Progression of Post-Traumatic Hip Osteoarthritis Following Pelvic Ring Injuries

James D Brodell, Hashim Shaikh[1], Thomas Francis Rodenhouse, Brian D Giordano, John P Ketz, Sandeep Soin[1], Noah Joseph[1]
[1]University of Rochester

INTRODUCTION: While rates of post-traumatic osteoarthritis after acetabulum fracture have been thoroughly studied, there is no literature examining rates of hip osteoarthritis after pelvic ring injuries. The objective of this study was to determine the incidence of post-traumatic hip osteoarthritis in pelvic ring injury patients. We hypothesized that more severe pelvic ring injuries would be associated with greater rates of post-traumatic hip osteoarthritis.

METHODS:

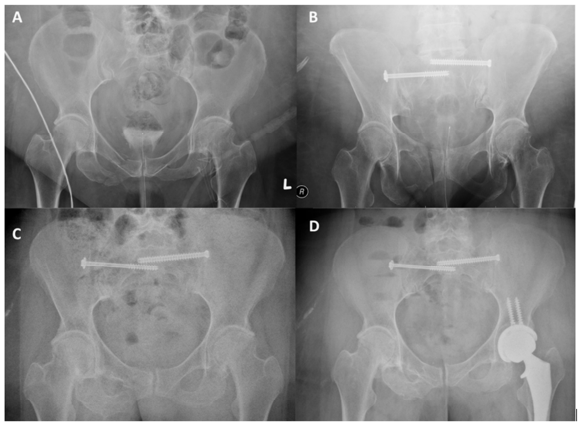
A retrospective review of patients with pelvic ring injuries was performed at an academic level I trauma center. Subjects were identified using a retrospective search for pelvic ring injuries. Patients were included if they were age 18 or greater, had a pelvic ring injury, and one year or more of radiographic follow-up. Patients were excluded if they had prior total or hemi-arthroplasty of either hip, femoral neck fracture, acetabulum fracture, femoral head fracture, inadequate radiographic follow-up. Both hips were graded using the Tönnis classification at the time of injury and available follow-up pelvis films. Comparison was made between stable and unstable pelvic ring injury patients, as well as severity of injury using the Young-Burgess classification.

RESULTS:

In total, 211 patients were included in the final analysis with a mean follow-up of 3.1 years (SD = 1.2 years). The average age of the cohort was 58.8 years (SD = 28.1 years). A total of 37 patients were found to have progression of OA within their ipsilateral hip, compared to 174 with no evidence of OA progression, a rate of 17.5% among all pelvic ring injury patients. No significant difference was identified between those with OA progression and those who did not go on to have OA progression in preoperative Tönnis score ($p = 0.17$).

Of the 211 patients, 127 were identified with stable pelvic ring injuries at admission, managed nonoperatively, in contrast to 84 patients with unstable pelvises who underwent pelvic ring fixation during their hospital stay. Among patients with stable pelvises, 118 had LC I injuries, 5 had (nondisplaced) LC II injuries, and 4 had APC I injuries. Those with unstable pelvic ring injuries consisted of 28 with APC II, 27 patients with LC I injury, 12 with LC II, 9 with LC III, and 8 patients with APC III injuries. There was a significantly greater percentage of patients within the unstable group who demonstrated OA progression compared to patients who had stable pelvises (35.7% vs. 6.2%, $p < 0.001$). Regarding the degree of OA progression, of the 127 patients who had stable pelvic ring injuries, there were 7 that had a Delta Tönnis score of 1, and 1 with a Delta Tönnis score of 2. Of the 84 patients with unstable pelvises, 22 had a Delta Tönnis score of 1, 6 had a Delta Tönnis score of 2, and 1 had a Delta Tönnis score of 3. One patient was identified who had a total hip arthroplasty performed after their injury at 19 months after their pelvic ring injury. [Figure 1].

DISCUSSION AND CONCLUSION: Traumatic pelvic ring injuries could result in alterations in pelvic biomechanics, including changes in pelvic tilt, rotation, and stability. To our knowledge, rates of post-traumatic osteoarthritis after pelvic ring injuries has yet to be described. Our investigation demonstrated that among all pelvic ring injuries, we identified a radiographic rate of osteoarthritis progression of 17.5% at a mean follow-up of 3.1 years. Moreover, there was a significantly greater incidence of progression for patients who underwent operative fixation for an unstable pelvis compared to those who had a stable pelvis and were managed nonoperatively. This may indicate that arthrosis can be precipitated by higher energy injuries and/or a more severe pelvic ring injury.



A) Presentation AP pelvis of a 65-year-old male who presented with a bilateral LC I pelvic ring injury and no ipsilateral or contralateral hip osteoarthritis. B) Post-operative AP pelvis demonstrating the construct. C) One year post-operatively, the patient has had rapid onset, severe, symptomatic left hip osteoarthritis with loss of the joint space, as well as significant heterotopic ossification. D) One and a half years post-operatively, the patient underwent an uncomplicated total hip arthroplasty.