

ORTHOPAEDICS, ARTHROPLASTY AND ARTHROSCOPY

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Acetabular medical wall bone stock quantification during developmental dysplasia of the hip

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Statement of the Problem: Implantation of the cup above or laterally to the level of the hip biomechanical center is considered to be a risk factor for the acetabular component's instability, so its implantation in the projection of the true acetabulum is desired but accompanied with risk of medial wall perforation and neurovascular complications. Thus precise quantitative assessment of medial wall bone stock in site of the planned acetabular component's bony bed during DDH is required.

Methodology & theoretical orientation: There were revealed a complex comparative MSCT-morphometric investigation of 32 normal hips and 65 hips with DDH Crowe I-III types. There were assessed medial wall bone width in projection of the lig. teres bed and planned acetabular component's bony bed centre according to the proposed MSCT-measuring technique; their correlation with indices of femoral head's cranial migration, acetabular horizontal sphericity angle and centre-edge (Viberg's) angle. Mann-Whitney test, one-way analysis of variance and Spearman's rank correlation were used respectively.

Findings: Width of the acetabular medial wall in projection of the lig. teres / acetabular component's bony bed centre was defined as: 4,3 mm (3,3; 4,8) / 7,2 mm (6,2; 7,8) for normal hips, 9,95 mm (7,5; 11,6) / 11,85 mm (9,8; 13,5) for Crowe I hips, 15 mm [(1,7; 17,3) / 15,7 mm (13,5; 17,3) for Crowe II hips and 15,45 mm (13,7; 19,8) / 16,05 mm (12,8; 20,2) for Crowe III hips, respectively. Weak correlation of acetabular medial wall bone stock in projection of acetabular component's bony bed centre with femoral head's cranial migration indicates the invalidity of the Crowe's DDH staging for THR's needs and the necessity of independent measuring of the index during individual preoperative planning.

Conclusion & Significance: Positioning of the cup at the level of the hip's biomechanical centre requires its medialisation that can be achieved safely only with medial wall width not less than 12-15 mm in both localisations, otherwise it should be turned to cotyproplasty technique. Since conventional biplanar X-ray imaging is invalid for precise measuring of the aforementioned indices due to superimpositioning, the proposed MSCT-morphometric technique could be of help in terms of individual safe implantation technique selection during THR preplanning for DDH.

Recent Publications:

1. Acetabuloplasty at the anatomic centre for treating Crowe class III and IV developmental hip dysplasia: a case series / C. Sen, K. Bilsel, M. Elmadag [et al.] // Hip. Int. - 2016. - Vol.26. - P.360-366.
2. Dorr L.D. Medial protrusion technique for placement of a porous-coated hemispherical acetabular component without cement in a total hip arthroplasty in patients who have acetabular dysplasia / L.D. Dorr, S. Jakakkol, M. Moorthy // J. Bone Joint Surg. Am. - 1999. - Vol.81. - P.83-92.
3. Evaluation of medial acetabular wall bone stock in patients with developmental dysplasia of the hip using a helical computed tomography multiplanar reconstruction technique / R. Y. Liu, K. Z. Wang, C. S. Wang, X. Q. Dang [et al.] // Acta Radiologica. - 2009. - Vol. 50, N 7. - P. 791-797.

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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