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Original Research Article

Efficacy of laparoscopic splenectomy in thalassemia patients

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ABSTRACT

Background: Haematological disorders in which splenectomy is indicated, the laparoscopic splenectomy became the standard management, except in β thalassemia in which laparoscopic splenectomy still not established yet.
Methods: Thirty patients with thalassemia between November 2017 and April 2019 were operated by anterior approach laparoscopic splenectomy with early ligation of splenic artery then the splenic vein ligated. In initial 12 cases the specimen was extracted via the lower flank port after extending the trocar incision to 10 cm, while through a 7-8 cm Pfannenstiel incision in 17 cases and one case converted to open.
Results: The procedure was completed in 29 patients while one patient converted to open. The mean age of patients was 15.2±3.8 years. The mean operating time was 104±23.5 minutes (90-120 minutes). The mean intra-operative blood loss was 179±37.2 ml (130-250 ml). No major intra-operative complications occurred. Only one patient required intraoperative blood transfusion. The mean postoperative hospital stay was 2.7 days (2-4 days).
Conclusions: Laparoscopic splenectomy is feasible and safe procedure in β thalassemia patients even with huge splenomegaly. The specimen extraction via a Pfannenstiel incision saves more time, carries low morbidity and offer better cosmetic results.

Keywords: Laparoscopic splenectomy, Thalassemia, Pfannenstiel incision

INTRODUCTION

In 1910, the first case of splenectomy was described in management of hereditary spherocytosis. After that splenectomy became a well-established treatment for different types of haemolytic anaemia.[1]

In Indian population, there is higher incidence of β thalassemia with hypersplenism which require splenectomy. The progress in laparoscopic surgeries and advances in the instruments results in application of laparoscope in treatment of haematological diseases.[2]

In 1991, Delaitre was the first one who describes laparoscopic splenectomy.[3] After that laparoscopic splenectomy became the initial treatment procedure in patients require splenectomy especially those with normal sized spleen.[4,5]

There is a controversy in laparoscpic splenectomy in case of splenomegaly, with increased conversion rate ranging from 17% to 37%.[2,6-8]

β thalassemia usually have huge splenomegaly which cause more difficulty in laparoscopic manipulation of the spleen. Some surgeons considered splenomegaly is a contraindication for laparoscopic surgery which changed later on as a result of increased experience and appearance of more advanced laparoscopic equipment's.[9,10]

The aim of this study was to evaluate the feasibility and safety of laparoscopic splenectomy in β thalassemia patients.

METHODS

This study was a randomized controlled prospective study that included 30 consecutive patients with thalassemia in whom splenectomy was indicated. The stud was carried out in Menofia University Hospital, General Surgery Department started on November 2017 and ended on April 2019.

A single team were operated all the patients which headed by the second author. Hypersplenism, increased requirement of blood transfusion, haemosiderosis and abdominal discomfort due to splenomegaly revealed as indications for splenectomy.

Preoperative blood transfusion were done to correct Hb >10 gm% in all patients. Immunization was done 3 weeks prior to surgery with polyvalent pneumococcal, hepatitis B and H. influenzae B vaccines for all patients.

All patients were operated under general anaesthesia. After induction of the anaesthesia, a nasogastric tube was inserted and urinary catheter was introduced under aseptic condition, then the patient draped in the right lateral decubitus, with left arm rest above the head and pillow behind the back so the trunk would be at 45° backward tilt. This would prevent the spleen from falling down by gravity when the lower pole was freed.

The surgeon and the camera operator were positioned on the patient's right side, the assistant on the left side, with the video monitors above and lateral to patient's left shoulder.

Closed access technique using veruss-needle was used for pneumoperitoneum. The first trocar was placed 2-5 cm medial to the lowest palpable edge of the spleen. An oblique viewing 30° 10-mm rod lens was used. Three other trocars were placed in an arc above and below the optic trocar.

Working 5 mm trocar was placed in the epigastrium; another 10- mm working trocar was placed in the anterior axillary line or right hypochondrium according to spleen size. In the left lower flank, another one 5-mm trocar was placed in the middle or posterior axillary line to retract the spleen.

Exploration of peritoneal cavity was done to exclude the presence of accessory spleen. The lower pole was first freed from the peritoneal attachments including the phrenicocolic ligament so that it could be lifted by the grasper in the lower port, and the grasper was held in place by anchoring it to the lateral thoracic wall. The next step by using Ligasure was to free the gastrosplenic ligament with division of the short gastric vessels. Lateral approach was practiced ; the splenic artery was usually easy to find along its tortious course above the upper border of the pancreas and so it was dissected and clipped by three clips (Figure 2).

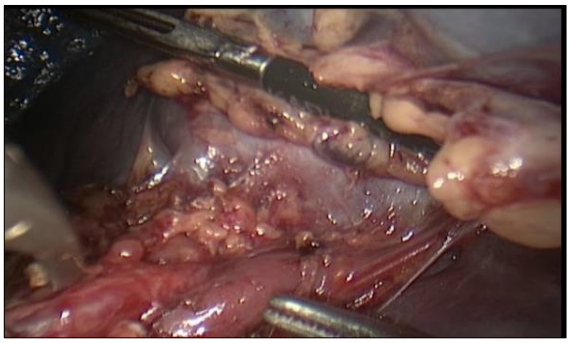

Figure 1: Dissection on splenic vein.

The splenic vein was identified at the hilum along with its tributaries and was isolated from the tail of the pancreas. Then splenic vein was ligated at the hilum by double sutures or double clips or individually sealed with Ligasure (Figure 3).

The spleen was allowed to fall slightly with gravity medially, and posterior and upper dissection was done till the visualization of the gastric fundus from the diaphragmatic surface of the spleen. The spleen was then flipped on its back to ensure its liberation from all peritoneal attachments.

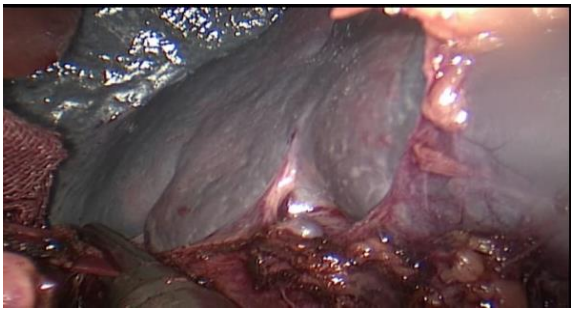

Figure 2: Clipping of splenic artery.

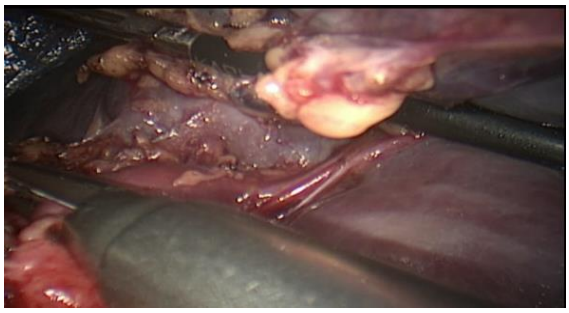

Figure 3: Clipping of splenic vein.

The lower flank trocar was removed, and the trocar incision was enlarged to 10 cm to extract the spleen intact

and also in some patients let the spleen fall in pelvis after correction of the position of the patient and elevating the head of the patient to let the gravity pull the spleen toward the pelvis then a Pfannenstiel incision about 7-8 cm to was done to extract the specimen intact. Abdominal drain was kept in the splenic bed. Blood loss, operative time, conversion rate were recorded

Postoperatively, antibiotics for 48 hours and intravenous analgesics were given. The intra-abdominal drain was removed 48 hours after surgery. liquid diet started after 24 hours. Early mobilization and chest physiotherapy were encouraged.

Postoperative complications and rate of blood transfusion were followed up.

Statistical analysis

The collected data were organized, tabulated and statistically analysed using SPSS software (Statistical Package for the Social Sciences, version 21, SPSS Inc. USA). Data were described using mean and standard deviation (SD) and frequencies according to the type of the data (quantitative or categorical respectively). Chi-square and fisher exact test were used for comparison of qualitative variables. One way ANOVA test was used to compare between means of categorical and numerical data. Significance level (p-value) was adopted, i.e. $p<0.05$ for interpretation of results of tests of significance.

RESULTS

Between November 2017 and April 2019, 30 patients of β thalassemia underwent laparoscopic splenectomy.

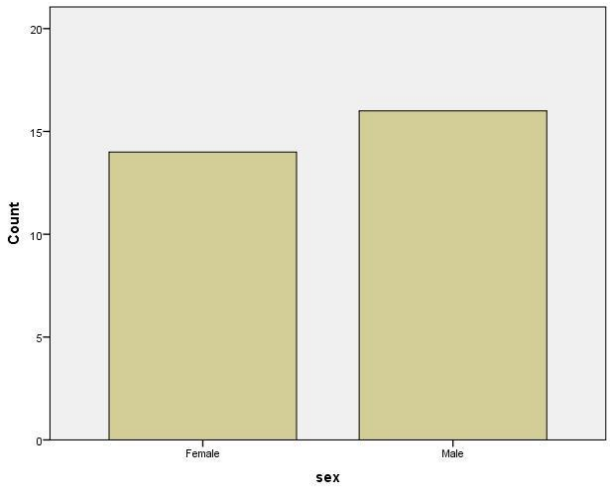

Figure 4: Distribution of sex.

As shown in Figure 4, among 30 patients of laparoscopic splenectomy, there were 16 (54%) males and 14 (46%) females. The median age of the patients was 15.2 years (range, 10-21 years). The laparoscopic splenectomy was completed in 29 patients, while only one patient converted to open technique. With growing experience and familiarity with the procedure, the threshold for subjecting the patient to elective laparoscopic procedure became higher. Accessory spleens were found in 2 (6.6%) patients and were removed laparoscopically. Mean cranio-caudal splenic diameter as measured on ultrasound was 16 cm (range, 14-18 cm).

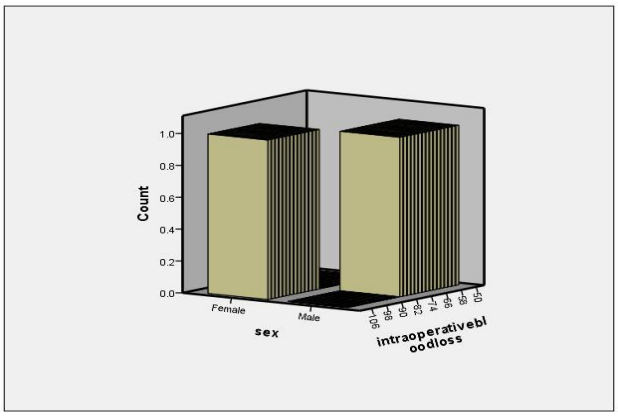

Figure 5: Relation between sex and intraoperative blood loss.

Table 1: Demographics of patients subjected for splenectomy.

Demographics	Mean±SD
Age	15.2±3.8
Sex	
Male	16 (54%)
Female	14 (46%)
Spleen diameter	15.4±5.3

Table 2: Intraoperative events and complication.

Intraoperative events	Mean±SD
Intra-operative blood loss	179±37.2 ml
Operation time	104±23.5 min
Intraoperative blood transfusion	1 (3.3%)
Intraoperative haemorrhage	1 (3.3%)
Conversion to open	1 (3.3%)
Splenic weight	1038±160 gm

Table 3: Postoperative events and complication.

Postoperative events	Mean±SD
Time to start oral	30±4.5 hours
Port site infection	1 (3.3%)
Intra-abdominal haemorrhage	1 (3.3%)
Ileus and diarrhoea	0
Duration of hospital stay	2.7±0.8 days

The mean intra-operative blood loss was 179 ml (range, 130-250 ml). The mean operative time was 104 minutes

(range, 90-120 minutes). The mean splenic weight was 1038 gm (range, 284-1649 gm.). There was no mortality in the current series; and, no major complication occurred intra-operatively except for excessive bleeding in 1 patient who required blood transfusion. Postoperative complications included port site infection in 1 (3.3%) patients, which was controlled with local dressings and antibiotics. The average hospital stay was 2.7 days (range, 2- 4 days).

DISCUSSION

Since 1991, laparoscopic splenectomy has been introduced as an alternative procedure for open splenectomy, it became the standard treatment for benign diseases especially those with normal-sized spleens.[4,5, 11]

There were many varieties for the definitions of huge splenomegaly among several studies, but all agreed that the increased splenic size and weight gives more difficulty to the laparoscopic technique as it takes more time in manipulating the huge spleen and the conversion to open technique may be used at the end.[12,13]

The cranio-caudal size of spleen over 20cm is a relative contraindication for the laparoscopic surgery.[10,14,15]

The patients with huge spleen remain a challenge for splenectomy even with open procedure, due to increased morbidity and mortality rates.[16,17]

During laparoscopic splenectomy, the difficulty degree increases if the size of the spleen is huge due to reduced available working space intra abdominally. In patients with β thalassemia, the problem associated with huge spleen becomes more obvious as these patients usually have huge splenomegaly with a smaller abdomen and also have large vascular pedicles with dilated splenic vein up to 2 cm in diameter. All these parameters increase the limitation of laparoscopic dissection and manipulation of the spleen with increased risk of intraoperative haemorrhage. Another difficulty parameter is that these patients may have hepatomegaly which compromise more intra-abdominal space.[18,19]

In spite of the above difficulties, there are 2 important advantages in thalassemic patients. First, haemosiderosis makes the spleen less friable with subsequently easier manipulation. Secondly, the huge spleen displaces the splenic hilum antero-inferior, which provides easy and direct access to the splenic vessels.[18]

There are many advantages for laparoscopic splenectomy over open method including less analgesic requirements, early return to regular diet, decreased stay in the hospital, better cosmetic results, and economic benefits derived from early return of the patients to full activities postoperatively.[18]

There are two approaches for laparoscopic splenectomy: the “anterolateral hanging spleen” technique which described by Delaitre and Maignein and the “posterolateral detached spleen” technique used by Park et al.[20,21]

Lateral approach was followed, which start by the dissection of the lower pole. The lateral approach is particularly suitable for patients with splenomegaly as in Tan et al.[22]

The early control of splenic artery was preferred by using double clip ligation. The ligation of the splenic vein was delayed till the remaining attachments dissected except splenophrenic ligament. The early ligation of the artery reduces the spleen size up to 15%-20% with subsequent increase in the working space and easier manipulation. It also decreases the splenic vein size, thereby facilitating the dissection with less risk of intraoperative bleeding. Another advantage of early splenic artery ligation is the return of blood from the spleen into the systemic circulation which is beneficial to the already anemic patients.

The intraoperative haemorrhage is the most important major complications as it increase the conversion rate. The rate of conversion reported in various studies range from 6% to 36% due to higher percentage of the thalassemic patients having huge splenomegaly causing higher conversion rates as reported in various studies.[7,8,23,24] Only one case (3.3 %) converted in this study.

The hand assisted laparoscopic splenectomy (HALS), became as an alternative to laparoscopic approach especially in patients with huge splenomegaly. HALS shows various advantages, as better tactile sensation, easy manipulation with effective tissues and organs retraction, offer better haemostasis and easier extraction of the specimen through the accessory incision.[11,25]

HALS was not practiced in the study because most of the patients (52%) were ≤14 years of age and associated with splenomegaly and hepatomegaly, 7 cm incision used in HALS for the non-dominant hand of the surgeon was not only difficult due to a small abdomen with hepatomegaly but also it decrease the cosmetic value of laparoscope.[11] The Pfannenstiel incision 7-8 cm for specimen removal associated with less morbidity and cosmetically better than the incision used in HALS. It is also better than the left lower abdominal incision used in 12 cases for specimen extraction.

Preoperative embolization of splenic artery could be used to decrease the blood loss and decrease the operative time for surgery of large spleens, but because of the serious complications, as severe pain, peri-splenitis and abscess of the spleen, this procedure became not advised.[15] So did not follow preoperative embolization in the patients was not followed.

Compared to open splenectomy there were decreased blood loss intraoperatively and decreased need for intraoperative blood transfusion in laparoscopic procedure.[7] The mean intra-operative blood loss was 179 ml, and only one case of the 30 patients required intra-operative blood transfusions.

Various studies have reported that operative time in laparoscopic splenectomy is longer than open splenectomy.[26,27] The mean operative in this study was 104 minutes, which is significantly lower than that reported in other studies.[6,7] This may be due to the large number of patients included in other studies.

The mean hospital stay was 2.7 days in this study, which is comparable with other studies.[2,7] Also this is less than hospital stays of patients with other causes which require laparoscopic splenectomy.[14]

CONCLUSION

Laparoscopic splenectomy revealed to be feasible and safe procedure to β thalassemia patients with splenomegaly. Pfannenstiel incision for specimen extraction is significantly decrease time, with low morbidity and offer better cosmetic results. The operative time in laparoscopic splenectomy is still longer than the open splenectomy but it decrease with time due to increased experience. Conversion rates from laparoscopic to open could be excluded by proper selection and preparation of the patients, almost all cases requiring conversion are due to either intraoperative haemorrhage or technical difficulty beyond the capability of current instrumentation and diminished by growing experience. Postoperative care and hospital stay in laparoscopic splenectomy were clearly shorter than the open splenectomy.

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