Chapter 4

PELVİC RİNG İNJURİES

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INTRODUCTION

The pelvic fractures are potentially life-threatening injuries with an increased incidence due to high velocity motor veichle accident (MVA). The incidence of pelvic ring injuries is estimated at about 3% of all fractures. (1,2) Adult pelvis fractures generally are either stable fractures resulting from low energy trauma, such as falls in elderly patients, or fractures caused by high energy trauma that result in significant morbidity and mortality. Severe pelvic injury usually due to high-velocity MVA, industrial accidents, falls off a significant distance. High energy traumas are particularly important because of the high incidence of associated soft tissue injuries, severe blood loss, shock, sepsis and adult respiratory distress syndrome (ARDS). The overall mortality from pelvic ring injuries is 9% to 22%, in open fractures 30-50% and patients with shock on arrival to the hospital have mortality rates of 33 to 57%. (3,4,5)

ANATOMY

The pelvic ring is composed of the sacrum and 2 innominate bones joined anteriorly at the symphysis and posteriorly at the paired sacroiliac joints. Each innominate bone is formed by the fusion of the ilium, ischium, and pubis that occurs at the tri-radiate cartilage. The pelvic brim is formed by the arcuate lines that join the sacral promontory posteriorly and the superior pubis anteriorly. The bony pelvis is divided into two regions. The arcuate line below is the true or lesser pelvis, in which are contained the pelvic viscera and above this is the false or greater pelvis that represents the inferior aspect of the abdominal cavity. Pelvic stability is conferred by ligamentous structures. The interosseous SI ligaments are among the strongest ligamentous connections in the body. Additional support is provided by the anterior and posterior sacroiliac ligaments, along with the iliolumbar ligaments, which connect the transverse

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venous thrombosis prophylaxis is controversial and should not be used as a first choice. (42,43)

Sexual dysfunction: Displaced unstable pelvic ring fracture has a greater risk for sexual life that both male and female patients. Sexual dysfunction in male patients are erection, ejaculation and worse satisfaction problems with sex life. Dyspareunia is a common problem in female patients. Genitourinary problems such as dysuria, urinary or gaita incontinence and reproductive problems can be seen in female patients. Orthopaedic surgeons should be aware of the common sexual dysfunction, even if there was no direct injury involved at the time of pelvic trauma. (28)

Fixation Failure: Vertical shear fracture pattern, obese patients and percuteneous ilisacral screw fixation tecnique have increased fixation failure rate. Patients with operatively treated fractures should close and careful follow-up after mobilization and at their 2-week follow-up to ensure that loss of fixation and reduction has not occurred. Fixation loss delayed diagnosis can be lead malunion and deformities with cause significant problems.(34)

REFERENCES

1. Schmal H, Markmiller M, Mehlhorn AT, Sudkamp NP. Epidemiology and outcome of complex pelvic injury. Acta Orthopaedica Belgica. 2005;71(1):41–47.
2. Lunsjo, K., Tadros, A., Hauggaard, A., Blomgren, R., Kopke, J., & Abu-Zidan, F. M. (2007). Associated injuries and not fracture instability predict mortality in pelvic fractures: A prospective study of 100 patients. The Journal of Trauma, 62(3), 687–691.
3. Starp JA, Fracture of pelvic ring in Bucholz WR, Court Brown CM, Heckman JD. Rockwood and Green's fracture in adults. 7th ed. Philadelphia: Wolter Kluwer, Lippincott William and Wilkins; 2010: 1415-59.
4. Demetriades D, Karaiskakis M, Toutouzas K, Alo K, Velmahos G, Chan L. Pelvic fractures: epidemiology and predictors of associated abdominal injuries and outcomes. J Am Coll Surg 2002;195:1-10.
5. Poole GV, Ward EF. Causes of mortality in patients with pelvic fractures. Orthopædics 1994;17:691-6.
6. Pohlemann T. Pelvic ring injuries assessment and concept of surgical management: AO principle of fracture management. 1st ed. New York: Thieme Struttgart; 2000. p. 391-413.
7. Tile M. Acute pelvic fractures: I. Causation and classification. J Am Acad Orthopaedic Surg. 1996;4(3):143–151.
8. Young JW, Burgess AR, Brumback RJ, Poka A. Pelvic fractures: value of plain radiography in early assessment and management. Radiology. 1986;160(2):445–451.
9. Burgess AR, Eastridge BJ, Young JW, et al. Pelvic ring disruptions: effective classification system and treatment protocols. J Trauma. 1990;30(7):848–856
10. Pennal GF, Tile M, Waddell JP, Garside H. Pelvic disruption: assessment and classifi-

cation. ClinOrthop Relat Res 1980(151):12-21.
11. Kellam JF, McMurtry RY, Paley D, Tile M. The unstable pelvic fracture. Operative treatment. Orthop Clin North Am 1987;18(1):25-41.
12. Denis F, Davis S, Comfort T. Sacral fractures: an important problem.Retrospective analysis of 236 cases. Clin Orthop Relat Res 1988; 227: 67e81.
13. Ruatti, S., et al. "Technique for reduction and percutaneous fixation of U-and H-shaped sacral fractures." Orthopaedics & Traumatology: Surgery & Research 99.5 (2013): 625-629.
14. Edieken-Monroe BS, Brunner BD, Jackson H. The role of standard roentgenogram in the evaluation of instability of pelvic ring disruption. Clin Orthop Relat Res 1989;240:63-76.
15. Ricci WM, Mamczak C, Tynan M, Streubel P, Gardner M. Pelvic inlet and outlet radiographs redefi ned. J Bone Joint Surg Am 2010;92:1947-53.
16. Kirby MW, Spritzer C. Radiographic detection of hip and pelvic fractures in the emergency department. AJR Am J Roentgenol 2010;194:1054-60.
17. Gonzalez RP, Ickler J, Gachassin P. Complementary roles of diagnostic peritoneal lavage and computed tomography in the evaluation of blunt abdominal trauma. J Trauma. 2001;51(6):1128-34; discussion 1134-6.
18. Nuchtern JV, Hartel MJ, Henes FO, et al. Significance of clinical examination, CT and MRI scan in the diagnosis of posterior pelvic ring fractures. Injury. 2015;46(2):315–319.
19. American College of Surgeons. Advanced trauma life support for doctors, ATLS Guidelines, 9th edition.
20. Guillamondegui OD, Pryor JP, Gracias VH, Gupta R, Reilly PM, Schwab CW. Pelvic radiography in blunt trauma resuscitation: a diminishing role. J Trauma 2002;53(6):1043-7.
21. Eastridge BJ, Starr A, Minei JP, O'Keefe GE, Scalea TM. The importance of fracture pattern in guiding therapeutic decision-making in patients with hemorrhagic shock and pelvic ring disruptions. J Trauma 2002;53(3):446-50; discussion 450-1.
22. Biffl WL, Smith WR, Moore EE, et al. Evolution of a multidisciplinary clinical pathway for the management of unstable patients with pelvic fractures. Ann Surg. 2001;233(6):843-50.
23. Poka A, Libby E. Indications and techniques for external fixation of the pelvis. Clin Orthop 1996;(329):54-9.
24. Sadri H, Nguyen-Tang T, Stern R, et al. Control of severe hemorrhage using C-clamp and arterial embolization in hemodynamically unstable patients with pelvic ring disruption. Arch Orthop Trauma Surg. 2005;125(7):443-7.
25. Ganz R, Krushell RJ, Jakob RP, Küffer J. The antishock pelvic clamp. Clin Orthop Relat Res. 1991 Jun;267:71-8.
26. Sadri H, Nguyen-Tang T, Stern R, et al. Control of severe hemorrhage using C-clamp and arterial embolization in hemodynamically unstable patients with pelvic ring disruption. Arch Orthop Trauma Surg. 2005;125(7):443-7.
27. Jackson S, Donovan J, Brookes S, Eckford S, Swithinbank L, Abrams P. The Bristol Female Lower Urinary Tract Symptoms Questionnaire:development and psychometric testing. Br J Urol 1996;77: 805– 812.
28. Baessler, K., M. D. Bircher, and S. L. Stanton. "Pelvic floor dysfunction in women after pelvic trauma." BJOG: An International Journal of Obstetrics & Gynaecology 111.5 (2004): 499-502.

29. Stubbart JR, Merkley M. Bowel entrapment within pelvic fractures: a case report and review of the literature. J Orthop Trauma. 1999;13(2):145-8.
30. Reilly, Mark C., Daniel M. Zinar, and Joel M. Matta. "Neurologic injuries in pelvic ring fractures." Clinical Orthopaedics and Related Research (1976-2007) 329 (1996): 28-36.
31. Carlson D, Simmons J, Sando W, Weber T. Morel-Lavallee lesions treated with debridement and dead space closure. Orthopaedic Trauma Association Annual Meeting, Toronto, Ontario, Canada, October 10– 12, 2002.
32. Tornetta III P, Normand A. Percutaneous management of Morel-Lavallee lesions. Orthopaedic Trauma Association Annual Meeting, Toronto, Ontario, Canada, October 10– 12, 2002.
33. Osgood GM, Manson TT, O'Toole RV, Turen CH: Combined pelvic ring disruption and acetabular fracture: Associated injury patterns in 40 patients. J Orthop Trauma 2013;27(5):243-247.
34. Kanakaris NK, Angoules AG, Nikolaou VS, Kontakis G, Giannoudis PV: Treatment and outcomes of pelvic malunions and nonunions: A systematic review. Clin Orthop Relat Res 2009; 467(8):2112-2124.
35. Biffl WL, Smith WR, Moore EE, et al. Evolution of a multidisciplinary clinical pathway for the management of unstable patients with pelvic fractures. Ann Surg. 2001;233(6):843-50.
36. Routt Jr, ML Chip, Sean E. Nork, and William J. Mills. "Percutaneous fixation of pelvic ring disruptions." Clinical Orthopaedics and Related Research (1976-2007) 375 (2000): 15-29.
37. Routt ML Jr, Nork SE, Mills WJ. Percutaneous fixation of pelvic ring disruptions. Clin Orthop 2000;375:15-29
38. Shuler TE, Boone DC, Gruen GS, Peitzman AB. Percutaneous iliosacral screw fixation:early treatment for unstable posterior pelvic ring disruptions. J Trauma 1995;38:453-8.
39. Barei DP, Bellabarba C, Mills WJ, Routt ME Jr. Percutaneous management of unstable pelvic ring disruptions. Injury 2001;32(Suppl 1):33-44.
40. Yap, Fui W., et al. "Trans-iliac pin/bolt/screw internal fixation for sacroiliac luxation or separation in cats: six cases." *Journal of feline medicine and surgery* 16.4 (2014): 354-362.
41. Vanderschot, Paul, et al. "Trans iliac–sacral–iliac bar stabilisation to treat bilateral lesions of the sacro–iliac joint or sacrum: anatomical considerations and clinical experience." Injury 32.7 (2001): 587-592.
42. Stannard, James P., et al. "Mechanical prophylaxis against deep-vein thrombosis after pelvic and acetabular fractures." JBJS 83.7 (2001): 1047-1051.
43. Rasmussen, Morten Schnack, Lars Nannestad Jorgensen, and Peer Wille-Jorgensen. "Prolonged thromboprophylaxis with low molecular weight heparin for abdominal or pelvic surgery." Cochrane Database of Systematic Reviews 1 (2009).