Perineal Injury Following Open Pelvic Fracture: A Case Report and Literature Review

Yifan Ng¹*, Antony Xavier Rex Premchand², Mark Chin Hung Tan² and Jill Cheng Sim Lee³

¹Department of Obstetrics and Gynaecology, KK Women’s and Children’s Hospital, Singapore.
²Department of Orthopaedics, Khoo Teck Puat Hospital, Singapore.
³Department of Urogynaecology, KK Women’s and Children’s Hospital, Singapore.

ABSTRACT

Perineal injuries following open pelvic fractures are rare but associated with significant risk of sepsis, haemorrhage, mortality and long-term sequelae such as urinary, faecal and flatus incontinence or sexual dysfunction.

Literature review was performed following the case of a 24-year-old nulliparous lady who presented with a perineal injury following an open pelvic fracture. Early gynaecological consult was obtained. External fixation of the pelvic fracture, surgical debridement and repair of the perineal injury was carried out.

The patient recovered well post-operatively without any major complications such as sepsis or infection, and was mobilising well at 3 months follow-up with no urinary, flatus or faecal incontinence.

Early gynaecological involvement in cases of perineal injury following open pelvic fractures is important to prevent short-term complications as well as long-term urinary, faecal and flatus incontinence and sexual dysfunction.

Keywords

Perineal injuries, Fractures, RTAs.

Case Presentation

Ms N, a 24-year-old nulliparous lady, was involved in a road traffic accident (RTA) where she was riding a motorcycle which collided with a stationary van. Upon arrival at the Accident and Emergency, she was diagnosed with an anterior-posterior compression (APC) grade III open pelvic fracture.

The pelvic X-ray (Figure 1) revealed widening of the pubic symphysis, Bilateral displaced superior and inferior pubic rami fracture as well as a midline sacral fracture from S1 to S5. CT angiogram showed pelvic fractures with a pelvic haematoma, perineal haematoma and active bleeding in the left labia majora. The trauma team called for gynaecological opinion immediately in view of visible perineal trauma with brisk per vaginal bleeding. At the time of presentation, Ms N’s heart rate was 122, blood pressure 108/68 mmHg and oxygen saturations were 100% on room air. At the emergency department, the trauma-related blood loss was estimated at 1.5 litres, and 2 units of packed red blood cells (279 and 281mls) were transfused pre-operatively.
Ms N was immediately transferred to the operating theatre for surgical management of her injuries following stabilization. Following skeletal stabilisation of the pelvic fracture with external fixator, Examination under anaesthesia revealed a left medial vulvar laceration (Figure 2) between the labia majora and minora, 5 cm long vertically with surrounding vulval oedema extending up to the mons pubis and laterally up to the limit of the labia majora. Exploration of the cavity of the vulval laceration revealed exposure of the pubic bone and symphysis pubis resulting in a large potential space (Figure 3 (a) and (b)). Bleeding appeared to originate from above the symphysis pubis, suggesting haemorrhage from the obturator vessels or its branches. The external anal sphincter was intact but the internal anal sphincter was completely torn. The rectal mucosa was intact as was the vagina and cervix. Flexible sigmoidoscopy up to 15 cm from the anal verge showed no blood in the anal canal and that the rectal walls were intact. Ms N’s intra-operative blood loss was estimated at 200 ml and no further transfusions were required intra-operatively. Despite this, her pre-operative haemoglobin level was 11.2 g/dL, which dropped to 8.0 g/dL post-operatively.

External fixation of the pelvic fracture was performed as definitive management in view of the high risk of infection if internal fixation was performed. This was followed by extensive washout of the cavity, debridement and repair of the internal anal sphincter via the overlapping method and repair of the vulva laceration in layers using absorbable sutures. The large cavity between the vulva and pubic bone was closed as much as possible with a drain left in situ to drain the pelvic and residual vulval haematoma fluid (Figure 4 (a) and (b)). Additionally, Ms N underwent angioembolisation of the left internal iliac artery and branches to the perineum on the same day, immediately following surgery. She was transferred to the Intensive Care Unit for 4 days prior to being transferred out to the general ward. She was subsequently discharged on the 13th post-operative day to a community hospital for rehabilitation for 4 weeks. Ms N had regained some mobility and was able to sit cross-legged at outpatient follow-up after 2 months (Figure 5), and the external fixation was then removed. At follow up appointment 3 months post-operatively, Ms N was mobilising independently and the fractures had healed. Her periods had resumed with normal flow and she denied any urinary, flatus or faecal incontinence, with no increased urinary urgency or problems with defecation. On examination, the vulval laceration had healed completely and was clean and dry. She had not yet resumed sexual intercourse, but she intends to start a family later on in the year. Written informed consent was obtained from Ms N to publish a case report about her open pelvic fracture and perineal injury.
Pelvic fractures can be stratified by the Young-Burgess classification system into four main types by the direction of the force applied to the pelvis; namely anterior-posterior compression (APC), lateral compression, vertical shear and combined fractures [7]. APC fractures are further graded by the degree of separation of the hemipelvices. An APC III fracture is considered an unstable open book fracture, as it involves the complete separation of both hemipelvices as well as disruption of both the anterior and posterior sacro-iliac ligaments. APC fractures in general have a higher mortality rate of 20% across all grades, and APC grade III fractures in particular carry a mortality rate of 37%. Of the different types of pelvic fractures, APC fractures also tend to be associated with haemorrhage and urologic injuries (22% of APC III fractures compared to 10% of APC II fractures) [7,8] are more likely to require embolisation to achieve haemostasis [9] and are more likely to cause de novo sexual dysfunction [10].

Initial management of a pelvic fracture follows Advanced Trauma Life Support principles [11,12]. As part of the physical examination, vaginal and rectal examinations are important to detect any occult open fractures. If the patient is determined to be haemodynamically unstable, resuscitation is initiated before applying a pelvic binder. A Focused Assessment with Sonography for Trauma (FAST) scan is performed to look for any free fluid in the peritoneum; a positive FAST scan suggests intra-abdominal haemorrhage and warrants laparotomy. Imaging can be done in the form of an anterior/posterior pelvic X-ray, or a contrasted Computed Tomography (CT) abdomen pelvis if the patient is stable. Following this, haemostasis is achieved either surgically, via pre-peritoneal packing, or via angiographic embolisation, then the fracture is externally fixed if amenable [13].

Haemorrhage was the cause of death in two-thirds of patients with pelvic fracture and up to 80-90% of haemorrhage arising from pelvic fractures is venous in origin, particularly from the presacral venous plexus [14]. On average, an open pelvic fracture is estimated to require the transfusion 29 units of packed red cells, of which 16 were used for acute resuscitation [3]. Due to the early external fixation and angioembolisation, Ms N only required a transfusion of 2 units of packed red blood cells. When the pelvis is fractured, the pelvic ring is unable to maintain proper tamponade on any venous bleeding if the fascia is disrupted. In the case of an open pelvic fracture, haemorrhage is also able to flow freely into the external environment. In an emergency setting, haemostasis may be achieved with packing to stop venous bleeding. Angioembolisation can be performed especially if there is persistent hypotension [15]. External fixation can also help to stop venous plexus bleeding as well as bleeding from cancellous bone [16].

An open pelvic fracture with a perineal injury presents an additional complication in terms of potential contamination from a ‘dirty’ wound. A study in China found 4 out 25 patients (16%) with pelvic fractures associated with vaginal injuries developed a pelvic abscess [1]. Proper wound debridement is critical to avoid sepsis. Many centres recommend faecal diversion if there is risk of faecal contamination [12,17,18]; one study reported up to 37% of open pelvic fracture patients requiring a diversional colostomy [11]. In this case although the internal anal sphincter was torn, the rectal mucosa was intact and successful primary closure of the perineal wound was achieved, so no diversion was required.

The internal anal sphincter injury is rare outside of an obstetric context [19]. Management of the anal sphincter tear is therefore drawn from evidence obtained from obstetric anal sphincter injuries and relies on a thorough physical examination to determine the extent of the damage. In this case, due to the traumatic nature of the tear, flexible sigmoidoscopy was performed to check that...
there was no disruption of the rectal mucosa. Accurate and prompt classification of the tear as well as the appropriate repair can help to reduce long term flatus and faecal incontinence. In a metaanalysis of 12 studies with 2288 women in an obstetric population, a significant association was noted between anal incontinence and third or fourth degree perineal laceration (pooled odds ratio 2.66, 95% confidence interval 1.77-3.98) [20].

Improper repair of the perineum may also result in long term sequelae such as urinary, flatus or faecal incontinence, vaginal stenosis and sexual dysfunction [21]. Across various studies, the rate of de novo dyspareunia occurring after pelvic fracture varies from 47-56% [10,22–24]. Again, APC fractures were associated with higher rates of sexual dysfunction than the other types of pelvic fractures - dyspareunia was reported in 91% of APC pelvic fractures in a study of 187 women by Vallier et al [24]. Similarly, Ter–Grigorian studied 24 women with pelvic fractures and reported 7 of 24 women (29%) developed urinary urge incontinence and 11 of 24 (45.8%) had urinary stress incontinence. Three (12.5%) developed flatus incontinence and faecal urge incontinence [22]. It is estimated that lower urinary tract injuries may occur in up to 25% of patients with pelvic fractures [25]. These urinary symptoms may not present immediately; there are case reports of women developing mixed (urge and stress) urinary incontinence, dysuria and microscopic haematuria secondary to bone spurs from malunion of pelvic fractures between 5-13 years prior [26,27]. This illustrates the importance of the early involvement of a multi-disciplinary team in managing pelvic fractures to prevent long-term sequelae.

In a young woman like Ms N, future fertility is an important consideration. It is possible to have a vaginal delivery after a pelvic fracture. An early study in 1983 of 34 pregnant patients in Denmark with a history of pelvic fracture found 27 out of 34 (79.4%) had successful uneventful normal vaginal deliveries [28]. However, in more recent studies, women with a history of pelvic fracture have a higher caesarean section rate. In a study of 48 women in the US, 28 women (58%) had caesarean sections, of which only 10 had caesarean sections for obstetric indications. Seven had caesarean sections for surgical implants (internal fixation) and 11 had caesarean sections in view of their history of pelvic fracture [29]. These studies however did not report on long-term sequelae such as urinary and faecal continence between those who had vaginal deliveries compared with women who delivered by caesarean section. There are no definitive guidelines for mode of delivery after a pelvic fracture, and even after accounting for obstetric indications there seems to be a high rate of bias towards caesarean section based on the history of prior pelvic fracture alone [30]. However, when there is an associated anal sphincter injury, assessment of anorectal symptoms, endoanal ultrasound and anorectal manometry may help guide recommendations for mode of delivery with regards to preserving anal sphincter function and preventing unnecessary caesarean sections [31].

In summary, open pelvic fractures carry a high morbidity as well as mortality, and this is further complicated by perineal injury. Early involvement of gynaecologists in a multi-disciplinary team can help to decrease the risks of sepsis and haemorrhage and reduce potential sequelae such as incontinence and sexual dysfunction.

**Funding Statement**

This case study was performed as part of the employment of the authors – MOHH Holdings for Yifan Ng and Mark Chin Hung Tan, Yishun Health for Antony Rex Xavier Premchand, Singapore Health Services for Jill Cheng Sim Lee.

**References**

1. Li P, Zhou D, Fu B, et al. Management and outcome of pelvic fracture associated with vaginal injuries: a retrospective study of 25 cases. BMC Musculoskelet Disord. 2019.
2. Ghosh S, Aggarwal S, Kumar V, et al. Epidemiology of pelvic fractures in adults Our experience at a tertiary hospital. Chinese J. Traumatol. 2019; 22: 138-141.
3. Brenneman FD, Katty D, Boulanger BR, et al. Redelmeier Long-term Outcomes in Open Pelvic Fractures. J. Trauma Inj Infect Crit Care. 1997; 42: 773-777.
4. Grotz MRW, Allami MK, Harwood P, et al. V Giannoudis Open pelvic fractures epidemiology current concepts of management and outcome. Injury. 2005; 36: 1-13.
5. Hammond CJ, Barron DA, Spencer J. Extensive perineal soft tissue disruption with open-book pelvic fracture Emerg. Radiol. 2007; 15: 277-280.
6. Duchesne J, Bharmal H, Dini A, et al, Open-book pelvic fractures with perineal open wounds a significant morbid combination. Am Surg. 2009; 75: 1227-1233.
7. Young JW, Burgess AR, Brumback RJ, et al. Pelvic fractures value of plain radiography in early assessment and management. Radiology. 1986; 160: 445-451.
8. Manson T, V O'Toole R, Whitney A, et al. Young-Burgess Classification of Pelvic Ring Fractures Does It Predict Mortality Transfusion Requirements and Non-orthopaedic Injuries. J Orthop Trauma. 2010; 24: 603-609.
9. Fu CY, Hsieh CH, Wu SC, et al. Anterior-posterior compression pelvic fracture increases the probability of requirement of bilateral embolization. Am J Emerg Med. 2013; 31: 42-49.
10. Duramaz A, Ilter MH, Yildiz S, et al. The relationship between injury mechanism and sexual dysfunction in surgically treated pelvic fractures. Eur J Trauma Emerg Surg. 2019.
11. Mi M, Kanakaris NK, Wu X, et al. Management and outcomes of open pelvic fractures An update. Injury. 2020.
12. Richardson JD, Harty J, Amin M, et al. Open Pelvic Fractures. J Trauma Inj Infect Crit Care. 1982; 22: 533-538.
13. Halawi MJ. Pelvic ring injuries Emergency assessment and management. J Clin Orthop Trauma. 2015; 6: 252-258.
14. Geeraerts T, Chhor V, Cheisson G, et al. Clinical review Initial management of blunt pelvic trauma patients with haemodynamic instability. Crit Care. 2007; 11: 204.
15. Karadimas EJ, Nicolson T, Kakagia DD, et al. Angiographic embolisation of pelvic ring injuries. Treatment algorithm and review of the literature. Int Orthop. 2011; 35: 1381-1390.
16. Kvarstein B, Riska E, Slatis P. Pelvic fractures. Ann Chir Gynaecol. 1981; 70: 256-263.
17. Rizzi L, Castelli C. Open pelvic fracture associated with lumbosacral dislocation and extensive perineal injury. Injury. 2015; 46: S44-S47.
18. Govaert G, Siriwathane M, Hatzifotis M, et al. Prevention of pelvic sepsis in major open pelviperineal injury. Injury. 2012; 43: 533-536.
19. Jones JG, Worthington T. Genital and Anal Injuries Requiring Surgical Repair in Females Less Than 21 Years of Age. J Pediatr Adolesc Gynecol. 2008; 21: 207-211.
20. LaCross A, Groff M, Smaldone A. Obstetric Anal Sphincter Injury and Anal Incontinence Following Vaginal Birth A Systematic Review and Meta-Analysis. J. Midwifery Womens Health. 2015; 60: 37-47.
21. Hasankhani EG, Omidi-Kashani F. Treatment Outcomes of Open Pelvic Fractures Associated with Extensive Perineal Injuries. Clin Orthop Surg. 2013; 5: 263.
22. Baessler K, Bircher MD, Stanton SL. Pelvic floor dysfunction in women after pelvic trauma BJOG. An Int J Obstet Gynaecol. 2004; 111: 499-502.
23. Ter–Grigorian A, Kasyan G, Pushkar D. Urogenital disorders after pelvic ring injuries. Cent Eur J Urol. 2013; 66.
24. Vallier HA, Cureton BA, Schubeck D. Pelvic Ring Injury Is Associated With Sexual Dysfunction in Women. J Orthop. Trauma. 2012; 26: 308-313.
25. Watnik NF, Coburn M, Goldberger M. Urologic Injuries in Pelvic Ring Disruptions. Clin Orthop Relat Res. 1996; 329: 37-45.
26. Küpeli B, Kordan Y, Alkibay T. Urinary incontinence after pelvic trauma: a case report. Int Urol Nephrol. 2001; 32: 363-365.
27. Davarinos N, Thornhill J, McElwain JP, et al. A Delayed and Rather Unusual Presentation of a Bladder Injury after Pelvic Trauma 5 Years after a Road Traffic Accident. Case Rep. Orthop. 2014; 1-3.
28. Madsen LV, Jensen J, Christensen ST. Parturition and Pelvic Fracture Follow-up of 34 obstetric patients with a history of pelvic fracture. Acta Obstet Gynecol Scand. 1983; 62: 617-620.
29. Cannada LK, Barr J. Pelvic Fractures in Women of Childbearing Age. Clin Orthop Relat Res. 2010; 468: 1781-1789.
30. Riehl JT. Caesarean section rates following pelvic fracture A systematic review. Injury. 2014; 45: 1516-1521.
31. Karmarkar R, Bhida A, Digesu A, et al. Mode of delivery after obstetric anal sphincter injury. Eur J Obstet Gynecol Reprod. Biol. 2015.