Hip conditions in CP patients

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PLEASE CLICK ON THE FOLLOWING LINK TO WATCH THE LECTURE ONLINE:-

https://www.youtube.com/watch?v=7f2WAT5om_0

Agenda

CP definition

GMFCS

Hip conditions in CP

Cerebral Palsy definition

Nonprogressive upper motor neuron disease (static encephalopathy) due to injury to immature brain , the associated musculoskeletal pathology is usually progressive

Background

Cerebral palsy (CP) has an incidence of approximately two per 1000 live births and is the most common cause of physical disability affecting children in developed countries

Although CP is by definition as a static encephalopathy, the associated musculoskeletal pathology is usually progressive

All children with CP are at risk of developing progressive hip displacement

Etiology

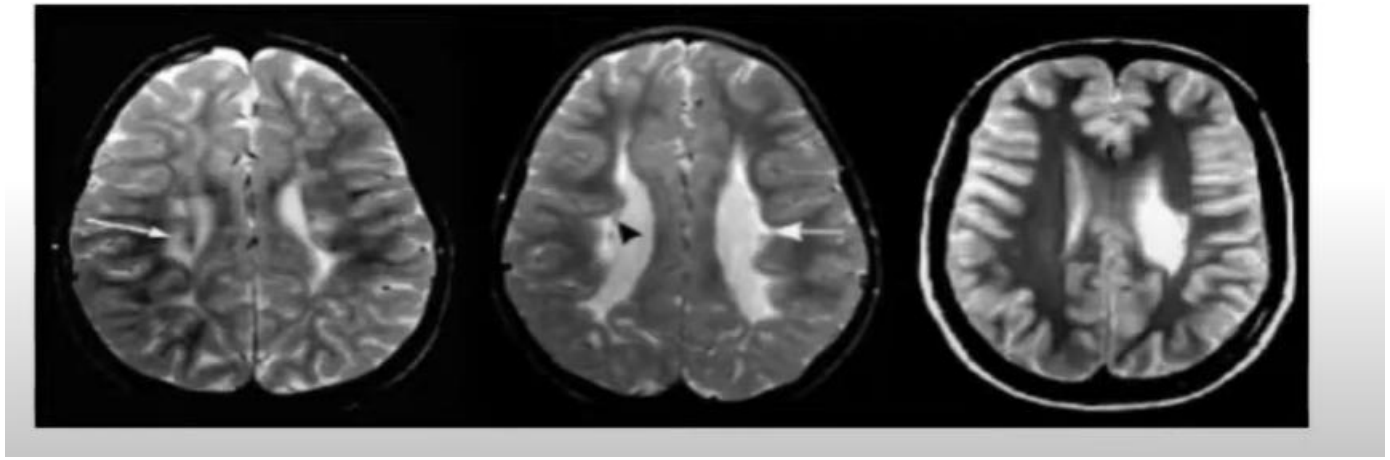
- Preterm
  - <33 wks - 70/1000;
  - <28 wks gestation 110/1000
- IUGR
- Intra-uterine infection
- Maternal viral infection
- Placental pathology
- Genetics

o Single-gene

o Polygenetic

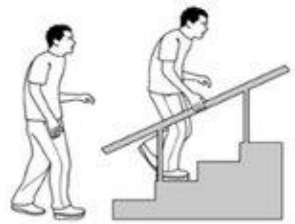
Pathoanatomy

- Primary brain injury
  - 60% white matter, 20% cortical, 10% mal-developments



GMFCS Level I

Children walk at home, school, outdoors and in the community. They can climb stairs without the use of a railing. Children perform gross motor skills such as running and jumping, but speed, balance and coordination are limited.



GMFCS Level II

Children walk in most settings and climb stairs holding onto a railing. They may experience difficulty walking long distances and balancing on uneven terrain, inclines, in crowded areas or confined spaces.

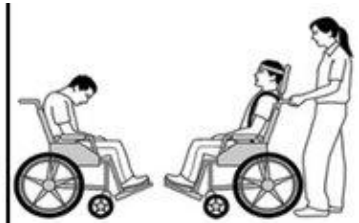
Children may walk with physical assistance, a handheld mobility device or used wheeled mobility over long distances. Children have only minimal ability to perform gross motor skills such as running and jumping.

GMFCS Level III

Children walk using a hand-held mobility device in most indoor settings. They may climb stairs holding onto a railing with supervision or assistance. Children use wheeled mobility when traveling long distances and may self-propel for shorter distances.

GMFCS Level IV

Children use methods of mobility that require physical assistance or powered mobility in most settings. They may walk for short distances at home with physical assistance or use powered mobility or a body support walker when positioned. At school, outdoors and in the community children are transported in a manual wheelchair or use powered mobility.



GMFCS Level V

Children are transported in a manual wheelchair in all settings. Children are limited in their ability to maintain antigravity head and trunk postures and control leg and arm movements.

The Hip in CP

Second most affected joint

Spectrum of hip patho-anatomy in CP

Displacement

Degeneration

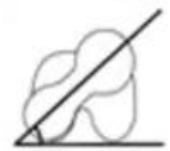
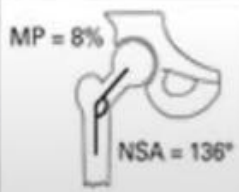
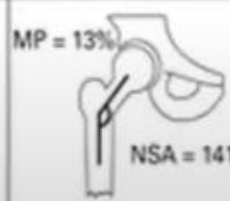
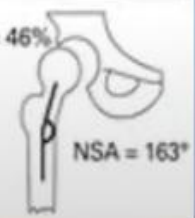
Acetabular dysplasia

Femoral anteversion

Femur neck shaft angle

spasticity

muscle imbalance

	GMFCS I	GMFCS II	GMFCS III	GMFCS IV	GMFCS V
FNA	 FNA = 30°	 FNA = 36°	 FNA = 40°	 FNA = 40°	 FNA = 40°
NSA + MP	 MP = 8% NSA = 136°	 MP = 13% NSA = 141°	 MP = 25% NSA = 149°	 MP = 37% NSA = 155°	 MP = 46% NSA = 163°

Who is at risk ?

HIP DISPLACEMENT IN CEREBRAL PALSY

BY BRENDAN SOO, MBBS, JASON J. HOWARD, MD, FRCS(C), ROSLYN N. BOYD, PHD, MSC(PHYSIOTHE
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Investigation performed at the Royal Children's Hospital, Murdoch Children's Research Institute, University of Melbourne, Parkville, Victoria, Australia

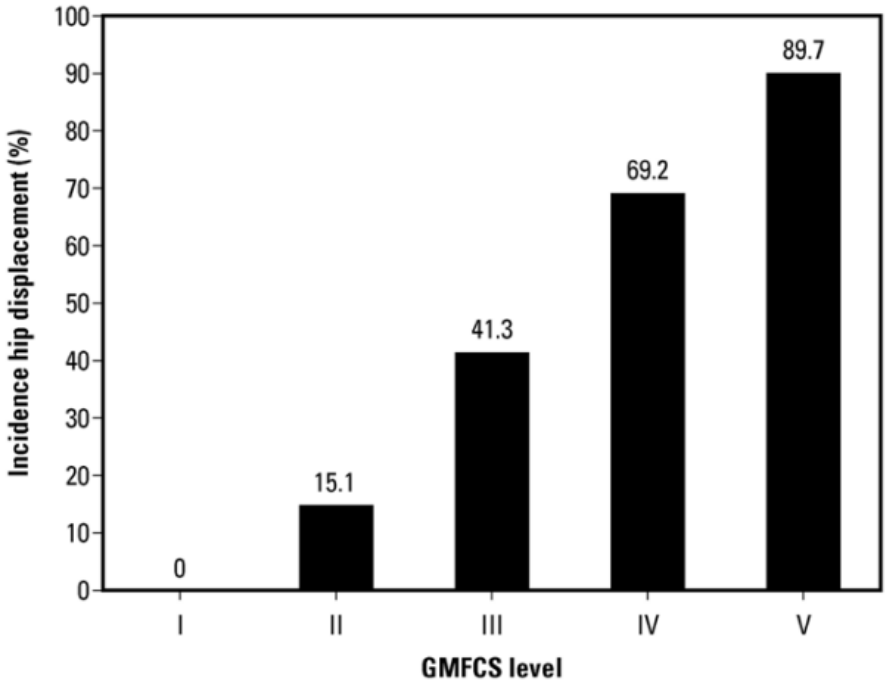


Fig. 4

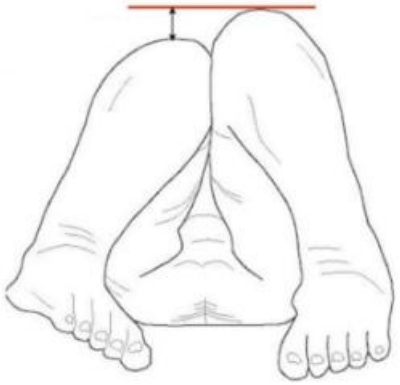
Incidence of hip displacement (a migration percentage of >30%) according to the Gross Mo-

Physical examination

Assess for abduction

Assess for flexion contractures

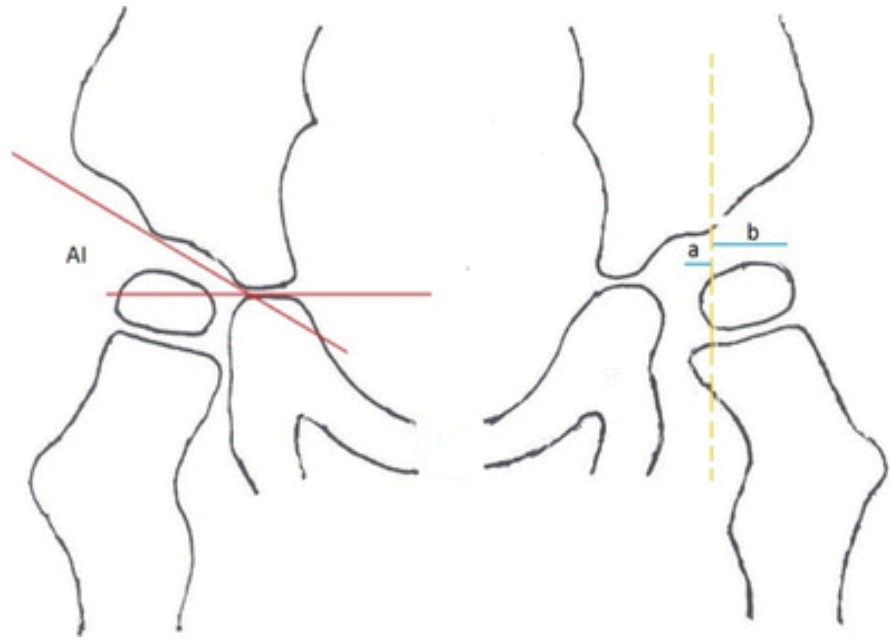
Assess for llD



Imaging modalities

Xray

Ct scan


AI
a
b

Prevention

-Hip subluxation/dislocation is preventable through surveillance and early identification followed by appropriate intervention

Studies indicate a significant decrease in the incidence of hip dislocation after the implementation of a surveillance program

Hip surveillance refers to the process of monitoring and recognizing the important early signs of progressive hip displacement

-Surveillance and early intervention should involve both clinical and radiological examinations

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PEDIATRICS (M GLOTZBECKER, SECTION EDITOR)

The role for hip surveillance in children with cerebral palsy

Benjamin Shore · David Spence · HK Graham

GMFCS I

GMFCS 1:

- Initial AP Pelvis at 12-24 months (or at age of identification)
- Repeat clinical and radiographic review at 3 years†
  - If GMFCS level has changed - alter surveillance accordingly
- Repeat clinical & radiographic review at 5 years†
  - If GMFCS level has changed - alter surveillance accordingly
  - If remains GMFCS level 1 – discharge from hip surveillance

GMFCS II

GMFCS 2:

- Initial AP Pelvis at 12-24 months (or at age of identification)
- Repeat clinical & radiographic review via yearly surveillance until MP stability
  - If MP unstable/abnormal – continue yearly surveillance
  - If MP stability established - review at 4-5 years
- Repeat clinical & radiographic review at 4- 5 years†
  - If GMFCS level has changed - alter surveillance accordingly
  - If MP stable – review at 8-10 years
  - If MP unstable – continue yearly surveillance until stability
- Repeat clinical & radiographic review at 8-10 years†
  - If MP stable – discharge

GMFCS III

GMFCS 3:

- Initial AP Pelvis at 12-24 months (or at age of identification)
- Repeat clinical & radiographic review 6 months later†
  - If MP unstable/abnormal – continue yearly surveillance
  - If MP stability established - review at 4-5 years
- Repeat clinical & radiographic review at 4- 5 years†
  - If GMFCS level has changed - alter surveillance accordingly
  - If MP stable – review at 8-10 years
  - If MP unstable – continue yearly surveillance until stability
- Repeat clinical & radiographic review at 8-10 years†
  - If MP stable – discharge
  - If MP unstable – continue yearly surveillance until stability established

GMFCS IV

GMFCS 4:

- Initial AP Pelvis at 12-24 months (or at age of identification)
- Repeat clinical & radiographic review every 6 months†
  - If GMFCS level has changed - alter surveillance accordingly
  - If MP unstable/abnormal – continue 6 month surveillance until stability
  - If MP stability established – continue yearly surveillance
- Repeat clinical & radiographic review at 7 years†
  - If MP stable (<30%) & GMFCS stable – review at pre-puberty
  - Continue yearly surveillance from pre-puberty to skeletal maturity
- Independent of MP, if evidence of pelvic obliquity, scoliosis continue 6 month surveillance until skeletal maturity

GMFCS V

GMFCS 5:

- Initial AP Pelvis at 12-24 months (or at age of identification)
- Continue 6 monthly surveillance until 7 years†
  - If GMFCS level has changed - alter surveillance accordingly
  - If MP stable (<30%) & GMFCS stable – review yearly until maturity
- Independent of MP, if evidence of pelvic obliquity, scoliosis continue 6 month surveillance until skeletal maturity

Sequelae

In younger children with CP, hip displacement is usually asymptomatic

Incidence of pain increases with the duration of follow-up Pain - and fixed deformity may contribute to difficulties with sitting, standing, walking, dressing, and perineal hygiene

Unilateral hip dislocation is sometimes associated with the development of pelvic obliquity and scoliosis

Management non- operative

Botox

Abduction bracing

Not effective in preventing progression

Operative management – prevention

Address contractures

Soft tissue release

Adductor longus tenotomy

gracilis myotomy

Adductor brevis myotomy

iliopsoas release / recession

Hamstering lengtheining

Obturator nerve ablation

Indications

MP >30-40%

MP increases 10% per year

Adduction / flexion contracures

Abduction limited to <35-45 deg

flexion contracture >20 degrees

Operative management – reconstructive

Varus deroational osteotomy (VDRO)

Corrects anteversion , coxa valga

Shortening bone

Indications

MP >50%

MP 40-50% with pain or gait disturbances

MP >40-50% after preventive surgery

Operative management – reconstructive

Dega osteotomy

Incomplete trans iliac osteotomy

Provides posterior and superior femoral head coverage

Indications variable

MP>60%

MP >40% + AI >25-27

AI > 30 degrees

Failed VDRO


R

Operative management – reconstructive

Risks for Revision

Higher GMFCS

Lower Age

Low surgeon volume

VDRO vs. VDRO + Dega?

- Al-Ghadir et. al: 25% revision VDRO alone vs. 0% combined
- Age significantly lower in VDR

Complications

- Femoral head AVN (11%)
- Heterotopic ossification (16%)

Symptomatic in 2% •

Operative management – salvage

Indications

Joint degeneration

Unreconstructable hip

Goals

- Pain relief
- Ease of hygiene and care
- Promote comfortable sitting

Operative management – salvage

Pain Relief

- Resection: 90.4%

.Valgus osteotomy: 88.4%

.Arthroplasty: 93.8%

. interposition: 90.9%

- Arthrodesis: 56.3%

Quiz

5 month old male patient

CP

DDH screening clinic

At 1 year old

Conclusion

- Cerebral palsy is a primary neurologic condition with progressive secondary musculoskeletal deformity as a result
- The GMFCS classification is a powerful prognostic tool for a child's function and the risk of hip pathology
- Hip pathology is progressive but at highly variable rates among children with CP
- Appropriate surveillance allows earlier intervention to prevent hip dislocation and degeneration
- Preventive soft-tissue releases have non-durable results but may prevent or delay reconstructive surgery if well-selected
- Reconstruction is effective at achieving and maintaining a well-reduced hip and improving quality of life
- Salvage options are largely equivalent and effective at pain relief and palliation

Any questions