

Osteotomy for Bladder Exstrophy: Commentary and Ten Tips for Success

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Patients with Bladder Exstrophy, though rare, are cared for at most Children's Hospitals. Although osteotomy is not always needed for closure, especially in the neonatal period, it can significantly increase the success treating those presenting late. Specific indications for osteotomy, as part of a reconstruction include wide diastasis as seen in cloacal exstrophy, re-closure after failed initial repair, patients with persistent abnormal perineal appearance, and uterine prolapse due to a wide pelvic floor.

In the osteotomy surgery, bony fixation is needed to both approximate the pelvis and to maintain it through healing. While fixation across the symphyseal diastasis would be intuitively attractive, its profile and proximity to the reconstructed urethra limit its value to older children. For decades, an external fixator has been one of the main fixation options used in surgical reconstruction of the exstrophied pelvis. In this issue, Cardin and Herrera-Soto describe adaptation of an Internal Fixator (INFIX), a technique adapted from pelvic trauma, to reduce and stabilize the reconstructed pelvis. This provides several advantages: It avoids percutaneous pins, improves sitting and early mobilization, and likely improves comfort. The senior surgeon, Herrera-Soto, used pedicle screws and spinal rods to create the INFIX bridging the right and left sides. They also stabilize each side craniocaudally with screws. The result is an all-internal construct which allows early mobilization, early discharge, and can be



Figure 1A. A 17 year old with classic exstrophy and pelvic prolapse

left in place for many months (7+ in this article) until bony and soft tissue healing is mature.

The INFIX concept is attractive, especially for older children, such as the 12-year-old subject of this case. One precondition, though, is to have enough tissue thickness to accommodate the screws and bar. If the metal bar is too close to the skin, it may risk wound breakdown. Cardin and Herrera-Soto used a 6.0 mm rod; for younger children, small-stature sets, or even cervical instrumentation may be needed to implement this construct. The abdominal wall scarring is likely to be less, as there are no pin tracts to see.

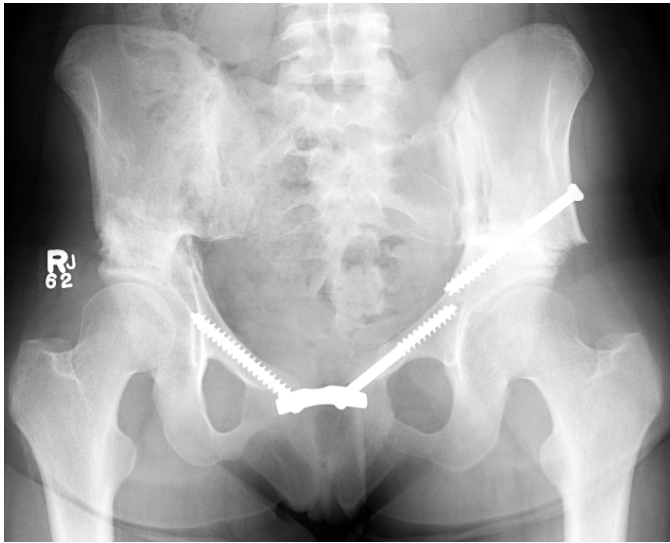


Figure 1B. Reconstruction with external fixator (since removed) and maintained with an intersymphyseal plate

While this concept has significant appeal, one concern is the need to leave the iliac wounds open throughout the long surgery, which may increase the risk of infection. Also, the INFIX does not allow progressive adjustability and requires another procedure for implant removal. The external fixation can be readily adjusted at bedside if necessary. It can also be removed in an awake setting without anesthesia when the osteotomies have healed. No implants are left internally. For many patients with exstrophy, especially larger children and adolescents, the stabilization described by Cardin and Herrera-Soto can lead to easier postoperative care and early mobilization. I look forward to using this technique on my older patients.

Since bladder exstrophy reconstruction is a rare procedure for most pediatric orthopaedic surgeons, I would also like to offer “Ten Tips for Success” throughout the reconstructive process:

1. Plan for hospitalization long enough to monitor bladder closure and urinary leakage.
2. Tunneled epidural catheter can relieve osteotomy pain and bladder spasms. Tranexamic acid is also worthwhile to limit bleeding with the multiple osteotomies, especially in older children.

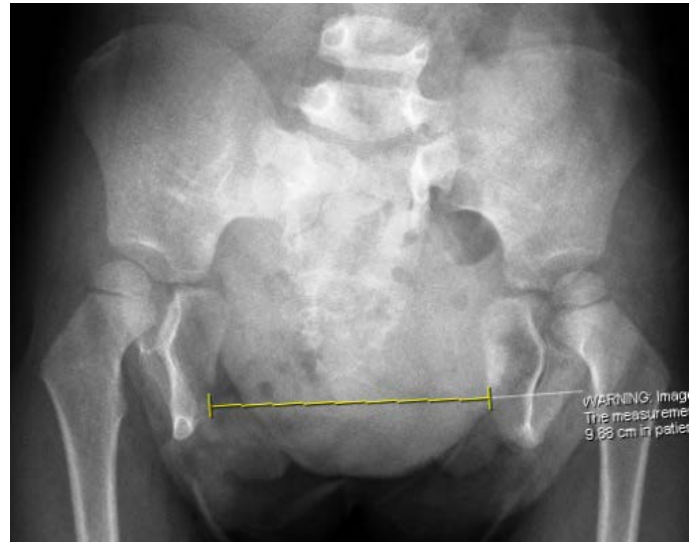


Figure 2A. A four year old with cloacal exstrophy, preoperation

3. The pelvic anatomy is externally oriented in exstrophy. Maximize lighting and access. Watch for dislocated hips, pelvic asymmetry, and unstable sacroiliac joints in patients with cloacal exstrophy.
4. Combined anterior and posterior osteotomy is important for children above 2-3 years, as described in this case.
5. Use Steinmann pin to localize level of osteotomy so that it exits near apex of sciatic notch. Allow enough bone caudally for fixation, whether using INFIX or external fixation.
6. If using external fixation, place two pins in each caudal segment, starting *lateral* to the anterior inferior iliac spine, with bi-cortical purchase. Then place one in each cranial segment.
7. In older children, prevent excessive medial “slide” at osteotomy site, with loss of contact and risk to sciatic nerve. The inter-fragmental screws used by Herrera-Soto can help with this.
8. For older children, I use inter-pubic fixation for the midline in addition, which can often be left in place for several years. A two-hole plate was initially used (Figure 1) but like Herrera-Soto, I also began to use

pedicle screws for this, due to the poly-axial adjustable heads (Figure 2).

9. A period of immobilization or traction can help to keep young children still and assist in management of urinary tubes. If used, the external fixator can be removed in clinic or bedside with oral analgesics and topical anesthetic.

10. Explain to parents that some diastasis will recur due to the innate lower growth potential of the anterior pelvic rami, but this does not compromise the result.

The clinical science of exstrophy reconstruction has advanced steadily since the first successful case in the early 1950s. The technique described by Cardin and Herrera-Soto provides additional options to improve clinical care.

References

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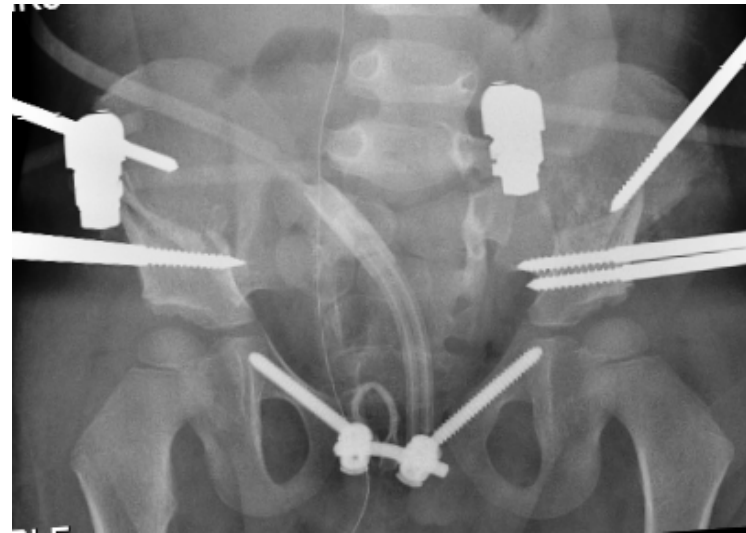


Figure 2B. Reconstruction with external fixation and inter-symphysial fixation with polyaxial pedicle screws and rod

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