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ORIGINAL ARTICLE

Laparoscopic Repair of a Rectal Injury Due to Hydrostatic Trauma. Report of a Case and Review of the Literature

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ABSTRACT

Introduction: *Hydrostatic rectal trauma (HRT) occurs when a pressurized fluid enters through the anus, overcoming the resistance of the rectal wall causing lesions of varied severity. Sixteen cases were found in the literature. The objective of this report is to present a case of HRT with rectal and sigmoid blowout managed laparoscopically.*

Case report: *Nineteen year old woman complained of abdominal pain and rectal bleeding after falling down backwards from a jet ski. Physical examination revealed peritoneal signs and blood in the rectum. Ultrasound, proctosigmoidoscopy and diagnostic laparoscopy were performed, showing a tear in the anterior wall of intra and extraperitoneal rectum. Primary suture and double barrel colostomy were performed.*

Conclusion: *A case of intra and extraperitoneal rectal trauma of infrequent etiology managed entirely laparoscopically is presented. In patients with this mechanism of injury, clinical presumption, proctological examination and proctosigmoidoscopy under anesthesia are highly important. Management of HRT does not differ from that applied for other causes of colorectal trauma and laparoscopic surgery can be used.*

Keywords: *Colorectal trauma; Laparoscopy in trauma; Hydrostatic injury*

INTRODUCTION

Hydrostatic trauma occurs when high pressure fluid enters through a natural body orifice. When the pressure exceeds the resistance of the tissues of the receiving cavity, injuries appear, the severity of which depends on the hydraulic/pneumatic energy released. In the particular case of hydrostatic rectal trauma (HRT), it occurs when fluid or air enters the anal canal overcoming the resistance of the sphincter complex, increasing the hydrostatic pressure in the rectal ampulla and causing the rupture of its layers.

A column of fluid that suddenly enters the rectal ampulla, as can occur during high-speed water sports (jet skiing, water skiing) is believed to behave like impalement with a solid object.[1]

The reported cases of hydrostatic trauma are scarce and the majority are gynecological injuries.[2] Initially published HRTs were caused by enemas1 or water skiing.[3] After an extensive bibliographic search, 16 cases of HRT due to falling from a jet ski were found and only in one case was the diagnostic laparoscopy used in the management algorithm.

The aim of this report is to present a case of rectal and sigmoid burst for HRT, to our knowledge, the first fully managed by laparoscopy.

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CLINICAL CASE

A 19-year-old woman was circulating as a second passenger on a jet ski at low speed in a local lake and after a sudden acceleration coinciding with turbulence suffered a fall backwards impacting the surface of the water in a seated position. The patient wore a bikini-style bathing suit without any special protection other than the life jacket.

At the moment of impact with the water, she felt the liquid entering her anus, followed by rectal fullness and the sudden appearance of generalized abdominal pain. She had no other injuries. She got out of the lake on her own, assisted by the driver of the vehicle. She was evaluated at the medical service of the nautical recreational complex, where generalized abdominal pain and rectal bleeding were found. She was referred to a regional hospital hemodynamically stable but with signs of a systemic inflammatory response. She underwent the initial care and an abdominal ultrasound that showed abundant free fluid in all four quadrants, for which she was transferred to a highest complexity medical center. She arrived at our hospital 4 hours after the trauma. The patient was lucid, subfebrile, hypotensive, tachycardic, and tachypneic. She had a flat abdomen with a generalized peritoneal reaction. On inspection of the perineal area, ecchymosis in the posterior perianal region and bleeding from the anus were found. Digital examination revealed a hypotonic sphincter with a break in continuity at 12 o'clock and a linear wound from the dentate line to the proximal. The vaginal examination was normal.

A rigid proctosigmoidoscopy under anesthesia in the operating room showed a linear injuty on the anterior aspect of the lower and middle rectum that compromised the mucosa and muscle without active bleeding. There were abundant clots in the rectal ampulla. A diagnostic laparoscopy was performed, observing abundant free water, solid stool and blood in the cavity (Fig. 1). A 15 cm linear tear on the anterior rectum and sigmoid colon extended from the peritoneal reflection in continuity with the previously described extraperitoneal rectal injury (Fig. 2). After complete abdominal exploration no other lesions were found. Treatment consisted of an intracorporeal 3-0 polyglactin 910 running suture (Fig. 3), a proximal double barrel colostomy, and an antegrade rectal lavage through the mucous fistula. The extraperitoneal rectal injury without active bleeding was left open. The presacral space was not drained.

The patient evolved with isolated feverish peaks and postoperative ileus. Due to the high probability of abdominal collection, a relaparoscopy was performed on the 5th day, verifying the absence of free fluid without suture leakage. A new antegrade lavage was performed through the mucous fistula.

The patient was discharged on the 13th postoperative day and was readmitted a week later due to febrile syndrome. A 3 cm liver abscess on segment VII was diagnosed by computed tomography (CT), which was drained percutaneously with satisfactory results.

During the control at the 6th month, she was asymptomatic. In the proctological examination, the sphincter had a small anterior break of continuity, but good resting tone and voluntary contraction, and anorectal manometry was normal. With flexible sigmoidoscopy and CT with rectal contrast, colorectal indemnity was confirmed, so the colostomy was closed without complications. She currently does not have any functional sequels.

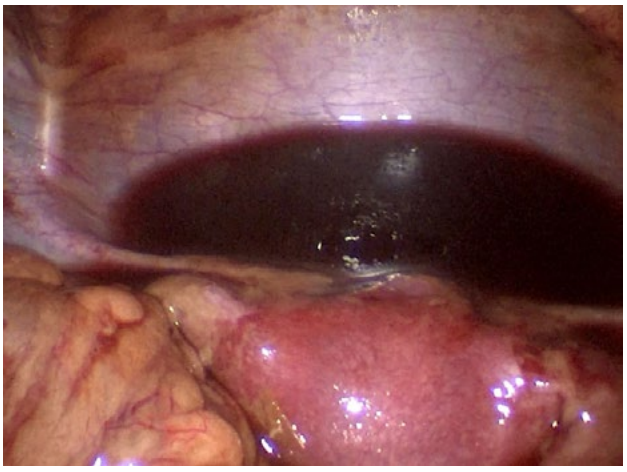

Figure 1: Laparoscopic view of the patient's pelvis. There is abundant serohematic free fluid with solid stool.

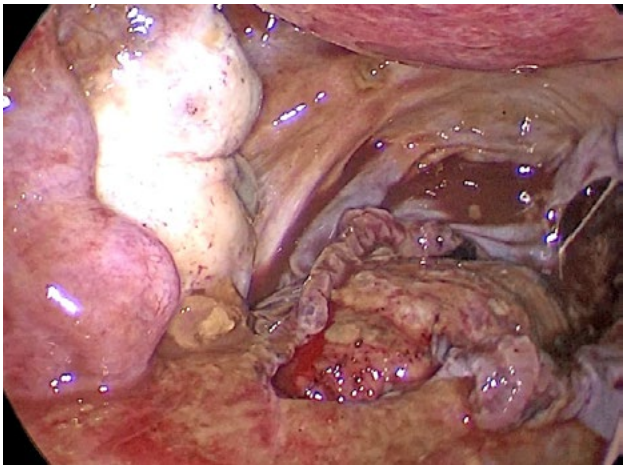

Figure 2: Linear tear of the anterior aspect of the intraperitoneal rectum is observed, revealing the mucosa of the posterior wall.

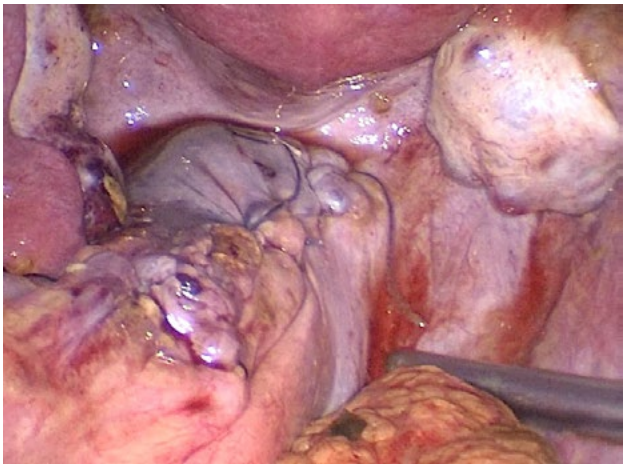

Figura 3: Completed intracorporeal resorbable one plane suture.

DISCUSSION

Hydrostatic pressure injuries to the rectum and sigmoid colon represent a very rare injury in the general population, with less than 20 published cases. There are three factors that demonstrate the importance of knowing this mechanism of injury:

1. small boats such as jet skis are increasingly accessible to the population and their use is increasing the incidence of associated injuries.[4]
2. some authors believe that there is a significant underreporting of HRTs.[5]
3. it is worth mentioning that some smaller lesions without free perforation can present with scarce symptoms so the diagnosis must have a high level of suspicion. Table 1 summarizes the cases published to date.

Most authors use CT as part of the secondary evaluation of these patients, however, others consider that when there are obvious signs of intra-abdominal injury, this

study would not be necessary.[6] In recent guidelines, CT only is indicated when abdominal examination is equivocal and in case of hemodynamic stability.[7] In the present case, the patient had an acute perforative abdomen and an ultrasound with free intra-abdominal fluid, so it was decided to explore her without a CT scan.

Rigid proctosigmoidoscopy (PSC) should be performed in all patients in whom rectal trauma is suspected. It has a sensitivity of 88% for extraperitoneal injuries and can decrease the morbidity caused by a non-therapeutic laparotomy. It is worth mentioning that PSC also allows documentation of the injury for legal purposes.[7] In the absence of free air or peritoneal signs, it can help diagnose inadvertent injuries in patients in whom expectant management or not performing a colostomy are decided.1 Descottes et al.,[8] published a case in which a resection and anastomosis were performed without a colostomy, leaving an inadvertent extraperitoneal injury that resulted in the death of the patient. In some cases, as in that published by Philpott et al.,[9] the presence of abundant blood or the impossibility of insufflation due to an intraperitoneal perforation reduces the diagnostic value of the procedure. In the present case, PSC under anesthesia allowed characterizing the extraperitoneal lesion and confirming the absence of active bleeding.

Other authors propose the use of endoanal ultrasound as part of the initial evaluation of these patients.[5,8] Descottes et al.,[8] emphasize the information it gives on the sphincter injury and Al-Habbal and Brouwer[5] use it to characterize the injury, replacing the PSC. We do not perform sphincter ultrasound because we do not have the equipment available.

Regarding the laparoscopic approach to HRT, there is only case published in 2010 by Al-Habbal and Brouwer,[5] where a diagnostic laparoscopy and a colostomy were performed in a patient with an extraperitoneal rectal injury. Laparoscopy in trauma is currently a topic of debate. Although it has the known advantages of less pain, fewer adhesions and fewer wound complications, it can have up to 19% false negatives in hollow viscus injuries.[10] There are clear contraindications for its performance in trauma patients with hemodynamic instability, head injuries, or cardiopulmonary dysfunction.

Within the algorithm of rectal trauma, laparoscopy has been postulated only to rule out intraperitoneal compromise.[7] However, at present the laparoscopic skills of sur-

TABLE 1: SUMMARY OF THE CASES OF HYDROSTATIC RECTAL TRAUMA PUBLISHED IN THE LITERATURE.

Autor	Año	Genero	Edad		RSC	Lesión	Cirugía
Morrison[13]	1998	F	14	Si	Si	Intraperitoneal, 2 perforaciones	Hartmann
Parsons[12]	1999	F	30	No	No	Extraperitoneal 4 cm	Colostomía en asa
Philpott[9]	1999	F	15	No	No	Intraperitoneal 8 cm	Rafia, colostomía proximal
Descottes[8]	2003	M	16	No	No	Intraperitoneal 5 cm	Resección y anastomosis
Goldberg[16]	2004	F	26	No	Si	Fístula rectovaginal	Hartmann, cierre primario
Kapur[6]	2007	F	15	No	Si	Esfínter, recto extraperitoneal	Rafia transanal, colostomía en asa
Kapur[6]	2007	F	19	No	No	Extra e intraperitoneal	Hartmann
Szmytkowski[17]	2007	M	34	Si	No	Extraperitoneal	Colostomía en asa
Nieboer[18]	2007	F	28	Si	Si	Extraperitoneal	Rafia, colostomía proximal
Tatsuta[19]	2009	F	18	Si	Si	Extraperitoneal 5 cm, intraperitoneal 3 cm	Rafia, Hartmann
Al-Habbal[5]	2010	M	20	Si	No	Extraperitoneal	Laparoscopia, colostomía en asa
Freeman[2]	2011	F	32	?	?	Estallido compartimento posterior de pelvis	?
Gill[14]	2011	F	14	Si	Si	Intraperitoneal	Hartmann
Culcu[20]	2014	F	21	Si	Si	Extra e intraperitoneal	Rafia, colostomía proximal
Davis[15]	2015	F	41	Si	Si	Extra e intraperitoneal	Rafia transanal, rafia intraperitoneal, colostomía en asa
Davis[15]	2015	F	38	Si	Si	Extraperitoneal 4 cm	Rafia transanal, colostomía en asa
Balmaceda	2020	F	19	No	Si	Extraperitoneal/intraperitoneal 20 cm	Laparoscopía, rafia lesión intraperitoneal, colostomía en asa

**CT: computed tomography. RSC: rectosigmoidoscopy..*

geons have notably increased and there is a great availability of equipment (stapled suture devices, energy instruments, etc.) in most emergency departments, so we believe that in the absence of the aforementioned contraindications, the resolution of the injuries should be attempted by this approach.

In our opinion the initial laparoscopic approach should be the choice for complex perineal and rectal trauma, where there is a low level of suspicion of associated injuries and hemodynamic stability, as in the case of HRT. When only extraperitoneal injury is found, a colostomy and distal lavage can be performed, while cases with intraperitoneal injury can be completed laparoscopically or converted if necessary.

In HRT, the decision to defunctionalize should be make with the same criteria as in other colorectal trauma.[7]

Intraperitoneal rectal injuries can be managed like those in the colon: if they are not destructive and the patient is hemodynamically stable a primary repair (suture, resection and anastomosis) can be performed, always previously ruling out with PSC an extraperitoneal injury.

For extraperitoneal injuries, the recommendation of the guidelines is defunctionalization.[11] Although there are series of cases with non-defunctionalized patients without mortality, the complication rate is more than double that for ostomized patients.[7] Among the published cases, there is only one with resection and primary anastomosis resulting in sepsis and death on the 2nd postoperative day.[8] In the present case, a double barrel colostomy was performed, which is preferable to leaving the rectal stump closed for easier transit reconstruction.

Clemens et al., [7] consider that antegrade lavage of the distal rectum is not clinically useful in low velocity trauma. Furthermore, if the mechanism of injury was the entry of a large amount of fluid into the rectal ampulla, it could be considered that it is clean as if an enema had been applied. We consider lavage a low-cost and low time-consuming maneuver that should be used. In our case, the rectum had no feces, however, it presented abundant hematic fluid.

Draining the presacral space has been part of the management of extraperitoneal rectal trauma in the classical literature, however it is currently a debated maneuver. A review of 17 studies concludes that not performing presacral drainage can decrease septic complications by up to 40%.[7] In published cases of HRT has generally not been performed. In the patient presented by Parsons et al.[12] a transanal drain that reached the presacral space through the rectal tear was placed. Of the 4 remaining cases with presacral drainage, 2 report a pelvic abscess.[9,13-15] We consider that healthy tissue should not be mobilized or dissected to drain the perirectal spaces, as in the case presented.

Transanal repair of extraperitoneal injuries significantly increases surgical time, may require tissue mobilization, and probably will not add any benefit to patients with HRT.[7] As mentioned above, these patients will be dysfunctional in most cases. It is the authors' opinion that these wounds should be closed to control hemostasis or when repair of the sphincter complex or the rectovaginal septum is required.

CONCLUSION

We present a case of trauma to the intra and extraperitoneal rectum of very rare etiology, managed entirely laparoscopically. In patients with this mechanism of injury, clinical presumption, as well as proctological examination and proctosigmoidoscopy under anesthesia are highly important. The management of HRT does not differ from that applied for other causes of colorectal trauma, and laparoscopic surgery can be used.

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COMMENT

Dr. Balmaceda publishes a rare clinical case, that has high morbidity if not diagnosed timely and treated properly. Hydrostatic trauma can compromise both the extra and intraperitoneal rectum, and a high level of suspicion is essential to avoid leaving unnoticed injuries that, if not treated promptly, would result in poor patient outcomes.

In the course of the presentation, the main points that generate controversy are addressed: What diagnostic method to choose when a HRT is suspected ? Can intraperitoneal injuries be solved by laparoscopy? Is suturing necessary for extraperitoneal injuries?

It should be noted that this case could be solved laparoscopically without excising the affected segment and without the closure of the extraperitoneal rectal defect. In fact, the presacral space was also not drained, one of the classic pillars of the treatment of these traumas that currently lacks sufficient evidence to support its use and benefit.

There is no universal optimal treatment, so individualized management is essential. In this particular case, the final outcome of the patient supports the decisions made by the treating team.

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