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Original Research Article.

Evaluation of Risk Factors of Pancreatic Injuries during Elective Laparoscopic Splenectomy in Paediatric Patients at a Tertiary Care Hospital

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ABSTRACT

Background: Splenectomy is often necessary in pediatric patients due to various hematologic disorders, with the majority of cases attributed to hereditary spherocytosis (HS), idiopathic thrombocytopenic purpura (ITP), autoimmune hemolytic anemia, and sickle cell disease. The present study aims to evaluate risk factors of pancreatic injuries during elective laparoscopic splenectomy in paediatric patients at a tertiary care hospital.

Materials & Methods: The study evaluated risk factors of pancreatic injury during elective laparoscopic splenectomy in 50 children with benign hematological diseases. Patients were randomly divided into two groups: one using bipolar-sealing devices and the other using endoscopic linear staplers to control the pedicle. Serum amylase, lipase, and LDH levels were monitored pre- and post-operatively to detect pancreatic injury. Data were analyzed using SPSS software.

Results: Mean age of the patients of group 1 and group 2 was 10.3 years and 11.1 years respectively. 60 percent of the patients of group 1 and 52 percent of the patients of group 2 were males. Mean operative time and blood loss was significantly higher among patients of group 2. At follow-up, mean hospital stay, mean serum amylase levels and mean serum lipase levels were significantly higher among patients of group 2.

Conclusion: Laparoscopic splenectomy (LS) is considered a safe surgical option for children. Although pancreatic complications are an uncommon form of morbidity most of these data come from studies involving adults or procedures utilizing stapling devices. This suggests that pancreatic injury during LS may be more closely linked to the method of hemostasis rather than factors like operative duration or spleen size.

Key words: Laparoscopic Splenectomy, Pancreatic.

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INTRODUCTION

Splenectomy is often necessary in pediatric patients due to various hematologic disorders. The majority of cases are attributed to hereditary spherocytosis (HS), idiopathic thrombocytopenic purpura (ITP), autoimmune hemolytic anemia, and sickle cell disease. With advancements in minimally invasive techniques, laparoscopy has become a common practice in pediatric surgery. Among the various procedures, laparoscopic splenectomy (LS) has emerged as a viable option and has gained popularity among surgeons as an alternative to the traditional open approach. The inaugural LS in adults was conducted in 1991. The first documented case in children dates back to 1993. Although the laparoscopic procedure tends to take longer than the open method and presents technical challenges, it appears to be safely and effectively executed, potentially offering several benefits of decreased pain, decreased postoperative ileus, shorter hospital stay, and better cosmesis.[1-3] Transumbilical LESS splenectomy has been used for the emergency treatment of patients with traumatic spleen rupture. LS has also been reported effective and safe for patients with massive splenomegaly due to portal hypertension, even without hand assistance5. Many comparative clinical studies have documented the effectiveness and safety of LS versus laparotomy. LS is believed to be superior to open splenectomy due to its minimal invasiveness, which manifests as minimal intraoperative bleeding, less pain, expedited postoperative recovery, shorter hospital stay, and lower complication rate. Therefore, LS is preferred to open splenectomy

in most adults and children. The use of the LigaSure vessel sealing system along with hilum hanging manoeuvre has been found to further shorten the operating time and intraoperative blood loss.[4-6] Hence; the present study was conducted to evaluate risk factors of pancreatic injuries during elective laparoscopic splenectomy in paediatric patients at a tertiary care hospital.

MATERIALS & METHODS

Present study involving 50 children with benign hematological diseases who underwent laparoscopic splenectomy (LS). The patients were randomly divided into two groups: Group 1: Bipolar-Sealing Devices. Patients in this group had bipolar-sealing devices used to control the pedicle during the surgery. Group 2: Endoscopic Linear Staplers. Patients in this group had endoscopic linear staplers used to control the pedicle during the surgery. Preoperative Investigations: All patients underwent routine preoperative investigations, including baseline serum amylase, lipase, and lactate dehydrogenase (LDH) levels. Surgical Procedure: Under general anesthesia, patients were placed in the right decubitus position. The first step was exploration for accessory spleens, followed by delivery of the spleen inside a bag through the umbilical port. Postoperative Care: Patients received broad-spectrum antibiotics and oral intake were initiated as soon as tolerated. Postoperative Monitoring: Serum amylase, lipase, and LDH levels were monitored on postoperative days to detect potential pancreatic injury. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software.

RESULTS

Mean age of the patients of group 1 and group 2 was 10.3 years and 11.1 years respectively. 60 percent of the patients of group 1 and 52 percent of the patients of group 2 were males. Mean splenic size among patients of group 1 and group 2 was 14.8 cm and 14.5 cm respectively. At baseline, mean serum amylase levels among patients of group 1 and group 2 were 33.3 IU/L and 34.5 IU/L respectively. At baseline, mean serum lipase levels among patients of group 1 and group 2 were 36.3 IU/L and 37.1 IU/L respectively. At baseline, mean serum lipase levels among patients of group 1 and group 2 were 218.3 IU/L and 221.9 IU/L respectively. Mean operative time and blood loss was significantly higher among patients of group 2. At follow-up, mean hospital stay, mean serum amylase levels and mean serum lipase levels were significantly higher among patients of group 2.

Table 1: Demographic data

Variable		Group 1	Group 2
Age group (years)	**Less than 10**	12 (48%)	11 (44%)
	10 to 16	13 (52%)	14 (56%)
	Mean age	10.3	11.1
Gender	**Boys**	15 (60%)	13 (52%)
	Girls	10 (40%)	12 (48%)

Table 2: Baseline data

Variables	Group 1	Group 2
Mean splenic size (cm)	14.8	14.5
Mean serum amylase (IU/L)	33.3	34.5
Mean serum lipase (IU/L)	36.3	37.1
Mean serum LDH (IU/L)	218.3	221.9

Table 3: Operative variables

Variables	Group 1	Group 2	p-value
Mean operative time (mins)	42.3	61.3	0.001 (Significant)
Mean blood loss (ml)	71.3	102.8	0.001 (Significant)
Conversion (%)	4	8	0.225

Table 4: Postoperative variables

Variables	Group 1	Group 2	p-value
Full oral intake on 1st day (%)	80	76	0.775
Hospital stay (mean days)	1.9	3.1	0.001 (Significant)
Mean serum amylase (IU/L)	51.3	82.3	0.000 (Significant)
Mean serum lipase (IU/L)	35.9	68.1	0.003 (Significant)
Mean serum LDH (IU/L)	323.8	341.8	0.335

DISCUSSION

Laparoscopic surgery is increasingly recognized as a viable alternative to traditional surgical methods. It is becoming increasingly clear that laparoscopic techniques can be effectively utilized in pediatric patients. The benefits of these techniques encompass reduced postoperative pain, lower incidence of ileus, fewer pulmonary complications, and shorter durations of hospital stays. Additionally, elective splenectomy for hematologic disorders or for the staging of Hodgkin's lymphoma also seems to be suitable for laparoscopic approaches.[7-10]

Mean age of the patients of group 1 and group 2 was 10.3 years and 11.1 years respectively. 60 percent of the patients of group 1 and 52 percent of the patients of group 2 were males. Mean splenic size among patients of group 1 and group 2 was 14.8 cm and 14.5 cm respectively. At baseline, mean serum amylase levels among patients of group 1 and group 2 were 33.3 IU/L and 34.5 IU/L respectively. At baseline, mean serum lipase levels among patients of group 1 and group 2 were 36.3 IU/L and 37.1 IU/L respectively. At baseline, mean serum lipase levels among patients of group 1 and group 2 were 218.3 IU/L and 221.9 IU/L respectively. Sakaguchi Y et al determined the effect of fibrin glue and polyglycolic acid (PGA) felt on prevention of pancreatic fistula (PF) after laparoscopic splenectomy in patients with hypersplenism due to liver cirrhosis. Fifty consecutive patients were enrolled in this prospective study. Twenty-three patients underwent laparoscopic splenectomy with a fibrin sheet (fibrin sheet group). The sealing ability of each treatment was evaluated by an ex vivo pressure test model. Based on the results from ex vivo experiments, 27 patients received prophylaxis using fibrin glue and PGA felt (PGA with fibrin group). The primary endpoint was the incidence of PF. Significantly more (5, 22%) patients developed PF in the fibrin sheet group than in the PGA with fibrin group (0%, P = .037). Their new application of fibrin glue and PGA felt is an effective prophylactic procedure for preventing development of PF after laparoscopic splenectomy.[10]

In the present study, mean operative time and blood loss was significantly higher among patients of group 2. At follow-up, mean hospital stay, mean serum amylase levels and mean serum lipase levels were significantly higher among patients of group 2. Ji B et al compared the effectiveness and safety of these approaches in patients with non-severe splenomegaly scheduled for elective total LS. 203 patients underwent LS, 58 (28.6%) via the posterolateral and 145 (71.4%) via the anterior approach. Three patients (1.5%) required conversion to laparotomy due to extensive perisplenic adhesions. The posterolateral approach was associated with significantly shorter operation time, reduced intraoperative blood loss, and shorter hospital stay than the anterior approach. The frequency of pancreatic leakage was slightly lower in patients undergoing LS via the posterolateral than the anterior approach. The posterolateral approach is more effective and safer than the anterior approach in patients without severe splenomegaly.[11] Casaccia M et al identify predictive risk factors for conversion to open splenectomy and postoperative complications in patients undergoing elective laparoscopic splenectomy. Conversion to open splenectomy was necessary in 39 cases (5.8%). Perioperative deaths occurred in 3 cases (0.4%). There were no complications in 560 patients (82.8%), with a mean hospital stay of 5 days (range, 2-54). Overall, morbidity occurred in 116 patients (17.2%). Multivariate analysis found that the body mass index (P = 0.01) and the presence of hematologic malignancy (P < 0.001) were independent predictors for intraoperative complications and surgical conversion. Spleen longitudinal diameter (P = 0.001) and surgical conversion (P = 0.001) were independent predictors for the occurrence of postoperative complications. Besides splenic dimensions, other factors like the patient's habitus and the specific underlying hematologic pathology should be recognized by the surgeon to reduce complications and initiate adequate treatment.[12]

CONCLUSION

Laparoscopic splenectomy (LS) is considered a safe surgical option for children. Although pancreatic complications are an uncommon form of morbidity most of these data come from studies involving adults or procedures utilizing stapling devices. This suggests that pancreatic injury during LS may be more closely linked to the method of hemostasis rather than factors like operative duration or spleen size.

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