Low-Profile Triangular Osteosynthesis for Unstable Posterior Pelvic Ring Injuries: Technical Note

***Rahul Vaidya, MD**; Kevin Steelman, MD; Ryan Bray, DO*
Detroit Medical Center, Ann Arbor, MI, United States

Purpose: Conventional triangular lumbopelvic fixation can be problematic because (1) it requires an advanced skill set for pedicle and iliac screw placement; (2) the connecting construct is technically demanding because of the screw insertion angles, often requiring offsets or rod bending; (3) reduction of the fracture may have to be done with Schanz pins and a femoral distracter followed by replacement by pedicle screws; and (4) may result in prominent instrumentation with subsequent wound breakdown. The purpose of this study is to describe our technique using implants that solve all these issues.

Methods: The patient is placed prone on a flat-top spinal Jackson table. We use a Schanz pin–based spine implant system (USS Fracture DPS /Johnson & Johnson). A lateral Wiltse approach is made between L5 and the posterior superior iliac spine (PSIS) for triangular fixation or bilateral Wiltse for U-shaped sacral fractures. The L5 Schanz pin is placed with AP fluoroscopy and and the Iliac pin is placed using the obturator outlet, obturator inlet, and iliac oblique views. The Schanz pins are placed parallel in the sagittal plane and at a 45° offset in the axial plane. The iliac pin is placed from the sacrum across the sacroiliac joint and below the PSIS so that it is not prominent. These are connected with a straight rod and 2 clamps. The hemipelvis can be distracted into reduction and then the clamps are tightened. This is followed by a horizontal screw such as a transacral screw.

Results: This series consisted of 18 consecutive patients who underwent lumbopelvic instrumentation for a sacral fracture/pelvic ring injury. We included only patients with a complete disruption through either the sacrum or sacroiliac joint from blunt trauma (AO/OTA Type C injuries). Reduction was measured by the modified Keshishyan Index and superior migration of the hemipelvis on the Bonesetter App (Detroit Bonesetter). There was no loss of reduction during the healing period, no failure of implants, or infection.

Conclusion: This technique does not require rod bending or an offset clamp, and results in a more recessed iliac screw and connecting rod to prevent wound breakdown.

Table 1: List of 18 patients who underwent lumbopelvic fixation (LPF) with associated pelvic injury, indication for treatment, type of treatment, and AO/OTA Classification

Patient	Injury	Indication for LPF	Treatment	AO/OTA Classification
1	R sacral fx, L APC2, b/l pubic rami fxs	Comminuted, displaced sacral fracture	R LPF, R S1 ISS, S2 TSS, INFIX	61C2.3(c,e,m)
2	R sacral fx, PS injury	Comminuted, displaced sacral fracture	R LPF, PS plate, R S1 ISS, S2 TSS	61C1.3(d)
3	R sacral fx, b/l pubic rami fx	Comminuted, displaced sacral fracture	R LPF, R S1 ISS, S2 TSS, INFIX	61C1.3(b)
4	R sacral fx, R pubic rami fx	Comminuted, displaced sacral fracture	R LPF, R S1 ISS, S2 TSS, INFIX	61C1.3(a)
5	L sacral fx, L pubic rami fx	Comminuted, displaced sacral fracture	L LPF, L S1 ISS, S2 TSS, INFIX	61C1.3(a)
6	R sacral fx, R pubic rami fx	Comminuted, displaced sacral fracture	R LPF, R S1 TSS, INFIX	61C1.3(a)
7	R sacral fx, L pubic rami fx	Sacral fx with L5/S1 facet extension	R LPF, R S2 TSS, INFIX	61C1.3(c)
8	R sacral fx, R pubic rami tilt fx	Comminuted, displaced sacral fracture	R LPF, R S1 TSS, INFIX	61C1.3(a,f)
9	L sacral fx, R APC2, b/l pubic rami fx	Comminuted, displaced sacral fracture	L LPF, L S1 ISS, S2 TSS INFIX	61C2.3(b,m)
10	B/l SI joint fx/dislocation	Bilateral SI joint fracture/dislocation	B/l LPF, B/l S1 ISS, S2 TSS, INFIX	61C3.1(j)
11	R sacral fx, L APC2, b/l pubic rami fx	Comminuted, displaced sacral fracture	R LPF, L S1 ISS, S2 TSS, INFIX	61C2.3(b,m)
12	R SI joint dislocation, PS injury	Sacral fx with L5/S1 facet extension	R LPF, PS plate, R S1 ISS	61C1.2(d)
13	L sacral fx, R APC2, PS injury	Comminuted, displaced sacral fracture	L LPF, PS plate, R S1 ISS, R S2 TSS	61C2.3(d,n)
14	Sacral U-fx, b/l pubic rami fx	Sacral U-type fracture with kyphosis	B/l LPF, L S1 ISS, S2 TSS, INFIX	61C3.3(b)
15	R sacral fx, R pubic rami fx, PS injury	Comminuted, displaced sacral fracture	R LPF, R S1 TSS, INFIX	61C1.3(a,d)
16	B/l sacral fx (b/l L5/S1 facet), L pubic rami	Bilateral sacral fractures with bilateral L5/S1facet extension	B/l LPF, R S1 ISS, S2 TSS, INFIX	61C3.3(b)
17	R sacral fx, L APC2, L ilium fx, L acetabulum fx	Comminuted, displaced sacral fracture	R LPF, R S1 TSS, R S2 TSS. L S1 ISS, L LC2S, INFX	61C2.3(d,n)
18	Sacral U-fx, L4-5 TP fx	Sacral U-type fracture with kyphosis	B/l LPF, R SI ISS, S2 TSS	61C3.3

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.