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CASE REPORT

A well-managed case of discontinuous anorectal injury caused by a personal watercraft treated by combining surgery and colonoscopy

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Abstract

Background: Anorectal injury caused by personal watercraft (PWC)-related trauma is rare. However, PWC accidents have increased recently, and since patients tend to be younger, treatment strategies should consider anal function preservation in addition to saving lives.

Case Presentation: A 30-year-old female patient who fell into the water when a PWC suddenly accelerated and injured her perineum with a forceful water jet was transported to our hospital. On examination, she was diagnosed with a traumatic rectal perforation with intraperitoneal findings and an anorectal injury. Emergency surgery, which involved direct suturing, temporary colostomy with intraoperative endoscopy for the rectal perforation, and anorectal reconstruction, was performed. The patient was discharged on postoperative day 19 without complications, and the colostomy was closed 5 months postoperatively.

Conclusion: We encountered a case of multiple noncontinuous anorectal injuries due to a PWC accident that was successfully treated using a combination of surgery and intraoperative endoscopy.

KEYWORDS
anorectal injury, endoscope, personal watercraft, rectal injury, rectal perforation

BACKGROUND

Personal watercraft (PWC) accidents have increased in recent years as the number of PWC users has increased. According to a previous report from the Ministry of Land, Infrastructure, Transport and Tourism in Japan, the number of accidents involving PWCs accounted for 0.06% of all injury mechanisms and had not decreased, while the number of general accidents has decreased by 35%, and the casualty rate per accident is approximately 3.5 times higher than that of general accidents.[1] The most common injuries from PWC accidents are blunt trauma to the body surface, followed by fractures. Anorectal injuries due to PWC-related trauma are reported to be rare (0.09%).[2]

Patients with PWC-related trauma are generally young,[1] and the managing medical personnel need to consider functional outcomes in addition to survival outcomes, especially in cases of anorectal injuries. Several factors need to be considered to preserve anal function, including the presence or absence of sphincter muscle damage, multifocality and continuity of the lesion, and the presence or absence of intraperitoneal findings. Appropriate diagnosis and management based on these factors are necessary to achieve favorable survival and functional outcomes. Here, we report a well-managed case of discontinuous anorectal injury caused by a PWC, which was treated with a combination of surgery and colonoscopy.

CASE PRESENTATION

A 30-year-old female patient who fell into the water when a PWC suddenly accelerated and injured her perineum with a forceful water jet was transported to our hospital. On arrival

at the emergency department, she was conscious, and her vital signs were stable. The abdomen was flat but slightly rigid, and global tenderness was observed. Muscle tension was present, especially over the epigastric region and lower abdomen. Deep lacerations and contusions without active bleeding were observed around the anus. Laboratory data revealed elevated inflammatory markers but no other obvious signs of organ damage. Contrast-enhanced computed tomography (CT) revealed an effusion near the rectum, free air in the abdominal cavity, and partial disruption of the anterior wall of the rectum (Figure 1A,B). Emergency surgery was performed based on a diagnosis of traumatic rectal perforation and anorectal injury.

After induction of general anesthesia, we first performed a colonoscopy, and a significantly perforated rectum in the Ra-Rb region (Figure 2A-1,A-2), independent of the anorectal injury, was detected. Laparotomy revealed contaminated ascites and a semiperiodic laceration of the anterior wall from the peritoneal reflection to the lower rectum (Figure 2B). After careful estimation from rectum to sigmoid colon including the injured rectal lesion using colonoscopy, considering the young age of the patient and stable vital signs, direct suturing of the perforation and temporary colostomy was performed (Figure 2A-3,A-4,C). The anal injury was particularly deep at the 5–10 o'clock position with external anal sphincter rupture (Figure 1C). The injury extended to the muscles of the pelvic floor. There was no obvious injury to the central pelvic nerve of visible thickness, and the external anal sphincter muscle fibers were sutured together as much as possible to preserve anal function, and the dead space was closed to prevent postoperative infection (Figure 3A). Note that all laparotomy, anorectal manipulation, and colonoscopy were performed in the lithotomy position.

The postoperative course was uneventful, with no obvious infection of the abdominal cavity or anal wound. The patient started consuming meals on postoperative day (POD) 3 and was discharged on POD 19. After confirming that anal sphincter function was intact and that perforated area has healed by endoscopy (Figure 3B), the colostomy was closed 5 months after the initial surgery.

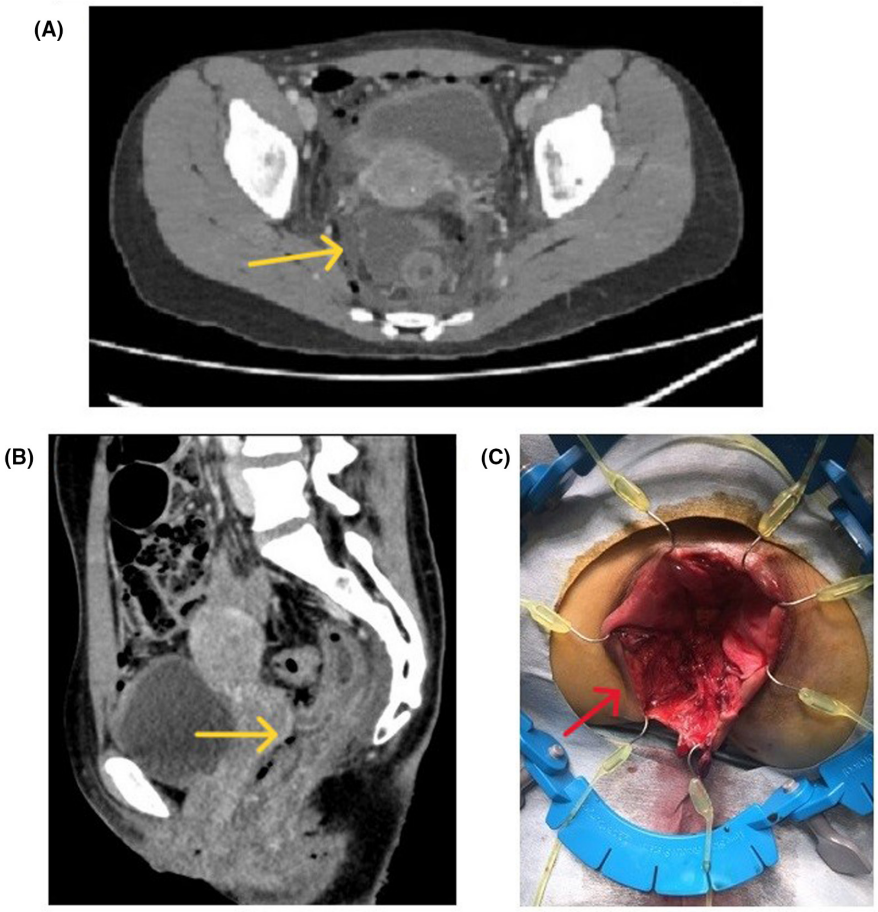

FIGURE 1 Preoperative images. (A) Computed tomography (CT) image of the axial section. Fluid retention near the rectum is indicated by yellow arrow and free gas in the abdominal cavity are noted. (B) CT image of the sagittal section. There is a wall interruption in the anterior wall of the rectum. The site of interruption is indicated by yellow arrow. (C) Prerepair photo of the anorectal injury. The injury is present at the 5–10 o'clock position with a deep defect and tear of the external anal sphincter is indicated by red arrow.

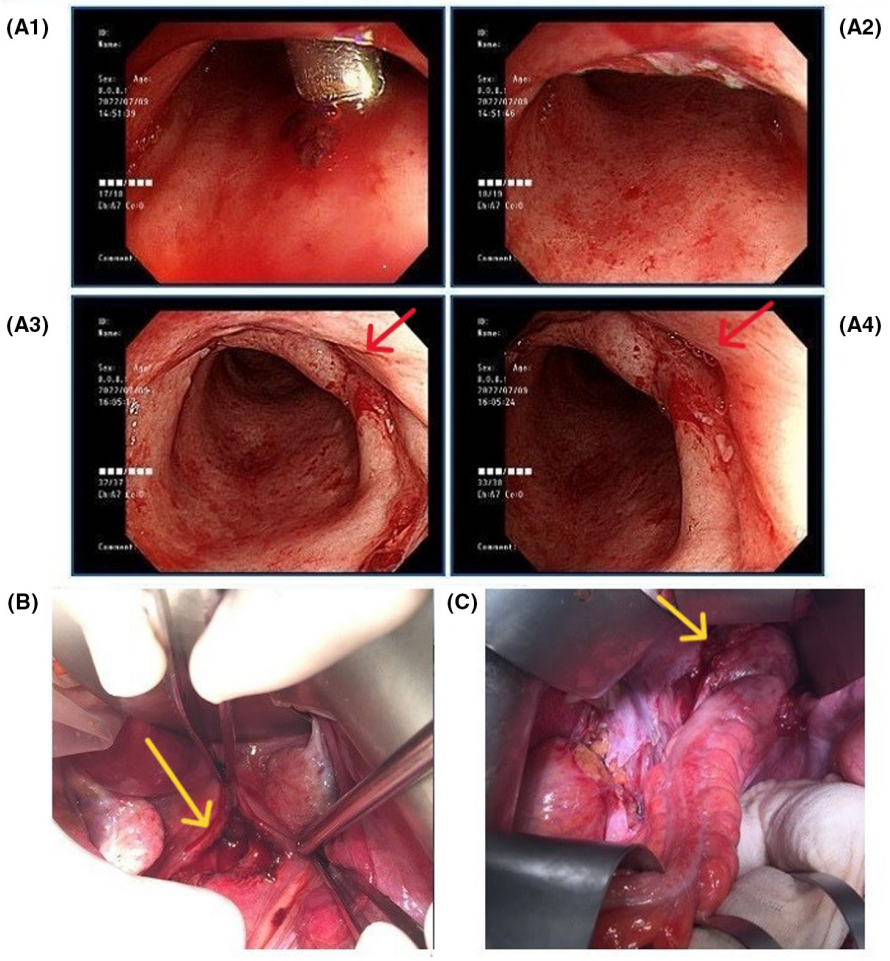

FIGURE 2 Intraoperative images. (A) Intraoperative endoscopic findings. Upper panel before repair and lower panel after repair. (A-1) Above the intestinal lumen, forceps were inserted into the perforation from the abdominal cavity. (B, C) Intraoperative findings. (B) is before repair, and (C) is after repair. The upper parts of the photograph shows the anorectal view, and the lower part shows the proximal view. A semiperiodic tear is observed in the anterior wall from the peritoneal reflection to the lower rectum. The site is indicated by yellow arrow.

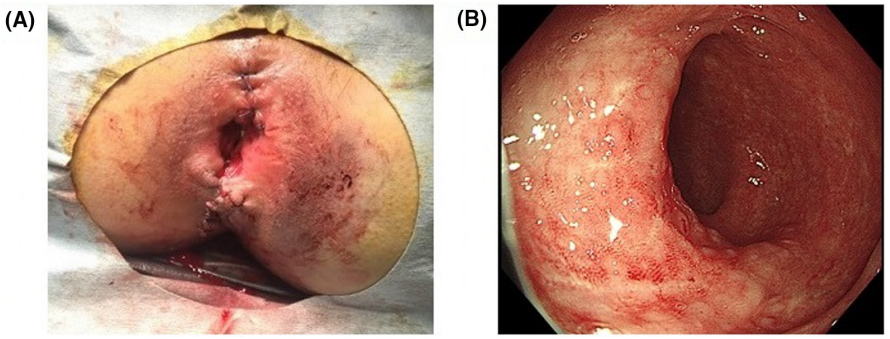

FIGURE 3 Postoperative images. (A) Photo after anal injury repair and reconstruction. (B) Endoscopic findings before colostomy closure 5 months after first surgery. The second Houston valve shows a scar that appears to be a perforation and tends to heal with conservative management.

DISCUSSION

We report a rare case of anorectal injury caused by PWC-related trauma. The patient was well managed with combined surgery and endoscopy, and her anal function was maintained.

Anorectal injuries due to PWC-related trauma account for less than 1% of all trauma related to PWCs.[2] In addition to the rarity, the peculiarities of the injury mechanism should be noted: a PWC has a system in which the impeller is rotated by the engine, water is taken in from the intake port at the bottom of the hull, and the water flow

is accelerated by a water jet.[3] They are characterized by injuries due to direct impact and an injury due to a water jet for generating propulsion. It has been reported that a passenger could damage the perineum by barotrauma due to a water jet when falling backward into the water in a spine position. Such an injury mechanism is likely to occur during sudden acceleration and not during high-speed driving,[2,4–6] as in this case.

We, for the first time, report a case of PWC-related trauma that was treated using intraoperative endoscopy, which contributed to the precise detection of the perforated area and secure surgical repair (Figure 2A). Searching PubMed with the search terms "anorectal injury" and "PWC," only nine cases have been reported. Of the nine PWC-related anorectal injury cases, five cases had extraperitoneal findings only, and the site of injury is on the anorectal side from peritoneal reflection. Four cases had intraperitoneal findings, of these three cases have injury in rectal on the oral side from the peritoneal reflection and one in sigmoid colon. Although the rectal injuries in the former cases were continuous with the anal injury, those in the latter two cases were not continuous,[7,8] indicating that rectal injury due to barotrauma carries the risk of multiple injuries without continuity. In one report, a patient who underwent partial resection of a perforated sigmoid colon died postoperatively. The autopsy in that case revealed a perforation on the anorectal side of the anastomosis, suggesting that the missed lesion could have been fatal.[7] The possibility of concealed lesions should always be considered, especially when only partial resection is performed without a diverting stoma or transanal repair. Intraoperative colonoscopy is a useful option to verify the absence of other perforations and confirm the robustness of the repair by leak testing.

In previous reports of intraperitoneal injuries, the surgical technique used was the Hartmann operation in one case,[8] direct suture repair of the perforation with diverting stoma in one case,[6] only partial resection in one case,[7] and only diverting stoma in one case.[9] In the present case, although the anterior wall of the rectum Ra-Rb was damaged seriously, we avoided a Hartmann procedure, considering the risk of stenosis or permanent stoma caused by leakage due to the anastomosis at a very low level. By combining appropriate identification of the injured lesion at an initial stage with the necessary and sufficient surgery, we could have achieved preservation of anal function, in addition to saving lives.

CONCLUSION

We encountered a case of multiple anorectal injuries without continuity caused by a PWC accident that was well managed by combining surgery and intraoperative endoscopy. This strategy enabled us to perform the necessary and sufficient surgery while preserving anorectal function and achieving social reintegration.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Approval of the research protocol: Not applicable.
Informed Consent: Informed consent was obtained from the patient for publication of this report.
Registry and the Registration No. of the Study/Trial: Not applicable.
Animal Studies: Not applicable.

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