Combined anterior fixation reduces postoperative pain and promotes earlier mobilization in lateral compression type 1 and 2 pelvic ring disruptions treated with posterior screw fixation

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INTRODUCTION: Treatment for lateral compression types 1 (LC1) and 2 (LC2) pelvic ring disruption remains controversial. Percutaneous screw fixation allows for early weight-bearing and decreases pain via fracture stabilization. Historically, surgeons often only addressed the posterior pelvic ring with screw fixation, however combined anterior and posterior ring fixation may increase mechanical stability. We hypothesized that patients treated with anterior and posterior percutaneous (AF+PF) screw fixation for LC-1 and LC-2 injuries will have decreased postoperative pain compared to patients receiving only posterior percutaneous screw fixation (PF).

METHODS: Patients with Young-Burgess LC1-2 pelvic ring disruptions treated across two hospitals were retrospectively identified. Patients ≥18 years old with LC1 or LC2 injuries treated via posterior percutaneous screw fixation with or without anterior percutaneous screw fixation were included. Incarcerated and pregnant patients, as well as pathologic fractures were excluded. The AF+PF and PF cohorts were 1:1 propensity matched for age, sex, and preoperative Visual Analogue Scores (VAS) for pain. Demographic and radiographic data were compared. Primary outcome compared between matched cohorts was VAS at the 24-hour postoperative mark. Secondary outcomes compared were morphine milligram equivalents (MME) usage at the 24-hour postoperative mark, VAS and MME at the 48-hour postoperative mark, and VAS and MME at 24 hours prior to discharge. Time to mobilization and postoperative length of stay were also recorded and compared. A p-value of <0.05 was considered significant.

RESULTS: 56 patients (28 with AF+PF and 28 with PF) from 2019 to 2023 were included. All demographic and baseline characteristics, including fracture pattern, were similar between the two groups (p>0.05) (Table 1). Patients in the AF+PF group had a significantly lower VAS score compared to the PF group 24 hours postoperatively (Difference in Mean (DIM): -2.18 (95% Confidence Interval (95%-CI): -0.91 to -3.45), p=0.0012), 48 hours postoperatively (DIM: -3.43 (95%-CI: -2.11 to -4.75), p=0.0001), and 24 hours before discharge (DIM: -2.68 (95%-CI: -1.31 to -4.04), p=0.0002). AF+PF patients had lower MME usage 24 hours before discharge (DIM: -6.99mg (95%-CI: -0.87 to -13.11), p=0.0259). Patients in the AF+PF group also had a significantly shorter days to mobilization (DIM: -3.21 days (95%-CI: -0.03 to -6.40), p=0.0479), however no significant difference in postoperative length of stay was observed (DIM: -1.96 days (95%-CI: -5.95 to 2.03), p=0.329) (Table 2).

DISCUSSION AND CONCLUSION: AF+PF lowers VAS and opiate consumption compared with PF in isolation for Young-Burgess LC1 and LC2 pelvic ring disruptions. Surgeons should strongly consider percutaneous anterior fixation in addition to posterior fixation if operating to improve pain control and early mobilization for these patterns.

Demographics and Baseline Characteristics	PF (n=28)	AF+PF (n=28)	p-value
Age (±SD)	49.36 ± 16.92	49.82 ± 16.92	0.9316
Sex (Female)	16 (57.14%)	15 (53.57%)	0.7883
Lateral Compression 2	11 (39.29%)	9 (32.14%)	0.5772
Complete Sacral Fractures	3 (10.71%)	4 (14.29%)	0.6864
Time from Injury to Sx (days)	4.57 ± 3.32	6.75 ± 4.88	0.0701
Preoperative VAS	8.11 ± 1.73	7.46 ± 2.36	0.2457

Table 1. Demographic and baseline pre-operative characteristics for patients who underwent posterior fixation vs. combined anterior and posterior fixation. VAS = Visual Analogue score

*Lateral compression 2 fracture type

**Complete sacral fractures

Outcomes	PF (n= 28)	AF+PF (n=28)	DIM	95% CI	p-value
24hr Postoperative VAS	4.39 ± 2.54	2.21 ± 2.20	2.18	0.91 to 3.45	**0.0012**
Δ 24hr Postoperative VAS	3.36 ± 2.561	5.25 ± 2.19	1.89	0.61 to 3.17	**0.0045**
48hr Postoperative VAS	5.18 ± 2.87	1.75 ± 1.97	3.43	2.11 to 4.75	**0.0001**
24hr Predischarge VAS	2.06 ± 2.54	1.32 ± 2.20	2.68	1.31 to 4.04	**0.0002**
24hr Postoperative MEQ (mg)	20.96 ± 11.63	17.31 ± 16.97	3.64	-4.15 to 11.44	0.3530
48hr Postoperative MEQ (mg)	19.29 ± 12.85	14.51 ± 16.40	4.78	-3.12 to 12.67	0.2302
24hr Predischarge MEQ (mg)	12.79 ± 12.811	5.80 ± 9.82	6.99	0.87 to 13.11	**0.0259**
Days to Mobilization	8.82 ± 6.83	5.61 ± 4.90	3.21	0.03 to 6.40	**0.0479**
Length of Stay (days)	10.57 ± 8.63	8.61 ± 6.93	1.96	-2.03 to 5.95	0.3290

Table 2. Post-operative outcomes and complications for patients who underwent posterior fixation vs. combined anterior and posterior fixation. VAS = Visual Analogue score, MEQ = morphine equivalent dose