

Save the Hip

**Indian Hip Surveillance Guidelines
for Children with Cerebral Palsy**

Preamble

Hip displacement is the second most common musculoskeletal impairment in children with cerebral palsy (CP). More than one-third of the children with CP are affected by this impairment. Hip displacement in children with CP is often asymptomatic until the hip is partially or fully dislocated, resulting in pain, gait disturbances, impaired sitting balance, difficulty in perineal care and pressure sores. The incidence of hip impairment is much higher in non-ambulatory children.

It is now well-known that hip surveillance programmes can effectively detect hip displacement early, leading to earlier and proactive management with better outcomes. National & provincial hip surveillance programmes have been developed and adopted in various regions of the world, with evidence supporting the role of surveillance in preventing dislocations and minimising the need for salvage surgery.

To offer similar benefits to Indian children with CP, a guidelines development project on National Hip Surveillance Program for Cerebral Palsy was initiated in May 2020. Based on the outcome of the one-year guidelines' development project, this guidelines document was prepared from an Indian practice perspective.

About development of this Indian guideline

Professional organisations whose members are involved in the care of children with CP were involved in the formation of this guideline. A National Expert Committee was constituted with representatives of these organisations. Advice was sought from international experts on this topic who acted as the Advisory Committee.

In phase 1: The Expert Committee reviewed more than 80 published research articles related to various aspects of hip impairment in children with CP. Key points from these articles were listed. National guidelines from other countries/regions were also reviewed, discussed and referred.

In phase 2: All important questions related to hip surveillance were listed. These questions were circulated to all the members of the expert committee. The Delphi process was used to develop consensus on these practical questions. When more than 80% of group members agreed to a particular viewpoint, it was considered as a consensus. With two rounds of the Delphi process, the committee reached a consensus on every single question. Consensus statements were listed.

In phase 3: The guideline was drafted based on these consensus statements. The main guidelines' document was written from a healthcare professionals' perspective. A simple version of this guideline is also prepared to spread awareness about this important message to care-givers/family/healthcare aids workers.

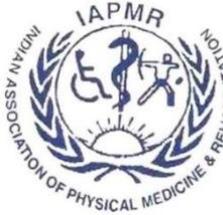
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Indian Academy of Cerebral Palsy



Paediatric Orthopaedic Society of India



Indian Association of Physical Medicine and Rehabilitation



All India Occupational Therapists' Association



Association of Child Neurology



Indian Association of Physiotherapists



Indian Orthopaedic
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Indian Academy of
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This guideline is for medical professionals and allied healthcare professionals who are involved in the care of children with cerebral palsy (CP).

Children with CP are at increased risk for hip displacement. Hip displacement may occur gradually and may not be painful initially. However, many of dislocated hips become painful eventually and lead to reduced function and impaired quality of life.¹

What is hip surveillance?

Hip surveillance is a process of actively monitoring the child for early identification of hip displacement. It is carried out by clinical and radiographic examinations at regular intervals, so that silent hip impairments can be identified in a timely fashion. When hip impairments are identified early, they can be managed by less aggressive surgical interventions, thus leading to better structural and functional outcomes. Hip surveillance has been found to be effective in several large population-based studies.²

Who should be surveilled?

All children and youth diagnosed with CP and those children not yet diagnosed with CP but for whom there is a clinical suspicion of having CP should be enrolled for surveillance. Besides the spastic variety, dystonic, athetoid, ataxic and hypotonic types of CP are included in hip surveillance.

By whom should the child be surveilled?

All trained clinicians working with children with CP can carry out hip surveillance. These include paediatricians, developmental paediatricians, paediatric neurologists, physical therapists, occupational therapists, physical medicine and rehabilitation experts, orthopaedic surgeons, and paediatric orthopaedic surgeons.

How should the child be surveilled?

Each visit for surveillance consists of two components: a clinical examination and a radiographic examination.

The **clinical examination** includes determining / re-confirming the child's Gross Motor Function Classification System (GMFCS) level. [To know more about GMFCS](#)
Inquiring about hip pain that may be present when moving the hip, changing positions, when performing personal care of the perineum.

The passive range of abduction is measured for each hip with maximum possible extension at the hips and knees. (Figure 1) Attention is given to the presence of pain while moving the hip.

Gait observation should identify cases of hemiplegic CP having Winters, Gage & Hicks (WGH) type 4 gait pattern. They form a subset that deserves special attention. [To know more about \(WGH\) type 4 gait](#)

The examiner also looks for pelvic obliquity and scoliosis. (Figure 2)



Figure 1: Supine posture for individual hip abduction measurement

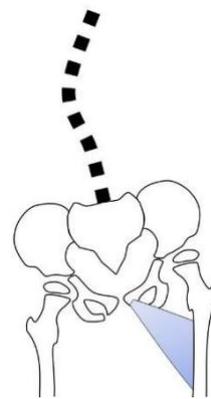


Figure 2: Pelvic obliquity and scoliosis

The **radiographic examination** consists of taking an antero-posterior pelvis radiograph in a supine position with standardized positioning. The pelvis is squared whilst positioning. The hips are in neutral abduction/adduction. (Figure 3) The patellae should face upwards. For children having flexion deformity at the hips, both lower limbs are flexed at the hips till lumbar lordosis is obliterated. This prevents anterior tilting of the pelvis. (Figure 4 & 5)



Figure 3: Correct positioning of the lower limbs

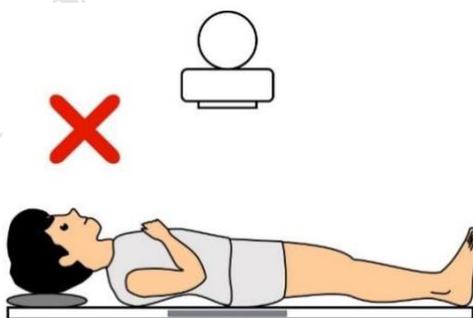


Figure 4: Incorrect position

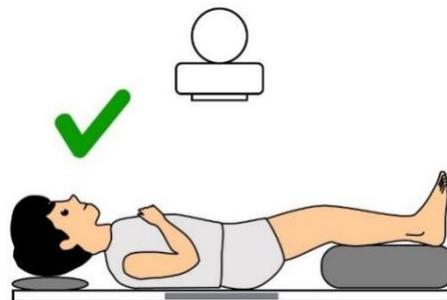


Figure 5: Correct positioning with lumbar lordosis obliterated

Migration percentage (MP) is measured on an anteroposterior radiograph.³ It measures the percentage of the ossified femoral head that lies outside the ossified acetabular roof. To measure the MP, a horizontal line is drawn through each triradiate cartilage (solid horizontal line) and a vertical line is drawn perpendicular to it at the lateral margin of the ossified acetabulum (solid vertical line). Two lines are drawn parallel to this solid vertical line at the medial and lateral border of the ossified femoral head (dotted lines). The distance between these two dotted lines is the width of the ossified femoral head (B). The width of the femoral head which is lateral to the solid vertical line (A) is divided by the width of the ossified femoral head (B). Migration percentage = $A/B \times 100$. (Figure 6)

Migration percentage (MP) is measured for each hip separately.

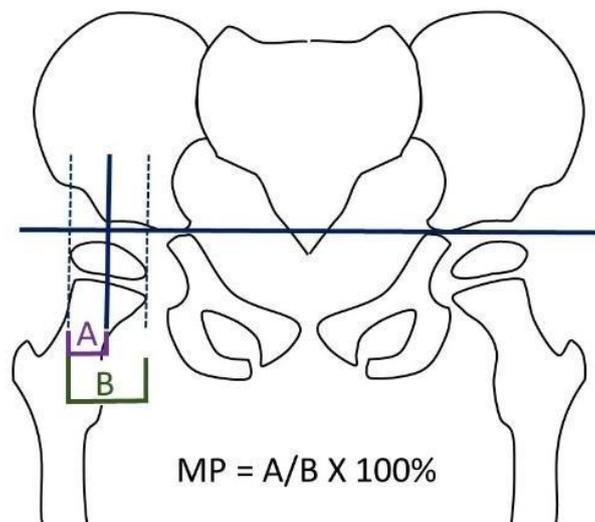


Figure 6: Measurement of migration percentage

How frequently should the child be surveilled?

Surveillance should preferably start at the age of 2 years for children for whom the diagnosis of CP is made, or even for those children in whom the diagnosis of CP is suspected. Surveillance frequency depends mainly on the GMFCS level, age of the child, and the age at which hip surveillance is started.

For the sake of easy understanding, the CP population is divided into 3 groups.

- GMFCS level I & II
- GMFCS level III
- GMFCS level IV & V

Children with GMFCS level I & II function should have a clinical and radiographic examination at 2, 6, and 10 years. In addition, they should have clinical examination at age 4 years and 8 years. Children with a Group IV hemiplegic gait pattern should continue to have a clinical exam and a radiograph every 2 years after the age of 10 years till skeletal maturity.

Children with GMFCS Level III function require clinical and radiographic examination every year till the age of 8 years. After 8 years, hip surveillance is carried out every 2 years till skeletal maturity if MP remains less than 30% and MP is stable (stability defined as <10% change in MP over a 12-month period). If a child enters hip surveillance after the age of 8 years, the child should have yearly radiograph for first 2 years and thereafter the frequency is reduced to once in 2 years.

When hip surveillance is initiated, children at GMFCS levels IV and V should have a clinical and radiographic examinations every 6 months for the first two years. If the MP is less than 30% and MP is stable (stability defined as <10% change in MP over a 12-month period), clinical exams and imaging may be reduced to annual visit. Children at GMFCS level IV and V should have a clinical and radiographic examination every year till skeletal maturity. If a child enters hip surveillance after the age of 4 years, the child should have a radiograph every 6 months for the first 2 years and thereafter the frequency is reduced to annual x-rays.

If in doubt about the GMFCS level, consider the child to have a more severe GMFCS level and accordingly follow the guidelines for that GMFCS level.

For quick visual reference please see the figure 7.

Years	2	2.5	3	3.5	4	5	6	7	8	9	10	After 10 years to skeletal maturity
GMFCS 1 & 2	▲ ■				▲		▲ ■		▲		▲ ■	▲ ■ * @
GMFCS 3	▲ ■		▲ ■		▲ ■	▲ ■	▲ ■	▲ ■	▲ ■		▲ ■	▲ ■ @
GMFCS 4 & 5	▲ ■ #											

▲ = Clinical examination ■ = Radiograph
 * Only for WGH type 4, @ every two yearly, # every yearly

Figure 7: Hip Surveillance for various levels of GMFCS

Time of discharge from hip surveillance

Children at GMFCS levels I & II are discharged at 10 years if the MP is stable and less than 30%. An exception is a child with Winter & Gage hemiplegic type 4 gait who should be followed up till skeletal maturity.

GMFCS level III, IV & V are discharged when they attain skeletal maturity, have MP < 30%, and when pelvic obliquity and scoliosis are not progressive on clinical examinations. Closure of the triradiate cartilage on the AP pelvis x-ray is used to indicate skeletal maturity. (Figure 8)

Exception: Child having MP > 30% or progressive pelvic obliquity or scoliosis requires continued surveillance.

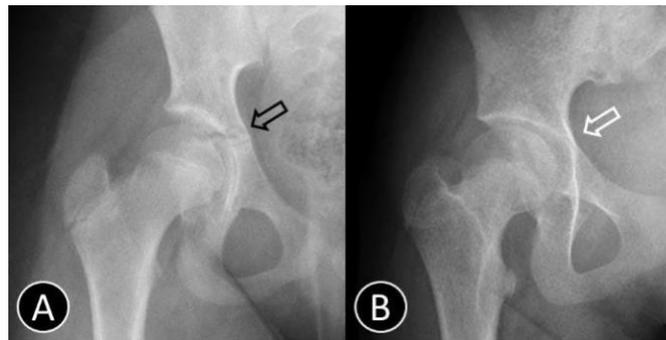


Fig 8: Attainment of skeletal maturity. A: Open triradiate cartilage (black arrow). B: Closure of triradiate cartilage (white arrow)

What should be the further line of action after hip surveillance?

A child is preferably referred to a paediatric orthopaedic surgeon or an orthopaedic surgeon if a paediatric orthopaedic surgeon is not available in the area, if

- MP value is 30% or more
- If MP is less than 30% but a child has hip abduction less than 30 degrees
- If MP is less than 30% but a child has hip pain during a clinical exam
- If MP is less than 30% but child / family reports pain in the hip during activities

All other children continue to undergo hip surveillance till they are discharged from the surveillance program.

Additional information

Gross Motor Function Classification System (GMFCS)

The GMFCS is a validated classification system to describe the gross motor function of children with CP.⁴ The expanded and revised version of the GMFCS which is available online is used as a reference. It can be downloaded free of charge from the website https://www.canchild.ca/system/tenon/assets/attachments/000/000/058/original/GMFCS-ER_English.pdf

The GMFCS classifies the children and young adults into five levels on the basis of their self-initiated movement with particular emphasis on sitting, walking, and wheeled mobility.

The GMFCS has five levels for describing differences in severity of motor abilities. Distinctions between levels are based on functional limitations, the need for hand-held mobility devices or wheeled mobility. For different age groups, separate descriptions are provided. Generally, it takes only a few minutes to assign a GMFCS level.

The GMFCS is relatively stable but in small children it is more likely to change.⁵ So, it is important that during each visit, GMFCS level is reconfirmed or re-evaluated.

GMFCS levels I & II suggest a child who is ambulatory without handheld mobility aid. Figure 9 & 10 represent typical GMFCS I & II children in the age group of 6 to 12 years.

GMFCS level III suggests a child who is a dependent ambulator with a handheld mobility aid. Figure 11 represents typical GMFCS III children in the age group of 6 to 12 years.

GMFCS level IV represents a child who is a marginal ambulator. For walking, they need the help of a caretaker and the mobility aid. (Figure 12) Child at GMFCS level V is considered non-ambulatory. (Figure 13)

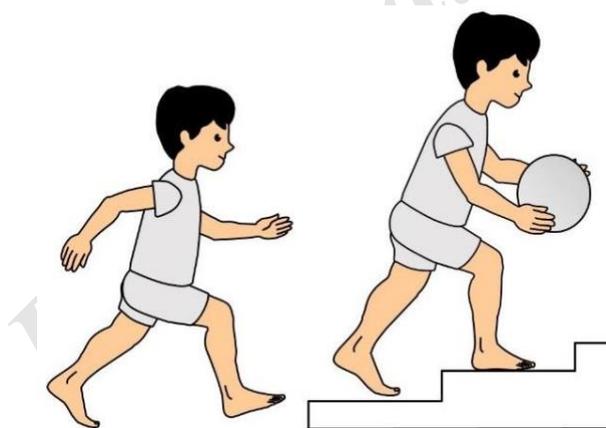


Figure 9: GMFCS level I child

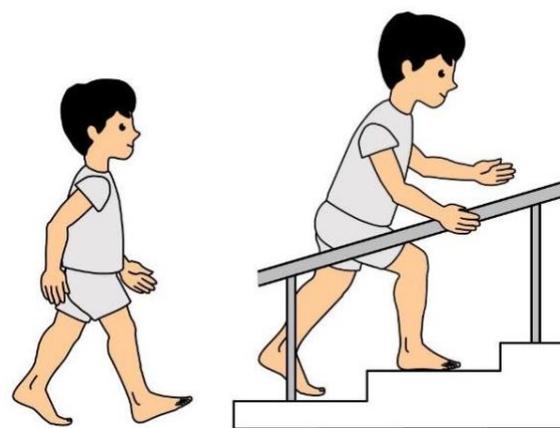


Figure 10: GMFCS level II child

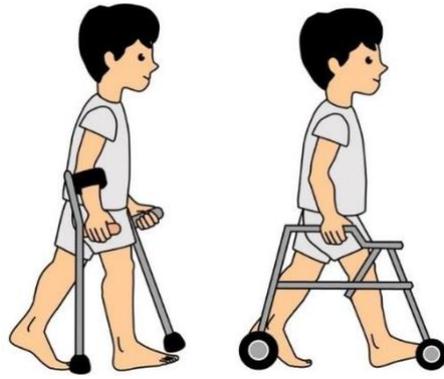


Figure 11: GMFCS level III children using different mobility aids



Figure 12: GMFCS level IV child



Figure 13: GMFCS level V child

Winters, Gage and Hicks (WGH) type 4 gait

Winters, Gage and Hicks described four types of gait pattern in children with hemiplegic type of CP.⁶ This classification was based on the sagittal plane kinematics of the ankle, knee, hip and pelvis. The Australian CP group added frontal and transverse planes kinematics to this classification.

Child with type 4 hemiplegic gait walks with the hip flexed, adducted and internally rotated, knee flexed and ankle in equinus. (Figure 14) A child with this gait pattern can be distinguished easily by gait observation. One does not need computerised 3-dimensional gait analysis for identifying this gait pattern.

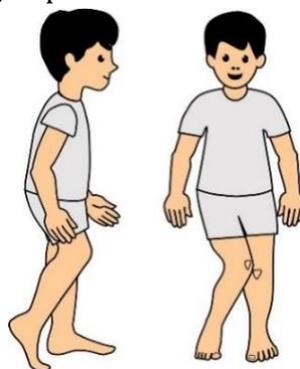


Figure 14: WGH type 4 gait representation in sagittal and coronal planes

Key points

- Hip Surveillance detects hip displacement early and reduces the need for major surgeries.
- Hip surveillance can be carried out by all medical and allied healthcare professionals involved in the care of children with CP.
- Children with all motor types of CP require hip surveillance.
- Surveillance frequency mainly depends on the GMFCS level and the age of the child.
- Migration percentage is used to quantify the severity of hip displacement on standardised AP pelvis radiographs.
- A child is referred to a paediatric orthopaedic / orthopaedic surgeon if MP value is 30% or more, hip abduction is less than 30 degrees, or if hip pain is reported during clinical examination or while performing certain activities.

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