

1 **Treatment of Rectal War Wounds**

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32 **Abstract**

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

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43 **Introduction**

44 Penetrating ballistic injuries are commonly seen in war, and the shift in recent
45 conflicts in Iraq and Afghanistan away from gunshot wounds (GSW) as the main
46 cause of injury is significant. The increased use of Improvised Explosive Devices
47 (IEDs) has resulted in more severely injured victims with an increase in perineal soft
48 tissue injury and a likely concomitant increase in penetrating rectal injury (PRI). [1 2 3
49 4]PRI may be externally visible if the perineum is disrupted or easily identified by
50 presence of blood on digital rectal examination (DRE). On other occasions, injuries
51 are found only with careful inspection at the time of surgery because of a high degree
52 of suspicion from the injury pattern. There is still debate about optimal treatment
53 strategies in high energy transfer PRI, because publications of combat zone PRI are
54 sparse.

55 Conventional care for civilian PRI is a temporary diverting loop colostomy [5] and pre-
56 sacral drainage [6], but several experienced trauma groups have questioned the
57 need for pre-sacral drainage [6-8]. The diversity of opinions in current literature on
58 PRI treatment seems inadequate for many of the high-energy transfer (HET) injuries
59 encountered in military surgical practice. The goal of this paper was to describe
60 practical management strategies of PRI (and concomitant soft-tissue loss) to aid in
61 the management of PRI sustained in military conflict based on representative cases
62 and review of the current literature.

63

64 **Case 1: Penetrating rectal injury due to gunshot**

65 A 38-year-old Afghan national male was transferred from the point of injury to the
66 emergency department (ED) of an International Security and Assistance Force
67 (ISAF) Role 3 medical treatment facility (R3MTF) in the Kandahar region after
68 sustaining a GSW to the right flank two hours previously. Initial observations were
69 with a heart rate of 110/min and blood pressure 90/40 mmHg. Abdominal
70 examination showed signs consistent with peritonitis and a single wound in the right
71 lower abdomen; DRE was normal and no other injuries were found. Anterior-posterior
72 abdominal X-ray revealed a projectile at the level of the promontory of the sacral
73 spine (Figure 1). An immediate laparotomy revealed gross faecal contamination from
74 circumferential destruction of the caecum, treated by right hemicolectomy and side-
75 to-side ileotransverse colonic anastomosis. In addition to the caecal injury,
76 exploration of an expanding retroperitoneal haematoma, necessitated suture ligation

77 of the left internal iliac vein and renorrhapy of the lower pole of the right kidney to
78 control bleeding.

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80 No additional bowel injuries, including injuries of the intra-abdominal rectum were
81 found and the projectile was not identified during laparotomy. After temporary
82 abdominal closure, the patient was admitted to the Intensive Care Unit (ICU) for
83 further resuscitation. Proctoscopy prior to relook laparotomy revealed an intraluminal
84 projectile without evident rectal injury or luminal blood (Figure 2). A diverting loop
85 colostomy was performed after copious intra abdominal and distal rectal washout and
86 the abdomen closed. The patient recovered without complications and was
87 discharged from hospital within one week. The colostomy was closed in a local
88 facility six weeks later.

89

90 **Case 2: Transgluteal injury due to rocket-propelled grenade**

91 A 25-year-old Afghan male was presented to the ED after a rocket-propelled grenade
92 (RPG) had broadsided his unarmoured vehicle without detonating. He suffered
93 grade II shock that responded to resuscitation efforts. Inspection revealed an isolated
94 but massive wound of both buttocks and rectum through which the missile had
95 passed (Figure 3). No bony injury of the pelvis was discernible on radiographs. An
96 exploratory laparotomy revealed no intraperitoneal injuries. A proctectomy with end
97 colostomy was performed with resection of the remainder of the rectum. Thorough
98 debridement and washout of both rectal, perineal and gluteal wounds was followed
99 by vacuum assisted therapy (VAC). The patient returned to the operating room three
100 times for completion of debridement followed by VAC dressing and progressive
101 partial closure over the following 5 days. The anorectal sphincter complex had been
102 completely destroyed without prospect for reconstruction. With the patient in the
103 prone position, rotation flaps of skin and subcutaneous tissue were mobilised
104 bilaterally to close the perineal defect over Penrose type drains. The drains were
105 removed after 5 days. The patient was discharged to a local civilian facility for
106 mobility rehabilitation 3 weeks after admittance.

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111 **Case 3: Tangential injury of the coccyx and rectum due to gunshot**

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

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133 **Discussion**

134 The first patient had an injury from a single GSW and we believe that even though it
135 was originally a high available energy projectile, by the time it had reached the
136 rectum it had already dissipated most of its energy to penetrate the rectum with no
137 discernible tissue destruction. The literature suggests that non-destructive rectal
138 injuries such as this may be treated without colostomy[9], but unfortunately the
139 austere situation of a war zone does not (always) afford the luxury of a wait and see
140 policy and emergent evacuation to the next level of care may be difficult and so we
141 believe our choice of defunctioning loop colostomy is justified, particularly in the face
142 of the massive faecal contamination caused by the destruction of the caecum. The
143 injuries suffered by the second and third patients resulted from much greater transfer
144 of energy to the rectum causing complete destruction of the posterior pelvis and the

145 anorectum – anorectal preservation was possible in the latter case because the anal
146 sphincter complex was preserved. Defunctioning colostomies in local nationals were
147 closed as soon as possible because of the harsh conditions resulting in a lack of
148 supplies.

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150 In civilian practice, most penetrating rectal injuries are caused by low energy transfer
151 (LET) projectiles and can easily be treated by performing diverting colostomy without
152 the need for further repair of the rectal injury or distal rectal washout [5,6]. In contrast
153 to LET PRI, literature on high energy transfer or blast injury of the rectum, as
154 encountered in the current conflict in Afghanistan, is rare. Our experience suggests
155 that multiple operations of a more intense nature are required for combat-related PRI
156 and is needed to treat the gross soft injuries due to the massive energy transfer
157 encountered in the perianal and buttock wounds of war. The primary phase often
158 includes initial cleaning, packing of both the perineal wound and the pre-peritoneal
159 space of the pelvis to control haemorrhage and a diverting colostomy. Subsequent
160 operations are required to complete debridement of soft tissue wounds that close by
161 secondary intention. The colostomy may only then be closed if the rectum has been
162 repaired with preservation of the anorectal complex. This is particularly true for PRI
163 associated with perineal injuries from anti-personnel IED [10].

164 In a retrospective analysis of penetrating pelvic battlefield trauma in 28 patients, 12
165 suffered extraperitoneal rectal injury from HET projectiles[11]. The study
166 demonstrated a significant correlation between pelvic fractures, massive soft tissue
167 injury and rectal injuries resulting in a mortality rate of 33%. High energy transfer
168 injuries usually result in rectal injuries that require some form of local surgical
169 debridement and repair in combination with a diverting colostomy for faecal diversion
170 [7,8,11]. In a cohort of colo-rectal injuries in 977 coalition forces serving in Iraq and
171 Afghanistan rectal injury led to faecal diversion twice as often as colonic injury with
172 more than half of patients requiring an 'ostomy' (56.2%) [12].

173 The role of presacral drainage in the management of civilian LET penetrating rectal
174 injuries is limited since morbidity and mortality do not increase when faecal diversion
175 is performed without presacral drainage [13]. However in HET wounds of the
176 extraperitoneal rectum, such as combat injuries, the administration of pre-sacral
177 drainage and distal washout is still advocated [7,14].

178 Based on 26 extraperitoneal civilian rectal gunshot injuries Levy et al recommended

179 that in most cases a loop colostomy is sufficient to divert the faecal stream while
180 Hartmann's procedure must be considered in cases with massive rectal and perineal
181 disruption; rectal wound repair should only be attempted when easy to perform;
182 presacral drainage should be performed via the transperineal route only in cases with
183 significant posterior rectal laceration and dissection of the perirectal spaces; and
184 distal rectal washout is not mandatory, but may be performed in cases of massive
185 disruption of rectal and surrounding tissues [15].

186 In a series of 29 patients suffering from penetrating rectal injuries a trauma to
187 treatment interval of more than 8 hours, the presence of perianal or gluteal injuries
188 and the presence of faecal contamination were significant factors affecting
189 development of morbidity [16]. In the largest published series by Burch et al. [17], and
190 in all subsequent series [11, 18-22], no benefit in reducing septic complications was
191 achieved when distal rectal washout was added to diversion and pre-sacral drainage
192 although Burch et al. showed a significant reduction in pelvic septic complications
193 through the application of presacral drainage [14].

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

200 The liberal use of proctoscopy in penetrating trauma in the region of the lower
201 abdomen, buttocks and upper femur is advocated, since it may reveal rectal injuries
202 otherwise missed by digital rectal examination. The diagnostic accuracy of the digital
203 rectal examination and proctoscopy in diagnosing rectal injuries is 76-95% [17,19-
204 21,23,24]. Data on false-negative proctoscopy is rare but may be as as high as 31%
205 [25].

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212 **Conclusion**

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

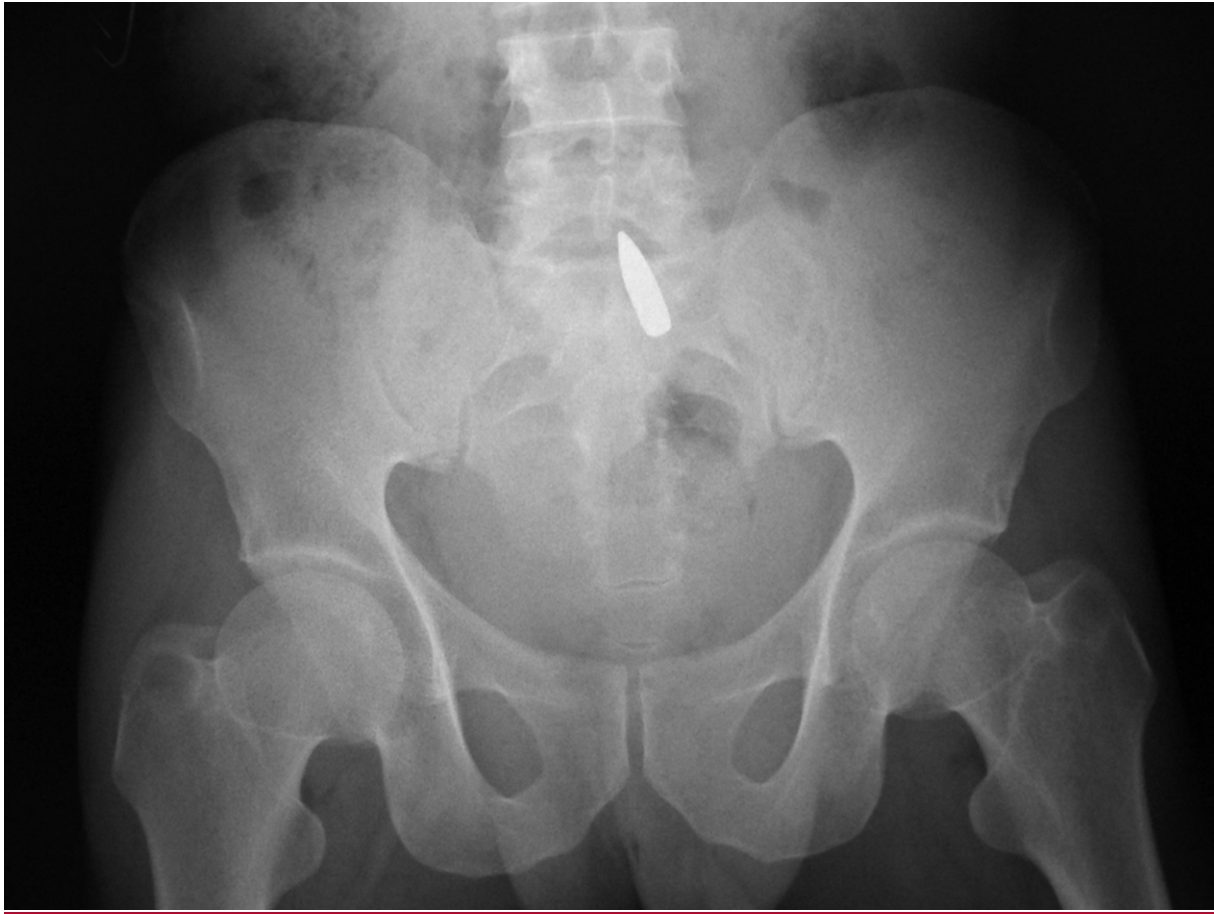
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277 Figure 1

278 X-ray image: projectile at the level of the promontory of the sacral spine

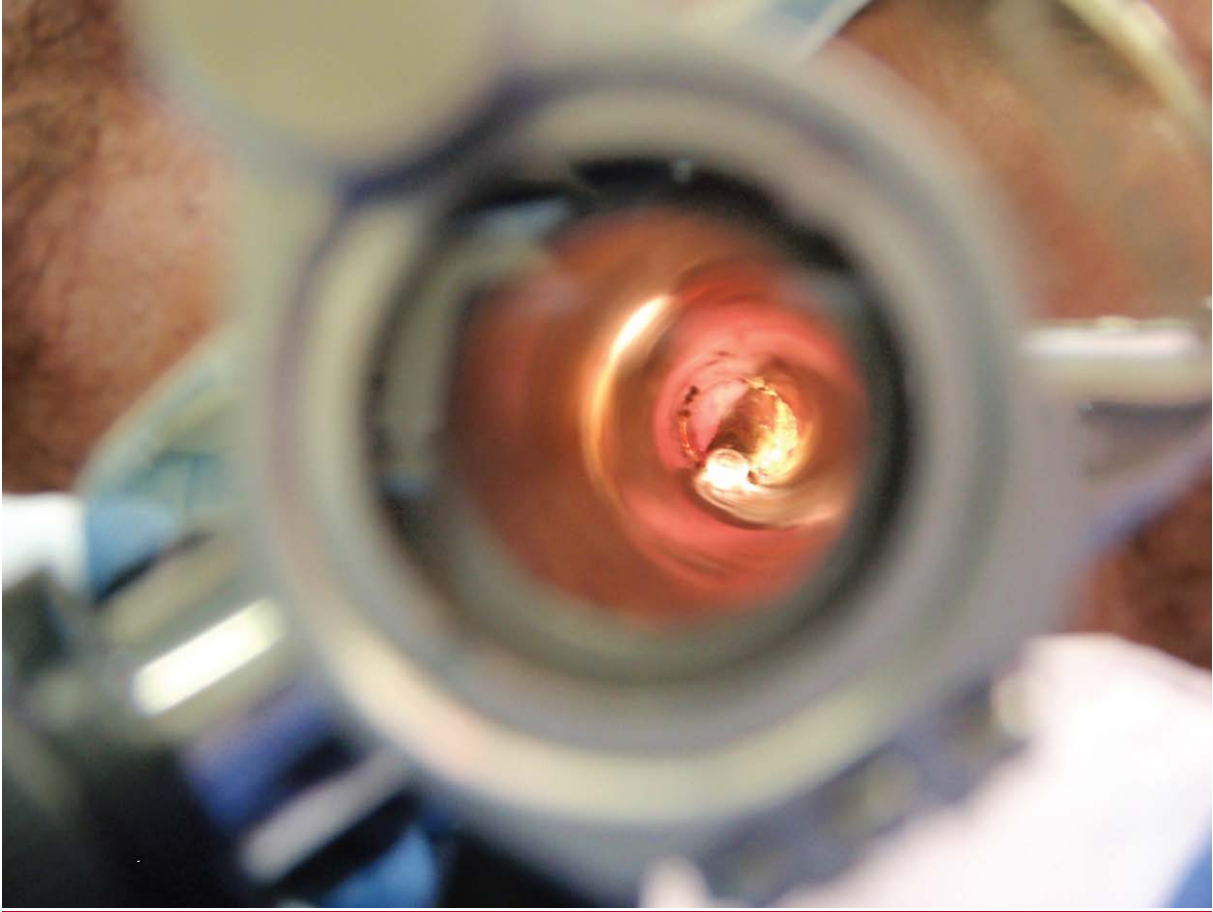


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281 Figure 2

282 Rigid rectoscopy revealing an intraluminal projectile without evident rectal injury



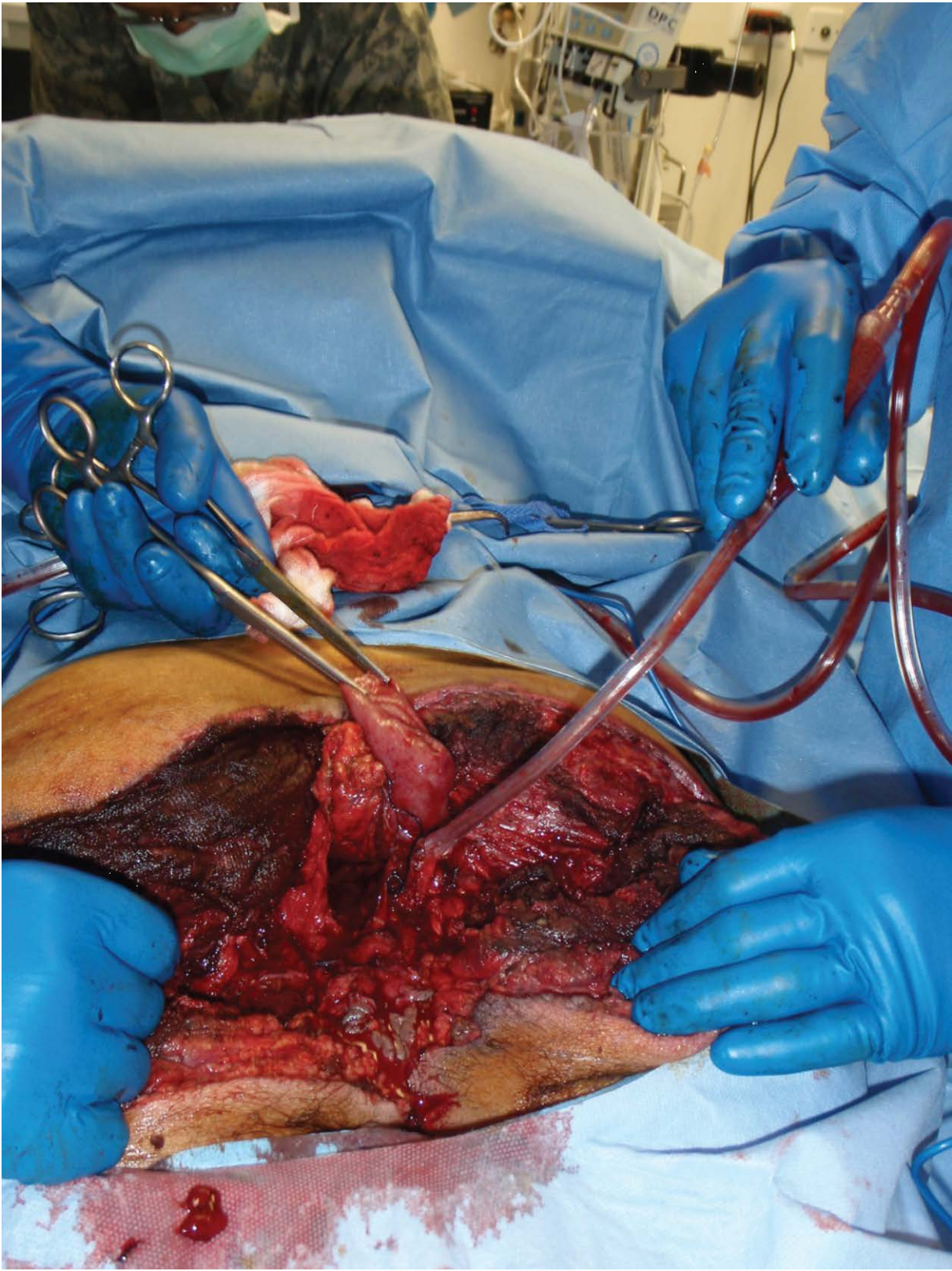
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285 Figure 3

286 Massive trans gluteal and anorectal wounds caused by rocket-propelled grenade.

287 Patient in prone position.



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