



"BROH" FEMORAL OFFSET INDEX – AN ANCILLARY MEASURE OF ADULT DYSPLASIA OF THE HIP

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AIM

Description of a new ancillary linear measure of ADH on cross-sectional imaging, the **BROH Femoral Offset Index**.

CALCULATION

- Identification of the cranial most slice of the hip at the level of the tip of greater.
- CT image Line a: from the anterior most tip of the greater trochanter to the anterior most part of the acetabulum.
- **BROH Femoral Offset Index** (Line b, CT): perpendicular to Line 'a' to the anterior most part of the femoral head.

INTRODUCTION

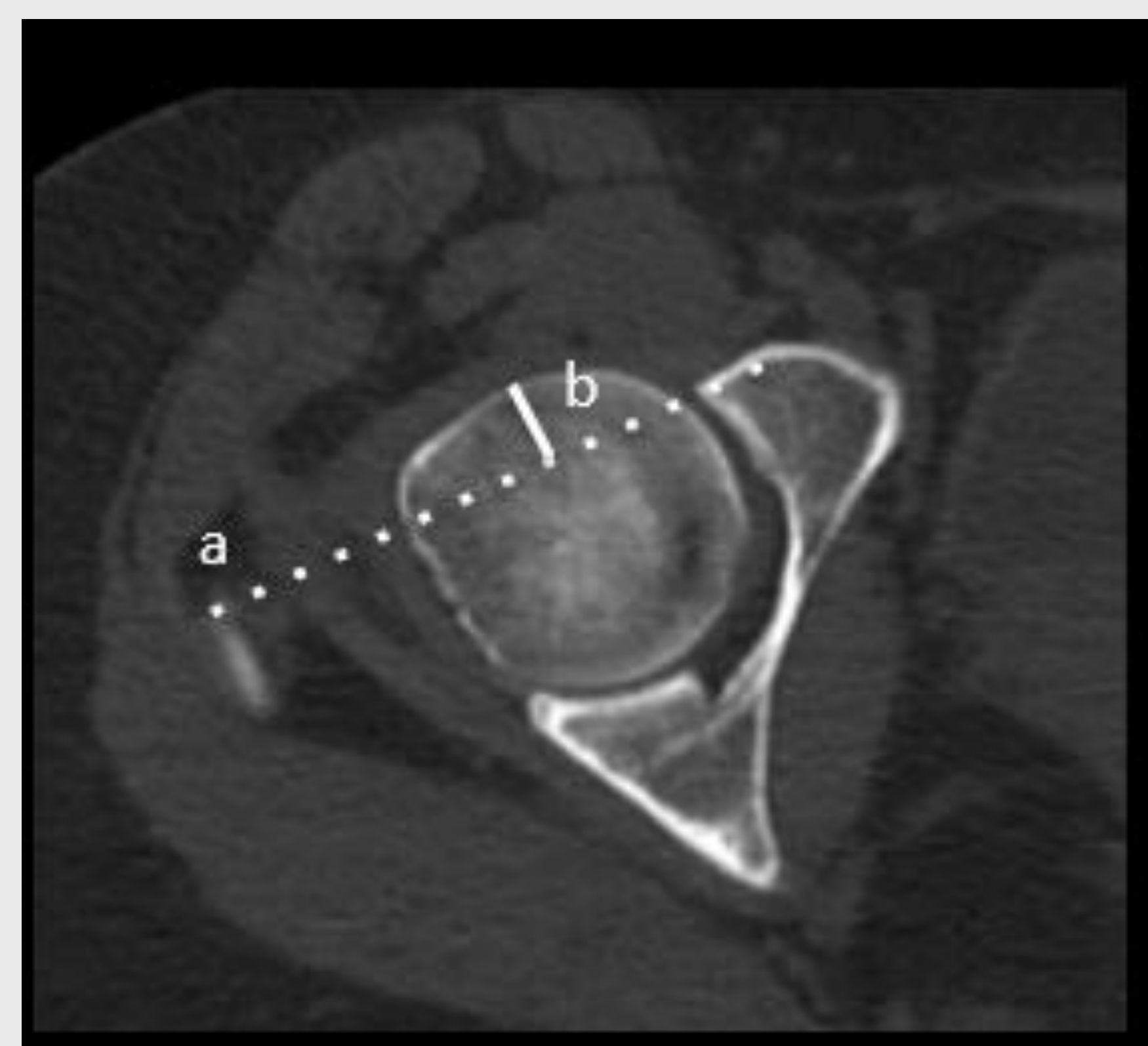
- **Adult Dysplasia of the Hip (ADH)** : shallow acetabulum, lack of anterior and lateral coverage of the femoral head.
- Seen in 20% to 40% of patients with hip **osteoarthritis**.
- Presentation with **hip pain** with or without a **limp**, often exacerbated with activity and may be associated with a sensation of **catching or popping**.
- Treatment: Birmingham Interlocking Pelvic Osteotomy, Periacetabular Osteotomy, Hip resurfacing or THR, conservative management.

RADIOGRAPHIC EVALUATION

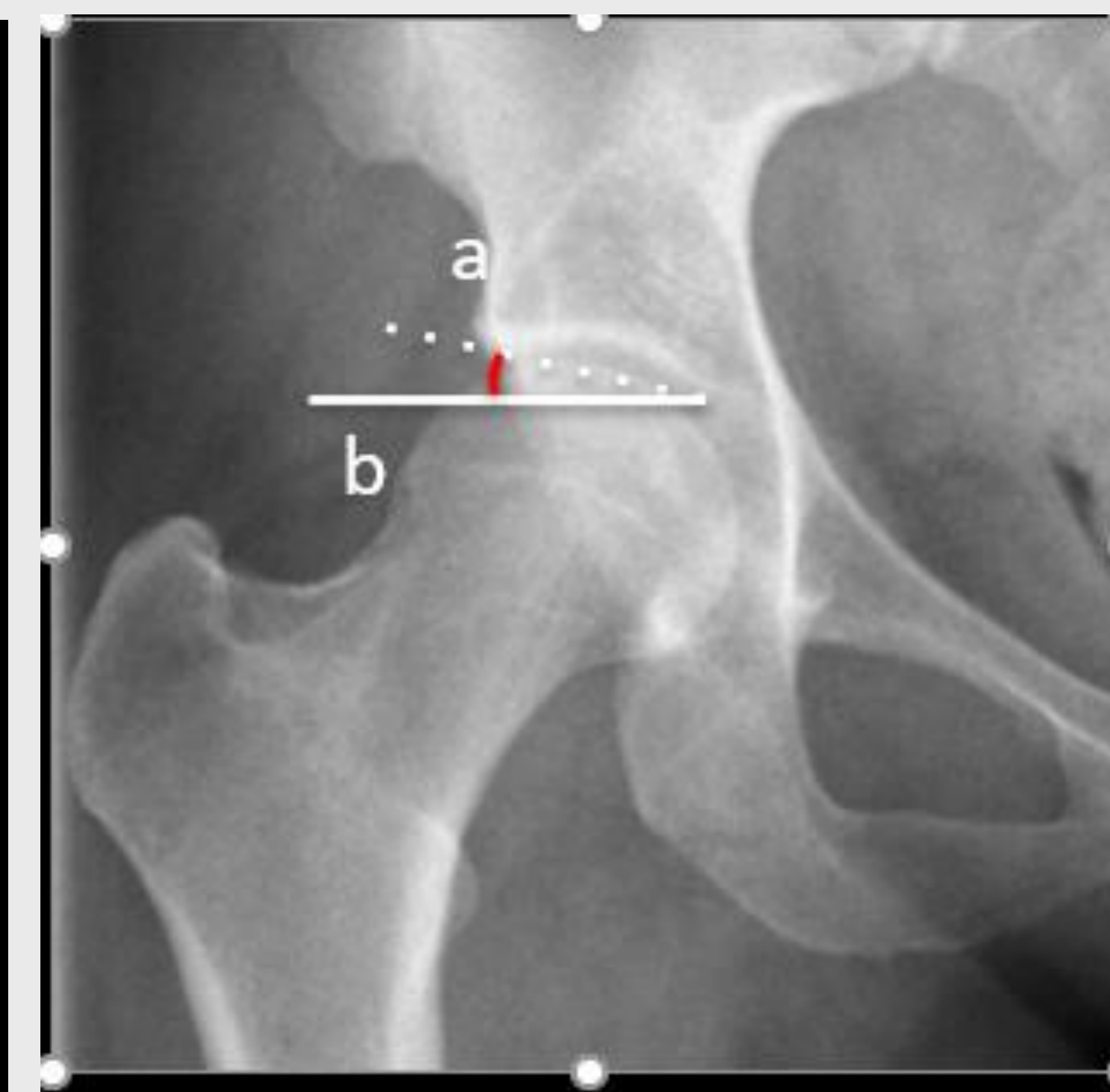
- X-rays radiographic measurements : **Tönnis Angle (Acetabular Index)**, Lateral Center Edge Angle (**LCEA**) of Wiberg, Femoral Neck-Shaft angle and Delta angle.
- Variable comparative inter-observer and intra-observer reliability in the estimation of **ADH**.
- **CT**: better characterization of hip morphology, acetabular deficiencies, anterior or posterior acetabular coverage.

PATIENTS AND METHODS

- Pelvis AP Xrays and CTs of 100 consecutive patients with hip pain and suspected **Adult Hip dysplasia (ADH)**.
- 60 hips with normal **Tönnis Angle**, 53 with dysplasia, 15 with reduced **Tönnis**.
- Calculation of **Tönnis Angle** and **BROH Femoral Offset Index** by a hip fellow and musculoskeletal radiology fellow.
- Mean, standard deviation, standard error of mean (SEM), ANOVA test, student T-test, Intraclass Correlation Coefficient (ICC) analysis.



BROH Femoral Offset Index



Tönnis Angle

RESULTS

- Increase of **BROH Femoral Offset Index** in the dysplastic cohort with a statistically significant p value of 0.0001.
- ICC revealed good intra- and inter-observer reliability of 0.9 and 0.9 respectively.
- The p value was 0.00031 on ANOVA.
- The level of statistical significance was defined as $p < 0.05$ in this study.

DISCUSSION

- Inherent limitation of radiographic evaluation as **ADH** has been established to be a 3D deformity.
- Failure of **Tönnis Angle** to evaluate the anterior femoral coverage.
- Inability to measure **Tönnis Angle** if the medial edge of the acetabular sourcil is blurred.
- **LCEA** grey zone of 20-25°.
- Identification of the exact slice is the main limiting factor for **CT** angular measurements (AASA, PASA, HASA).

CONCLUSIONS

- The **BROH Femoral Offset Index** is a new, ancillary measure on **CT** cross-sectional imaging that can be used to supplement existing indices to assess **ADH**.
- Linear measure, easy to calculate and has been found to increase proportionally with degree of hip dysplasia.
- Good intra- and inter-observer reliability.
- Further studies needed to understand how the **BROH Femoral Offset Index** can be validated as an additional measure in diagnosis and monitoring of **ADH**.