Management of the Hip in Cerebral Palsy

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Acetabular Deficiency in Spastic Hip Subluxation

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J Pediatr Orthop • Volume 31, Number 6, September 2011

The direction of spastic hip subluxation is generally agreed to be lateral or posterolateral after adduction and flexion contracture of the hip.[1,4,5] However, the location of acetabular deficiency in spastic hip subluxation is controversial and has been reported to be anterosuperior,[4,6] posterosuperior,[7] or multidirectional.[8]

25 children with spastic CP
Age 4.4 – 9.6
22 hips were subluxated (Reimer's > 30%

The differences were significant in all directions and greater in the anterior aspect of the acetabulum.

Conclusions: The definition of pathology is defined by the deviation from normal physiological status. Acetabular dysplasia in spastic hip subluxation is global and more apparent in the anterior aspect.

Location of acetabular deficiency and associated hip dislocation in neuromuscular hip dysplasia. A 3 dimensional computed tomographic analysis.

Kim HT, Wenger DR.
JPO 1997 Mar/April;17(2);143-151.

- 41 hips in 24 patients with neuromuscular disease (NMD)
- three-dimensional computed tomography (3DCT)
- The location of the acetabular deficiency
  - Posterior 37%
  - Anterior 29%
  - Midsuperior 15%
  - Mixed 19%
- Although subtle morphologic changes occurred in the entire acetabulum, the major acetabular deficiency coincided with the direction of the subluxation or dislocation.
- The location of the acetabular deficiency that develops in cerebral palsy is not always posterosuperior.

Periacetabular osteotomy in the treatment of neurogenic acetabular dysplasia

S. J. MacDonald, O. Hersche, R. Ganz
From the London Health Sciences Centre, London, Canada

VOL. 81-B, No. 6, NOVEMBER 1999

- 13 hips
- 6 spastic, 7 flaccid
- 11 pain, 2 progressive subluxation
- 5 also underwent VDO
- Pain eliminated in 7, reduced in 4

Triple Pelvic Osteotomy in Complex Hip Dysplasia Seen in Neuromuscular and Teratologic Conditions

Rebello G, Zilkens C, Dudda M, Matheney T, Kim YJ.
JPO 2009 Sep;29(6);527-34.

- 31 hips in 26 patients
- 2 groups: spastic and nonspastic
  - 9/15 spastic patients were nonambulatory
  - 1/11 nonspastic patients was nonambulatory
- average age 9.6 years
- F/U average 3 years
- Results:

	lateral CE angle
pre	1.1
post	42.8

  - 1 nonunion of the pubic ramus with sciatic nerve palsy
  - 2 persistent hip subluxation

Complete Redirectional Acetabular Osteotomies for Neurogenic and Syndromic Hip Dysplasia

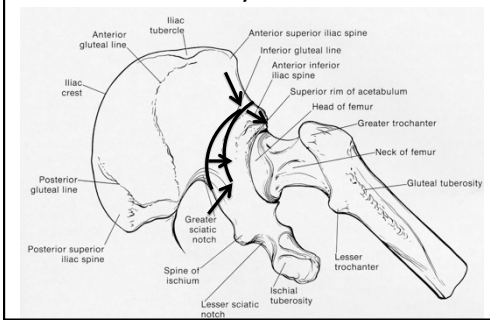
Sankar, Wudbhav N. JPO 33:S39-S44, July/August 2013.

- "Complete" redirectional osteotomies,
  - the triple innominate osteotomy
  - periacetabular osteotomy
- specific advantages in the neurogenic and syndromic patient population
  - can be performed after skeletal maturity
  - offer the ability to correct acetabular version and the hypoplastic acetabulum
  - allow hypercoverage when necessary
  - may theoretically better preserve marginal ambulatory ability

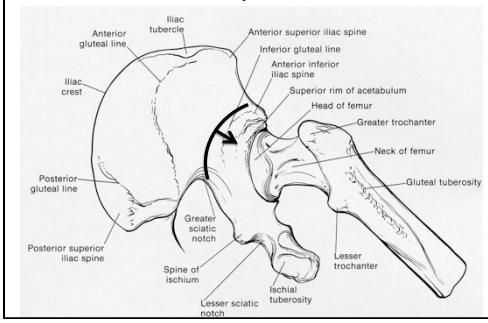
Depending on skeletal maturity

TWO BROAD CATEGORIES OF RECONSTRUCTIVE PELVIC OSTEOTOMIES

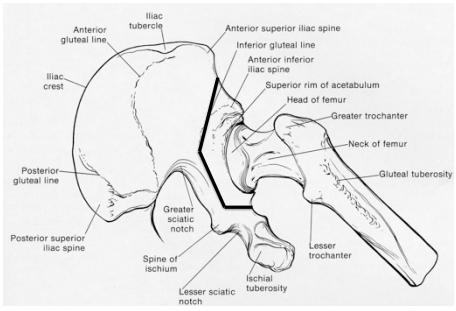
Skeletally Immature



Skeletally Immature



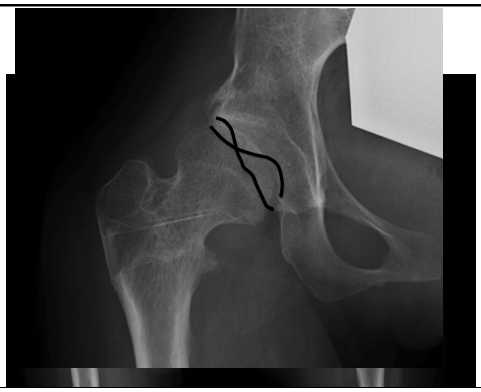
Skeletally Mature



Plain xrays

3D CT scan

HOW CAN WE ASSESS ACETABULAR DYSPLASIA?

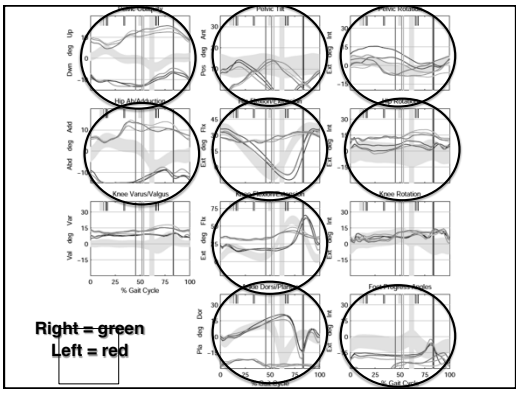


2 categories of other issues for people with NM conditions

- Manage everything else
  - Tone
  - Lever arm deformities
  - Contractures
- Intraoperative issues
  - Osteopenia
  - Soft tissue tightness (muscle too!!)
  - Direction of acetabular deficiency?
    - modification of technique

Hemi CP Type 4, microcephaly, GMFCS II, pain

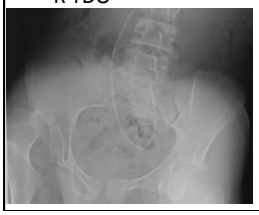
	MOTION L	MOTION R
HIPS		
Flexion	90	90
Extension		
Thomas test	WNL	20
knee 0		
knee 90		
Abduction		
hips extended	40	15
hips flexed	65	30
Adduction		
Ober test	-	-
Internal rotation	60	60
External rotation	30	20
Anteversion	35	20



Imaging

Hemiplegic CP, GMFCS II

- Proximal femoral varus derotation
- Ganz periacetabular osteotomy
- Psoas, adductor, and gastrosoleus lengthening
- R TDO



can be a cause of abnormal internal hip rotation during gait

NM ACETABULAR DEFICIENCY

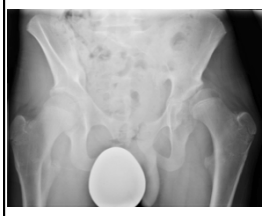
L Hemiplegic CP,GMFCS II

- LLD
- L Genu valgum
- L hip dysplasia
- B patella alta
- B hamstring contracture

Treatment

- L distal femoral hemiepiphyseodesis
- R distal femoral ephiphyseodesis
- L Ganz PAO
- L hamstring lengthening
- L patellar advancement

L Hemiplegic CP,GMFCS I



NM acetabular deficiency can be a cause of abnormal internal hip rotation during gait

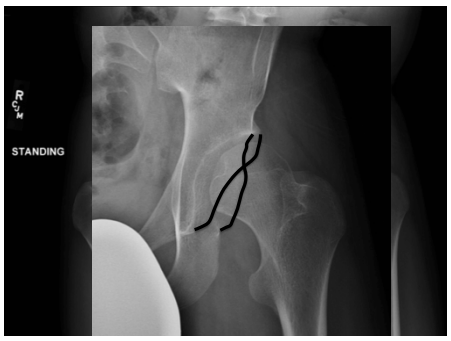
Case:
CP 2° prematurity

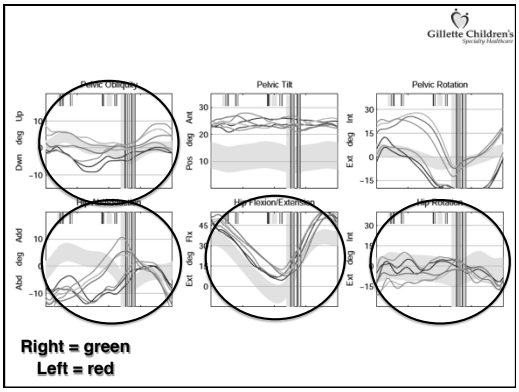
Pre SDR

- Asymmetric
- Triplegia
- GMFCS II

Post SDR

	MOTION L	MOTION R	SELECTIVITY, STRENGTH L	SELECTIVITY, STRENGTH R
HIPS				
Flexion	110	110	1, 5/5	1, 5/5
Extension				
Thomas test	0	0		
knee 0			1, 5/5	2, 4/5
knee 90			1, 2+/5	2, 3/5
Abduction				
hips extended	25	40	1, 2/5	2, 4-/5
hips flexed	50	65		
Adduction			1, 4/5	2, 5/5
Ober test		-		
Internal rotation	70	40		
External rotation	35	45		
Anteversion	55	20		



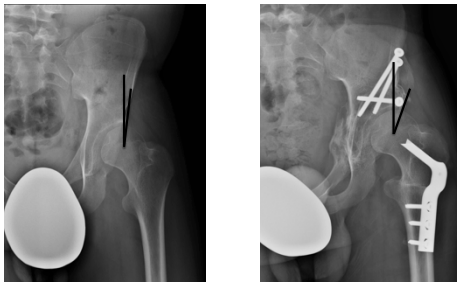


B SEMLS

- Left femoral derotational osteotomy
- Left Ganz periacetabular osteotomy
- Bilateral tibial derotational osteotomy
- Bilateral gastrocnemius recession
- Left soleus fascial striping

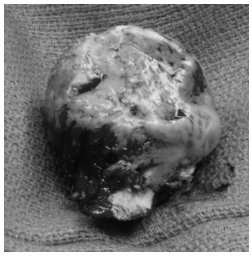
Pre SEMLS

Pre **Post**

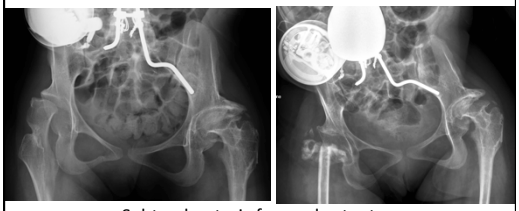


Salvage

- Valgus
- Resection
- Replacement

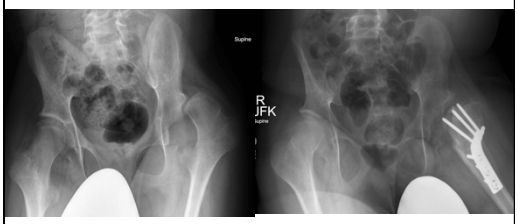


Proximal Femoral Resection



- Subtrochanteric femoral osteotomy
- Soft tissue interposition arthroplasty
- Traction (inpatient skeletal 3 weeks)
- Heterotopic ossification prophylaxis

Femoral head excision
with valgus osteotomy
and soft tissue release



GMFCS III with L hip pain
despite prior pelvic osteotomy