Neurologic Injury in Operatively Treated Acetabular Fractures

Yelena Bogdan, MD[1]*; Paul Tornetta III, MD*[1]*; Clifford B. Jones, MD, FACS*[2]*;*
Emil H. Schemitsch, MD[3]*; Daniel S. Horwitz, MD*[4]*; David Sanders, MD*[5]*;*
Reza Firoozabadi, MD[6]*; Juan de Dios Robinson, MD*[7]*; Andrew Marcantonio, MD*[8]*;*
[1]*Boston University Medical Center, Boston, Massachusetts, USA;*
[2]*Orthopaedic Associates of Michigan, Grand Rapids, Michigan, USA;*
[3]*St Michael's Hospital, Toronto, Ontario, Canada;*
[4]*Geisinger Health System, Danville, Pennsylvania, USA;*
[5]*London Health Sciences Center, London, Ontario, Canada;*
[6]*Harborview Medical Center, Seattle, Washington, USA;*
[7]*Dalhousie University, Halifax, Nova Scotia, Canada;*
[8]*Lahey Clinic, Burlington, Massachusetts, USA*

Purpose: Neurologic injury after pelvic fractures is well studied, yet there is a paucity of data regarding the recovery of neural injury in acetabular fractures. Nerve injury in acetabular fractures is typically at the peripheral nerve level rather than at the nerve root and functional recovery may be quite different than in pelvic ring injuries. The purpose of this study is to evaluate a large series of operatively treated acetabular fractures with documented neurologic injury, both fracture-related and iatrogenic, and to track neurologic recovery and outcome.

Methods: All operatively treated acetabular fractures with documented neurologic injury from 8 trauma centers were reviewed in detail. To be included, patients had to be followed for at least 6 months or to neurologic recovery. We excluded patients with associated type 3 posterior pelvic ring injuries, nerve injury unrelated to the acetabular fracture (ie, laceration), spinal cord injury, and preexisting neurologic deficit. Data collected included demographics, injury characteristics, presence of dislocation, and surgical approach. Although these are not root injuries, we documented motor and sensory function by root to clearly document recovery. We tabulated L2-3, L4, L5 and S1 function preoperatively, at 3 months, at 6 months, and at final follow-up. Outcomes included partial or complete recovery, development of CRPS (chronic regional pain syndrome), brace use, and return to work. Motor and sensory injuries were documented separately as either complete (no function) or incomplete (weakness or paresthesias) at all time points.

Results: 137 patients (101 male, 36 female) with an average age of 42 years (range, 17-87) met criteria. Mechanisms of injury included motor vehicle collision (67%), fall from height (11%), motorcycle (9%), and other (13%). The most common fracture types were transverse + posterior wall (33%), posterior wall (23%), and both-column (23%). Median time from injury to surgery was 3 days (range, 0-92), and follow-up was 25 months. The Kocher-Langenbeck (KL) was used in 74%, the ilioinguinal/stoppa in 19%, and 7% were combined. The neurologic deficit was identified preoperatively in 57%, postoperatively with no preop exam (obtunded, etc) in 24%, and was iatrogenic in 19%. Surgical approach (KL versus others) did not have an effect on the development of iatrogenic palsy ($P = 0.8$). A total of 187 motor and/or sensory deficits were identified: 7 in L2/3 (1 complete, 6 incomplete), 18 in L4 (1 complete, 17 incomplete), 114 in L5 (32 complete, 82 incomplete), and 48 in S1 (12 complete, 36 incomplete). Full recovery occurred in 54 (29%), partial recovery in 69 (37%), and 64 (34%)

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.

had no recovery (Table). Deficits in the sciatic distribution (L5, S1) were least likely to fully recover (26%) and 31% of those with complete injuries had no recovery. Importantly, 48% of iatrogenic injuries did not recover. Hip dislocation had no effect on neurologic recovery ($P = 0.4$). Of L5 deficits that had partial or complete recovery, 36% did so by 3 months and 52% by 6 months. 48 patients wore a brace at final followup, all for L5 dysfunction (48/106, 45%). CRPS developed in 19% (18/94 with data) and 60% (42 of 70 with data) returned to work. Complete versus incomplete injury did not affect development of CRPS ($P = 1$). Nerve recovery had no effect on return to work ($P = 0$ .8).

Table.
Recovery by Functional Level (Both Complete and Incomplete Injuries Included)

Level	No Recovery	Partial Recovery	Full Recovery
L2/3 (n = 7)	2 (29%)	2 (29%)	3 (42%)
L4 (n = 18)	8 (45%)	2 (10%)	8 (45%)
L5 (n = 114)	33 (29%)	51 (45%)	30 (26%)
S1 (n = 48)	21 (43%)	14 (29%)	13 (27%)

Conclusion: Peripheral neurologic injury in operatively treated acetabular fractures is most common in the sciatic nerve distribution. Surgical approach does not influence development of iatrogenic palsy. L5 deficits (extensor hallucis longus, tibialis anterior, and deep peroneal sensation) were most commonly seen in this series and have only a 26% chance of full recovery.

See pages 99 - 147 for financial disclosure information.