Derotation Osteotomies in Cerebral Palsy

Elhanan Bar-On M.D.
Schneider Children's Medical Center
✓ What? Define the problem
✓ Why does it happen?
✓ What are the consequences?
✓ When should we treat it?
✓ How can we treat it?
✓ What is different from other CP Surgery?
✓ Sagittal Plane: Flexion/Extension

→ Crouch; Equinus
Frontal Plane: Ab/Adduction

Scissoring
The Third Plane

✓ Transverse Plane

→ Rotational Deformity
Soft Tissue Pathology
Soft Tissue Surgery

Tenotomy;
Recession;
Lengthening;
Transfer
Osteo - Tomy = Bone - Cut
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Normal Femoral Rotational Profile

Degrees of femoral anteverision

Fetal mos. → Birth

Years

7 9 2 4 6 8 10 12 14

Diamond shapes show:

58°
38°
31°
23°
15°
Rotational Bony Deformities in CP

→ Persistent Anteversion

Iliopsoas tendon and muscle

Lesser trochanter
Consequences of Excessive Anteversion
Consequences of Excessive Anteversion
Muscle Vector Disruption
Moment Lever Arm

Load

$\delta_{load}$

$\delta_{effort}$

Effort

Body Weight

Abductor Force
Lever Arm Dysfunction
Soft Tissue Correction

Lofterod B, Terjesen T

Acta Orthop. 2010

Multilevel Soft Tissue Surgery →

12° decrease in foot Int. Rot

Does Not Address

Lever Arm Dysfunction!
Malrotation Correction

Only by Derotation Osteotomy
Femoral Derotation Osteotomy

- **Level:** Proximal vs Distal
- **Incision:** Percutaneous vs Open
- **Fixation:** External vs Internal; Plate Type
Femoral Derotation Osteotomy

✓ Level: Proximal vs Distal
Femoral Derotation Osteotomy

✓ Level: Proximal vs Distal

Kerr Graham JBJS(B) 2003:

“Femoral Derotation at both levels gives comparable excellent correction of the hip and foot progression angles in children with CP”.

Femoral Derotation Osteotomy

- Incision: Percutaneous vs Open
  - Open: Quicker, Less Radiation
  - Percutaneous: Less Soft tissue damage \(\rightarrow\) Quicker Rehabilitation
External Fixator Assisted Osteotomy + Percutaneous Locking Plate Fixation
Surgical Technique

1. Derotation Planning & Schanz Pin Insertion
2. Osteotomy
3. Correction & Ex Fix Bar Connection
4. Plate Insertion: Submuscular, Extraperiosteal
5. Percutaneous Locking Screws
6. External Fixator Removal
Post Op Management

✓ Casting: Only for concomitant soft tissue release

✓ Weight Bearing: Partial as tolerated
Additional Issues

How Much Correction?

✓ To ~ 45° Ext Rot & 30° Int Rot
✓ Actual correction 40% less than reported at surgery

(Kay et al. JPO 2003)
Additional Issues

At What Age?

✓Recurrence in patients operated at Age < 10 yrs

(Kim H, Aiona M, Sussman M JPO 2005)
Address Tibial & Foot Rotation

✓ May worsen with Femoral Derotation
Clinical Examples
Clinical Examples
Clinical Examples
Clinical Examples
Thank You