

Morphometric Analysis and Safety of Percutaneous Fixation of Anterior Column of Acetabulum in an Indian Population: A Preliminary Report

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Purpose: There has been an emerging trend in percutaneous fixation of minimally or nondisplaced fractures of anterior column of acetabulum. Considerable morphometric variations have been described in literature for its complex structure which can influence the safety of percutaneous screw fixation. This study presents a preliminary data of morphometric variations and safety of percutaneous fixation of fractures of anterior column of acetabulum in an Indian population.

Methods: CT-based data obtained in form of DICOM (Digital Imaging and Communications in Medicine) files from 102 uninjured pelvises was retrospectively analyzed in iPlan (BrainLab AG). Dimensions of narrowest zones around acetabulum and superior pubic ramus were measured. A method for calculation of axis anterior column of acetabulum was derived by joining these narrowest zones. Screw trajectories were directed along this axis and their lengths were measured from the lateral cortex to the point of first cortical perforation on superior pubic ramus. Screw length, distance of exit point from pubic symphysis, and the length of anterior column up to pubic tubercle were measured and compared among male and female groups.

Results: The morphology of osseous corridor of anterior column of acetabulum varied along its length with 2 constriction zones, first in acetabular region and second in superior pubic ramus region. Significant morphometric variations occur among male and female cases, with males having a wider osseous corridor in general. Only 54% cases (67.6% males and 22.5% females) allowed safe applicability of 6.5-mm diameter screw trajectories (with additional 4 mm of safety corridor). For female cases, the screw lengths were smaller and the screw exit point on superior ramus was more lateral compared to male cases.

Conclusion: Considerable intrapopulation and interpopulation morphometric variations of anterior column have been observed. The vertical height of the acetabular constriction zone is the chief parameter in deciding the safe applicability of anterior column screw. Standard screws of 6.5 mm and 7.3 mm diameters may not be safe for all the patients for percutaneous fixation. There is need of an individualized preoperative CT-based approach while planning for percutaneous fixation of the anterior column fractures.