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

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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.

Introduction
Perineal injury following open pelvic fractures are rarely reported due to low incidence of between 2-4% [1], and can be associated with sepsis, haemorrhage, and long-term sequelae such as urinary, faecal and flatus incontinence or sexual dysfunction [2]. Pelvic fractures from high energy trauma are associated with high mortality of up to 16% [3]. In such cases, gynaecologists should be involved early as part of the multidisciplinary trauma team to reduce potential morbidity and mortality.

Here we describe a case of perineal injury following open pelvic fracture where gynaecologists were involved early, with good functional outcome and discuss the care of severe non-obstetrical pelvic and perineal trauma from a gynaecological perspective.

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.

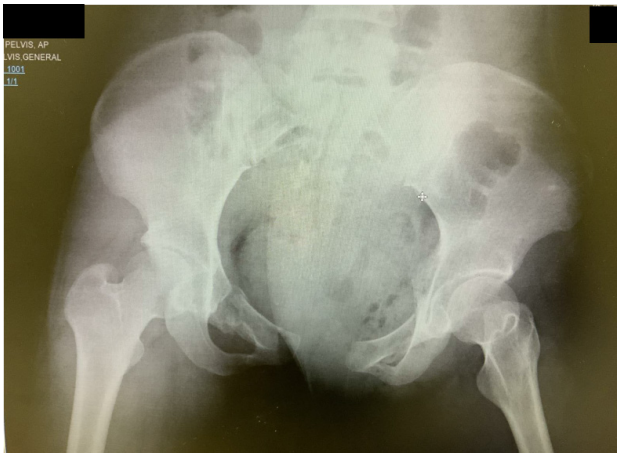

Figure 1: Pre-operative anterior-posterior pelvis x-ray.

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, 5cm 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 15cm 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 200mls 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.

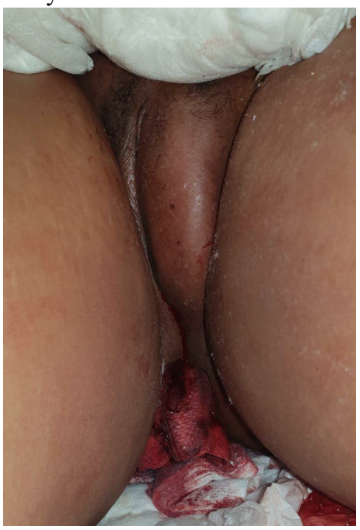

Figure 2: Pre-operative view of the perineum showing the left vulval swelling.

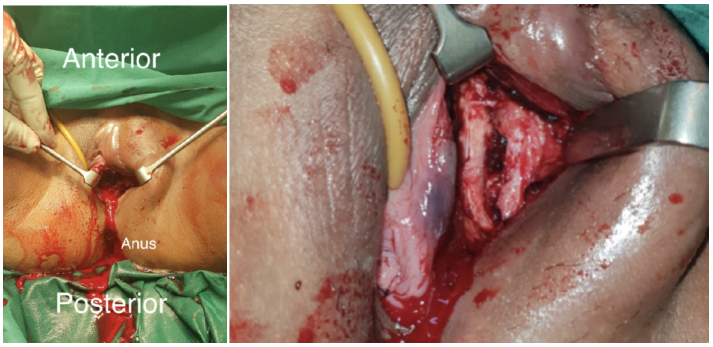

Figure 3: (a) Intra-operative view of the perineum (b) zoomed picture to show the visible symphysis pubis that has been disrupted.

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.

Figure 4*:* (a) Post-debridement picture taken immediately post-operatively, showing the surgical drain over the left vulva (b) Photo of the perineum one-week post-operation, showing the sutures over the left labia majora.

Figure 5: Outpatient follow up at 2 months showing definitive external fixation and the ability to sit normally. Photo taken 3 days prior to removal of external fixation.

Discussion

Pelvic fractures account for 3% of all fractures; however open pelvic fractures, defined by exposure of the fractured bone to the external environment via a skin break, are uncommon and only occur in 2-4% of all pelvic fractures [4]. These are typically associated with high energy impacts such as RTAs [2]. Vessels passing through the pelvis include the external and internal iliac as well as the femoral, obturator, and superior gluteal arteries and veins. These vessels can easily be damaged by the high energy impact that causes the fracture. Due to the importance of the pelvis in weight-bearing as well as the anatomical structures passing through or near the pelvis, morbidity is high, and mortality is estimated at up to 16% after an open pelvic fracture [3]. The major risks are haemorrhage, the risk for sepsis from wound contamination especially if there is any rectal injury, and the potential long-term sequelae of perineal trauma including urinary, flatus or faecal incontinence, and sexual dysfunction [5]. In a 2009 study by Duchesne et al, patients with pelvic fractures associated with open perineal wounds had a longer hospitalisation stay by 13 days and a higher average treatment cost of US$120,000 compared to similar patients without open perineal wounds, who had an average treatment cost of US$60,000 [6].

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 metanalysis 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.

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