Quantitative Contribution of Progressively More Extensile Posterior Surgical Approaches to the Acetabulum

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Purpose: Our purpose was to (1) objectively quantify the surface area of acetabular exposure using the Kocher-Langenbeck (KL), trochanteric osteotomy (TO), and surgical dislocation of the hip (SD) approaches, and to (2) compare the qualitative ability of a surgeon to see or palpate important anatomic landmarks in each exposure.

Methods: Ten thawed, fresh-frozen cadavers with ten hips and lower extremities were used for the study. The cadavers were placed in the lateral decubitus position. Continuous data collection was obtained by taking a calibrated digital photograph (Image J, NIH, Bethesda, MD) from the surgeon's best view. Discrete data points consisted of relevant anatomic landmarks that were classified as visualized, palpated but not visualized, or not visualized or palpated. These landmarks consisted of the greater and lesser sciatic notches; the margins of the acetabulum anteriorly, superiorly, and inferiorly; the anterior inferior iliac spine (AIIS); the greater and lesser trochanters; the vastus ridge; the pelvic brim; the quadrilateral surface; the iliopectineal eminence; and the femoral head fovea. Each specimen had three approaches performed in series by a board-certified orthopaedic surgeon under the direct supervision of a fellowship-trained orthopaedic trauma surgeon. The KL approach was performed first. Calibrated photographs and discrete data were collected at this point. Next a TO was performed. The osteotomy was made from just anterior to the posterior one-third margin of the gluteus medius insertion on the greater trochanter extending distally to the lateral femur just distal to the vastus ridge. The remaining attachments of the gluteus medius to the trochanter were elevated with the osteotomized portion of greater trochanter along with the gluteus minimus off of the superior margin of the acetabulum. Data were collected for the TO at this point. Lastly, an SD through a Z-shaped anterior hip capsulotomy was performed. A sharp Hohmann retractor was then placed anteriorly between the anterior inferior and anterior superior iliac spines. A blunt Hohmann was placed inferior to the transverse acetabular ligament. Two human retractors were again placed in the greater and lesser sciatic notches as previously perfomed in both the KL and TO portions of the approach. Data were collected for the SD at this time.

Results: The acetabular surface area exposed with a KL approach was 27.66 (±6.67) cm^2; with a TO approach, 41.82 (±7.97) cm^2; and with the SD, 53.08(±9.04) cm^2. The surface area exposed was significantly increased for both the TO and SD when compared to the KL ($P < 0.001$). The ability to see and touch surgical landmarks was similar between the SD and TO approaches. The TO allowed palpable exposure of the exterior surface of the anterior column to the AIIS in 8/10 specimens and visual exposure of the AIIS in 3/10 specimens while the SD allowed palpable exposure of the exterior surface of the anterior column to the AIIS in 10/10 specimens and visual exposure of the AIIS in 8/10 specimens. Performing SD enabled the surgeon to touch the inferior acetabulum and to see femoral head fovea in every specimen whereas the KL and TO approaches only allowed palpation of the inferior margin of the acetabulum in 3 and 4 specimens, respectively.

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Conclusion: The trochanteric osteotomy and the surgical dislocation can both improve surgical access to the acetabulum when compared with the Kocher-Langenbeck approach. Increases in acetabular exposure for the TO over the KL were primarily in the anterior and superior portions of the acetabulum. The SD exposure also increased anterior exposure to the AIIS as well as allowing access to the articular surface of the acetabulum and femoral head.

See pages 99 - 147 for financial disclosure information.