

Applications of laparoscopic technique in spleen surgery

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Abstract. – OBJECTIVES: To improve the safety of laparoscopic splenectomy by reviewing the procedures and complications resulting from the surgery

PATIENTS AND METHODS: The clinical data of 68 laparoscopic splenectomy patients were collected, analyzed and compared to 47 open splenectomy cases from May 2009 to May 2012, which were performed in our hospital. We summarized the data, skill level, and complications which resulted from the surgery.

RESULTS: Sixty eight patients had successful laparoscopic splenectomies performed with less operative time, intraoperative blood loss, post op recovery time and LOS [length of stay] and compared it to 47 open splenectomy cases during the same period. All had significant statistical differences. The resulting complications from the surgeries had no statistical difference between the two groups.

CONCLUSIONS: Laparoscopic splenectomy is the safest and most efficient choice for splenectomies. The procedure has all the advantages of minimally invasive surgical technology.

Key Words:

Laparoscopic splenectomy, Laparoscope, Splenectomy.

Introduction

Laparoscopic splenectomy (LS) was first reported by Delaitre, and Maignien¹ in 1991, and was rapidly popularized in surgical clinics, since it resulted in less postoperative pain, faster recovery, fewer complications, shorter hospital stay, and better cosmetic results for the patients. In the beginning, it was mainly used in the splenectomy of a moderately swollen spleen. In 1995, it was extensively used in splenomegaly surgery², which developed from a hand-assisted laparoscopic splenectomy to a fully laparoscopic splenectomy. Since 2009, our hospital began to carry out such procedures as reported below.

Paatient and Methods

General Information

A retrospective analysis of 68 laparoscopic splenectomy cases performed in the department of general surgery at our hospital from May 2009 to May 2012 (LS group), included 38 males and 30 females, average age 45 ± 15 years. In the same period, 47 conventional open splenectomy cases (OS group), included 28 males and 19 females, average age 42 ± 14 years. The patients were tested by B ultrasound or CT scan to verify the spleen size prior to surgery. There were 22 cases of splenomegaly (spleen diameter > 20 cm) in the LS group, and 15 cases in the OS group. The general conditions of the patients were shown in Table I.

Surgical Procedures

Patients in the laparoscopic group were given intravenous anesthesia with tracheal intubation, and the pneumoperitoneum pressure was around 13 mmHg. The patients were in the Trendelenburg position at 15° and tilted to 30° , in order to expose the spleen. The punctured hole location was in the umbilicus, and a 10 mm Trocar was implanted for laparoscopic observation. The 5 mm Trocar and 12 mm Trocar were separately implanted on the right midclavicular line under the costal margin of the umbilical level as the main operating hole. Another 5 mm Trocar was implanted in the front of the left armpit and the umbilical level, as a secondary drainage hole. Firstly, the lower pole of the spleen adhesions and splenic-colon ligaments were removed using LigaSure. The lower pole of the spleen was gently lifted using intestine clamps, and the splenic-kidney ligaments were separated. We tried to lift the spleen to the right and up, and separated the splenic pedicle and diaphragm-spleen ligaments. Careful attention was paid to protect the tail of the pancreas. The stomach-spleen ligaments and

Table I. General information of patients.

| | LS group (n = 68) | OS group (n = 47) |
|-----------------------------------|-------------------|-------------------|
| Male/female ratio | 38/30 | 28/19 |
| Age (yr) | 45 ± 15 | 42 ± 14 |
| Traumatic rupture (n) | 16 | 10 |
| Hypersplenism (n) | 30 | 24 |
| Spleen benign occupying (n) | 10 | 6 |
| Cirrhotic portal hypertension (n) | 12 | 7 |

splenic pedicle were exposed, and the serosa was cut until the upper pole of the spleen, using the LigaSure. We attempted to make the splenic pedicle dissociate thinner, and the splenic pedicle was cut off using Endo-GIA. If the gastric short artery and partial diaphragm-spleen ligaments were not cut off, the Endo-GIA or LigaSure was used to cut them off. The resected specimens were placed in a specimen bag; and the spleen was cut into pieces and removed, after expanding the 12 mm hole in the right lower quadrant. A peritoneal drainage tube was set in the splenic fossa at the end of the surgery (Figures 1 to 4).

Results

Amongst the 68 cases in the LS group, there were two cases that were converted to open splenectomy, as the others were successful. The operation time was 90 ± 50 min, and blood loss was at 120 ± 40 ml. Two patients had symptoms of increased blood amylase, and recovered after conservative treatment. There were no other complications. Amongst the 47 cases in the OS

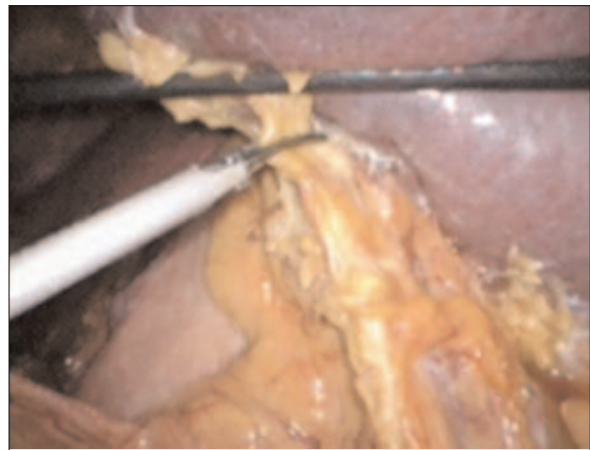


Figure 2. Splenic pedicle was separated.

group, the time of operation was 120 ± 45 min, and blood loss was at 170 ± 60 ml. Two patients had wound infections. There was no postoperative bleeding, pancreatic leakage, portal splenic vein thrombus, or perioperative mortality in the two groups. Comparing the results of the two groups, LS had shorter operative time, less blood



Figure 1. Swollen spleen under laparoscope.



Figure 3. Splenic pedicle was off using Endo-GIA.

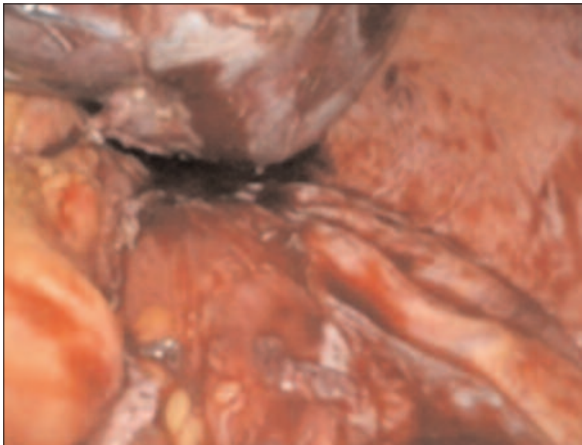


Figure 4. Spleen was removed.

loss, faster postoperative recovery and shorter hospital stay. There were no significant differences in postoperative complication rates between the two groups (Table II).

Discussion

Selection of Operative Indication

Currently, laparoscopic splenectomy is most commonly used in benign splenic lesions such as splenic cyst, hemangiomas, and on patients with a splenic rupture. In 1995, Poulin and Thibault first reported laparoscopy splenectomy². For massive splenomegaly, hand-assisted laparoscopic splenectomy is more commonly used, and complete laparoscopic splenectomy is less frequently used. For this study, 22 cases of massive splenomegaly surgeries were performed using laparoscopic splenectomy. Koshenkov et al³ reported that the conversion rate of laparoscopic splenectomy was 25%, and laparoscopic splenectomy had significant less

blood loss and a faster recovery. Zhou's et al⁴ controlled trials showed that laparoscopic splenectomy was safe and feasible. Most authors believe that laparoscopic splenectomy is the same as open splenectomy.

Surgical Position and Approach

The right lateral position is conducive to dissecting the rear of the spleen, spleen-kidney ligament and the diaphragm-spleen ligament. However, it is more difficult to expose the splenic hilum, short gastric artery and spleen. Corcione et al⁵ thought that the lateral approach had less bleeding, postoperative pain and fewer complications, so it was better than the front approach. After opening the greater omentum, the spleen naturally tends to the outer side, and the splenic artery is in the horizontal position, the splenic pedicle is easier to treat. It is helpful to locate the accessory spleen around the lesser sac. Meanwhile, the supine position is more convenient for performing other concomitant operations. All laparoscopic surgeries were performed supine on the right oblique.

Selection and Application of Major Surgical Instruments

LigaSure and Endo-GIA were used for all cases in this investigation. The hemostasis effect of LigaSure was reliable when operating on the ligament around the spleen and veins that measured less than 7 mm. However, LigaSure was not recommended for dissecting the splenic pedicle. Using the Endo-GIA was safe, effective, and time saving for dissecting the splenic pedicle. An ultrasonic scalpel can be used for separating the surrounding tissues of the spleen, but it is not as good as the LigaSure in hemostasis. Currently, Ligasure has the unique advantage because it is safe and effective in hemostasis and disarticulation⁶.

Table II. Results.

| | Group A (n = 68) | Group B (n = 47) |
|-----------------------------------|------------------|------------------|
| Operation time (min) | 90 ± 50 | 120 ± 45 |
| Volume of blood loss (ml) | 120 ± 40 | 170 ± 60 |
| Cases of blood loss (n) | 0 | 0 |
| Converted cases (n) | 2 | 0 |
| Portal splenic vein thrombus (n) | 0 | 0 |
| Cases of blood amylase increasing | 2 | 0 |
| Cases of wound infection (n) | 0 | 1 |
| Hospital stay time (D) | 4 ± 3 | 8 ± 5 |

Points and Considerations of Operation

During the surgery, the lower pole adhesions of the spleen and spleen-colon ligaments should be separated at first. The spleen-kidney ligaments were separated, and the lower pole of the spleen was lifted. The back of the splenic pedicle and pancreas tail were separated, and the width of the splenic pedicle was narrowed in order to facilitate the splenic pedicle, and prevent hemorrhaging. During the separation of the spleen-stomach ligaments, we avoided to clamp the excessive tissues. The procedure to separate the upper pole of the spleen may be difficult; and could be withheld, until the splenic pedicle is dissected. If the short gastric artery is bleeding as the splenic pedicle is removed, then titanium clips could be used for clipping.

Removing the specimen after laparoscopic splenectomy is time-consuming; taking 1/3 to 1/2 of the whole procedure. Currently, the procedures were as follows: place the specimen into the specimen bag; expand the poke hole; cut the specimen into pieces; take out the pieces as instructed. The specimen bag should be strong and impermeable. It should be noted not to damage the specimen bag when taking out the specimen, in order to prevent exsufflation of the slurry, containing the spleen tissue from the intraperitoneal. This could cause autologous splenic tissue transplantation or infection.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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