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Trauma Case Reports

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Case Report

Severe anorectal injury secondary to jet ski accident: An important and increasing mechanism of injury

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ARTICLE INFO

Keywords:

Personal watercraft
 Jet ski
 Perineal injury
 Rectal injury
 Trauma

ABSTRACT

Introduction: Traumatic injuries from jet ski-related accidents have increased in incidence over the past few decades. Anorectal injuries are uncommon but typically arise from high-speed jet ski accidents. We present a case of a severe anorectal injury from a fall off the back of an accelerating jet ski.

Case report: This case reports on the presentation, operative findings and management of a 22-year-old female with major internal and external anal sphincter disruption sustained via an unusual traumatic mechanism. Operative findings identified a complete internal and external anal sphincter disruption at the 1 and 7 O'clock positions and extra-peritoneal rectal perforation. Washout, suture repair and an end-colostomy were performed.

Conclusion: Understanding the potential severity of injury from the insult mechanism is paramount to triaging and managing trauma patients. Although this case describes an inconspicuous mechanism, the resulting trauma is significant and should prompt consideration in future cases. In addition, the article describes an approach to the repair of such injuries and the difficult decision relating to the role and type of defunctioning colostomy to protect any possible missed injuries in a complex traumatic environment, and in the protection of the anorectal repair.

Main article

A 22-year-old female presented to hospital with a significant extra-peritoneal rectal injury and associated complete anal sphincter disruption sustained whilst riding as a passenger on a personal watercraft (jet ski). She reported holding onto the back of the vehicle when the driver accelerated, and she slipped off the back of the vehicle causing her perineum to land on the jet ski chassis but denied any contact with the water jet. The patient experienced immediate severe perianal pain and bleeding. There was no faecal incontinence. She had no significant past medical, surgical, or obstetric history. Of note, she had no history of gynaecological or anorectal procedures.

On initial assessment her vitals were stable. Examination of the perineum revealed a 5 cm laceration extending from the coccyx to the anal verge at the 7 o'clock position, 1 cm deep, with anal canal mucosa on view. Per-rectal examination identified an empty rectum, with reduced anal tone and a palpable posterior tear extending cranially into the posterior rectal wall.

Urinalysis was unremarkable and a 14Fr indwelling catheter was inserted without complication. No macroscopic haematuria was noted. Standard trauma blood tests were sent without abnormality. The haemoglobin concentration was 109 g/L.

A dual bolus trauma protocol CT "pan scan" was performed (Fig. 1) which identified an extensive perineal injury with a large

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volume of extra-peritoneal gas adjacent to the rectal wall and vagina, significant rectal oedema, a rectal wall and anal sphincter tear, and moderate volume of extraperitoneal pelvic fluid suggestive of rectal injury and possible posterior vaginal wall injury. No intra-peritoneal fluid or gas was noted, and no other traumatic injuries were found.

Resuscitative treatment was initiated with intravenous fluids and broad-spectrum antibiotics (ceftriaxone and metronidazole). The patient was kept nil orally and transferred to the operating theatre for an examination under anaesthesia (EUA) of the rectum and vagina, debridement and repair of perineal and anal sphincter injury, and possible diverting loop colostomy.

The operation was performed by an experienced, specialist colorectal surgeon, familiar with anal sphincter repair. EUA revealed a full-thickness rectal wall laceration at 1 o'clock and 7 o'clock which both extended caudally to disrupt both the internal and external anal sphincter. Furthermore, there was extension of the 7 o'clock rectal wall and anal sphincter disruption into the pre-sacral space, with contaminated tissues. There was no vaginal involvement. The pre-sacral space was irrigated, and devitalised tissue was debrided. A redivac drain was placed into the pre-sacral space. The anal sphincters were repaired in layers with polydioxanone (PDS), as was the rectal mucosal defect. The anal mucosa was reapproximated with 3-0 vicryl. A laparoscopic end sigmoid colostomy was performed, at which time, extraperitoneal bruising was noted. No intraperitoneal pathology was seen.

The patient was recovered postoperatively on the ward. Intravenous antibiotics were continued, and her pain was managed with multimodal oral analgesia. The pre-sacral drain was removed on day five postoperatively. She was discharged on day eight following surgery. She has since been reviewed in the clinic at 4 weeks and 12 weeks post her injury. A digital rectal examination revealed that her wounds had completely healed and there were normal anal contractions and tone. She is currently on the waitlist for a reversal of her end-colostomy. Following the stoma reversal, she will be reviewed for any continence issues and investigations instigated at this time if clinical concern.

Discussion

Understanding the mechanism of traumatic injuries is imperative in determining appropriate triage and investigation of trauma patients. Historically, loss of control whilst water-skiing at high speeds resulted in similar injuries as this case [1]. However, as water-skiing has lost popularity and jet skis have become more commonplace on our beaches, jet ski-related trauma is becoming increasingly prevalent.

Previous case reports have described most anorectal injuries relating to jet ski accidents to occur during high-speed travel, but only three have reported injuries resulting from falling off the back of an accelerating jet ski, and all described the mechanism of injury relating to the barotrauma from the high-pressure waterjet to the perineum [2–4]. The degree of injury described in some case reports extended to the intraperitoneal rectum resulting in an intraperitoneal perforation, highlighting the importance of cross-sectional imaging in the stable patient to evaluate the extent of injury prior to operative evaluation [2,6].

A further consideration is the role of colonic diversion. Some authors have advocated for primary repair without diversion when there is no major physiological derangement [5]. Despite overall a favourable outcome in most cases following this approach, in complex injuries, there is potential for missed injuries resulting in sepsis and death [6]. In addition to this, undiverted extraperitoneal rectal injuries were associated with a higher rate of local infection [7].

There is no convincing evidence comparing end-colostomy versus loop colostomy in the management of traumatic anorectal injuries. Whilst reversal of a loop colostomy is easier to perform and associated with a lower rate of complications, it does not completely isolate the rectum from faecal contamination and consequently may be associated with a higher rate of rectal wound complications. Therefore, we advocate for an end-colostomy to both protect the repaired wound from faecal contamination and safeguard against complex injuries.

Another consideration is the role of endoanal ultrasound and Magnetic resonance imaging in evaluating sphincter integrity. There is little role for imaging in patients with established sphincter injury and who are already planned for EUA as this is the gold standard for assessment of sphincter injury in the trauma setting [8].



Fig. 1. CT demonstrating the rectal thickening and surrounding fluid and gas in the extraperitoneal soft tissues.

The routine use of imaging assessment of the anal sphincter prior to reversal of the colostomy has not been well studied. In patients with normal anal tone and contractions, anal imaging and manometry is unlikely to change management [9].

CRediT authorship contribution statement

Donald Morice: Writing – original draft, Conceptualization, Writing – review & editing. **Matthew A.R. Stokes:** Conceptualization, Writing – review & editing. **James Davey:** Writing – original draft. **Stewart Skinner:** Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they do not have any personal or financial conflicts of interest.

References

- [1] M.D. Freeman, T.M. Everson, S.S. Kohles, Forensic epidemiologic and biomechanical analysis of a pelvic cavity blowout injury associated with ejection from a personal watercraft (jet-ski), *J. Forensic Sci.* 58 (1) (2013) 237–244.
- [2] D.M. Morrison, M.D. Pasquale, C.J. Scagliotti, Hydrostatic rectal injury of a jet ski passenger: case report and discussion, *J. Trauma* 45 (4) (1998) 816–818.
- [3] S.S. Kapur, L.W. Frei, Colorectal and vaginal injuries in personal watercraft passengers, *J. Trauma* 63 (5) (2007) 1161–1164.
- [4] G. Di Flumeri, C. Carcaboulas, C. Dall'Olivo, M. Moriggia, R. Poiatti, Anorectal and perineal injury due to a personal watercraft accident: case report and review of the literature, *Chir. Ital.* 61 (1) (2009) 131–134.
- [5] M.D. Trust, C.V.R. Brown, Penetrating injuries to the colon and rectum, *Curr. Trauma Rep.* 1 (2015) 113–118.
- [6] B. Descottes, F. Lachachi, I. Moumouni, S. Durand-Fontanier, R. Geballa, Rectal injury caused by personal watercraft accident: report of a case, *Dis. Colon Rectum* 46 (7) (2003) 971–973.
- [7] P.L. Bosarge, J.J. Como, N. Fox, Y. Falck-Ytter, E.R. Haut, H.A. Dorion, N.J. Patel, A. Rushing, L.A. Raff, A.A. McDonald, B.R. Robinson, G. McGwin Jr., R. P. Gonzalez, Management of penetrating extraperitoneal rectal injuries: an eastern Association for the Surgery of trauma practice management guideline, *J. Trauma Acute Care Surg.* 80 (3) (2016) 546–551.
- [8] E. Tan, A. Anstee, D.M. Koh, W. Gedroyc, P.P. Tekkis, Diagnostic precision of endoanal MRI in the detection of anal sphincter pathology: a meta-analysis, *Int. J. Colorectal Dis.* 23 (6) (2008) 641–651, <https://doi.org/10.1007/s00384-008-0449-5>. Epub 2008 Mar 11.
- [9] P.C. Jeppson, M.F. Paraiso, J.E. Jelovsek, M.D. Barber, Accuracy of the digital anal examination in women with fecal incontinence, *Int. Urogynecol. J.* 23 (6) (2012) 765–768, <https://doi.org/10.1007/s00192-011-1590-1>. Epub 2011 Nov 5.