

Study of Splenic Injury in Belharzail Hepatic Fibrosis Patients Subjected To Blunt Abdominal Trauma

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ABSTRACT

Background: Portal hypertension is the fate of chronic forms of schistosomiasis, and manifests with splenomegaly and portosystemic collaterals. Patients with schistosomal splenomegaly are vulnerable to higher grades of splenic injury when subjected to blunt abdominal trauma. Defective hemostasis together with compromised general status of the patient may interfere with management of these cases. Aim of this study was to assess management of splenic injury in cases of blunt abdominal trauma in cases of schistosomal splenomegaly. **Methods:** The study included 165 patients admitted with blunt abdominal trauma. They were divided into two groups "Group A" (30 patients) with schistosomal splenomegaly and "Group B" (135 patients) as a control. The data were retrospectively reviewed as regards incidence and grade of splenic injury and management of included cases. **Results:** Splenic injury occurred in 28 patients (93.34%) in "Group A" and in 18 patients (13.34%) in "Group B" ($P < 0.001$). Among patients with splenic injury, there were significant advanced grades of injury in "Group A" than "Group B" ($P = 0.003$). "Group A" showed significant more need for blood transfusion than "Group B" ($P < 0.001$). Conservative management was not successful for any of the cases of "Group A" while it was successfully applied in (66.67%) of "Group B" ($P < 0.001$). Splenectomy was performed in all the explored cases in Group A. **Conclusions:** Splenic injury following blunt abdominal trauma in cases of schistosomal splenomegaly should be managed as a special entity. Our recommendation is to proceed for abdominal exploration in such cases and splenectomy is the treatment of choice.

Keywords: Blunt abdominal trauma; Schistosomal splenomegaly; Splenic injury

INTRODUCTION

Human schistosomiasis is one of the most widespread parasitic infections as it is estimated to affect more than 200 million people all over the world¹. In Egypt, it is estimated to affect about 7.2 million individuals². In most of the cases, chronic infection causes shrinkage of the liver with typical pre-sinusoidal portal hypertension, which manifests by splenomegaly, portosystemic collaterals, and ascites³.

Patients with schistosomal splenomegaly when subjected to blunt abdominal trauma are vulnerable to a more severe splenic injury than would have been caused by the same trauma to normal individuals⁴. These patients have a defective hemostatic system as they show a hypo-coagulable and hyper-fibrinolytic state⁵. Moreover, long standing cases have a compromised general condition as obstructive

pulmonary hypertension with a restrictive pattern of right ventricular dysfunction are observed⁶. These parameters may hinder to effectively apply the non-operative management in treatment of traumatic splenic injury for such patients.

During the past three decades, management of blunt abdominal trauma has shown a major shift from operative to selective non-operative management⁷. The current guidelines and classifications reconsider splenic lesions in the light of the physiopathologic status of the patient associated with the anatomic grade of injury and the other associated lesions⁸. These parameters are significantly affected in patients with schistosomal splenomegaly. Consequently, conservative management of these selective cases subjected to splenic injury may be questionable.

These observations have motivated us to assess the management of splenic injury with blunt abdominal trauma in patients with

schistosomal splenomegaly in comparison to other individuals. Approvals by the ethical committees of both institutions have been obtained to conduct the research.

PATIENTS AND METHODS

We retrospectively reviewed all cases of blunt abdominal trauma that have been admitted to the emergency surgical departments in both Alexandria and Menoufia Main University Hospitals throughout the period from June 2014 to December 2016. The included Patients were categorized into two groups; "Group A" included patients with schistosomal splenomegaly, and "Group B" included the rest of the admitted patients as a control group. Schistosomal splenomegaly was diagnosed by the known history of these chronic patients and was confirmed by the presence periportal hepatic fibrosis on abdominal ultrasound and/or CT. Patients with splenomegaly due to other causes were excluded from the study. Patients' data regarding the amount of intraperitoneal collection and the need for blood transfusion were collected and registered. In each group, data about splenic injury have been collected including number of cases and grade of splenic injuries determined by abdominal ultrasound and/or CT. Management strategies were recorded in the form of either successful conservative management or abdominal exploration indicated by the splenic injury. For the explored cases, type of surgical procedure regarding the spleen was recorded.

Patients' ages were presented as mean \pm standard deviation, while other parameters were presented as frequency with percentage. Comparison between the two groups was performed by statistical analysis using Student "t" test for quantitative parameters and Chi Square test for qualitative parameters using SPSS-20 (Statistical Package for Social Sciences version 21). Probability values of less than 0.05 were considered significant.

All the authors disclose that there are no any conflicts of interest, research funding concerning this study, or sponsorship or financial arrangement relating to this research.

RESULTS

The study included 165 patients admitted to the Emergency Department at both institutes with blunt abdominal trauma. We chose to have a retrospective study in order to eliminate selection bias in these critical group of patients. "Group A" with Schistosomal splenomegaly included 30 patients while "Group B" (control group) included 135 patients. The patients' age in "Group A" ranged from (21-57 years) with a mean of (38.47 \pm 11.87), while for "Group B" it ranged from (22-59 years) with a mean of (38.68 \pm 10.79) with no significant difference between the two groups (P=0.923). Among the 165 included patients with blunt abdominal trauma, splenic injury was found in 46 (27.88%) patients. The incidence of splenic injury was significantly higher in "Group A" than "Group B" (P<0.001). It was found in 28 patients (93.34%) in "Group A", while it was found in 18 patients (13.34%) in "Group B". Regarding grades of splenic injuries, Grade I & II were significantly lower and Grade III & IV were significantly higher in "Group A" than "Group B"; (P<0.001) and (P=0.003) respectively. There was no significant difference between the two groups as regards incidence of Grades V & VI (P=0.089) (**Table 1: Grades of splenic injury**). As shown in **Table 2, (Intraperitoneal collection and blood transfusion in patients with splenic injury)** although there was no significant difference between the two groups as regards the amount of intraperitoneal fluid collection detected by abdominal ultrasound, patients in "Group A" showed significant more need for blood transfusion than "Group B" (P<0.001). Among patients with splenic injuries, conservative management was initiated in 4 patients (14.28%) in group A, however, unstable general condition was the indication for conversion to operative management. Consequently, all the patients within "Group A", had gone through abdominal exploration indicated for the splenic injury. On the other hand, conservative management was successful in 12 patients (66.67%) in "Group B" (P<0.001). Splenectomy was performed in all the explored cases in "Group A", however, it was performed in 5 (83.34%) out of the 6 explored cases in "Group B". Splenorrhaphy was feasible in one case (16.66%) in "Group B".

Table 1. Grades of splenic injury

	Group A 30 Patients		Group B 135		P
	Number	Percentage	Number	Percentage	
Total Splenic injury	28	93.34%	18	13.34%	<0.001*
Grade I & II	4	14.29%	14	77.78%	<0.001*
Grade III & IV	17	60.71%	3	16.67%	*0.003
Grade V & VI	7	25%	1	5.56%	^{FE} p=0.124

FE: Fisher Exact

Table 2. Intraperitoneal collection and blood transfusion in patients with splenic injury

		Group A Splenic injury 28 Patients		Group B Splenic injury 18 Patients		P
		Number	Percentage	Number	Percentage	
Intra-peritoneal collection	Mild	6	21%	6	33.33%	0.369
	Moderate	11	39%	7	38.89%	0.978
	Massive	11	39%	5	27.78%	0.423
Blood Transfusion		24	86%	7	38.89%	<0.001*

DISCUSSION

Schistosomiasis is a complex of acute and chronic infestations. In Egypt, the disease is well established and it is estimated that up to 70% of the rural population in endemic areas is affected by *Schistosoma mansoni*⁹. About 5-10% of infected individuals with schistosoma develop the hepatosplenic form of the disease, which leads to portal hypertension and is considered the advanced stage of the disease. The main manifestation of this severe form is splenomegaly with gastrointestinal bleeding due to portal hypertension¹⁰. The standard line of therapy of oesophageal varices is endoscopic variceal ligation that can be used either for cases of acute haemorrhage or for primary prophylaxis alternatively with non-selective β - blockers¹¹. Splenectomy is indicated for prevention of increased elimination of the corpuscular elements of the blood and for relieving symptoms caused by hugely enlarged spleen¹². Consequently Yet, a considerable percentage of patients with schistosoma can live with moderate grades of non-complicated splenomegaly.

Due to its fragile structure, the spleen is considered the most commonly injured solid organ in blunt abdominal trauma⁴. As documented in several studies, splenic injuries occur in 25%–50% of cases of blunt abdominal trauma¹³⁻¹⁵.

These figures match with the observed incidence among the included patients within the current study (27.88%). Spleen is positioned immediately beneath the left ribcage which gives this organ a sort of protection against injury⁴. When spleen is enlarged it will be palpable under the costal margin consequently more vulnerable to injury by trauma. This explains our observation of the significant increase in the incidence of splenic injury among included patients with schistosomal splenomegaly.

Considering the spleen as one of the major organs affected during the chronic severe form of schistosomiasis, significant alterations in its morphology is evident. It has been documented by Raafat et al.¹⁶, that in schistosomal splenomegaly there is a significant increase in percentage of collagen fibres including subcapsular deposition. Borojevic¹⁷ attributed thickening of the splenic cords to fibrosis that matches with the classical descriptive the terms “sclero-congestive” and “fibro-congestive”, with which this type of splenomegaly is categorized. Although spleen elastography has been introduced as a reliable method to determine spleen hardness, it has been directed to mainly assess liver fibrosis¹⁸. However, none of previous studies has directed the attention to utilize this method as an indicator of physical splenic stiffness with loss of spleen resilience and pliability to absorb trauma. It seems theoretically that this fibrosis may give

some resistance to injury, however, its stiffness will decrease the damping response to trauma leading to more serious injury. This can obviously explain our observation throughout the current study of significant increase in the incidence of high grades splenic injury compared to the control group.

In 1968, Upadhyaya¹⁹ proposed non-operative management in a study on 52 paediatric patients with splenic trauma. Gradually, due to wider knowledge of the role and functions of the spleen, more surgeons preferred a conservative approach, either partial splenic salvage or non-operative management when possible²⁰. In addition to CT findings, one of the most crucial strategies in non-operative management is the hemodynamic stability of the patient⁷. There is evidence that nonoperative management of splenic injury that rapidly stabilizes with little fluid or blood replacement is successful in 80%–90% of cases²¹. However, when the clinical workup suggests ongoing bleeding of suspected intraabdominal origin, immediate operative intervention is mandated²². In the current study, non-operative management was not feasible in any the cases of in “Group A”. There was failure to obtain the desired safe hemodynamic stability that was essential to initiate or to continue non-operative management. The rationale behind this, is the defective coagulation in patients with hepatosplenic schistosomiasis. It has been proven that there is induced vasodilation by schistosomes as vasoconstrictors are released in smaller amounts than the vasodilators²³. This interference with vascular tone can compromise the initial step in haemostasis. Infected individuals have shown defective primary haemostasis by evidence of decrease platelet count with impaired platelet activation and aggregation. Secondary haemostasis is also impaired, as schistosomes have been observed to interfere with the intrinsic coagulation pathway⁵. Moreover, this hypocoagulable state can be attributed to both increased consumption of coagulation factors and decreased their hepatic synthesis as well²⁴. Besides interference with primary or secondary haemostasis, schistosomes may also reduce thrombus formation through the observed hyperfibrinolytic state²⁵. All these factors can contribute significantly to compromise the patient hemodynamic stability and explain the significant

increase in the rate of blood transfusion compared to the control group.

In the current study, splenorrhaphy was not feasible in any of the cases in “Group A”. splenic size, extensive collaterals and adhesions to the diaphragm constitute the obstacle to perform this procedure

CONCLUSIONS

Although the number of the studied cases is small, the study is sending an alert regarding this group of patients. Cases of chronic schistosomal splenomegaly when subjected to splenic injury after blunt abdominal trauma should be managed as special entity. We recommend for such patients to avoid non-operative management and proceed to surgical exploration for the patient safety. Skilled and experienced hands are the corner stone for safe and successful surgery. Splenectomy is the procedure of choice for such cases.

We suggest having a wider scale of patients to be included in future studies to solidify our preliminary recommendations

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Three Ports Laparoscopic Appendectomy with Intracorporeal Tie in Pediatrics

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ABSTRACT

Background: Laparoscopic appendectomy has been widely used in surgical practice, particularly following the first use of laparoscopic techniques in appendectomy by Semm in 1983 (1). Since this time, different techniques were employed to secure closure of appendicular stump, different methods for closure of the appendicular stump during laparoscopic appendectomy such as linear stapler (Endo GIA), endoloop ligature, intracorporeal suture and metal endoclips were used. **The aim of the work:** This prospective study was applied for infants and children undergoing laparoscopic appendectomy through three ports, with securing appendicular stump by multiple intracorporeal ties, facilitating this technique the anchoring stitch through abdominal wall passing seromuscular of the appendix hanging and fixing it that preserving additional fourth port. **Patients and methods:** Thirty pediatric patients will be operated for laparoscopic appendectomy after confirming the diagnosis of acute appendicitis through clinical, laboratory and imaging tools. Supraumbilical port either 10 mm or 5 mm for telescope, the second port placed high left iliac fossa 5mm 1st working instrument, the third through suprapubic region 5 mm 2nd working instrument. After devascularization using bipolar control of appendicular vessels, anchoring stitch hanging and fixing the appendix passing through abdominal wall then seromuscular layer of appendix and extruded to outside through abdominal wall again, elevation and fixation of appendix that permits intracorporeal tie with advantage of more securing of stump and multiple ties with least economic burden and no need for additional fourth port. **Results:** Between April 2017 to may 2019, 30 patients were included in our study. 16(53.4%) patients were female and 14(46.6%) were male. Their ages ranged between 4 and 12 years old [mean age was 8.3 years]. The mean operative time was 53 minute. The mean postoperative hospital stay was 1.45day. None of the patients converted to open appendectomy. No intra-operative complications. In all cases, no leak from the appendicular stump was detected. Superficial wound infections were found in two patients (6%) which respond to oral antibiotic therapy, intra-abdominal abscesses in one (3%) drainage under ultrasonography was done, no mortality was detected in this study. **Conclusion:** Three ports laparoscopic appendectomy with intracorporeal tie reduce economic burden for laparoscopy with acceptable cosmetic results and high efficacy through reliable closure of appendicular stump

Keywords: Appendectomy, laparoscopic, tie, ports.

INTRODUCTION

Acute appendicitis is the most common pediatric surgical emergency worldwide. Prompt evaluation and management is essential to minimizing complications (2). Laparoscopic appendectomy has been widely used in surgical practice, particularly following the first use of laparoscopic techniques in appendectomy by Semm in 1983.(1) Different methods were applied for closure of appendicular stump as a main step for laparoscopic appendectomy after devascularization, all of them were studied regarding operative time, economic burden, safety securing closure and learning curve needed.

Although various stump closure techniques have been suggested by numerous clinical and experimental studies, there is no consensus on whether a routine method should be used for the closure of appendiceal stump (3) for closure of appendicular stump by ready closure method like endoloop, extracorporeal ready tie or either type of clips, surgeon need only two ports other than camera port. On the other hand, to do intracorporeal tie for closure of the stump, surgeon need third right sided port for traction and fixation of the appendix and the other two ports performing the tie, with total number four ports. In this work, for acute appendicitis we close the stump by multiple intracorporeal ties by only

two working ports aided by transabdominal anchoring stitch passing through abdominal wall and seromuscular of appendix hanging it and fixing it, making performing of intracorporeal tie applicable with only total three ports.

PATIENTS AND METHODS

This is a prospective study was be applied on 30 patients diagnosed acute appendicitis of different severity in pediatric surgery causality department , Zagazig university in the period from april 2017 to may 2019.

Diagnosis of acute appendicitis by clinical evaluation, radiological findings and laboratory results. Operative techniques were discussed with parents and informed consent was obtained for each case. Patient data including age, gender, pathological outcomes, duration of surgery, length of hospital stay, and postoperative complications were evaluated. All the surgical procedures were performed under general anesthesia with preoperative antibiotic prophylaxis

Operative technique

Pneumoperitoneum was created using Hasson open technique , through 10mm or 5mm port abdominal cavity explored to confirm the diagnosis of appendicitis and to assess the severity .Second 5mm port was at left iliac fossa and the third 5mm port at suprapubic region. After visualization the peritoneal cavity, traction the appendix by grasper of suprapubic port and devascularization of mesoappendix by bipolar cauterization using left iliac fossa port. Then the needle pass through abdominal wall under vision passing through seromuscular layer of appendix and exteriorized to outside and traction by mosquito from outside. Now the appendix is fixed, tracted to abdominal wall and skelotonized. It is ready for multiple intracorporeal ties by two working ports only. Afterward, the appendix was removed through the trocar in umbilicus , because it is 10mm wide enough to pass excised appendix through it easily.

RESULTS

Between April 2017 to may 2019, 30 patients were included in our study. 16(53.4%) patients were female and 14 (46.6%) were male. Their ages ranged between 4 and 12 years old [mean age was 8.3 years].

The mean operative time was 53 minute.

The mean postoperative hospital stay was 1.45day. In all patients, closure of appendicular stump using multiple intracorporeal ties by only two working ports aided by traction and fixation of appendix by anchoring stitch passing through abdominal wall to interior then through seromuscular layer of appendix then to exterior through abdominal wall

. None of the patients converted to open appendectomy. No intraoperative complications. In all cases, no leak from the appendicular stump was detected.

Superficial wound infections were found in two patients (6%) which respond to oral antibiotic therapy, intra-abdominal abscesses in one (3%) drainage under ultrasonography was done, no mortality was detected in this study.

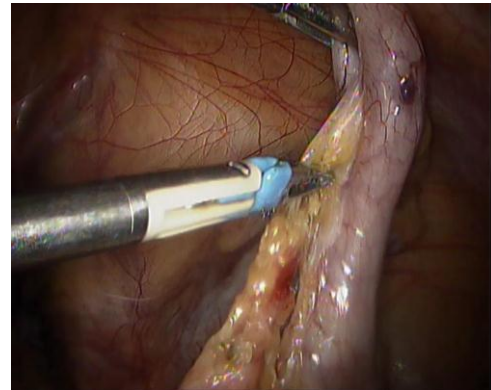


Fig (1): Dvascularization of the appendix by bipolar diathermy



Fig (2): Hanging the appendix to the abdominal wall

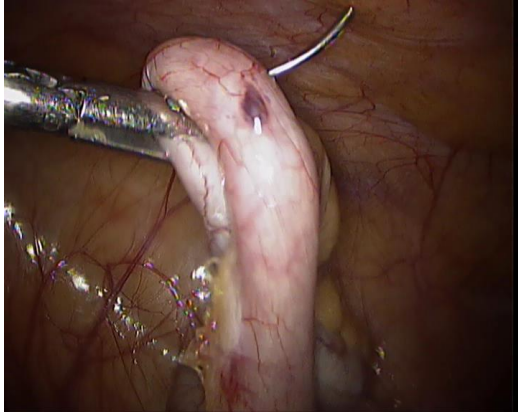


Fig (3): Hanging the appendix to the abdominal wall

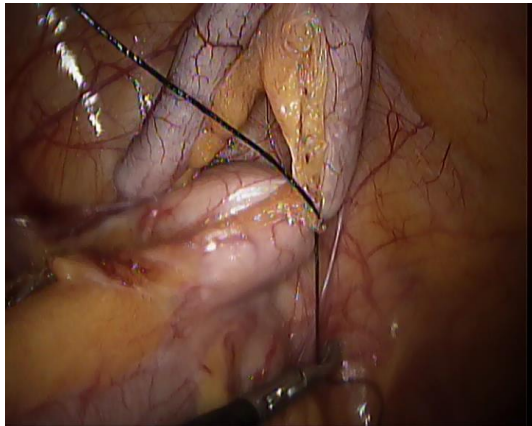


Fig (4): Intracorporeal tie securing appendicular stump

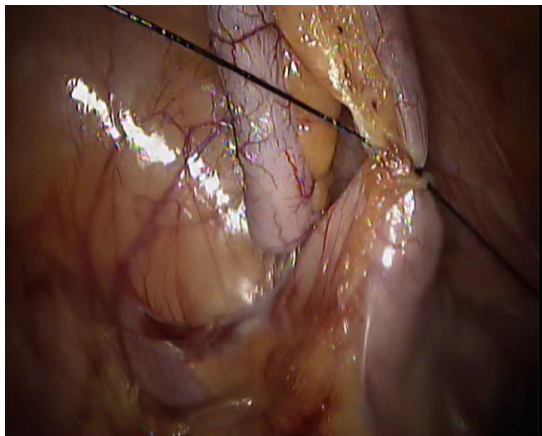


Fig (5): Intracorporeal tie securing appendicular stump

DISCUSSION

For treatment of pediatric appendicitis, laparoscopic appendectomy is effective, safe and minimally invasive, with better postoperative recovery, improved laboratory parameters and reduced complications⁽⁴⁾.

In laparoscopic appendectomy, most steps of the procedure were established and not debatable except the way of appendicular stump closure, which differ from institute to another respecting economic burden, availability of accessory tools and surgeon experience. There is no standard routine closure technique in the management of appendiceal stump. Therefore, the ideal method should be determined based on the condition of the radix of the appendix⁽⁵⁾. Some surgeons prefer to use the stapler closure technique, whereas some others use handmade endo-loop techniques and the endo-loop clips that have been developed based on the surgical experience and conditions⁽⁶⁾ for economic reasons GIA stapler and ready endoloop are not available in all times. Two reasons hinder us from using metallic clips or haemo-clips; first is not to change 5mm port to 10 or 12 mm port with associated decrease cosmeses, parents satisfaction and high incidence of port site hernia, second is leakage fear and migration specially if appendicular stump is pathologically odematous, fraiable and/ or distended. So, we prefer intracorporeal tie using silk or vicryle suture , actually we do two or three ties for more securing with low cost , even if appendix is friable or odematous , multiple ties were reliable. As mentioned before, to do intracorporeal tie for appendicular stump, two working ports and additional right sided port for traction and fixation of appendix. In this study we replace the additional right sided port by anchoring stitch through abdominal wall and appendix.

This anchoring technique was first described for laparoscopic appendectomy in adults by Joshi et al 2007⁽⁷⁾, he do anchoring stitch by intracorporeal needle fixation. In this work, we do slight modification by direct hanging appendix through abdominal wall using needle.

In this study, no leakage from the appendicular stump closure was recorded. No conversion to open appendectomy.

CONCLUSION

Laparoscopic appendectomy is the standard approach for acute appendicitis in pediatric age groups assuming basic laparoscopy set available and well trained pediatric surgeon.

Three ports laparoscopic appendectomy with intracorporeal tie reduce economic burden for laparoscopy with acceptable cosmetic results and high efficacy through reliable closure of appendicular stump.

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