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## THR preplanning during DDH: focus on acetabular spongius bone quality

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**Statement of the Problem:** Since implantation of the acetabular component into poor-quality bone is considered to be a risk factor for its instability and routine DXA is invalid for precise assessment of acetabular bone density, preoperative evaluation of bone density directly in the presumed implantation site via special methodic seems to be required. **Methodology & Theoretical Orientation:** There were revealed a complex comparative MSCT-morphometric assessment of acetabular spongius bone X-ray density (attenuationcoefficient) due to proposed technique of 32 normal hips and 65 hips with DDH Crowe III types. Patients with DXA-verified osteoporosis or osteopenia were excluded. The evaluation implied 5 mm-interval measuring due to topographical zones (supraacetabular area, anterior and posterior acetabular walls). Obtained results were stratified due to dysplastic sectoral deficiency subtype: antero-lateral, postero-lateral or total deficiency and analyzed with appropriate statistical methods. MannWhitney test, one-way analysis of variance and Spearman's rank correlation were used respectively. **Findings:** All dysplastic hips showed increasing of X-ray density of supraacetabular area with simultaneously with X-ray density loss of anterior and posterior acetabular walls in all sectoral deficiency subtypes. There were determined progressive increase of the X-ray density of the supraacetabular bone and steady decrease of anterior and walls ones in correlation with the femoral head cranial displacement. The most severe loss of acetabular spongius bone X-ray density in all the zones was observed during the total sectoral deficiency subtype. **Conclusion & Significance:** Detected changes of acetabular spongius bone X-ray density reflectsthe local degenerative processes and following changes of the biomechanical bonetissue properties occurred due to dysplastic deficiency formation that influence primary and delayed acetabular component's stability. The defined normal ranges and regularities of acetabular spongius bone X-ray density changes during DDH that should be taken into consideration for preoperative planning of acetabular component implantation.

### Recent publications:

- 1 Best bone of acetabulum for cup component placement in Crowe types I to III dysplastic hips: a computer analysis / D. Shonenberg, R. Guggenberg, D.Frey, H.-C. Pape [et al.] Osteoporos Int. - 2018. - Vol. 2. - P.459-465
2. Bone mineral density t-scores derived from CT attenuation numbers (Hounsfield units): clinical utility and application / Am. J. Radiology - 2014. - Vol.200. - P.961-967.
3. CBCT-based bone quality assessment: are Hounsfield units applicable? / R. Pauwels, R. Jacobs, S.R. Singer, M. Mupparapu // Dentomaxillofac Radiol. - 2015. - Vol.44, N 1. - P.2014-2028.

### Biography

Elena Kovbasa has obtained her PhD degree at the age of 29 years in Dnipro State Medical University, Ukraine. Her PhD thesis was dedicated to implantation characteristics of acetabulum implicated to THR during developmental dysplasia of the hip. After that she had been working as an Assistant Professor of Trauma and Orthopaedics Department of Dnipro State Medical University, Ukraine since 2019. Since 2023 she's Head of the Department of Clinical Sciences of Kharkiv Institute of Medicine and Biomedical Sciences. The main field of scientific search is preoperative planning for THR in various hip joint pathologies and postural balance restoring after THR during DDH. She has over 40 publications and international conferences reports, those have been cited over 30 times, and her publication h-index is 2.5.

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