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REVIEW

Rectal damage control: when to do and not to do

Control de daños de recto: que hacer y que no hacer

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Trauma de recto, lesión rectal extra-peritoneal, intraperitoneal, inestabilidad hemodinámica, hemodinámicamente inestable, control de daños, Heridas, recto, colostomía, proctoscopia, examen rectal digital, hemostáticos, tratamiento conservador, agentes antibacterianos, anaerobiosis, canal anal, lesiones abdominales, laparoscopia, hemorragia, tomografía, radiografía computarizada, tomografía, cirujanos colon

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Abstract

Rectal trauma is uncommon, but it is usually associated with injuries in adjacent pelvic or abdominal organs. Recent studies have changed the paradigm behind military rectal trauma management, showing better morbidity and mortality. However, damage control techniques in rectal trauma remain controversial. This article aims to present an algorithm for the treatment of rectal trauma in a patient with hemodynamic instability, according to damage control surgery principles. We propose to manage intraperitoneal rectal injuries in the same way as colon injuries. The treatment of extraperitoneal rectum injuries will depend on the percentage of the circumference involved. For injuries involving more than 25% of the circumference, a colostomy is indicated. While injuries involving less than 25% of the circumference can be managed through a conservative approach or primary repair. In rectal trauma, knowing when to do or not to do it makes the difference.

Resumen

El trauma de recto es poco frecuente, pero generalmente se asocia a lesiones de órganos adyacentes en la región pélvica y abdominal. Estudios recientes han cambiado los paradigmas del manejo tradicional derivados del trauma militar, mostrando mejores resultados en la morbilidad y mortalidad. Sin embargo, las técnicas de control de daños en el trauma rectal aún son controvertidas. El objetivo de este artículo es proponer el algoritmo de manejo del paciente con trauma rectal e inestabilidad hemodinámica, según los principios de la cirugía de control de daños. Se propone que las lesiones del recto en su porción intraperitoneal sean manejadas de la misma manera que las lesiones del colon. Mientras que el manejo de las lesiones extraperitoneales del recto dependerá del compromiso de la circunferencia rectal. Si es mayor del 25% se recomienda realizar una colostomía. Si es menor, se propone optar por el manejo conservador o el reparo primario. Saber que hacer o que no hacer en el trauma de recto marca la diferencia.

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Conflicts of interest:

The authors declare that they have no conflict of interest.

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Remark

1) Why was this study conducted?

This article aims to present an algorithm for the management of rectal trauma in the patient with hemodynamic instability, according to damage control surgery principles

2) What were the most relevant results of the study?

We propose to manage intraperitoneal rectal injuries in the same way as colon injuries. The management of extraperitoneal rectum injuries will depend on the percentage of the circumference involved. For injuries involving more than 25% of the circumference, a colostomy is indicated. While injuries involving less than 25% of the circumference can be managed through a conservative approach or primary repair.

3) What do these results contribute?

In rectal trauma, knowing when to do or not to do it makes the difference.

Introduction

Rectal trauma prevalence is low in both intraperitoneal and extraperitoneal segments. However, the intraperitoneal segment is the most commonly compromised portion. Eighty percent of rectal injuries are secondary to penetrating trauma, usually associated with other pelvic or abdominal injuries¹. The principles of traditional treatment have their origins in wartime experiences. However, recent studies of civilian trauma classify extraperitoneal rectal injuries as destructive and nondestructive, depending on the percentage of circumference involved^{2,3}. These studies have changed the paradigm behind military rectal trauma management, showing better morbidity and mortality^{2,3}. The treatment of patients with penetrating rectal trauma and hemodynamic instability remains a surgical challenge, mainly because it requires immediate surgical exploration without allowing previous imaging studies. This article aims to present an algorithm for the treatment of rectal trauma in patients with hemodynamic instability, according to damage control surgery principles.

This article is a consensus that synthesizes the experience acquired during the last 30 years in trauma management, general surgery and critical care of the trauma and emergency surgery group (Cirugía de Trauma y Emergencias - CTE) in Cali, Colombia, conformed by experts from the Hospital Universitario del Valle "Evaristo García" and Hospital Universitario Fundación Valle del Lili with the Universidad del Valle and Universidad Icesi, in collaboration with the Colombian Association of Surgery and the Pan-American Trauma Society.

Epidemiology

According to recent reports, rectal trauma has approximately 1-3% in civilian trauma centers and 5.1% in military scenarios. The most common mechanism is penetrating trauma secondary to gunshot wounds (71-85%), followed by blunt trauma (5-10%) and penetrating trauma due to stab wounds (3-5%). An explosive mechanism causes around 23% of military rectal injuries. It is unlikely to find isolated rectal lesions due to the proximity of the rectum to other pelvic organs and blood vessels, which can make treatment very challenging. Despite significant advances in trauma systems and surgical treatment, mortality rates remain between 3-10% and the associated complications between 18-21%³⁻⁵.

Table 1. Evolution Of Military Rectal Trauma Management

Treatment	Mortality (%)	Armed Conflict
Non-operative management	100	American Civil War (1865)
Primary repair	60-90	World War I (1918)
Fecal derivation	30-40	World War II (1945)
Fecal derivation + Pre-sacral drainage	15-20	Korean War (1953)
Primary repair + Distal rectal lavage	13-15	Vietnam War (1975)
Vital support + Damage control surgery	8	Yugoslavian War (2001)

Throughout history, military conflicts have significantly influenced the evolution of rectal trauma management (Table 1). Rectal trauma was managed expectantly, resulting in a mortality rate of 100% in the American Civil War; surgical treatment became mandatory with a reduction in mortality rate to 60-75% during World War I. Then, North American and British surgeons performed colostomies for colorectal injuries, with a reported mortality rate of 53-59%, during World War II, which combined with perioperative care advances decreased mortality to 22-35%. Posteriorly, in the Vietnam war, Lavenson and Cohen introduced the distal rectal lavage, which was also attributed to further decreases in the mortality rate. Finally, in Yugoslavian and Afghanistan conflicts, vital support and damage control techniques significantly reduced mortality to almost 5%. Through all the experience developed during these armed conflicts, the “4 Ds” dogma (Debridement, Derivation, Drainage and Distal lavage) became the standard treatment for rectal trauma ⁶⁻⁸.

However, several differences exist between military and civilian rectal trauma, such as injury mechanism, resource availability and the initial interventions performed. This represents a challenge reflected in high damage control surgery and mortality rates reported in the military literature. Based on a review of colorectal injuries from Iraq and Afghanistan armed conflicts, some authors advocated for derivation in rectal trauma given the unknown effects of energy dissipation from high-speed mechanisms potentially compromising the viability of an anastomosis. In civilian trauma, the optimal treatment of rectal trauma remains controversial. For this reason, it is important to acknowledge the influence of the burden placed on the combat surgeon, which might affect the extrapolation of data between civilian and military studies ^{9,10}.

In consequence, civilian trauma studies have recently questioned the “4 Ds” principles. Stone and Fabian conducted a randomized clinical trial that reported lower mortality in patients with colon injuries managed with primary repair. These results preceded several series that assessed the efficacy of each aspect of surgical treatment in rectal trauma. The implementation of damage control techniques has introduced the second look surgeries as a second opportunity in surgical decision making.

Initial approach

The American Association for the Surgery of Trauma (AAST) anatomical classification of rectal trauma severity (Table 2) does not differentiate injuries according to their anatomical location (intra-peritoneal or extra-peritoneal). This situation prevents discriminating between injuries of the intra-peritoneal or the extra-peritoneal segment, both of which have different ma-

Table 2. AAST Rectum Trauma Classification

Grade	Injury Type	Description
Grade	Injury Type	Description
	Laceration	Partial-thickness laceration
II	Laceration	Laceration < 50% of circumference
III	Laceration	Laceration > 50% of circumference
IV	Laceration	Full thickness laceration with extension into peritoneum
V	Vascular	Devascularized segment

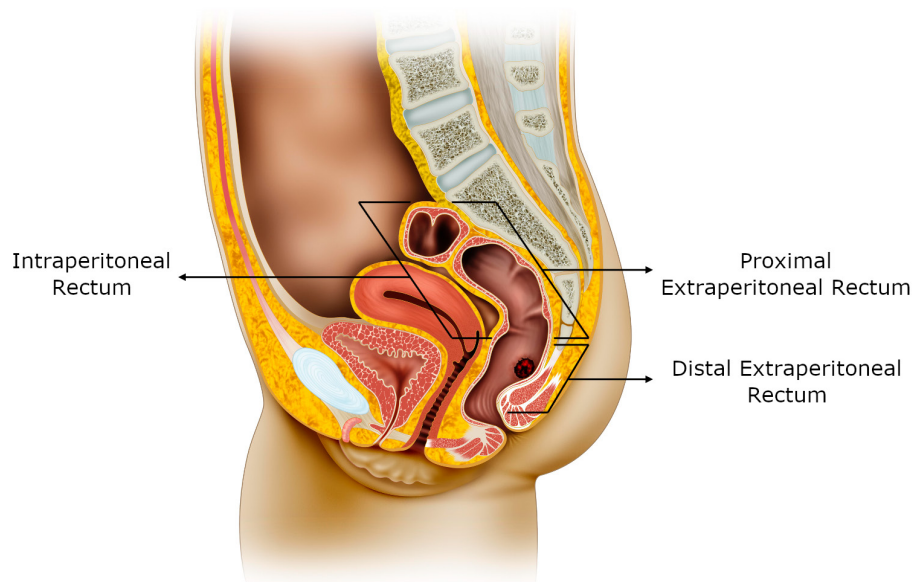


Figure 1. Anatomical Division of the Rectum: Intraperitoneal and Extraperitoneal Portions. An extraperitoneal rectal injury involving less than 25% of the circumference (nondestructive) is shown.

nagement options. Gonzales et al. introduced an alternative approach by classifying extraperitoneal rectal injuries into destructive and nondestructive according to the percentage of the rectum circumference involved, with a cut-off point of 25% ².

The rectum is anatomically protected deep in the pelvic cavity, which makes it harder to diagnose rectal injuries (Figure 1) ². For this reason, suspicion of rectal trauma is typically raised by the mechanism of trauma and associated injuries. High energy pelvic trauma, trans-pelvic gunshot wounds and impalement mechanisms have a high probability of causing rectal injuries. Meanwhile, mechanisms such as stab wounds have a lower probability of causing rectal involvement. In the context of patients with high energy blunt trauma, a wide pubic symphysis, associated urogenital injuries and pelvic fractures (especially anteroposterior fractures by compression) should raise suspicion and guide further evaluation for concomitant rectal injuries ¹¹. Suspected rectal injuries must be evaluated through digital rectal examination, CT-Scan or proctoscopy if the patient's hemodynamic status allows it ¹².

Digital rectal examination

The digital rectal examination has a 33-52% sensitivity for identifying rectal injuries, with a false positive rate of 63-67%. Findings on digital rectal examination include a rectal wall defect, bleeding, decreased anal sphincter tone, bone fragments or high prostate. Macroscopic bleeding can often be confused with alternative sources, especially in large soft tissue compromise. However, a digital rectal examination still plays an important role in the confirmation of a diagnostic suspicion when there are questionable findings on physical examination. Precaution during digital rectal examination is required if it might represent a potential danger to the examiner ¹³⁻¹⁵.

Computed axial tomography

Computed Axial Tomography often shows a wound track extending adjacent to the bowel. However, intraluminal contrast extravasation, a full-thickness wall defect, asymmetric extraluminal free air and hemorrhage within the bowel wall constitute more specific tomographic findings. Other imaging findings suggestive of rectal injury include rectal wall thickening, perirectal fat and intraperitoneal free fluid, which is not explained by another injury (Figure 2) ^{16,17}.

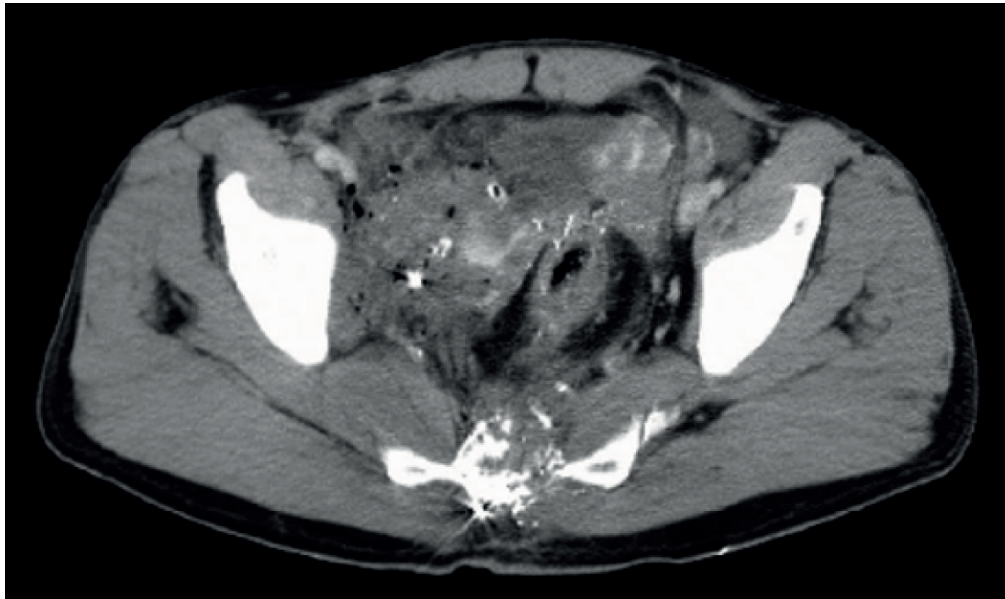


Figure 2. Computed Axial Tomography of the Upper Pelvis. Sacral fracture with several bone fragments, thickening of the rectal wall, para-rectal air and free intraperitoneal fluid are shown, in a patient with intraperitoneal rectal injury secondary to a high-speed gunshot wound in the upper quadrant of the left gluteus.

Proctoscopy

Patients with suspected rectal trauma are often evaluated with proctoscopy, which has an overall sensitivity of 71% and is even more sensitive at detecting extraperitoneal injuries (88%). The optimal location to perform proctoscopy has been a matter of discussion. Some advocate its performance in the emergency department but, considering the poor cooperation of patients. This might decrease the examination quality. Finally, lack of bowel preparation and associated injuries may further decrease the sensitivity of proctoscopy by limiting pelvic mobility and rectal lumen visualization (bloody field) ¹⁸.

Surgical approach

The treatment of patients with rectal trauma depends on their hemodynamic status and the anatomic location of the injury. Patients with hemodynamic instability should be immediately transferred to the operating room for damage control surgery, with previous hemodynamic stabilization and hemostatic resuscitation.

Intraperitoneal rectal injuries should be managed in the same way as colon injuries, in which primary repair is the standard treatment ¹⁹. Colostomy constitutes an alternative when a primary repair cannot be performed. Regarding extraperitoneal rectal trauma, if the injury compromises more than 25% of the rectal circumference (destructive injury) a colostomy is recommended. But if the injury involves less than 25% of the rectal circumference (nondes- tructive injury), it can be repaired.

An early administration of broad-spectrum intravenous antibiotics, guaranteeing anaerobic coverage, is crucial in the treatment of patients with rectal trauma. Antibiotics should be administered before surgical treatment and must be continued for only 24 hours postoperatively. A longer antibiotic course has shown no benefits, and extending this therapy must be considered only if there is clinical evidence of active infection.

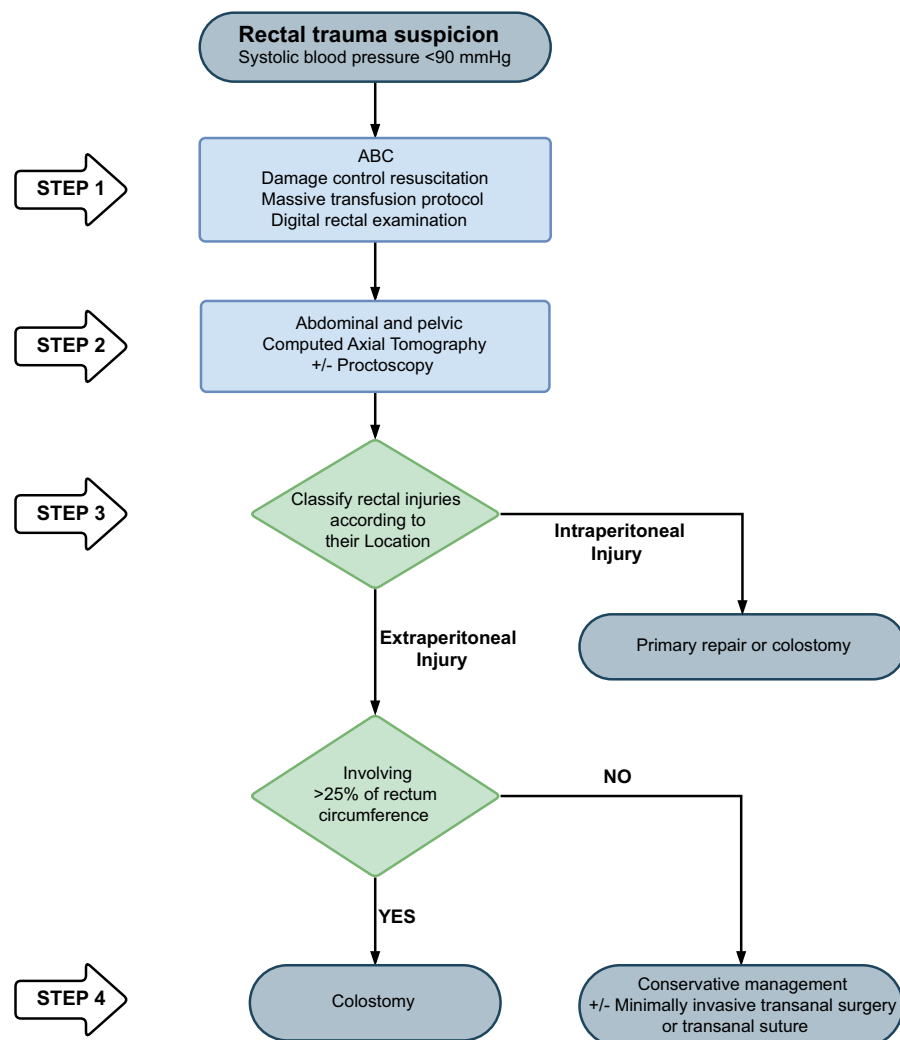


Figure 3. Damage Control Management in Rectal Trauma. An algorithm is proposed for the approach and management of the patient with suspected rectal trauma and hemodynamic instability, according to the anatomical location (intraperitoneal or extraperitoneal) of the rectal injury.

Conservative management

Patients with hemodynamic instability and extraperitoneal rectal injuries involving less than 25% of the circumference should be managed through damage control principles by omitting correction of the defect and performing serial clinical follow-up of perineal soft tissue and traumatic wounds. The transanal suture is also an initial management option if experienced surgeons and adequate equipment are available. Nonetheless, it can be performed later in the third phase of damage control.

Minimally invasive transanal surgery (MITAS) is a technique that uses basic laparoscopic equipment and is initially considered for high-quality local tumor resection. This technique has proven to be effective for local excision of tumors, but it also allows the surgeon to perform different procedures and provides direct visualization of the distal 15 cm of the rectum. Therefore, it has been proposed as the main strategy to repair nondestructive extraperitoneal rectal injuries ¹⁷.

Colostomy

Colostomy is a fast and effective procedure for fecal contamination control in a patient with hemodynamic instability and extraperitoneal rectal trauma involving more than 25% of the circumference.

The damage control strategy proposed for rectal trauma is outlined in the algorithm shown in Figure 3. It describes the approach and management of the patient with suspected rectal trauma and hemodynamic instability, according to the anatomical location of rectal injuries (intraperitoneal or extraperitoneal)¹³.

Discussion

The diagnosis of rectal injury can be challenging due to its protected anatomy. Therefore, it should be suspected based on the mechanism of trauma and injuries in adjacent structures. Trans pelvic gunshot wounds, high-energy pelvic trauma and impalement are the most common traumatic mechanisms associated with rectal injuries. Extraperitoneal rectal injuries have a high risk of going unnoticed. Therefore, it is mandatory to perform a complete evaluation of the patient (taking into account its hemodynamic status) to confirm or exclude them.

The primary repair of rectal injuries can be technically challenging due to the complex access to the pelvic cavity. Moreover, repair of posterior wounds becomes a major challenge as the rectum becomes retroperitoneal and eventually extraperitoneal. In addition, repairing injuries close to the peritoneal fold requires an extensive and time-consuming dissection which can be detrimental in patients with hemodynamic instability. In the meantime, if the injury cannot be repaired, the intraluminal contents may descend to the ischiorectal plane and ascend to the retroperitoneum^{11,18}.

Recent studies recommend colostomy to manage extraperitoneal rectal injuries, especially if primary repair is not technically feasible^{20,21}. On the other hand, some intraperitoneal rectal injuries can be repaired primarily without performing a colostomy²¹. Accordingly, we have proposed a simplified damage control management for rectal trauma, which avoids time-consuming interventions such as pre-sacral drainage or rectal lavage. Interventions, that have no negative impact in morbidity and mortality¹¹.

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