest lectures: Theme - Adolescent child with CP*		
12.30 pm	*Guest lectures: Theme - Common problems in management*		
02.30 pm	*Interactive session*		
03.30 pm	*Debate on controversial issues*	*04.30 pm*	*Valedictory function*

PRE-CONFERENCE WORKSHOP

20th December, 2013, Friday

Venue of workshop: Polio Foundation, Opp. Rajvadu, Jivaraj Park, Ahmedabad

Morning session (9 am to 1.30 pm)

A : Vdieo gait analysis and gait abnormatlities in CP - Abhay Khot, Jessica Mahy, Melbounr, Australia and other Indian faculty

B : Perceptual motor development - V J Perumal, Indore, India

C : Postural control: fundamental in clinical practice - Shraddha Diwan, Laxit Doshi, Pragnesh Nathavat, Ahmedabad, India

Afternoon session (2.30 to 5.30 pm)

D : Pre & post operative physio therapy - Abhay khot, Jessica Mahy, Melboune, Australia and other Indian faculty

E : Foot biomechnaics: deviations & rehabiliattion - Savaji Nakum, Mona Patel, Tejas Patel, Ahmedabad, India

F : Play thererapy in occupational therapy - sunil Gauriar - Ahmedabad, India.

Select one workshop from A, B & C and one workshop from D, E & F

Registration fees for conference

	IACP Member	Non Member	Student
Till 31st Oct. 2013	INR 700/-	INR 1000/-	INR 500/-
After 31st Oct. 2013	INR 1200/-	INR 1500/-	INR 750/-

Registration fees for pre-conference workshops

Till 31st Oct. 2013 INR 500/- , After 31st Oct. 2013 INR 600/-

National Cerebral Palsy Day Celebration (India)

Center of disease control of USA has calculated the life time cost of cerebral palsy to be nearly one million USD in USA. To the utter surprise of medical fraternity, they found the social costs of cerebral palsy much bigger than the medical costs which means we need to do much more for these persons at a societal & administrative levels. Social costs refer to the caring, housing, education, employment and recreational expenses. Hence, lot more research initiatives world over are being done to prevent cerebral palsy at primary level as well as reduce the consequences at secondary level and improve quality of life at tertiary levels so that economic impact of disability can be minimized. Money spent on preventing cerebral palsy & its consequences due to negligence is money saved for the cumulative benefits of the society at large.

Realizing the importance of such efforts and their glaring paucity across the country, professionals from various medical & related rehabilitation fields have formed "The Indian Academy of Cerebral Palsy" on 14th September 2004 and are working together to improve academic as well as service expertise of its members. To improve community awareness & to facilitate social advocacy, IACP has decided CP Day Celebrations any day of the week having 3rd October, every year from 2010 onwards as "National Cerebral Palsy Day" in honor of their 1st founder president late Dr. Perin. K. Mullaferoze who pioneered multidisciplinary care of cerebral palsy in the country. The purpose of such a nationwide program is to demystify cerebral palsy riddle to the public at large and minimize the effects of rampant myths prevailing in the society. Eradicating ignorance & misconceptions is a powerful tool in public health domain and will ensure the growth of an inclusive society where every individual, irrespective of abilities and developmental differences, earns his or her rightful place under sunshine and lives a life of dignity and not be looked upon as a social liability.

Society needs to inculcate attitudes of empathy & understanding in creating level playing field for these persons and their families and not to speak out in lip sympathy and charity. The members of IACP solicit your cooperation in this endeavor by joining National Cerebral Palsy Day Celebrations. Support us in minimizing architectural and attitudinal barriers. Let us reach out to them as a wholesome society together.

IACP Guidelines for CP Day Celebrations on

one of the day of the week having 3rd October, every year

1. Form local core groups to implement activities with local funding.
2. Functions by Children & Families - **a]** Conduct painting, sports & other cultural activities and offer encouragement. Involve a local achiever as a role model & mentor to set an example to younger persons. **b]** Organize walks involving children & adults with cerebral palsy, parents, professionals and public. **c]** To have Informative exhibition & posters for information to parents. **d]** Panel discussions, Q & A sessions with experts.
3. Schools - Both Main stream & Special Schools to be involved via workshops, training programs & round table discussions. To help in this effort IACP will provide a draft protocol on main streaming if requested.
4. Media - Publication of articles in news papers, talks on radio & local TV. Support for an advertisement on National TV to be worked upon with help of brand ambassadors.
5. Administration - Interact with local disability commissioner and Dept. of empowerment & social justice both at local, state & central govt. levels with the help of institutions *(like NIOH, NIMH, NIMHANS, AYJNIHH, NCERT, & National Trust & NGO's like Spastic Societies, Lion Clubs, Rotary clubs, Parivar & Parents' self help groups as well as all related specialty academic bodies & IMA).*
6. Participating delegates of the meeting were requested to implement as many of the above programs as locally feasible and send reports to General Secretary IACP before 31st October for publication in the forthcoming News Letter & IACP Web Site.
7. To learn from the experience of first year to improve the guide lines for future initiatives.

Give them back,
the power to take control

with

LYRICA™

75mg, 150mg capsules **PREGABALIN**

New possibilities in neuropathic pain

- Rapid relief from neuropathic pain, as early as day 2[1-4]
- Sustained pain reduction[1,2,4]
- Significant relief of central and peripheral neuropathic pain[1,2]
- Highly effective even in refractory patients[6]
- Recommended in guidelines as a first line choice for neuropathic pain[7-13]
- Convenient and simple dosing[5]
- Well established safety profile[5]

Summary of Prescribing Information for LYRICA™

Composition: Each hard gelatin capsule contains 75 mg or 150 mg pregabalin. **Indication(s):** Treatment of neuropathic pain in adults and management of Fibromyalgia. **Contraindications:** Hypersensitivity to the active substance or to any of the excipients. **Adverse Reactions:** The most commonly reported adverse reactions and which resulted in discontinuation from pregabalin were dizziness and somnolence. Adverse reactions were usually mild to moderate in intensity. In all controlled studies, the discontinuation rate due to adverse reactions was 13% for patients receiving pregabalin and 7% for patients receiving placebo. Other common adverse events (reported in > 1% of patients in clinical trials) included peripheral edema, increase in appetite, weight gain, blurring of vision, confusion, decrease in libido, irritability, ataxia, abnormal coordination, memory impairment, tremor, dysarthria, paresthesia, diplopia, vertigo, vomiting, flatulence, feeling drunk, edema, abnormal gait, inability to concentrate, euphoria, dry mouth, constipation, and fatigue. **Warnings and Precautions:** Dizziness and somnolence, associated with pregabalin treatment, could increase the occurrence of accidental injury (fall) in the elderly population. Therefore, patients should be advised to exercise caution, and not drive, operate complex machinery or engage in other potentially hazardous activities until they are familiar with the potential effects of the medication. Some diabetic patients who gain weight on pregabalin treatment may need to adjust hypoglycaemic medications. Pregabalin should not be used during pregnancy unless the benefit to the mother clearly outweighs the potential risk to the fetus. Effective contraception must be used in women of child bearing potential. Breast-feeding is not recommended during treatment with pregabalin. Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption should not take this medicine. Pregabalin may potentiate effects of ethanol and lorazepam. **Dosage:** Pregabalin treatment can be started at a dose of 150 mg per day. Based on individual patient response and tolerability, the dosage may be increased to 300 mg per day after an interval of 3 to 7 days, and if needed, to a maximum dose of 600 mg per day in neuropathic pain, or 450 mg per day in fibromyalgia, after an additional 7-day interval. Pregabalin may be given in either two or three divided doses, with or without food. Dosage reduction in patients with compromised renal function needs to be individualized according to creatinine clearance. Elderly patients may also require a dose reduction of pregabalin due to a decreased renal function.

Refer full prescribing information for additional information.
SPI adapted from LPDLYC052010

1. Siddall et al.Pregabalin in central neuropathic pain associated with spinal cord injury :a placebo controlled trial.Neurology 2006;67(10):1792-800. 2. Freynhagen R et al.Efficacy of Pregabalin in neuropathic pain evaluated in a 12 week, randomized double blind, multicentre, placebo controlled trial of flexible and fixed dosing regimens. Pain 2005;115;254-63. 3. Dworkin RH et al.Pregabalin for the treatment of post herpetic neuralgia,a randomized placebo controlled trial, Neurology 2003;60:1274-83. 4. Van Seventer R et al.Efficacy and tolerability of twice daily pregabalin for treating pain and related sleep interference in post herpetic neuralgia:a 13-week, randomized trial.Curr Med Res Opin 2006,22(2):375-84. 5. Pfizer Inc. LYRICA Prescribing information. June 2007. 6. Data on file, Pfizer Inc. 7. G. M. Franklin, et al. Neurology® 2011;76:1–1. 8. Dubinsky RM et al. Practice parameter: treatment of postherpetic neuralgia: an evidence-based report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2004;63(6):959-65. 9. Attal N et al. EFNS guidelines on pharmacological treatment of neuropathic pain. Eur J Neurol 2006;13(11):1153-69. 10. Institute for Clinical Systems Improvement (ICSI). Assessment and management of chronic pain. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI) 2008:84. 11. Moulin DE et al. Pharmacological management of chronic neuropathic pain – consensus statement and guidelines from the Canadian Pain Society. Pain Res Manag 2007 Spring;12(1):13-21. 12. Suarez L. New Guidelines Boast Benefits for Patients Suffering with DPN pain. Diabetic Microvascular Complications Today 2006;May/June:21-22. 13. Martinez V, et al. Douleurs. 2010;11:3-21.

#Disclaimer

LYRICA is recommended in Neuropathic pain and fibromyalgia only. The additional benefits in sleep disturbances and anxiety have been noted in a large number of clinical trials where these existed as co morbidities with neuropathic pain. Additional benefits are promoted in the approved indications only. Pfizer India does not suggest or recommend the use of a product in any manner other than as described in the Locally Prescribing Information.

For the use only of a Registered Medical Practitioner or a Hospital or a Laboratory

INDLYR3913041

Full prescribing Information available on request

TM: Trademark of C.P Pharmaceuticals International C.V (CPPI)

Pfizer *Working together for a healthier world™*

Pfizer Limited: Pfizer Centre, Patel Estate, S. V. Road, Jogeshwari (W), Mumbai - 400 102.

America's best-in-class cancer treatment

Now in Andhra Pradesh

Powered by the world's most advanced cancer treatment technology - TrueBeam.

First in Andhra Pradesh and the third in India, TrueBeam represents an innovative leap forward and delivers unparalleled accuracy, precision, and power in cancer care.

- Revolutionary, non-invasive radiosurgery technology
- Dramatic reduction in treatment times by up to a factor of 10
- Unrivaled precision with 100 accuracy checks per second
- Image acquisition 60% faster than other machines
- Emphasis on patient comfort

Reimbursement facility available for AP State Govt. employees

AMERICAN ONCOLOGY INSTITUTE

CANCER CARE EXCELLENCE

We journey with you

At Citizens Hospital Nallagandla Serilingampally Hyderabad
T: 040 6719-9999

www.americanoncology.com

Title Code approval by Office of The Registrar of Newspapers for India : APENG03400 /01/1/2013-TC

IACPCON - 2013

8th Annual Conference of Indian Academy of CerebraL Palsy

20th, 21st & 22nd December 2013, Ahmedabad.

Venue

AHMEDABAD MEDICAL ASSOCIATION HALL
Opp. H.K. College of Commerce
Ashram Road, Ahmedabad - 380009.

Hosted By

Polio Foundation

INSTITUTE OF COMMUNITY HEALTH CARE AHMEDABAD

CONFERENCE SECRETARIAT

Polio Foundation

Pavansutspciety, opp. Rajvadu,
Jivrajpark, Ahmedabad - 380 051
Ph. No: 079 - 26610801/02/03, +91 9879505507,
Email: iacppf@gmail.com

Published by Dr. A.K. Purohit on the behalf of **IACP,**
Printed at: Paras Ramesh Jagirdar
Chandraprabha Graphics, Advertising-Designing-Printing, Cell No. : 9949981999
Central Office: 408, Amrit Apartments, Phase II, Kapadia Lane, Somajiguda, Hyderabad -500082
Tele. No. Mobile: 9849054600 (SMS ONLY)