

Flexion-distraction Fracture of the Pelvis: Review of the Literature and a Conceptual Classification

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Abstract

We present a rare injury pattern of the pelvis that has not been published prior to this report in the literature. We describe in detail the injury sustained by a young male who was involved in a motor vehicle collision and suffered multiple injuries, including blunt head and chest trauma; pelvic and as well as long bone fractures. The injury pattern did not fall into the currently available classification systems and thus motivated us to design a classification system and suggest an approach to management as we have successfully managed our case.

Keywords: Pelvis; Classification; Flexion-distraction

Abbreviations: ICU= Intensive care unit; ATLS= Advanced trauma life support; MVC = motor vehicle collision

Introduction

Pelvic fractures make up 16% of all major trauma. This represents high energy trauma associated with a high mortality rate (31%). Majority of these fractures are classified using the common classification systems, namely Young and Burgess or Tile classification. Some fracture patterns however do not fit into any fracture classification system. We present a rare case of a flexion-distraction fracture of the pelvis with a proposed conceptual classification.

Case

A 26 year old male presented to the emergency department following a head-on high energy motor-vehicle collision (MVC). He was a restrained driver. He sustained multiple injuries including the following: intra-peritoneal urinary bladder rupture, blunt renal and hepatic trauma, left mid-shaft femur fracture, bilateral ankle fractures (open fracture on the right), right talus fracture and lastly a bilateral symmetric transverse fracture of the iliac wings also

involving the sacrum. This was associated with a Morel-lavallée lesion, which was debrided and had a washout with vancomycin powder mixed in saline wash.

He had sensory paraesthesia in the S2-S5 region. Clinically motor function of upper and lower limbs was unaffected. Debridement and fixation of the open ankle injury was undertaken with subsequent wound closure in the second sitting. He also underwent an antegrade intra-medullary femur nail for the left femur. He required a long stay in ICU for improved ventilation. The pelvic fracture was treated surgically without adverse events by the first author*using a posterior approach to the pelvis through paramedian incisions plus internal fixation. At six months follow up, the patient was fully mobile and pain-free from the pelvic fracture.

Discussion

The severity of this fracture pattern and the neurological risk it poses warrants its inclusion in existing classification systems. However this being a rare injury pattern the currently available classification systems do not account for this particular injury pattern. Having managed our patient and his injury pattern inspired us to design a conceptual classification {Figure 1} for this fracture pattern as well as a proposed treatment algorithm. The growth plate injury addition in the conceptual classification is based on an injury pattern observed in a child treated with a pelvic fracture that involved the posterior ring {Figure 2}. This child was involved in a MVC and sustained a femoral artery injury resulting in hip disarticulation after a delayed hospital presentation. She also sustained a pelvis injury involving the Sacroiliac Joint and Iliac apophysis which was treated with threaded sacroiliac rods {ITS. Austria} and Kwire fixation. We have also not seen her injury pattern described in the literature as well.

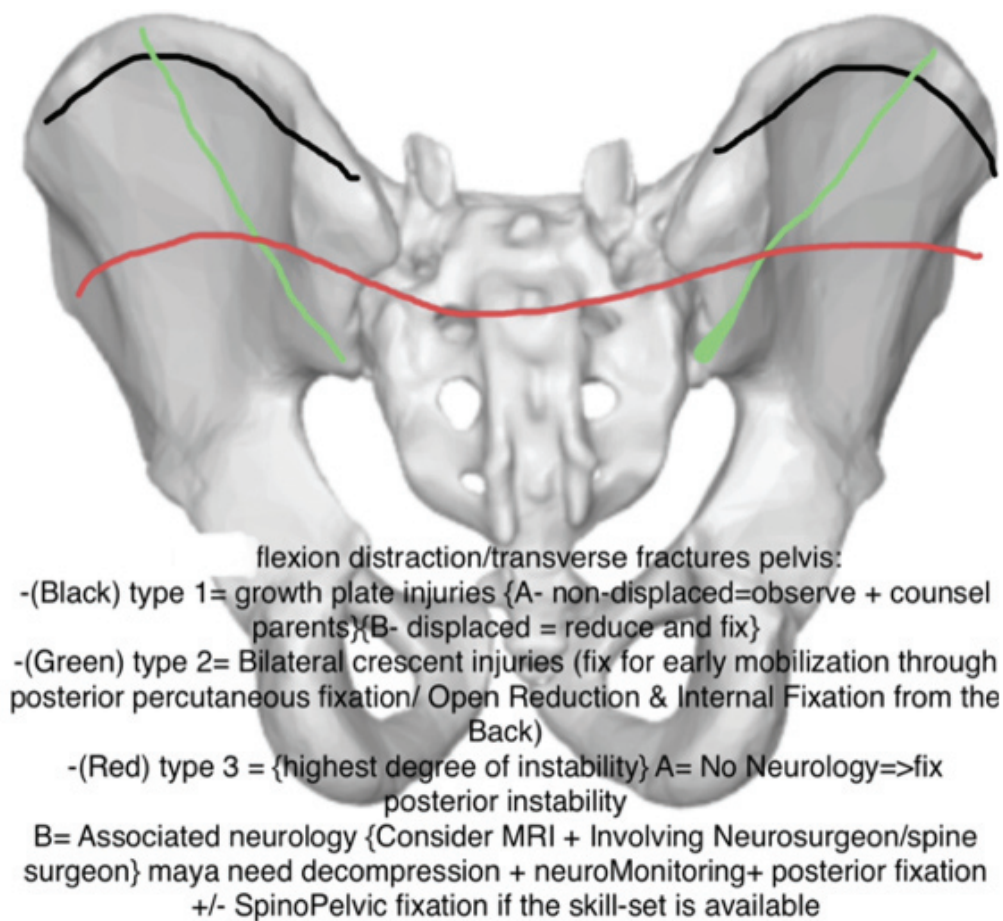


Figure 1. Text : Flexion distraction/transverse Pelvic injuries:

(Black) type 1= growth plate

A: non-displaced; observe and counsel for possible growth disturbance & asymmetric pelvis.

B- Displaced= reduce and fix.

(Green) type 2= Bilateral Crescent injuries=> ORIF to stabilise & mobilise early. LC 2 screws Vs Posterior fixation.

Static films = may show non-displaced injury, however since it's a posterior lesion ORIF recommended.

(Red) type 3 = (as with type 2 - spinopelvic dissociation =>ORIF is recommended:

A: no Neurology; therefore protect neurology through ORIF.

B: Neurological fallout; MRI (Identify lesion and Prognosticate)+ Neurosurgeon/ Spine Surgeon (spinal decompression + intra-op Neuromonitoring + posterior fixation +/- SpinoPelvic fixation where the skillset is available)

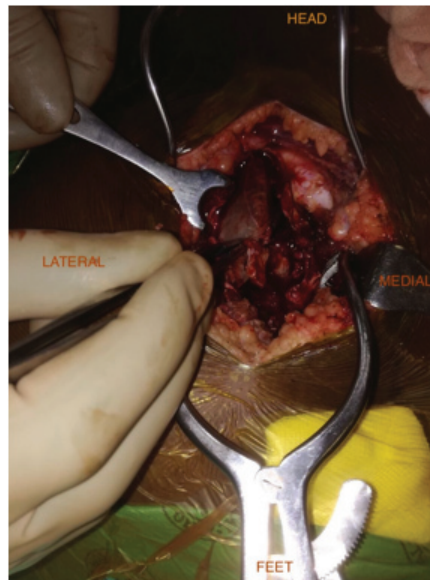
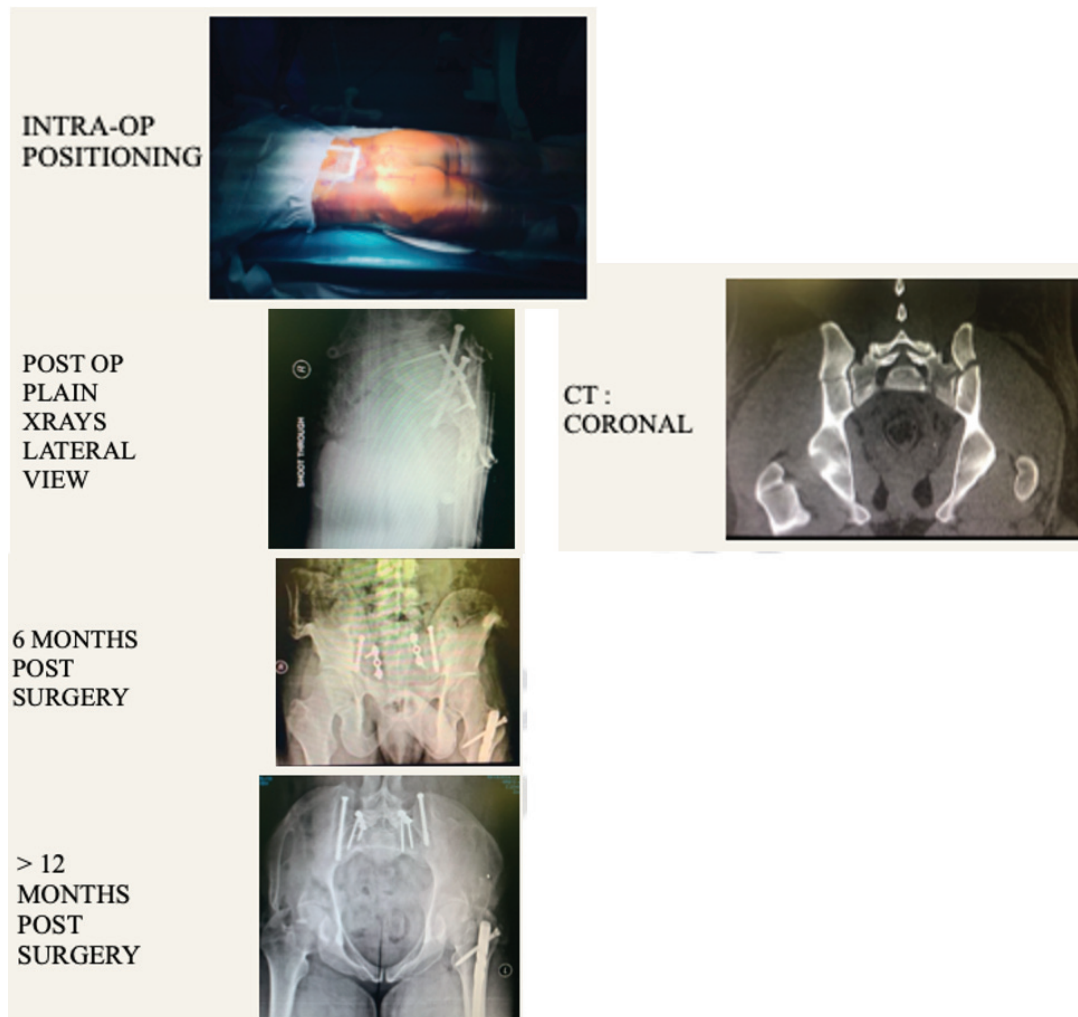


Figure 2. Text:

14year girl involved in MVA sustained vascular injury and presented too late for limb salvage and was disarticulated at the hip joint ipsilateral to the iliac crest pelvic injury and SacroIliac joint injury. She had staged fixation for some of her injuries as she recovered in ICU. Her injury pattern assisted in conceptualising the classification.



Pre-operative and Post-operative images (plain imaging and 3D CT scan)



Conclusion

Symmetrical bilateral transverse fracture of the pelvis is an extremely rare injury. This fracture does not fit into any existing classification system. This is associated with high energy trauma and management should focus on life-threatening injuries first. On the basis of the limited available literature, the fracture is associated with a relatively good prognosis and a good functional outcome can be expected. We present the first conceptual classification to help guide surgeons' clinical decision making. Understanding that what is rare now may not be in the future we hope to have added value to the body of science.

Acknowledgments

All the authors contributed to the publication of this work. The patient also gave consent to write on the findings of his injury as well as publish the relevant images to advance science and improve future patient care.

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