

The Utility of Epidural Analgesia for Acetabular Fractures in Trauma Patients: A Case Report

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Background

Acetabular fractures represent an estimated 25% of all pelvic fractures and are usually the result of high impact trauma.¹ They often require initial stabilization prior to definitive surgical fixation.

Given the complex innervation of the acetabular labrum, including contributions from the nerve to quadratus femoris, obturator nerve, and sciatic nerve, acute pain management may prove challenging and up to 65% of patients may experience chronic post traumatic pelvic pain.²⁻⁵

Regional anesthesia procedures are a component of multimodal pain management and may include epidural catheter placement, lumbar plexus block, quadratus lumborum block, and the supra-inguinal fascia iliaca block.⁶⁻⁸ Positioning during these procedures may be difficult given the presence of orthopedic hardware.

Due to the multi-innervation and widespread injury of the pelvis, an optimal analgesic regimen has not yet been established for patients with complex acetabular fractures.

We describe an epidural-based perioperative pain management strategy for three patients.

Case Presentation

	Patient 1	Patient 2	Patient 3
Patient demographics	22-year-old Female	29-year-old Female	55-year-old Male
Type of injury	Left femoral shaft and acetabular fracture	Bilateral acetabular fractures with severely comminuted fracture of left hemipelvis	Pelvic ring disruption, left acetabular fracture and left S1-S3 sacral fractures
Timing of epidural placement	Post acetabular ORIF	Prior to acetabular ORIF while in distal femoral traction	Post acetabular ORIF, required subsequent operation on acetabulum while epidural in place
Level of epidural placement	L2-L3	T11-T12	L3-L4
Additional opioid requirement while epidural in place?	None while epidural in place	Additional opioids only intraoperatively during ORIF and immediately in the post-anesthesia care unit	Additional opioids needed on Day 5 after epidural placement. Switched to epidural infusion with 0.1% bupivacaine alone with an additional hydromorphone patient-controlled analgesic device (PCA)
Anticoagulation	Once daily enoxaparin	Enoxaparin switched to subcutaneous heparin	Subcutaneous heparin

Role of Regional Anesthesia for Acetabular Fracture

Regional Anesthesia Techniques

- The current literature regarding regional techniques for patients with pelvic fractures is scarce.⁹
- A previous randomized trial compared continuous epidural infusion versus patient-controlled epidural analgesia for pelvic fractures. Both modalities improved pain scores equally.¹⁰

Analgesic Efficacy of Epidural Catheter

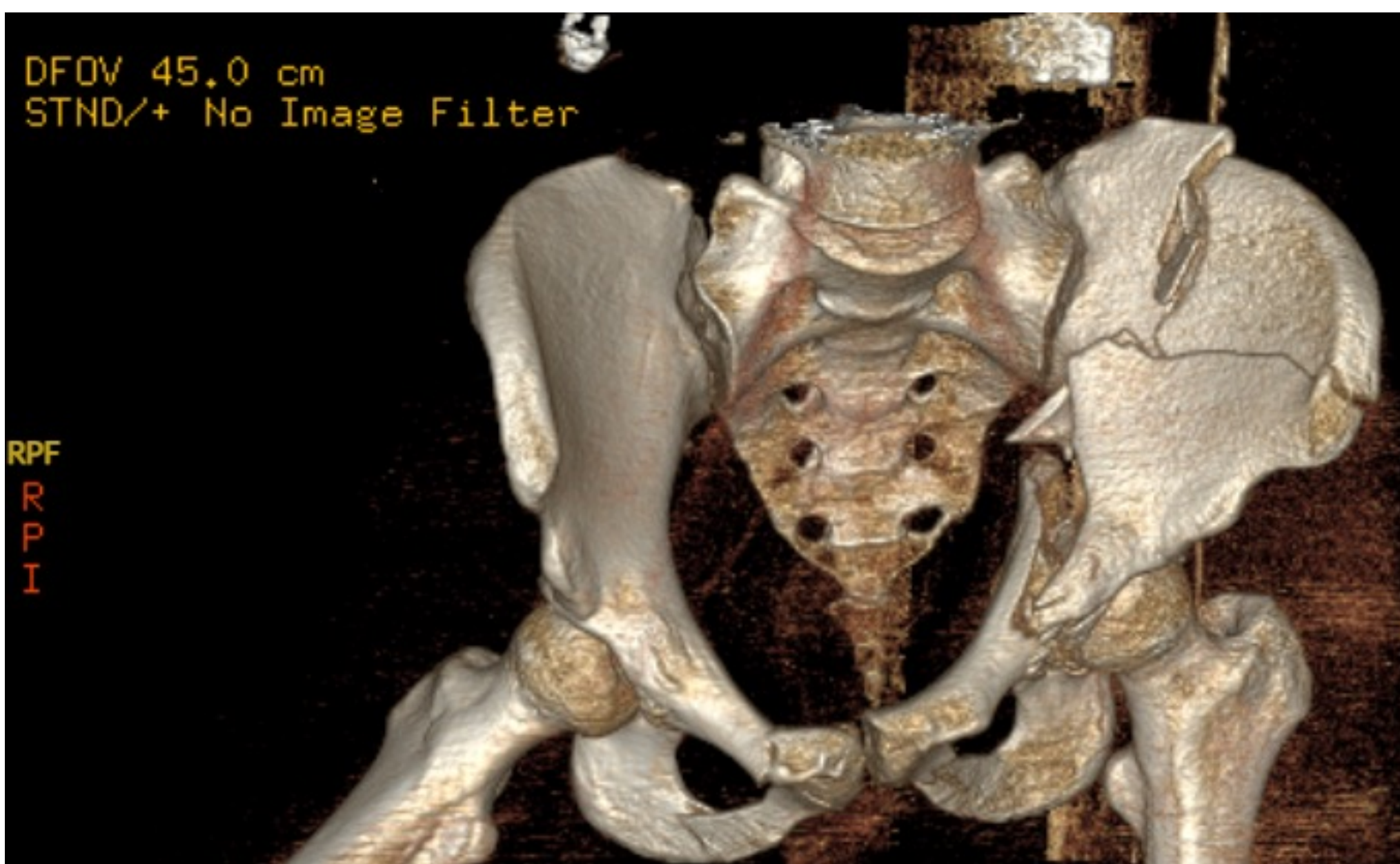
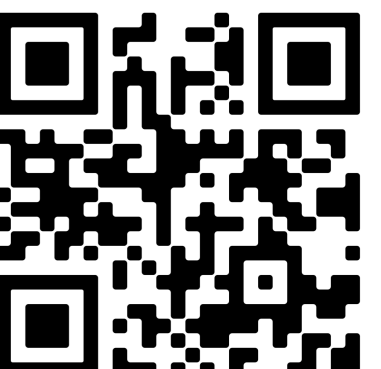
- Patient-controlled epidural analgesia was obtained with a solution of 0.1% bupivacaine with hydromorphone 5mcg/mL with background infusion and demand dosing.
- Patients reported improved pain scores and adequate analgesia with epidural in place. Additional analgesics included acetaminophen and methocarbamol.
- Patient 3 experienced a window of nociception at the bottom of the left buttock on day 5 of epidural placement refractory to boluses despite having adequate sensory blockade and decided to use a PCA rather than replace epidural.

Challenges with Epidural Approach

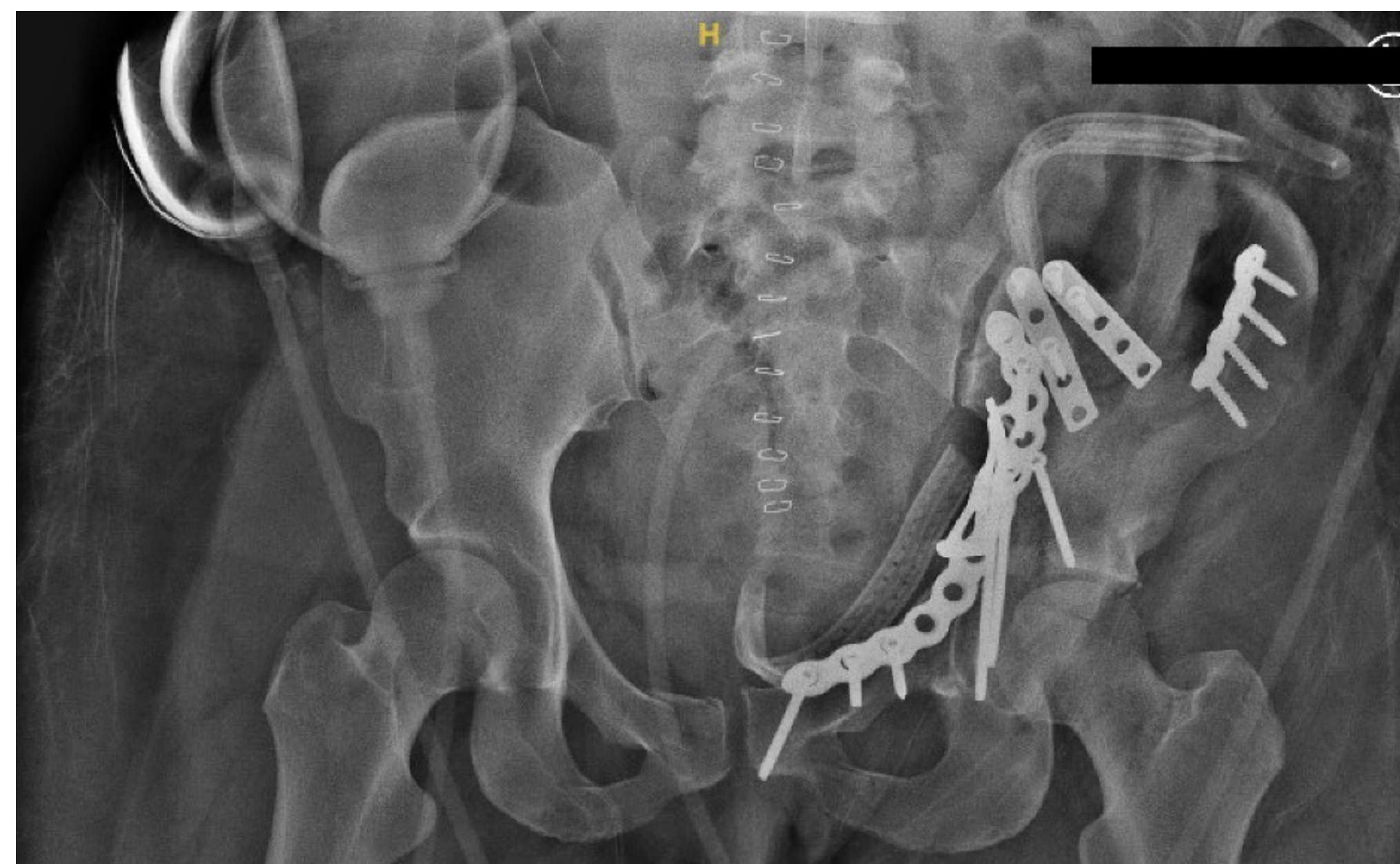
- Epidural for patient 2 was placed prior to definitive fixation. Given the presence of hardware, orthopedic surgery was consulted to briefly remove traction to facilitate epidural placement.
- While epidural in place, trauma team educated regarding contraindication for twice daily enoxaparin for DVT prophylaxis.

References

- Alvarez-Nebreda M.L., Weaver M.J., Uribe-Leitz T. et al. Epidemiology of pelvic and acetabular fractures in the USA from 2007 to 2014. *Osteoporos Int.* 2023.
- Alzaharani A., Ball K., Gudena R. et al. The innervation of the human acetabular labrum and hip joint: an anatomic study. *BMC Musculoskelet Disord.* 2014.
- Gerbershagen H.J., Dagekin O., Isenberg J., Martens N., Ozgür E., Krep H., Sabatowski R., Petzke F. Chronic pain and disability after pelvic and acetabular fractures—assessment with the Mainz Pain Staging System. *J Trauma.* 2010.
- Meyhoff CS., Thomsen CH., Rasmussen L.S., et al. High incidence of chronic pain following surgery for pelvic fracture. *Clin J Pain.* 2006.
- Weiss R.J., Montgomery SM., Stiller C., et al. Long-term follow-up of opioid use in patients with acetabular fractures. *Injury Extra.* 2012.
- Mistry T., Sonawane K., Raghuvanshi A., Balavenkatasubramanian J., Gurumoorthi P. Preemptive pericapsular nerve group block to facilitate sitting position for neuraxial anesthesia in patients with acetabular fractures: A case series. *Saudi J Anaesth.* 2022.
- Chelly JE., Cassali A., Al-Sansam T., Coupe K., Criswell A., Tucker J. Continuous lumbar plexus block for acute postoperative pain management after open reduction and internal fixation of acetabular fractures. *J Orthop Trauma.* 2003.
- Uysal et al. Lumbar block in supine position for postoperative pain management in acetabular fracture surgeries: cadaveric and clinical experience. *Braz J Anesthesiology.* 2021.
- Cunningham DJ., Robinette JP., Paniagua AR., LaRose MA., Blatter M., Gage MJ. Regional anesthesia does not decrease opioid demand in pelvis and acetabulum fracture surgery. *Eur J Orthop Surg Traumatol.* 2022.
- Nolan JP et al. Patient-controlled epidural analgesia following post-traumatic pelvic reconstruction. A comparison with continuous epidural analgesia. *Anaesthesia.* 1992.



Initial pelvic radiograph demonstrating complex left acetabular fracture with superior extension through the left ilium



Post-acetabular open reduction and internal fixation (ORIF) demonstrating extensive ORIF of the left hemipelvic structures with significant improvement in alignment

Conclusions

Epidural analgesia can be used for pain control in patients admitted with acetabular fractures, both pre- and post- definitive fixation.

Implementing an epidural approach requires multidisciplinary collaboration to ensure appropriate positioning with orthopedic hardware and selection of pharmacologic DVT prophylaxis.

Additional prospective studies are needed to further assess the efficacy of epidural analgesia for patients with acetabular fractures.