

The Effect of Initial Reduction and Method of Reduction on Final Alignment in Type 3 Posterior Pelvic Ring Injuries

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Background/Purpose: Malunion after Type 3 posterior pelvis injuries can lead to persistent pain and disability. While there are excellent data on the ability to reduce these fractures, there are little data about the change in position of pelvic injuries during healing. We sought to evaluate the effect of initial reduction quality and method of reduction on final alignment. We hypothesized that closed reduction and open reduction techniques would have equal efficacy in maintaining reduction to union and that greater postoperative displacement would lead to greater change in alignment.

Methods: We reviewed the records of 100 patients with unilateral Bucholz Type 3 posterior ring injuries treated by two physicians at two Level I trauma centers. Patients were treated with either open reduction or closed reduction with traction and multiple percutaneous iliosacral screws were used for posterior fixation in all cases. Patients were evaluated with immediate postoperative pelvis radiographs and radiographs at the time of union. Displacement was measured as the vertical difference in the iliac wing, sacrum, and ischial heights perpendicular to a plumb line on the AP pelvis radiographs. Displacements were compared using a two-tailed *t*-test assuming *P* < 0.05 for significance. Pearson’s correlation was used to evaluate the relationship of initial displacement with the change in displacement during union.

Results: 40 patients were treated with a closed reduction and 60 with open reduction. There was no difference between the groups in initial displacement at the time of injury, gender, injury severity score or time to surgery. The average length of follow-up was 622 days. All injuries united. Initial postoperative displacement was greater in the open reduction group, and this difference was maintained through to union (Table 1). The average increase in displacement from immediate postoperative films to the final films after union was greater in the group treated with an open reduction technique (Table 2). Immediate postoperative displacement did not predict displacement over time for either group (Pearson’s correlation -0.08 to -0.31). Additionally, there was no difference in the interval displacement in patients who were plated anteriorly versus those who were not (*P* = 0.4, 0.8, 0.9 for iliac, sacral, and ischial heights).

Table 1	Displacement at Union (mm)		
	ORIF	CRPP	<i>P</i> Value
Iliac wing height (AP)	5.1 ± 5.2	2.7 ± 1.5	0.006
Sacral height (AP)	4.1 ± 6.0	2.4 ± 1.5	0.086
Ischial height (AP)	5.9 ± 6.3	2.9 ± 1.8	0.003

ORIF = open reduction and internal fixation, CRPP = closed reduction and percutaneous pinning.

See pages 99 - 147 for financial disclosure information.

POSTER ABSTRACTS

Table 2	Change in Displacement From Postoperatively to Union (mm)				
	ORIF	Range	CRPP	Range	P Value
Iliac wing height (AP)	2.6 ± 4.4	0 to 19.4	1.3 ± 1.3	0 to 5.4	0.066
Sacral height (AP)	2.0 ± 4.6	0 to 29.0	0.9 ± 1.5	0 to 7.5	0.159
Ischial height (AP)	2.6 ± 4.2	0 to 18.0	1.0 1.7	0 to 9.8	0.022

Conclusion: We evaluated the effect of reduction technique and initial postoperative displacement on maintenance of reduction to union in unstable posterior pelvic ring injuries. Our data suggest that a percutaneous reduction technique may have an influence on maintenance of reduction with statistically less displacement during union as well as better final alignment in iliac and ischial height. Sacral height trended toward better alignment. Greater postoperative malalignment did not correlate with change in alignment and the use of anterior fixation did not influence the displacement over time. Finally, we found that in both groups, there was a shift in alignment during union that was as high as 29 mm in the open group and 9.8 mm in the closed group.

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