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ABSTRACT

Treatment strategies for penetrating rectal injuries (PRI) in civilian settings are still not uniformly agreed, in part since high-energy transfer PRI, such as is frequently seen in military settings, are not taken into account. Here, we describe three cases of PRI, treated in a deployed combat environment, and outline the management strategies successfully employed. We also discuss the literature regarding PRI management. Where there is a major soft tissue component, repetitive debridement and vacuum therapy is useful. A loop or end colostomy should be used, depending on the degree of damage to the anal sphincter complex.

INTRODUCTION

Penetrating ballistic injuries are commonly seen in war, and the shift in recent conflicts in Iraq and Afghanistan away from gunshot wounds (GSW) as the main cause of injury is significant. The increased use of improvised explosive devices (IEDs) has resulted in more severely injured victims with an increase in perineal soft tissue injury and a likely concomitant increase in penetrating rectal injury (PRI).^{1–4} PRI may be externally visible if the perineum is disrupted or easily identified by presence of blood on digital rectal examination (DRE). On other occasions, injuries are found only with careful inspection at the time of surgery because of a high degree of suspicion from the injury pattern. There is still debate about optimal treatment strategies in high-energy transfer (HET) PRI, because publications of combat zone PRI are sparse.

Conventional care for civilian PRI is a temporary diverting loop colostomy⁵ and presacral drainage,⁶ but several experienced trauma groups have questioned the need for presacral drainage.^{6–8} The diversity of opinions in current literature on PRI treatment seems inadequate for many of the HET injuries encountered in military surgical practice. The goal of this paper was to describe practical management strategies of PRI (and concomitant soft tissue loss) to aid in the management of PRI sustained in military conflict based on representative cases and review of the current literature.

CASE 1: PRI DUE TO GUNSHOT

A 38-year-old Afghan man was transferred from the point of injury to the emergency department (ED) of an International Security and Assistance Force (ISAF) Role 3 Medical Treatment Facility (R3MTF) in the Kandahar region after sustaining a GSW to the right flank 2 h previously. Initial observations were a heart rate of 110 beats/min and blood pressure 90/40 mmHg. An abdominal examination showed signs consistent with peritonitis and a single wound in the right lower abdomen; DRE was normal and no other injuries were found.

Key message

High energy transfer penetrating rectal injury as seen in recent military conflicts are, in contrast to low energy transfer civilian penetrating rectal injury, in need of a diverting colostomy and repetitive aggressive surgical treatment.

Anterior–posterior abdominal x-ray revealed a projectile at the level of the promontory of the sacral spine (Figure 1). An immediate laparotomy revealed gross faecal contamination from circumferential destruction of the caecum, treated by right hemicolectomy and side-to-side ileotransverse colonic anastomosis. In addition to the caecal injury, exploration of an expanding retroperitoneal haematoma necessitated suture ligation of the left internal iliac vein and renorrhaphy of the lower pole of the right kidney to control bleeding.

No additional bowel injuries, including injuries of the intra-abdominal rectum, were found, and the projectile was not identified during laparotomy. After temporary abdominal closure, the patient was admitted to the intensive care unit (ICU) for further resuscitation. Proctoscopy prior to relook laparotomy revealed an intraluminal projectile without evident rectal injury or luminal blood (Figure 2). A diverting loop colostomy was performed after copious intra-abdominal and distal rectal washout, and the abdomen closed. The patient recovered without complications and was discharged from hospital within 1 week. The colostomy was closed in a local facility 6 weeks later.

Figure 1 X-ray image: projectile at the level of the promontory of the sacral spine.

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Case report

Figure 2 Rigid rectoscopy revealing an intraluminal projectile without evident rectal injury.

CASE 2: TRANSGLUTEAL INJURY DUE TO ROCKET-PROPELLED GRENADE

A 25-year-old Afghan man presented to the ED after a rocket-propelled grenade had broadsided his unarmoured vehicle without detonating. He experienced grade II shock that responded to resuscitation efforts. Inspection revealed an isolated but massive wound of both buttocks and rectum through which the missile had passed (Figure 3). No bony injury of the pelvis was discernible on radiographs. An exploratory laparotomy revealed no intraperitoneal injuries. A proctectomy with end colostomy was performed with resection of the remainder of the rectum. Thorough debridement and washout of the rectal, perineal and gluteal wounds was followed by vacuum assisted therapy (VAC). The patient returned to the operating

Figure 3 Massive trans gluteal and anorectal wounds caused by rocket-propelled grenade. Patient in prone position.

room three times for completion of debridement followed by VAC dressing and progressive partial closure over the following 5 days. The anorectal sphincter complex had been completely destroyed without prospect for reconstruction. With the patient in the prone position, rotation flaps of skin and subcutaneous tissue were mobilised bilaterally to close the perineal defect over Penrose type drains. The drains were removed after 5 days. The patient was discharged to a local civilian facility for mobility rehabilitation 3 weeks after admittance.

CASE 3: TANGENTIAL INJURY OF THE COCCYX AND RECTUM DUE TO GUNSHOT

A shocked 7-year-old Afghan boy presented to the R3MTF 8 h after experiencing a HET tangential GSW to the pelvis. Following resuscitation in the ED he was transferred to the operating room where laparotomy revealed no intraperitoneal injury and a descending loop colostomy was formed with distal washout of the sigmoid colon and rectum. The patient was turned prone for washout of the rectal wound. The skin and gluteal muscles were severely injured. The coccyx was completely destroyed and there was a 75% circumferential laceration of the rectum approximately 5 cm from the anal verge, but the anus and sphincter complex were intact, as was the surrounding skin. After debridement, primary repair of the rectum was achieved with minimal mobilisation using inverting interrupted sutures of 3.0 Vicryl. A VAC dressing was applied over gauze covered with adhesive plastic dressing, which had been placed to protect the rectal repair. The patient returned to the operating room three times for debridement and irrigation over the next week. At each procedure, the skin defect was increasingly covered using skin advancement flaps until it was closed. The patient resumed diet on the third day after admission. He was able to walk with assistance after the first week. He was discharged to the care of his family. He returned for closure of the colostomy 6 weeks later. Resumption of bowel movement per rectum with normal continence occurred a week later.

DISCUSSION

The first patient had an injury from a single GSW, and we believe that even though it was originally a high-available-energy projectile, by the time it had reached the rectum it had already dissipated most of its energy to penetrate the rectum with no discernible tissue destruction. The literature suggests that non-destructive rectal injuries such as this may be treated without colostomy,⁹ but unfortunately the austere situation of a war zone does not (always) afford the luxury of a wait-and-see policy and emergent evacuation to the next level of care may be difficult, and so we believe our choice of a defunctioning loop colostomy is justified, particularly in the face of the massive faecal contamination caused by the destruction of the caecum. The injuries experienced by the second and third patients resulted from much greater transfer of energy to the rectum causing complete destruction of the posterior pelvis, though anorectal preservation was possible in the latter case because the anal sphincter complex was preserved. Defunctioning colostomies in local nationals were closed as soon as possible because of the harsh conditions resulting in a lack of supplies.

In civilian practice, most PRI are caused by low-energy transfer (LET) projectiles and can easily be treated by performing diverting colostomy without the need for further repair of the rectal injury or distal rectal washout.^{5 6} In contrast to LET PRI, literature on HET or blast injury of the rectum, as encountered in the current conflict in Afghanistan, is rare. Our experience suggests that multiple operations of a more intense nature are

required for combat-related PRI and needed to treat the gross soft injuries due to the massive energy transfer encountered in the perianal and buttock wounds of war. The primary phase often includes initial cleaning, packing of the perineal wound and the preperitoneal space of the pelvis to control haemorrhage and a diverting colostomy. Subsequent operations are required to complete debridement of soft tissue wounds that close by secondary intention. The colostomy may only then be closed if the rectum has been repaired with preservation of the anorectal complex. This is particularly true for PRI associated with perineal injuries from antipersonnel IED.¹⁰

In a retrospective analysis of penetrating pelvic battlefield trauma in 28 patients, 12 had extraperitoneal rectal injuries from HET projectiles.¹¹ The study demonstrated a significant correlation between pelvic fractures, massive soft tissue injury and rectal injuries, resulting in a mortality rate of 33%. High-energy transfer injuries usually result in rectal injuries that require some form of local surgical debridement and repair in combination with a diverting colostomy for faecal diversion.^{7 8 11} In a cohort of colorectal injuries in 977 coalition forces serving in Iraq and Afghanistan rectal injury led to faecal diversion twice as often as colonic injury, with more than half of patients requiring an 'ostomy' (56.2%).¹²

The role of presacral drainage in the management of civilian LET PRI is limited, since morbidity and mortality do not increase when faecal diversion is performed without presacral drainage.¹³ However, in HET wounds of the extraperitoneal rectum, such as combat injuries, the administration of presacral drainage and distal washout is still advocated.^{7 14}

Based on 26 extraperitoneal civilian rectal gunshot injuries, Levy *et al*¹⁵ recommended that: in most cases a loop colostomy is sufficient to divert the faecal stream while Hartmann's procedure must be considered in cases with massive rectal and perineal disruption; rectal wound repair should only be attempted when easy to perform; presacral drainage should be performed via the transperineal route only in cases with significant posterior rectal laceration and dissection of the perirectal spaces; and distal rectal washout is not mandatory, but may be performed in cases of massive disruption of rectal and surrounding tissues.

In a series of 29 patients with PRI with a trauma to treatment interval of more than 8 h, the presence of perianal or gluteal injuries and the presence of faecal contamination were significant factors affecting development of morbidity.¹⁶ In the largest published series by Burch *et al*,¹⁷ and in all subsequent series,^{11 18–22} no benefit in reducing septic complications was achieved when distal rectal washout was added to diversion and presacral drainage, although Burch *et al*¹⁴ showed a significant reduction in pelvic septic complications through the application of presacral drainage.

There are too few publications on combat PRI for evidence-based advice for treatment of these patients, but based on the experience of the authors in combination with the published literature we recommend repetitive debridement in combination with washout of penetrating rectal wounds with high-energy transfer to the tissue, such as those caused by IEDs. They may be managed well with aggressive surgical debridement and assisted by subatmospheric pressure therapy if available.

The liberal use of proctoscopy in penetrating trauma in the region of the lower abdomen, buttocks and upper femur is advocated, since it may reveal rectal injuries otherwise missed by DRE. The diagnostic accuracy of the DRE and proctoscopy in diagnosing rectal injuries is 76% to 95%.^{17 19–21 23 24} Data on false-negative proctoscopy is rare but may be as high as 31%.²⁵

CONCLUSIONS

In contrast to treatment of LET PRI, in which an expectant treatment in combination with a diverting colostomy might suffice (although in austere conditions this may not be the safest option), HET PRI requires aggressive surgical management. Massive soft tissue injuries require repetitive washout and debridement in combination with an end colostomy and drainage or subatmospheric pressure therapy to save the patient's life. Only when the patient's condition and healing of the rectal and perineal injuries are deemed to be sufficient is reversal of the colostomy advised as feasible.

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