Outcomes of laparoscopic versus open splenectomy

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Purpose: Laparoscopic techniques have gained wide clinical acceptance in surgical practice today. The laparoscopic approach has been established as the technique of choice for elective splenectomies performed on normal sized spleens. The purpose of this study was to evaluate the outcome of patients undergoing laparoscopic splenectomy (LS) at the TOBB University of Economics and Technology (ETU) Hospital and Kecioren Training and Research Hospital. Methods: One hundred and thirty-five patients underwent splenectomy between January 2000 and July 2010. For comparison, the records of 130 patients undergoing splenectomy were evaluated for age, gender, hospital stay, time to start of diet, conversion rate, operation time and wound infection. Results: Mean operation time means the time interval between surgeon commencing operation to end of operation. Mean operation time in patients treated by LS was 132 minutes and 121 minutes in open splenectomy (OS). Mean hospital stay was 5.65 days in patients undergoing LS and starting of diet was 1.21 days. In patients treated by OS, mean hospital stay was 9.17 days, starting of diet was 2.37 days. Four patients were converted to open surgery. Conversion rate was 6.4 percent. In the early post operative period (within 10 days of surgery) 9.2%, LS group had lower incidences of wound infection rate after surgery than OS group (4.8%, 7.4%, respectively; P = 0.06). Conclusion: LS is a safe and effective alternative to OS for treatment of splenic diseases in patients of all ages.

Key Words: Laparoscopy, Splenectomy

INTRODUCTION

Laparoscopic techniques have gained wide acceptance with growing surgical experience and technological development. Laparoscopy has also been applied to other abdominal operations including Fundoplication, cholecystectomy, totally extraperitoneal/transabdominal preperitoneal, and appendectomy [1]. Laparoscopic splenectomy (LS) is an advanced minimally invasive procedure and first reported in 1991 [2,3].

Several factors make LS more difficult than other advanced laparoscopic procedures. Exposure of the spleen on the left upper quadrant can be difficult, especially in obese patients, and control of the splenic blood supply demands advanced technical skills and equipment. Injury to the tail of the pancreas during dissection of the splenic hilum may cause pancreatitis and pancreatic fistula. LS has several advantages over open splenectomy (OS),
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despite these risks [4]. There are several prospective non-
randomized studies comparing OS and LS in the litera-
ture. LS results in less pain, shorter hospital stay, less mor-
bidity and mortality, earlier return to job, and earlier start
to diet [1,5-7].

Indications for LS are similar to those for open proce-
dure with only a few exceptions. LS is especially used in
hematologic diseases like idiopathic thrombocytopenic
purpura (ITP). These patients generally use corticoste-
roids predisposing patients to wound infection and de-
hiscence [1,8]. Because of this, LS is the gold standard for
splenectomy for normal-sized spleens. The aim of this
study was to share our experience and encourage the usage
of LS in our country.

METHODS

One hundred and thirty-five patients underwent sple-
nectomy at General Surgery Clinic between January 2000
and July 2010. Splenectomies for trauma and carcinoma
were not included in the study. Precise contraindications
for the laparoscopic approach were no different from oth-
er laparoscopic procedures and included portal hyper-
tension and severe cardiopulmonary disease. No patients
were pregnant. Computed tomography scans demonstrated splenic masses in all the patients. Ultrasonography
was performed in patients with heterotopic splenosis to
identify cholelithiasis. For comparison, the records of 130
patients undergoing splenectomy were evaluated for age,
gender, hospital stay, time to start of diet, operation time,
and wound infection rate.

Patients received pneumococcal and hemophilus influ-
enzae vaccine 1 day before surgery. Surgery was per-
formed under general anesthesia and right lateral decubi-
tus position. The surgeon stood on the patient’s right side,
with the first assistant on the patient’s left side and the
camera assistant to the surgeon’s left. The open Hasson
technique was used to enter the peritoneal cavity and
place the first port (12 mm), about 4 to 7 cm below the cos-
tal margin along the midclavicular line. Two 5-mm ports
were then inserted under direct vision below the left sub-
costal margin. One was placed in the subxiphoid area and
the other along the anterior axillary line. A 10-mm 30° lap-
aro scope was used for visualization. Dissection was per-
formed using a Harmonic Scalpel (Ethicon Endo-Surgery
Inc., Cincinnati, OH, USA).

The abdomen is thoroughly inspected for accessory
splenic tissue and additional pathologies. After extraction
of liver and stomach, dissection is started. Gastroplenic
ligament was controlled with clips or endoscopic vascular
stapler in our first experiences. The lateral peritoneal at-
tachments of the spleen are divided with laparoscopic
shear. The splenic hilar vessels were divided using the vas-
cular endostapler ATW45 (Ethicon Endo-Surgery Inc.) in-
troduced through the 12-mm port. The spleen is extracted
by morcellation within a plastic bag and pulled out
through the umbilical incision. The umbilical (usually 5 to
6 cm) incision was enlarged to allow for the removal of the
bag without the risk of tearing. The fascia of umbilical in-
cision is sutured.

RESULTS

Of the 130 patients, 62 patients (47.7%) were operated
on using the laparoscopic procedure. Of these, 38 were fe-
male and 26 were male. Age ranged between 10 and 70
years. Mean age was 36.1 years. Of the 68 patients (53.3%)
undergoing OS, 46 (67.7%) were female and 22 (32.3%)
were male. Mean age was 45.7 years and ranged between
14 and 85 years. All patients were readmitted for follow up
1 month later (Table 1).

The indications for splenectomies were ITP in 53 pa-
tients (85.4%), spleen storage disease in 3 patients (4.8%),
mass in spleen in 2 patients (3.2%) and hemolytic anemia
in 4 patients (6.4%). OS was performed in 66 patients.
Forty-nine patients (72%) had ITP, 4 patients (5%) had he-
molytic anemia, 5 patients (7%) had spleen storage dis-
case, 5 patients (7%) had mass in the spleen, 3 patients (4%)
had TTP and infarct with abscess formation in 2 patients
(2%) (Table 2). LS was successfully performed in 58 pa-
tients (93.5%). Four patients were converted to open
surgery. The reason for conversion was bleeding in 2 pa-
tients and advanced adhesions in 2 patients. The con-
version rate was 6.4 percent. Four patients were found to
**Table 1. Outcomes of laparoscopic splenectomy (LS) versus open splenectomy (OS)**

|                      | LS (n = 62) | OS (n = 68) | P-value |
|----------------------|-------------|-------------|---------|
| Gender               |             |             |         |
| Female/male          | 38/24       | 46/22       | 0.96    |
| Age (yr), mean (range) | 36.1 (10–70) | 45.7 (14–85) | 0.92    |
| Mean time to start of diet (day) | 1.21       | 2.37       | 0.002   |
| Mean hospital stay (day) | 5.65       | 9.17       | 0.01    |
| Mean operation times (min) | 132       | 121        | 0.80    |
| Conversion rate, n (%)  | 4 (6.4)     | -          | -       |
| Wound infection rate, n (%)  | 3 (4.8)     | 5 (7.4)    | 0.06    |

LS results in shorter hospital stay, less perioperative morbidity, less postoperative pain, better cosmesis and shorter time to start of diet compared to OS. In our study, we compared operation time, hospital stay, conversion rate, start to diet between OS and LS [9]. Nowadays, splenectomy is indicated in cases with hematologic diseases that are unresponsive to medical therapy and have recurrence after medical therapy. When this operation has been performed laparoscopically, it results in the advantages mentioned above. The application of LS has become the standard technique, especially in hematologic diseases.

**DISCUSSION**

LS is indicated especially for elective splenectomies performed on normal-sized spleens. There are only limited prospective randomized studies comparing OS and LS, although there are several nonrandomized studies.
Splenomegaly is a contraindication for LS in our center like in most centers. This is due to difficulties in controlling of spleen and technical insufficiency [10,12]. Because of this, the number of OS was higher than LS in the last 5 years. But LS is being performed more frequently with growing experiences and technical improvements. With the technological development and increase in our experience, we have performed LS in patients with splenomegalies. But in this study, we did not compare the size of the spleens in the two groups. Operation time is longer in enlarged spleen compared to normal-sized spleen [8]. In our study, mean operation time was 132 minutes in LS and 121 minutes in OS.

Accessory spleen is another subject of debate in LS. Although accessory spleens are found in 10% of the general population, they are more common (30%) in patients with hematologic disease [13]. Donini et al. [14] reported that there was no significant difference in detecting accessory spleens between LS and OS. It is easier to detect accessory spleens in LS due to the magnifying effect of laparoscopy. In some studies, accessory spleens were detected in 11 to 21% of patients undergoing LS and in 4 to 27% of patients undergoing OS with the same indications [15]. In our study, accessory spleens were found in 4 patients (6.6%) and were extracted laparoscopically.

In long-term follow-up of patients, remission rates of 80 to 90% were reported in LS. There were similar results in OS patients [16]. In our study, recurrence was detected in 7 patients (8.8%) in short-term follow-up. Recurrence was because of accessory spleen. Most of the patients that need splenectomy were those that had hematologic diseases and cardiovascular diseases. Minimally invasive procedures are more advantageous to these patients [17].

Hospital stay and time at which oral intake was started were shorter in LS group. Also liquid diets may be given to patients in the morning of operation day [18]. In order to reduce post operative nausea we had given the patients 400 mL of carbohydrate solution 90 minutes before the operation morning. In our study, mean hospital stay was 5.65 days and start time to diet 1.21 days in LS patients. These data were 9.17 and 2.37 days in OS patients, respectively. The differences between LS and OS were statistically significant in favour of LS.

In conclusion, LS is a safe and effective procedure in experienced hands. LS is superior with regard to hospital stay, start time to diet, wound infection and cosmesis. Finding of accessory spleen that creates difficulty in LS is not different from OS in long-term follow-up studies. Enlarged spleen is not a contraindication in selected cases nowadays. LS can be performed safely in appropriate cases.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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