Advance Research Journal of medical and clinical science
Received 10 Sep 2022 | Revised 16 Sep 2022 | Accepted 20 Sep 2022 | Published Online 28 Sep 2022

DOI: https://doi.org/10.15520/arjmcs.v8i09.469

ARJMCS 08 (09), 969–985 (2022)

ISSN (O) 2455-3549

ICV 2020 = 86.28

REVIEW ARTICLE

Penetrating Trans-Anal Rectal Injury, Multiple Case Study

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Abstract

The objective of this study is to evaluate the management of penetrating trans-anal rectal injuries.

Introduction

The rectum is a portion of the large intestine that begins at the recto-sigmoid junction, which is identified anatomically by the coalescence of the tenia coli at the distal sigmoid colon. Distally, the rectum transitions into the anal canal, the rectum is approximately 12–15 cm long and functions in fecal storage prior to defecation.

Rectal injuries should be considered in all pelvic trauma patients and managed appropriately. Colorectal injuries remain a challenging clinical entity associated with significant morbidity. Familiarity with the different methods to approach and manage these injuries, including "damage control" tactics when necessary, will allow surgeons to minimize unnecessary complications and mortality. [1]

Rectal injuries due to penetrating trauma are more common than blunt trauma .Early diagnosis and aggressive treatment result in good prognosis, regardless of the patients' age and previous medical condition. Trans-anal rectal injuries are uncommon. (2). Surgical repair of rectal injuries was first formally described among World War I soldiers [9], although the adoption of proximal diversion and its association with reduced mortality was not described until World War II [10].

The initial management of all trauma patients should follow the standard ACS Advanced Trauma Life Support (ATLS) guidelines. The diagnosis and initial management of rectal injuries form part of the secondary survey and should only be pursued once immediately life-threatening injuries have been excluded or addressed. The digital rectal exam (DRE) in trauma settings has low sensitivity and does not change subsequent management. Recent civilian evidence suggests that the combination of CT of the abdomen/pelvis and rigid proctoscopy is the new gold-standard for diagnosis of rectal injuries. (42)

Keywords: foreign body, trans-anal rectal injuries and anal sphincter injuries.

METHODS

The recording of 3 patients (two males and on female) with a median age of 26.6 (range 15-40) years, had trans-anal rectal injury and were treated between 2016 and 2018 at Al-Hussan teaching hospital, were reviewed. Trans anal rectal Injury was caused by a falling down on a sharp object in two patients, and by rectal cleansing enema in one patient. Two patients (the female 23 years old and 1 6years old male) presented to the hospital about 12 -24 hours after their injury(case 1 ,3), while(case2) patients(45 years old male) presented after 24 -48 hours of his injury. All the patients treated with fecal diversion, without presacral drainage or rectal wash out, and treatment of associated injuries like primary repair for injury of anal sphincter, and primary repair of intraperitoneal rectal injury.

Result

Although Injury to the rectum or transverse colon is an independent predictor of mortality. (34) there was no mortality reported in the study , possibly because of low energy trauma , younger age patients, , and early surgical intervention after proper resuscitation in the emergency department and no associated comorbidity like diabetes mellitus or ischaemic heart disease .

The complication rate was significantly higher in shocked patient (No.1) and in too late presented female patient (No.3), which manifested as superficial surgical site infections with ileus managed with conservative measures.

Discussion

Classification of rectal injury in relation to the peritoneal cavity, intraperitoneal vs. extra peritoneal had important effect in the result of treatment of rectal injury. Recent civilian evidence suggests that the combination of CT of the abdomen/pelvis and rigid proctoscopy is the new gold-standard for diagnosis of rectal injuries.

Intraperitoneal rectal injuries (IP) were treated with primary repair. Injuries to the proximal two-thirds and accessible distal one-third of the extra peritoneal rectum (EP) were treated with repair and selective fecal diversion

Management by anatomic distinction allows for omission of colostomy in most IP injuries and select EP injuries, while diminishing the risk of retro rectal abscess in EP injuries with the judicious application of presacral drainage. (34).

With advance in laparoscopic surgery some study showed that rectal injuries could be successfully managed with diagnostic laparoscopy to rule out an intra-abdominal injury, followed by a laparoscopic ally placed loop sigmoid colostomy for diversion. Laparoscopy is not yet an option in the austere environment.21

Conclusion

The three cases in our study were diagnosed based on clinical finding. CT scan, proctoscopic examination and digital rectal examination then treated with exploratory laparotomy, fecal diversion and peritoneal toilet but without presacral drainage or rectal washout and taking into account individual variation in their management, such as fecal diversion (Hartmann's colostomy) and primary anal sphincter injury repair in patient (No.1). And In Case 2. Intraperitoneal rectal injury following rectal enema was treated with and primary repair of rectal injury with proximal fecal diversion (sigmoid loop colostomy).

While in case 3 (female patient) transanal repair of lower rectal injury because the injury just above the dentate line and was accessible and suture of serosal injury on the posterior aspect of the uterus. With advance in laparoscopic surgery some study

Supplementary information: The online version of this article(https://doi.org/10.15520/arjmcs.v8i09.4 69) Contains supplementary material, which is available to authorized users.

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showed that rectal injuries could be successfully managed with diagnostic laparoscopy to rule out an intra-abdominal injury but diagnostic laparoscopy was not performed in this study because the patients presented as acute abdominal conditions and the exploratory laporatomy was most appropriate decision in this condition in addition to lack experience in using diagnostic laporoscope in emergency surgery in Al- Hussaian teaching hospital at that time.

Introduction

Colorectal injuries remain a challenging clinical entity associated with significant morbidity. Familiarity with the different methods to approach and manage these injuries, including “damage control” tactics when necessary, will allow surgeons to minimize unnecessary complications and mortality. [1] Rectal injuries due to penetrating trauma are more common than blunt trauma, early diagnosis and aggressive treatment result in good prognosis, regardless of the patients’ age and previous medical condition. Trans-anal rectal injuries are uncommon. Out of 54 cases of penetrating rectal trauma treated over eight years at a Level I trauma centre in the USA, there was only one case of trans-anal rectal perforation(2). The diagnosis of trans-anal rectal injury is usually delayed because of the patient’s denial and late presentation. Although uncommon, rectal injuries are dangerous and should be taken seriously. A high index of suspicion is essential for its diagnosis. (2).

Rectal injuries can result from pelvic trauma, (3). ingestion of a foreign body(4) or introduction of a foreign body through the anus.(5) Foreign bodies can be introduced into the rectum for diagnostic and therapeutic procedures, self-administered treatment, autoeroticism, accidental introduction, and criminal assault.(4-6-7) . The objective of this study is to evaluate the management of penetrating trans-anal rectal injuries.

Keywords: foreign body, trans-anal rectal injuries and anal sphincter injuries.

1-History

As a consequence of the association of rectal trauma with gunshot wounds, major philosophical changes in the management of rectal injuries can be traced back to periods of armed conflict. During the civil war, penetrating colorectal injuries were almost universally managed no operatively, with resulting morality rates approaching 90% [8]. Surgical repair of rectal injuries was first formally described among World War I soldiers [9], although the adoption of proximal diversion and its association with reduced mortality was not described until World War II [10]. Higher-velocity rectal injuries were then encountered during the Vietnam War, leading to a classic management principle termed the four D's; direct repair, drainage, diversion, and distal rectal washout [11]. Recent military conflicts in the Middle East have continued to add to the collective experience with rectal trauma [12], [13], [14], Military personnel sustaining colon or rectal trauma continue to have elevated mortality rates, even after reaching surgical treatment facilities. Furthermore, associated serious injuries are commonly encountered. Fecal diversion in these patients may lead to reduced mortality, although prospective selection criteria for diversion do not currently exist. Future research into risk factors for colostomy creation, timing of diversion in relation to damage-control laparotomy, and quality of life in veterans with stomas will produce useful insights and help guide therapy. (15)

2- Anatomical considerations

The rectum is a portion of the large intestine that begins at the recto-sigmoid junction, which is identified anatomically by the coalescence of the tenia coli at the distal sigmoid colon. Distally, the rectum transitions into the anal canal, an anatomic distinction that is primarily histologic. The rectum is approximately 12–15 cm long and functions in fecal storage prior to defecation. The blood supply of the rectum changes along its length, with the proximal 2/3rd s of the rectum supplied by the superior rectal artery and the distal third supplied by the middle and inferior rectal arteries. The

anatomic relationship of the rectum to the peritoneal reflection in the pelvis carries critical implications for injury management. Based on the location of the peritoneal reflection, the intra peritoneal rectum is comprised of the proximal two thirds of the anterior rectum and the proximal third of the lateral rectum. The remainder of the rectum is extra peritoneal. The anatomic boundary imparted by the peritoneal reflection allows for confined fecal spillage after extra peritoneal rectal injury without intra-abdominal extension. Conversely, injuries to the intraperitoneal rectal can lead to gross contamination of the peritoneal cavity if not managed promptly. Rectal injuries are generally graded using the American Association for the Surgery of Trauma (AAST) injury classification [16]. Grade I injuries consist of contusions, hematomas without revascularization, and partial-thickness lacerations. Grade II injuries comprise full-thickness lacerations that span < 50% of the rectum circumference, while Grade III injuries are those encompassing ≥ 50% of the circumference. Grade IV injuries include lacerations that extend to the perineum. Grade V injuries are defined by devascularized rectal segments.

Rectal injuries can also be categorized into non-destructive (< 50% of the rectal circumference) or destructive (≥ 50% circumference, injuries causing malperfusion, or multiple rectal injuries in close proximity) [17]. However, this distinction is largely historic, as contemporary injury management is now dictated primarily by anatomic location of the injury relative to the peritoneal reflection, i.e. intraperitoneal vs. extraperitoneal, as opposed to circumferential extent. A recent case series noted that 93% of penetrating rectal trauma occurs in an extraperitoneal location, and 88% of these injuries occur in the lower one-third of the rectum. (18)

3-Epidemiology

Rectal trauma has a reported incidence of approximately 1 to 3% in civilian trauma centers and 5.1% from recent wartime data. (19) The vast majority of injuries are caused by gunshot wounds (71–85%), while blunt trauma (5–10%) and stab wounds (3–5%) comprise the remainder. (19) Up to 23% of war-related rectal injuries are due to explosive trauma. (19) Despite advances in trauma systems and surgical management, mortality rates remain between 3 and 10% with an additional complication rate of 18 to 21%. (20, 21, 22) This may in part be related to varied levels of experience and comfort regarding complex rectal injuries among surgeons and the continued evolution of their management. In addition, rectal injuries are rarely seen in isolation given the close proximity of other pelvic organs and vasculature which can make management more difficult. (19)

The incidence of rectal injury with blunt pelvic fractures was noted a 2.2%. 23) Of the injuries evaluated, a widened pubic symphysis was noted to be associated with a threefold increase in the risk of rectal injury. 23) Early reported mortality rates were 53 and 59%, but with advances in perioperative care decrease mortality to 22 to 35%. also further declines in the mortality rate due to experience gained in the conflicts, the dogma of the “four Ds” (debridement, diversion, drainage, and distal washout) became the standard treatment of rectal injuries. (24)

While other study reported that, traumatic injuries to the lower gastrointestinal tract occur in up to 15% of all injured combatants, with significant morbidity (up to 75%) and mortality. Gunshot wounds remain the primary mechanism of injury (57.6%). Notably, the mortality rate for patients with no fecal diversion (10.8%) was significantly greater than those with fecal diversion. (25)

The mechanism of injury

Before we discuss the management of rectal injury it is important to know the following.

1. Type of rectal injury:

A- Isolated extra peritoneal

B- Isolated intraperitoneal

C- Combined Intra- and extra peritoneal

2. Mechanism of injury: blunt vs. penetrating trauma.

3. Fecal diversion vs. no stoma. (5)

4. Injury in the rectum by increase intraluminal pressure

The rectal perforation could be due to increase intraluminal hydrostatic pressure in the rectum by using enema, there is a study reported by Shiels et al ,found that colonic perforations with hydrostatic enemas occurred at approximately 120 mmHg.(18) so awareness of the possible injury from enemas administered to chronically constipated patients should be stressed.

Because prompt diagnosis and early surgical treatment carries a relatively good prognosis, a high degree of suspicion by the attending physician is extremely important. (38), and because of socially unacceptable incident, the natural hesitancy of the patient to describe what might have been a very embarrassing. Severe colorectal injury may be caused by trans-anal high hydrostatic pressure, and it may necessitating resection of the blown injured segment. The firm lateral support of the rectum makes the rectosigmoid junction the first part to be hit by the pressure column, which acts as a solid body as it opens the anal sphincter. This occurred in one of our patients by compressing water tube directed at the anus with a water-soap enema to relieve constipation. Rectal perforation due to retrograde irrigation enema is possibly the most common cause of rectal injury in old patients. while the patient in this study was young adult 45 years old ,In whom the perioperative findings include inraperitoneal, anterior rectal wall perforation just at the peritoneal reflection discovered as black spot after mopping the area with swap and finding small pieces of fecal material with offensive bad odor, turbid and blood stained intraperitoneal fluid in the pelvic cavity, firstly the patient deny any history of external trauma but later on ,postoperatively, the cause of his rectal injury was clarified when he confessed that the abdominal pain developed following using rectal enema.

The certain precuations and advices in using rectal enema, should be followed to reduce the incidence of colorectal perforation during barium-enema radiography by

1) Performing proctoscopy prior to barium enema.

2) Avoiding the use of the rectal balloon in patients with known rectal lesions.

3) Avoiding barium studies in patients with active colitis.

4) Avoiding generation of pressure greater than that created by a column of barium suspension of one meter, and

5) Using a lower concentration of barium when possible. (43)

While the second cause of rectal injury in this study was falling on a sharp object that caused the anorectal injuries in cases 1 and 3, and the injury was considered a combined Intra- and extra peritoneal rectal injury. The predominance of the anterior wall rectal injuries can be explained by the anatomical poster anterior direction of the anorectal canal. [44]

Diagnosis

The initial management of all trauma patients should follow the standard American college of surgeons (ACS), Advanced Trauma Life Support (ATLS) guidelines. The diagnosis and initial management of rectal injuries form part of the secondary survey and should only be followed once immediately life-threatening injuries have been excluded or addressed. In terms of the initial physical exam and diagnostic work-up for rectal injury, although long-considered to be an essential component of the secondary survey for all pelvic trauma patients. Penetrating injury near the pelvis should heighten the suspicion for rectal trauma. Recent civilian evidence suggests that the combination of CT of the abdomen/pelvis and rigid proctoscopy is the new gold-standard for diagnosis of rectal injuries. (42) Digital rectal exam may still have a role in light of questionable physical exam findings or as confirmation of diagnostic suspicion. Caution should be considered if there is potential danger for the examiner. [14], [34]

Digital Rectal Examination

In the secondary survey, the digital rectal examination (DRE) was performed routinely, recent literature has given less dependence to the role of the rectal exam during every trauma evaluation. 26 27 28 DRE has a sensitivity of 33 to 52% for rectal injury, but there is a high false-negative rate of 63 to 67%. 26 28 the variable rates in detection are dependent on the examiners experience in detecting injury.

The DRE can also be a hazard for the practitioner as well as the patient. The exam potentially exposes the practitioner to injury, transmission of infectious disease, and even litigation for assault. 26 DRE has been recommended in the setting of high-velocity trauma and open pelvic fracture with sacral and pubic bone fractures to assess for a gross defect in the rectal wall. The findings on DRE in case of rectal injury, include a defect in the rectal wall, gross blood, decreased anal sphincter tone, a high-riding prostate or bony fragments, 29

Role of Computed Tomography

CT is indicated in patients with a normal physical exam but heightened suspicion for rectal trauma (e.g., widened pubic symphysis, penetrating injury near the rectum, and blood at the urethral meatus), a pelvic CT offers a noninvasive evaluation for rectal injury. This can also be done with CT cystography when there is a concern for bladder injury. The use of rectal contrast is institution dependent and may not adequately evaluate the distal rectum due to occlusion by the device's balloon. Stable patients with a normal physical examination and CT can be observed clinically or discharged. A positive finding on CT warrants further evaluation with proctoscopy unless the injury is clearly intraperitoneal, prompting surgical management.21

The most sensitive finding on CT is a wound tract that extends adjacent to the bowel, a full-thickness wall defect, extravasation of intraluminal contrast, hemorrhage within the bowel wall, and foci of asymmetric extra luminal free air are more specific findings. . 21

Additional secondary findings that suggest a rectal injury include rectal wall thickening, perirectal fat stranding, and unexplained intraperitoneal free fluid. 30 31 A retrospective review of 10 patients injured in combat demonstrated that CT was able to detect each rectal injury, Perirectal air was the most common finding on CT ,but CT had a 20% false-positive rate. 30

Triple-contrasted CT in pediatric blunt trauma has been shown to be equally efficacious for detecting rectal trauma as proctoscopy, but studies in adults suggest the ability to forego oral or rectal contrast. 32 Ultimately there is inadequate evidence to decisively support or refute the routine use of intraluminal contrast. 30, 31 if the location of a rectal injury relative to the peritoneal reflection remains unclear after CT scan and rigid proctoscopy, diagnostic laparoscopy can be performed to exclude an intraperitoneal component [33].

Role of Proctoscopy

On initial trauma evaluation, if the patients present with hemodynamic instability, should proceed immediately to surgical exploration while stable patients with obvious abnormalities on physical examination are best evaluated with intraoperative proctoscopy. Proctoscopy has a sensitivity of 71% for rectal injury and is most sensitive for extra peritoneal injuries (88%).The identification of an extra peritoneal injury avoids the morbidity of a negative laparotomy. 27

Proctoscopy in the emergency department/trauma.

The quality of the examination and the sensitivity of proctoscopy in the emergency department may be decreased due to Lack of bowel preparation, uncooperation of the patients, and associated injuries (limited pelvic mobility, bloody field).

Proctoscopy finding suggesting rectal injury

Proctoscopy allows documentation of the size and extent of the patient's injury and demonstrates less conclusive findings such as intraluminal blood.

Given the lower sensitivity for intraperitoneal injuries, these circumstances may prompt evaluation via laparoscopy to rule out intra-abdominal rectal injury. (1) In the recent studys like Trust et al. (2018) further clarified the diagnostic approach, by demonstrating a 97% sensitivity for penetrating rectal injuries and blunt when a combination of rigid proctoscopy and abdominopelvic CT were used. [35], [36]

Associated Injuries and Clinical Significance

Rectal trauma is often associated with injuries to adjacent structures, such as

1-bony pelvis, Typically, pelvic fractures would be detected on X-ray as an adjunct to the secondary survey, though small fractures may be noticed on CT. Widening of the pubic symphysis has been associated with rectal trauma and a single retrospective study noted that 75% of rectal injuries were associated with an anteroposterior compression pelvic fracture. [23]

2-the urogenital system, A series of 28 patients with penetrating pelvic trauma demonstrated a 43% incidence of urological injury. Additional associated findings of blood at the urethral meatus or prostatic displacement should prompt urethral evaluation with a retrograde urethrogram. Consideration should also be given for CT cystography. [37]

3- In aseries of study with penetrating pelvic trauma, pelvic vasculature injury were demonstrated nearly in 50% rate of these injuries. [37]

4-In this study we demonstrated an anal sphincter damage and injury to the uterus in two separated patients in association with penetrating Trans anal rectal injury.

Methods

The management of rectal trauma is dictated by anatomy. Only the anterior upper two-thirds are serosalized and intraperitoneal and the lower one-third of the rectum and posterior upper two-thirds are extra peritoneal. A recent case series noted that 88% of these injuries occur in the lower one-third of the rectum and 93% of penetrating rectal trauma occurs in an extra peritoneal location. 36 The recording of 3 patients (two males and on female) with a median age of 26.6 (range 16-40) years, had trans-anal rectal injury and were treated between 2016 and 2018 at Al-Hussan teaching hospital, were reviewed. Trans anal rectal Injury was caused by a falling down on a sharp object in two patients, and by rectal cleansing enema in one patient. Two patients (the female 23 years old and 16 years old male) presented about 12 -24 hours after their injury(case 1 ,3), while(case2) patients(40 years old male) presented after 24 -48 hours of his injury .The local ethics from committee of medical association at AL- Nasiriya, and center of Iraqi surgical board at thi- quar medical college.

Case 1

16 year old boy presented to AL- Hussian teaching Hospital as a referring patient from another small hospital 30 KM in the south of AL-Nassiryia city ,the patient presented with signs of hypovolemic shock, he looks pale, hypotensive ,blood pressure 90/60(although he was young) ,pulse rate was 130 BPM and during general examination in the emergency department(ED) there was tenderness on the lower abdomen with large lacerated wound in perianal region which involving an area from 2nd to 5th o'clock with deep penetrating wounds which involving ,about 25% of circumference of perianal skin and digital rectal examination in ED revealed that ,the anal sphincter was lax with clinical evidence of concealed hemorrhage confirmed with gush of fresh bleeding with clots ,passed out the anal canal after digital rectal examination(DRE) ,also inside the perianal wounds there were parts of foreign body , which represent pieces of dried root of plant(the papyrus reed cane, pens like foreign body) on which he fallen down and some of these plants had sharp edges that was cut through anal sphincter muscles and extended up penetrating the anterior part of lower 1/3 rectal wall.

The patient was resuscitated with I.V normal saline 1000 cc and sample of blood send for cross

matching and preparation of two pints of blood for transfusion. After packing of perianal wound the patient was send to the theatre and treated by arresting active bleeders with primary repair of the anal sphincter and exploratory laparotomy and fecal diversion (Hartmann's colostomy). All the pieces of the foreign body were extracted out during the operation. The patient received two unit (pint) of whole blood (blood products were not available), preoperatively. Postoperatively the patient was admitted in intensive care unit (I.C,U) and the fluids therapy with I.V antibiotics which include third generation cephalosporin (ceftriaxone) and metronidazole (flagyl)were administered and the patient allowed to start oral fluid diet 48 hours postoperatively when there was normal bowel sound on auscultation.

The patient passed smooth post-operative period in relative to the severity of his injury and he stays in the hospital for 7 days then discharged from the hospital after training about stoma care. In the follow up, there was superficial perianal wound infection ,with incontinence of anal sphincter to flatus ,which recovered after 6 weeks postoperatively and confirmed with history and by DRE with the lubricated index finger (there was no sophisticated facility to asses anal sphincter function or measurement of anal canal resting tone), and also clinically there was no anal canal stenosis and after complete healing of perianal wound closure of colostomy 10 weeks postoperatively and the patient return to his normal life activity and now I am frequently seeing a shop where he is aworker.

Case 2

He was a male patient 40 years old, presented with history of lower abdominal pain for two days (48) hours, the patient presented with normal blood pressure, slight tachycardia (heart rate was100 BPM) sublingual temperature was 37.5 (low grade of fever), positive bowel sounds and there was no clinical sign of external trauma to the abdominal wall.

The patient deny any history of external trauma to the abdomen and he did not mentioning any think about abuse of rectal enema which later on discovered as the cause of his rectal injury ,after post-operative reevaluation of the history. The CT scan was helped to diagnose an abnormal pelvic finding such as sign of local inflammation with minimal amount of free fluid in the pelvis with free intraperitoneal gas and pelvic pericolic fat stranding with bowel wall thickening while DRE and proctoscopic examination gives no significant clinical finding to help in diagnosis of this patient .the perioperative findings included that, there was a small pieces of fecal material with offensive bad odor in the pelvic cavity with few cc of turbid and blood stained intraperitoneal fluid .

The rectum examined by gentle upward traction on sigmoid colon which helped in identification of a longitudinal 1 cm full thickness intraperitoneal perforation in the anterior rectal wall , just at peritoneal reflection ,appeared as a black spot after mopping the area with swap , and the injury was treated with proximal sigmoid loop colostomy with peritoneal toilet. And primary closure of rectal injury with single interrupted suture with 00 vicryl suture after excision of devitalized tissue (trimming) in the edge of the wound. And abdominal pelvic drain used after washing the pelvis with normal saline.Closure the laparotomy wound in layers and dressing, and did not use rectal wash out.the postoperative complication was bowel ileus which was treated conservatively.

Case 3

The story is different in this 23 years old female who was unmarried(single) and she was presented at night to the hospital complaining of bleeding per rectum, and lower abdominal pain, but she refused the local examination(DRE) even by female doctor and she left (went out)the emergency department after receiving simple resuscitation measures including I.V. fluid with antibiotics, and after 12 hours she returned back to the hospital complaining of lower abdominal pain, tender lower abdomen and she presented as a febrile patient (sublingual temperature 38.5 c), ,tachycardia 120 BPM, the blood pressure was within normal range and she was not tachypnea. during secondary survey

reevaluation, preoperatively, she told us about the real cause of her injury , she said that, during rainy weather , she felled down on a sharp object (iron rood) left on the foundation of building nearby her home, and after we were taking consent from her ,for surgery and agreement for local examination (DRE)by multi displinary team consist of gynecologist ,surgeon and post graduated female doctor and during evaluation there was bleeding per rectum with lacerated wound in the mucosa of the anal canal with normal anal sphincter tone and because she is virgin no gynecological examination was done, and there was full thickness defect in the anterior rectal wall was detected by DRE just above anorectal junction and confirmed by rigid proctoscopic examination in the theatre room, and there was fresh blood and blood clots was found in the anal canal. CT examination was not done because she was emergency case.

Explarotory laparotomy was done and the peri operative findings was that ,there was a turbid, bad odor collection of bloody stained fluid measures about 100 cc in the pelvic region intraperitonally and there was 1-2 cm diameter perforation in peritoneum at cul de sac and the examining finger of the assistant passed freely per anus through the rectal wall injury to meet with finger of the surgeon deeply in the pelvic cavity(bimanual examination) and there is tangential injury to the posterior surface of uterus(serosal injury) , the patients was treated with fecal diversion(sigmoid loop colostomy) with peritoneal toilet and because it was accessable injury, transanal primary repair of the lower rectal wall injury with interrupted 00 vicryl suture , and Without presacral drainage or rectal washout.

There is a wide variety of reported foreign bodies that can cause colorectal injuries. (20) A fall down on sharp objects causes perforating injury in the lower rectal in two patients in this study, and perforation in the recto sigmoidal junction in third patient (case 2).

RESULT

Treatment methodology of rectal injury is chosen based on anecdotal experience, and there is no clear evidence that any technique is superior to the others .41 .Although Injury to the rectum or transverse colon is an independent predictor of mortality. (34) There was no mortality reported in this study, possibly because of low energy trauma, younger age patients, and might be due to small number patient included in this study, and early surgical intervention after proper resuscitation in the emergency department and no associated comorbidity like diabetes mellitus or ischaemic heart disease.

The post-operative complication rate was significantly higher in shocked patient (No.1) and in too late presented female patient (No.3), which manifested as superficial surgical site infections with ileus managed with conservative measures. The colostomy was closed around 10 weeks postoperatively in all patients .after reevaluation of case (No1) for anal sphincter tone and function, the result was that, the sphincter became continent and normally DRE finding which is the only clinical method available to asses anal sphincter function because there was no monometric study for anal canal resting tone available in the hospital at that time.

Table 1 shows the details regarding the events in this study that caused penetrating transanal rectal injures and their management and complications

No.	Age	Gender	Clinical presentation and associated ingery	Proctoscopic examination	Digital Rectal Examination	CT scan Examination	Type of surgical repair	complications	Mortality
1	16	male	The Patient presented with shock state, sever paller, blood pressure 90/60 puls rate 130pbm, bleeding per rectum with clots and foreign body penetrating through anus	No proctoscopic exam. Because he was emergency Case	Concealed hemorrhage, lax anal sphincter, lower rectal tear anteriorly above the dentate line	No CT Because he was emergency Case	Exp. Laparotomy, Hartmann's colostomy, anal sphincter repair, no rectal washout, no presacral drainage	Incontinent for flatus only for six weeks, superficial site infection treated conservatively with ceftriaxone and flagyl	no
2	40	male	The patient presented with lower abdominal pain for 48 hours normal BL.P .tachycardia, 100bpm, Temp.37.5C no sign of external trauma, the cause of the injury by rectal perforation due to retrograde irrigation enema.	Proctoscopic examination gives no significant clinical finding to help in diagnosis of this patient.	DRE gives no significant clinical finding to help in diagnosis of this patient.	the CT scan was helped to diagnose an abnormal pelvic finding such as sign of local inflammation with minimal amount of free fluid in the pelvis with free intraperitoneal gas and pelvic periodic fat stranding with bowel wall thickening	Primary repair of rectal injury with proximal fecal diversion (Sigmoid loop colostomy). no rectal washout or resacral drainage	Ileus treated conservatively	no
3	23 year old	female	Bleeding per rectum,and lower abdominal pain sublingual temperature 38.5 c), ,tachycardia 120 BPM, the blood pressure was within normal range and she was not tachypnic.the cause of the injury was that she felled down on a sharp object (iron rood) left on the foundation of building nearby her home	Bleeding per rectum with lacerated wound in the mucosa of the anal canal with normal anal sphincter tone and because she is virgin no gynecological examination was done, and there was full thickness defect in the anterior rectal wall was detected by proctoscopic exam.	There was full thickness defect in the anterior rectal wall was detected by DRE just above anorectal junction and confirmed by rigid proctoscopic examination and there was fresh blood and blood clots was found in the anal canal.	No CT exam. Because she was emergency Case (acute abdominal pain)	The patients was treated with fecal diversion (sigmoid loop colostomy) with peritoneal toilet and because the injury was accessable, transonic primary repair of the lower rectal wall injury, Without presacral drainage or rectal washout.	Superficial surgical site infection treated conservatively	No mortality

Discussion

1- Classification of rectal injuries

A- Rectal injuries classified by using the American Association for the Surgery of Trauma

(AAST) and rectal injuries are generally graded as following [16].

Grade I injuries consist of partial-thickness lacerations, contusions, and hematomas without devascularization.

Grade II injuries comprise full-thickness lacerations that span <50% of the rectum circumference.

Grade III injuries are those encompassing ≥50% of the circumference.

Grade IV injuries include lacerations that extend to the perineum.

Grade V rectal injuries are defined by devascularized rectal segments.

B- Rectal injuries can also be categorized into non-destructive (<50% of the rectal circumference) Non-destructive rectal injuries have been defined as those with less than 25% loss of circumference, or destructive (≥50% circumference, injuries may causing malperfusion, or multiple rectal injuries in close proximity.

C- Classification by anatomic location of the injury.

Contemporary injury management is now dictated primarily by anatomic location of the injury in relation to the peritoneal reflection, i.e. intraperitoneal vs. extra peritoneal.

The rectal injury in case 1 and 3 of this study were considered as combined extra and intraperitoneal rectal injuries and for eliminate or decrease post-operative morbidity the treatment followed the principles for management of both intra and extra peritoneal rectal injuries, while the patient No 2 had isolated intraperitoneal rectal injury.

Table 2 Rectal injury classified as per ICD-9 clinical modification codes From Rectal trauma injeres: outcomes from the USA National Trauma Data bank

ICD-9 code	Injury
863.45	Isolated extra peritoneal
863.55	Isolated intraperitoneal or combined intra-and exra peritoneal

2-Causes of rectal injuries

I: penetrating rectal injuries, which includes

A. Intraperitoneal rectal gunshot wounds .6
B. Trans-anal rectal perforation or introduction of a foreign body through the anus. 2, 5
C. Rectal perforation due to retrograde irrigation enema is possibly the most common cause of rectal injury in old patients.38
D. Combined rectal and urinary trauma or other complex rectal injuries. 6
E. Extra peritoneal rectal injury without intra-abdominal extension. 15
F. Ingestion of a foreign body (4)

II: Rectal injuries can result from blunt pelvic trauma. (3)

The causes of transanal rectal injury in the patients included in this study were incidentally falling down on a sharp object that caused the anorectal injuries in cases 1 and 3 ((the third case (female patient) was injured by falling down in iron rods fixed in the foundation of new building nearby her home)) while in patient No.2 in this study was injuried by passing (compressing)water tube directed through the anus with a water-soap enema to relieve constipation (rectal perforation due to retrograde irrigation enema).

3-diagnosis of rectal injuries

A. The diagnosis and initial management of rectal injuries form part of the secondary survey and should only be pursued once immediately life-threatening injuries have been excluded or addressed.15
B. The digital rectal exam (DRE) in rectal trauma evaluation has low sensitivity and does not change management plan. Excluding or postponing this examination should therefore be considered. [15] , and There is no role for routine DRE.[34]
C. Recent civilian evidence suggests that the combination of computerized tomography (CT) of the abdomen/pelvis and rigid proctoscopy is the new gold-standard for diagnosis of rectal injuries. [42]

D. With advance in laparoscopic surgery some study showed that rectal injuries could be successfully managed with diagnostic laporoscopy to rule out an intra-abdominal injury, followed by a laparoscopically placed loop sigmoid colostomy for diversion. Laparoscopy is not yet an option in the austere environment.[6]

Rectal perforation diagnosis in this study was confirmed by thorough history, physical examination, digital rectal examination , CT examination of the abdomen/pelvis , and proctoscopic examinations and taking into account individual variation between the patients as we see , in case No.1 Rectal perforation was diagnosed by history, physical examination to found parts of foreign bodys (dried plant roots) still fixed and penetrating deeply through the anal canal and preoperative digital rectal examination revealed lax anal sphincter (anal sphincter injury) and because the patient presented with a shock state , CT and proctoscopic examinations were postponed. In the patient No.2, the CT scan was helped to diagnose an abnormal pelvic finding such as sign of local inflammation with minimal amount of free fluid in the pelvis with free intraperitoneal gas and pelvic pericolic fat stranding with bowel wall thickening while DRE and proctoscopic examination gives no significant clinical finding to help in diagnosis of this patient.

While in patient No.3, (female patient) digital rectal examination help in detection of lower anterior rectal wall injury just above the dentate line, in spite new evidences, which suggest that the digital rectal exam (DRE) in rectal trauma settings has low sensitivity and does not change subsequent management. [15] But in this patient preoperative (DRE) help in diagnosis of lower rectal injury which was confirmed also by proctoscopic examination. CT exam. Was not done because the diagnosis clearly defined by history, clinical examination (the patient present with acute abdominal pain), DRE and proctoscopic examination. Diagnostic laparoscopy was not done in all patient because the patients presented as acute abdominal conditions and there was lack experience in using diagnostic laporoscope in emergency surgery in Al- Hussian teaching hospital at that time.

4-treatment of rectal injury.

Rectal perforation is a relatively common surgical dilemma that requires a thorough history, physical examination, radiographs inventiveness and good laparoscopic experience in diagnosis and treatment of acute abdominal injuries including rectal injury treatment .[27] Initial management of rectal injuries form part of the secondary survey and should only be pursued once immediately life-threatening injuries have been excluded or addressed.[15] patients with full-thickness penetrating rectal injury subsequent to the development of the pathway were evaluated. And generally managed as following

A. Intraperitoneal rectal injuries (IP) were treated with primary repair.
B. Injuries to the proximal two-thirds and accessible distal one-third of the extra peritoneal rectum (EP) were treated with repair and selective fecal diversion.
C. Inaccessible distal EP injuries were treated with diversion and presacral drainage.
D. Management by anatomic distinction allows for omission of colostomy in most IP injuries and select EP injuries, while diminishing the risk of retrorectal abscess in EP injuries with the judicious application of presacral drainage. [39]
E. With advance in laparoscopic surgery some study showed that rectal injuries could be successfully managed with diagnostic laparoscopy to rule out an intra-abdominal injury, followed by a laparoscopic ally placed loop sigmoid colostomy for diversion. Laparoscopy is not yet an option in the austere environment. [5]
F. In patients with isolated extra peritoneal rectal injuries, laparoscopic exclusion of intraperitoneal injuries, followed by a diverting loop sigmoid colostomy, is a feasible option. [7]

G. The failure of drainage and distal washout to correlate with a reduction in postoperative complications suggests that these may be unnecessary steps in the management of penetrating rectal injuries.[40] so diverting colostomy without rectal repair or drainage appears to be safe for the management of most civilian retroperitoneal rectal gunshot wounds.[40]

with taking on consideration the general principles in the treatment of rectal injury , all the patients in this study were treated by exploratory laparotomy with fecal diversion (sigmoid loop colostomy in patient No 2 and 3) ,and peritoneal toilet but without presacral drainage or rectal washout .and also taking into account individual variation in their associated injuries ,like anal sphincter injury in case 1 which was treated with primary repair of the anal sphincter and fecal diversion(Hartmann's colostomy) , as Hartmann's procedure is ideally suited for extensive rectal injuries. [25] and all the pieces of the foreign body were extracted out in the theatre room ,while in Case 2 intraperitoneal rectal injury was treated with trimming the edge of rectal perforation and primary repair , and in case 3 the serosal injury on the posterior aspect of the uterus was sutured , and transanal repair of lower rectal injury because the injury just above the dentate line and was accessible .

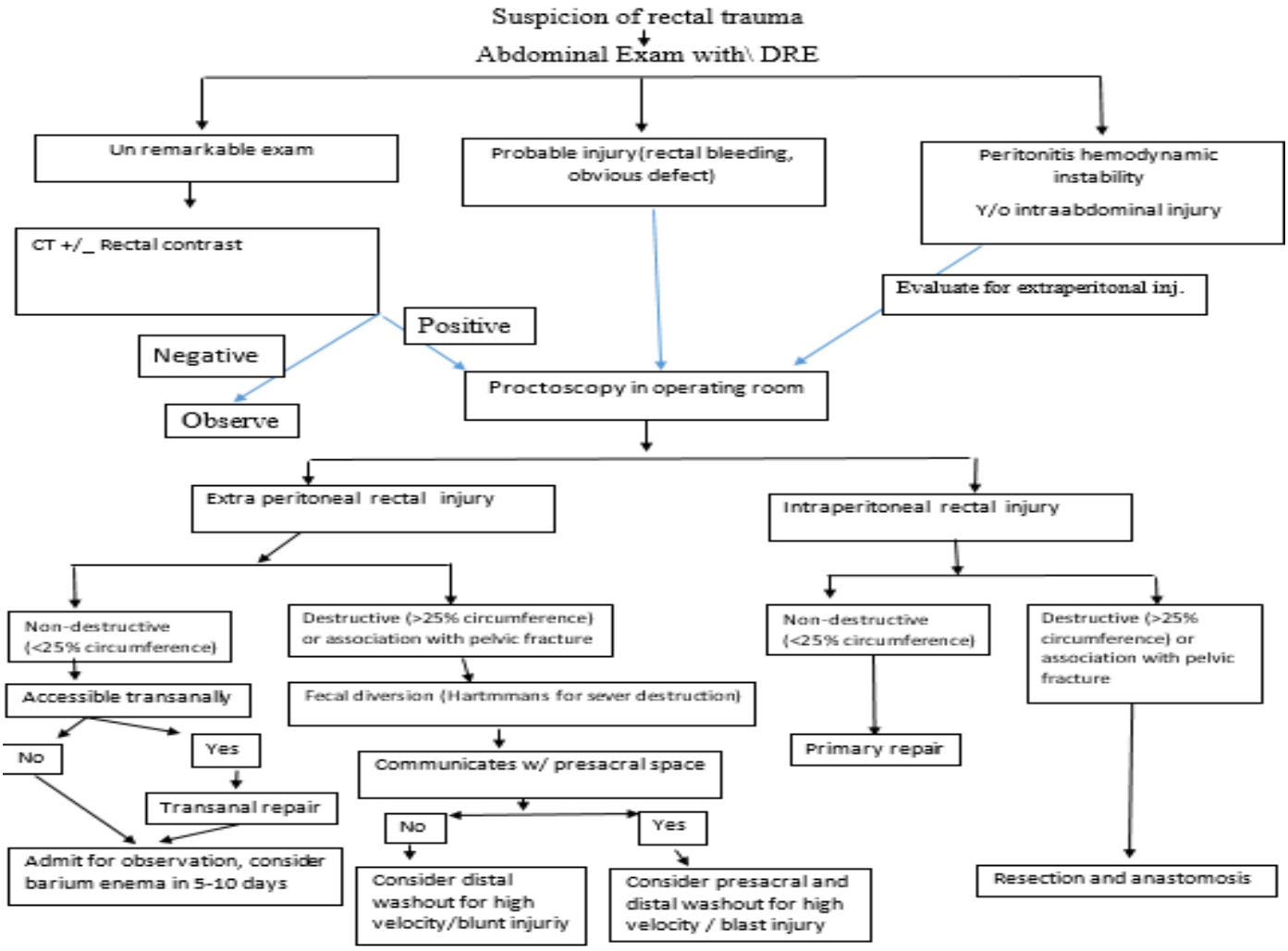

Figure (2) steps for management of rectal injury (45)

CONCLUSION

By following the application of general principles for management of trans-anal rectal injury , the patients in this study were treated as acute abdomen patients, and also taking in account the anatomical location of the injury in the rectum and

the relation of the injury to the peritoneal reflection on the rectal wall. CT scan was performed in patient No.2 and added further information to the diagnosis but it was not done in patient N O: 1 and 3, beacause they presented as emergency cases .DRE was helpful in diagnosis of patients N0:1 and NO: 3 and it gives no clinical finding in patient N0:2 proctoscopic examination helped in detection of lower rectal injury in female patient (No.3) while negative finding in patient 2 and it did not performed in patient NO: 1

All the patients were treated with exploratory laparotomy , fecal diversion and peritoneal toilet but without presacral drainage or rectal washout and taking into account individual variation of associated injurys like management of patient (No.1) with fecal diversion(Hartmann's colostomy) and primary repair of anal sphincter injury. And In Case 2. Intraperitoneal rectal injury was treated with and primary repair of rectal injury with proximal fecal diversion (sigmoid loop colostomy). in case 3 (female patient) , because the rectal injury just above the dentate line and was accessible ,transanal repair of lower rectal injury and exploratory laparotomy ,with fecal diversion (loop colostomy) and suture of serosal injury on the posterior aspect of the uterus

With advance in laparoscopic surgery some study showed that rectal injuries could be successfully managed with diagnostic laporoscopy to rule out an intra-abdominal injury but diagnostic laporocopy was not performed in this study because the patients presented as acute abdominal conditions and the exploratory laporatomy was most appropriate decision for treatment , in addition to lack experience in using diagnostic laporoscope in emergency surgery in Al- Hussaian teaching hospital at that time. The post-operative complications manifested in case NO.1 as Incontenet for flatus only for six weeks, superficial site infection treated conservatively with ceftriaxone and flagyl. In case NO.2 early postoperative ileus treated conservatively while in case NO.3 superficial surgical site infections respond to conservative treatment. The colostomy was closed around 10 weeks postoperatively after reevaluation of case (No.1) for anal sphincter tone and function.

RECOMMONDATION

1. All operations of rectal injury need to performed by experienced senior consultant if possible because rectal perforation is a relatively common surgical dilemma .27
2. Intraperitoneal rectal injuries (IP) were treated with primary repair without fecal diversion. (7)
3. Injuries to the proximal two-thirds and accessible distal one-third of the extraperitoneal rectum (EP) were treated with repair and selective fecal diversion. (7)
4. Management by anatomic distinction allows for omission of colostomy in most IP injuries and select EP injuries, while diminishing the risk of retrorectal abscess in EP injuries with the judicious application of presacral drainage. (39)
5. The failure of drainage and distal washout to correlate with a reduction in postoperative complications suggests that these may be unnecessary steps in the management of penetrating rectal injuries. (40, 30)
6. Inaccessible distal EP injuries were treated with diversion and presacral drainage. (39)
7. Rectal injuries could be successfully managed with diagnostic laporoscopy to rule out an intra-abdominal injury. (6)
8. Diagnostic laparoscopic for exclusion of intraperitoneal injuries, in patients with isolated extraperitoneal rectal injuries. (7)
9. The wartime surgeon is often faced with injuries sustained from high-velocity ammunition and explosive ordinances. These challenges along with previous wartime experience have resulted in the traditional military doctrine of drainage, diversion, and distal washout for all penetrating rectal injuries.5 However, the current literature shows an evolution in the management of penetrating rectal injuries with an emphasis for a more conservative approach.(3)

10. Recent civilian evidence suggests that the combination of computerized tomography (CT) of the abdomen/pelvis and rigid proctoscopy is the new gold-standard for diagnosis of rectal injuries.(42)

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How to cite this article: AL- saaedi Fadhil Penetrating Trans-Anal Rectal Injury, Multiple Case Study Advance Research Journal of medical and clinical science. 2022; 969–985. https://doi.org/10.15520/arjmcs. v8i09.469