Pathoanatomy of Acetabular Bicompartmentalization in Children with Legg-Calve-Perthes Disease

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“the ossific appearance of medial and lateral pockets in the acetabulum”

Yngve DA, Roberts JM

Acetabular hypertrophy in Legg-Calve-Perthes disease

“Usually observed in severe cases associated with lateral
displacement of the femoral head.“

“Different manifestations of the same process as lateral
extrusion of the femoral head”

“A poor prognostic factor”
Hoikka V, Poussa M, Yrjonen T, Osterman K

Intertrochanteric varus osteotomy for Perthes’ disease

“Bicompartmentalization did not influence the postoperative containment.“
Morphological changes in the acetabulum in Perthes’ disease


“Increased appositional growth at the triradiate cartilage lead to bicompartamentalization.”
QUESTIONS

- Which anatomical change renders bicompartamental appearance on plain radiograph?

- What is the meaning of bicompartamentalization in the disease process of LCPD?
METHOD

3D CT software program
(Rapidia 2.6, Infinitt Technology Inc., Seoul, Korea)
METHOD

- 3D CT software program
  (Rapidia 2.6, Infinitt Technology Inc., Seoul, Korea)
- MPR (multiplanar reconstruction)
PATIENTS

- 16 children with bicompartamental acetabulum
- 14 boys, 2 girls
- Age at the study: Avg. 7+6 yr (5+8 to 10+9)
- Catterall classif.: IV in 9, III in 7
- Stage: AVN in 4, fragm. in 11, reossif. in 1
METHOD

- **MR imaging within 3 months from 3DCT:** 4 cases
  - Acetabular cartilage
  - Ligament teres
  - Triradiate cartilage
  - Femoral epiphyseal cartilage
METHOD
METHOD

- In coronal plane;
  - On what level is the acetabulum bicompartmental?
METHOD

- **In coronal plane:**
  - On what level is the acetabulum bicompartamental?
  - Mediolateral thickness of the triradiate cartilage
METHOD

- In horizontal plane;
- Mediolateral thickness of the acetabular floor
METHOD

- **In horizontal plane;**
  - Mediolateral thickness of the acetabular floor
  - Posterior border of the acetabular fossa

![Images showing various bone surfaces: Smooth, Borderline, Sharp angled, Stepped]
RESULTS

- **In coronal plane:**
  - At the inferior ramus of triradiate cartilage
  
  ![Diagram](image)

  **unicompartmental**
RESULTS

- **In coronal plane;**
  - At the acetabular fossa

[bicompartmental]
RESULTS

- In coronal plane;
  - Thickened triradiate cartilage at the acetabular fossa

![Image showing an anatomical diagram with measurements and a paired t-test result showing P < 0.001]
RESULTS

- In horizontal plane;
  - Thinned acetabular fossa floor

![Image with arrows indicating thinned acetabular fossa floor](image)

Graph showing paired t-test with P = 0.0017.
RESULTS

Smooth  Borderline  Sharp angled  Stepped

No of hips

P < 0.001
Chi-square test
RESULTS: MRI

<Anterior>  <Triradiate cartilage>  <Acetabular fossa>
RESULTS: MRI

(Ligamentum teres)
CONCLUSION

- Acetabular bicompartmentalization develops from growth imbalance between the lunate surface (cartilage-covered) and the acetabular fossa (cartilage-devoid).

- It reflects disease severity and cartilage hypertrphy, but does not necessarily mean lateral subluxation of the femoral head.
Thank you!