

Surgical Approach Algorithm for Transverse + Posterior Wall Fractures*Yelena Bogdan, MD; Shashank Dwivedi, MS; Paul Tornetta III, MD;**Boston University Medical Center, Boston, Massachusetts, USA*

Background/Purpose: Transverse + posterior wall (TR-PW) fractures are difficult to treat and have historically poor results, which correlate with the reduction. The Kocher-Langenbeck (KL) approach is used most often, while the extended iliofemoral, which has greater risks, has been reserved for more complex variants. No data exist on the use of sequential anterior and posterior approaches for this pattern. The purpose of this study is to evaluate an algorithmic method to determine the choice of surgical approach(es) for TR-PW fractures. We aimed to evaluate the effectiveness of the algorithm with respect to the reduction of the fractures and to report on the results of patients treated with it in the context of prior literature.

Methods: This was a retrospective study of a single-surgeon series of open reduction and internal fixation (ORIF) of TR-PW fractures. Exclusion criteria were inadequate imaging or follow-up and percutaneous or nonoperative treatment. Demographic, injury, surgery, and complication data were collected from medical records. Images (5-view pelvis radiographs and CT scans) for each patient were evaluated for fracture pattern and subtype (transtectal, juxtatectal, or infratectal), associated dislocation, direction, and amount of displacement of the ischiopubic fragment after any dislocation was reduced, presence of impaction or intra-articular fragments, final reduction, and subsequent union. Anatomic reduction was defined as the fracture site not being visible or being visible with ≤ 1 mm displacement and no joint step-off (as per Matta). We also made an effort to contact each patient by telephone to obtain updated data on functional status (Merle d'Aubigné score) when they could not return to the clinic. Radiographic arthritis was defined by Matta criteria, and osteonecrosis was defined as any changes in the trabecular pattern of the head. Heterotopic ossification (HO) was graded by the Brooker method.

Results: Of 114 TR-PW fractures in the database, 49 were excluded and 65 patients met criteria; average follow-up was 23 months. 82% were treated with KL and 18% with sequential ilioinguinal and KL approaches. All juxtatectal and infratectal fractures were treated with the KL approach while the approach to transtectal fractures relied on further assessment of radiograph and CT scans. Direction of displacement, as defined by direction of translation of the ischiopubic segment on axial CT, was the most important determinant, followed by obliquity of the fracture line. The sequential approach was used when the TR fracture was more vertical, exiting high in the anterior column, for displacement >1 cm, and for anterior translation. The algorithm resulted in 100% reduction within 1 mm (anatomic by Matta). Initial displacement was significantly higher in the sequential approach ($p=0.01$). The functional outcome as measured by Merle d'Aubigné score (average 16.3), radiographic arthritis (68% good/excellent), osteonecrosis (8%), revision (8%), grade III HO (1.5%), and infection (6%) rates are comparable with prior reports. Five patients went on to total hip arthroplasty (4 KL, 1 sequential) at 1-3 years after injury. Patients treated with the sequential approach had significantly less HO compared with the KL approach ($P = 0.04$); however, all but one patient had Brooker grade I or II, and no patient required excision.

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Conclusion: The use of sequential ilioinguinal and KL approaches for specific TR-PW acetabular fractures allowed for anatomic reductions in all cases. The use of an algorithm taking into account the obliquity and separation of the fracture as well as the translational displacement leads to good clinical and radiographic outcomes, and has notably decreased HO rates. However, despite excellent reductions and no loss of reduction or nonunions, our results are similar to Matta and Letournel and demonstrate a higher rate of joint space narrowing and conversion to total hip arthroplasty than other patterns.