

Laparoscopic Splenectomy and Lymph Node Biopsy for Hematologic Disorders

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Objective

The authors audit the introduction of laparoscopic splenectomy and laparoscopic intra-abdominal lymph node biopsy and compare outcomes with a parallel cohort of patients undergoing open splenectomy.

Summary Background Data

Laparoscopic splenectomy was first reported in 1992. It was introduced into clinical practice at the Royal Brisbane Hospital in 1991. Between June 1991 and March 1994, 24 patients have undergone laparoscopic splenectomies and 23 patients have had laparoscopic intra-abdominal lymph node biopsies.

Methods

Laparoscopic splenectomy was performed using a four- or five-port technique. The splenic hilum was secured using a linear stapler cutter, and the spleen was removed after placing it in a laparoscopic bag. Lymph node biopsy was performed using a three- or four-port technique, depending on the site and size of the lymphadenopathy.

Results

Laparoscopic splenectomy was completed in 22 patients (92%). Median hospital stay was 3 days (range 2-7 days) and morbidity occurred in two patients (8%). Lymph node biopsy was completed laparoscopically in 21 of 23 patients (91%), with morbidity in two cases (9%). Median hospital stay was 2 days (range 1-6 days), with a diagnostic accuracy of 90%. Comparison with open splenectomy revealed that the laparoscopic approach took significantly longer to perform ($p = 0.0002$), but resulted in a significantly shorter hospital stay ($p = 0.0005$).

Conclusions

Both laparoscopic splenectomy and laparoscopic lymph node biopsy currently are used as the treatments of choice for hematologic disease in our institution.

Although laparoscopic cholecystectomy is well established as the treatment of choice for symptomatic gallstones,¹ newer laparoscopic procedures have yet to establish their place in routine surgical practice.² The widespread availability of videolaparoscopy has spawned a

range of new techniques, including esophagectomy,³ fundoplication,⁴ vagotomy,⁵ hysterectomy,⁶ colectomy,⁷ and hernia repair.⁸ Of the newer laparoscopic procedures, splenectomy has been reported in single cases⁹⁻¹¹ or small series,¹² but has not yet been widely used. Be-

Table 1. INDICATIONS FOR LAPAROSCOPIC SPLENECTOMY

| Indication | No. |
|---------------------------------------|-----|
| Idiopathic thrombocytopenic purpura | 9 |
| Hodgkin's lymphoma | 4 |
| Non-Hodgkin's lymphoma | 3 |
| AIDS-related thrombocytopenic purpura | 2 |
| Chronic lymphatic leukemia | 2 |
| Myelofibrosis | 1 |
| Gaucher's disease | 1 |
| Autoimmune hemolytic anemia | 1 |
| Granulomatous splenitis | 1 |
| Total | 24 |

tween June 1991 and March 1994, the department of surgery in the Royal Brisbane Hospital has undertaken 24 laparoscopic splenectomies and 23 laparoscopic lymph node biopsies. The indications, operative technique, and outcome in these 47 patients are reported.

PATIENTS AND METHODS

Twenty-four patients, median age 32 years (range 11–82 years) and median weight 70 kg (range 44–99 kg), were referred for laparoscopic splenectomy to two surgeons over a 33-month period. Three had undergone previous abdominal surgery in the form of appendectomy, cholecystectomy, and umbilical hernia repair. The indications for laparoscopic splenectomy are listed in Table 1. In six cases of splenectomy for lymphoma, a full-staging laparoscopy was undertaken; this included multiple lymph node biopsies. Patients who underwent surgery for idiopathic thrombocytopenic purpura were all receiving prednisone (40–60 mg/day) and had a median platelet count of 53×10^5 (range 7–244).

A further 23 patients, median age 53 years (range 20–73 years) and median weight 65 kg (range 41–88 kg), were referred for laparoscopic intra-abdominal lymph node biopsy. Four had undergone previous abdominal surgery (hysterectomy, colectomy, appendectomy, open splenectomy). Biopsies were taken from the para-aortic nodes ($n = 9$), portal tract ($n = 5$), small bowel mesentery ($n = 6$), and celiac axis ($n = 3$).

Operative dates and details were recorded prospectively, whereas further patient information has been obtained by a retrospective review of the case notes. Medical records of all open splenectomies for hematologic disease since June 1991 also were examined for comparative data. In all cases,

the median is quoted with ranges. Comparisons between groups have been made using the Mann-Whitney *U* test for nonparametric data, with 95% confidence intervals.

OPERATIVE TECHNIQUE (Fig. 1)

Splenectomy

Under general anesthetic, in the supine position with a sandbag under the left costal margin and 10-degree head-up tilt, a pneumoperitoneum is induced after open insertion of a Hasson cannula.¹³ A 30-degree telescope is used, and four further operating ports are inserted. Attention is then turned to the short gastric vessels, which are secured with Liga clips and divided. The splenic hilum is then dissected, and the splenic vein and artery are divided using a vascular Endo GIA linear stapler cutter (Ethicon, Somerville, NJ). Any remaining lower pole vessels are then secured, either with Liga clips or the linear stapler cutter. The spleen is then freed from its peritoneal attachments and in the case of benign pathology, placed in a canvas bag and morselled before removal through the left upper quadrant port. If detailed histology is required, the left upper quadrant incision is enlarged to allow extraction of the organ in one piece. All cannula sites greater than 5 mm in size are closed using

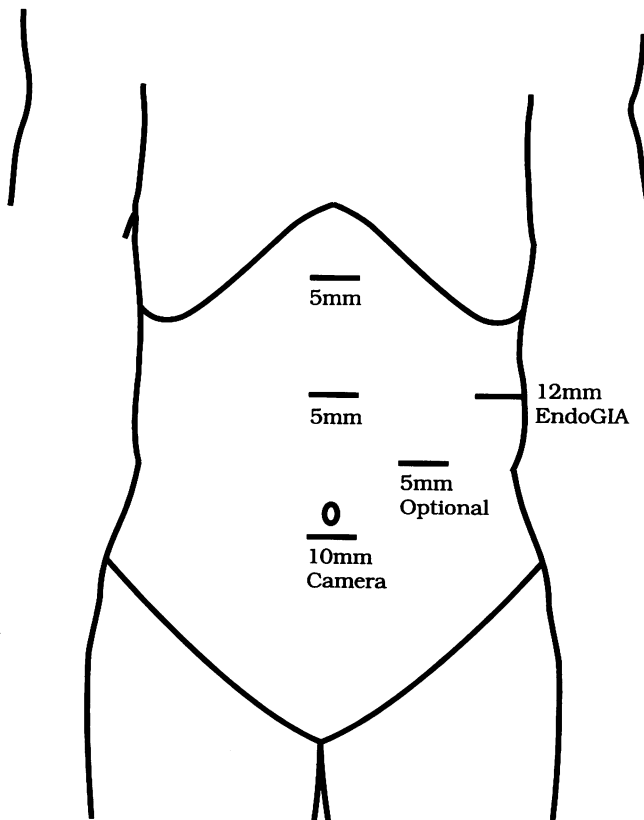


Figure 1. Port placement for laparoscopic splenectomy.

Table 2. COMPARISON OF LAPAROSCOPIC AND OPEN SPLENECTOMY

| | Laparoscopic Splenectomy* (n = 24) | Open Splenectomy† (n = 11) | Mann-Whitney (95% CI) |
|---------------------------|------------------------------------|----------------------------|-----------------------|
| Age (yrs) | 32 (11–82) | 54 (17–74) | p = 0.07 (–32, 1) |
| Patient weight (kg) | 70 (44–99) | 68 (51–87) | p = 0.85 (–10, 12) |
| Operative duration (min) | 120 (80–245) | 75 (40–130) | p = 0.0002 (30, 75) |
| Postoperative stay (days) | 3 (2–7) | 7 (4–21) | p = 0.0005 (2, 5) |
| Weight of spleen (g) | 218 (101–1538) | 255 (94–5040) | p = 0.9 (–125, 156) |

* p = 0.0005.

† p = 0.0002.

20 Dexon (Davis and Geck, Wayne, NJ) to the deep fascia.

Lymph Node Biopsy

After open insertion of the Hasson cannula, between two and four further ports are inserted. Lymph node biopsies were taken and hemostasis secured with diathermy. Access to the para-aortic area was gained by dissection through the posterior peritoneum to the left of the small bowel mesentery. The celiac axis is approached through the lesser sac after dividing one or two vessels along the greater curve of the stomach. Both portal tract and small bowel mesentery are readily accessible without extensive dissection.

RESULTS

Laparoscopic splenectomy was completed in 22 patients, with conversion to laparotomy required in two cases (8%) because of hemorrhage from the short gastric vessels. Median operating time for laparoscopic splenectomy was 120 minutes (range 80–245 minutes) whereas median postoperative stay was 3 days (range 2–7 days). Morbidity occurred in two patients (8%). One patient had a postoperative hemorrhage and required 5 units of blood, but no further surgery, whereas a second patient developed a wound infection at the umbilical port. One patient, a 79-year-old woman with lymphoma, died on postoperative day 7 of myocardial infarction.

Since June 1991, 11 patients have undergone open splenectomies for hematologic disease, and these are compared with our laparoscopic cases in Table 2. The groups are of similar age and weight, and the size of the spleens removed is not significantly different. Open surgery is significantly quicker than laparoscopic surgery (p = 0.0002), whereas postoperative stay is significantly shorter after laparoscopic surgery (p = 0.0005). Morbid-

ity after open surgery occurred in three patients (27%)—one postoperative hemorrhage, three episodes of atelectasis, and one case of pneumonia.

Lymph node biopsy was requested for intra-abdominal lymphadenopathy of unknown cause and was completed laparoscopically in 21 patients. One patient was converted to an open laparotomy because no lymph nodes could be found laparoscopically; a second patient was converted because of the suspicion of a pancreatic mass. Median operating time was 40 minutes (range 20–65 minutes), and median postoperative stay was 2 days (1–6 days). Morbidity occurred in two patients. One suffered scrotal edema due to subcutaneous extravasation of CO₂. This resolved within 24 hours. A second patient suffered postoperative hemorrhage from the inferior epigastric artery, which required a 6-unit transfusion. The histologic diagnoses resulting from the biopsies are listed in Table 3.

DISCUSSION

We have shown that laparoscopic splenectomy is an attainable goal in more than 90% of patients. We also have demonstrated that laparoscopic intra-abdominal lymph node biopsy is a useful diagnostic tool in hematologic disease and has a low morbidity and short hospital stay. Although laparoscopic splenectomy is undoubtedly slower than open surgery, in our institution, it results in a significantly shorter hospital stay and lower morbidity.

Early case reports of laparoscopic splenectomy⁹ suggested that it was a feasible procedure. In cases of idiopathic thrombocytopenic purpura, splenectomy could be completed by removing the spleen through a trocar port after morselling in a bag, whereas in lymphoma, a small left upper quadrant incision is needed to remove the spleen in one piece. Thibault et al.¹⁴ reported two cases of laparoscopic splenectomy with a 50% conversion rate and a 240-minute operating time. Another small series by Lefor et al.¹⁵ reported 75% success in four

Table 3. FINAL HISTOLOGICAL DIAGNOSES IN 23 PATIENTS AFTER LAPAROSCOPIC LYMPH NODE BIOPSY

| Diagnosis | No. |
|------------------------------|-----|
| Non-Hodgkin's lymphoma | 11 |
| Hodgkin's lymphoma | 1 |
| AIDS-related lymphadenopathy | 4 |
| Tuberculosis | 1 |
| Adenocarcinoma | 3 |
| Gaucher's disease | 1 |
| Silicosis | 1 |
| Reactive nodes only | 1 |
| Total | 23 |

patients with idiopathic thrombocytopenic purpura and an operative time between 180 and 255 minutes. Operative technique is similar in all published series, but some centers recommend preoperative splenic artery embolization to reduce blood loss.¹⁶ With increasing acceptance of the technique, several centers have reported series in the double figures. Poulin et al.¹⁶ reported 12 cases with conversion to laparotomy in two and a postsurgical stay of 3.5 days. Cadiere et al.¹⁷ presented 15 cases with conversion to laparotomy in one patient and a mean postoperative stay of 3.8 days, whereas Legrand et al.¹⁸ reported ten cases with conversion in one case and a postoperative stay between 3 and 8 days.

The majority of operations in our series were undertaken by two surgeons (GF and LN) with two cases of splenectomy undertaken by surgical trainees under supervision (NO and MRh). As far as we are aware, it is the largest single-center series of laparoscopic splenectomy and demonstrates that with increasing experience, a low morbidity can be maintained and conversion to laparotomy is a rarity. Laparoscopic splenectomy has become the treatment of choice for hematologic disorders in our institution.

Laparoscopic lymph node biopsy is a well-recognized procedure among gynecologists¹⁹ and urologists,²⁰ but has not been widely reported for hematologic disease above the pelvic brim. However, laparoscopy is a valuable diagnostic tool with low morbidity, and it has been used for many years in some centers.²¹ Our series demonstrates a high diagnostic yield (>90%) and a relatively short hospital stay (2 days). Published series with which to compare our results for laparoscopic lymph node biopsy are few. Initial animal studies suggested that para-aortic lymph node dissection was an attainable goal in 88% of pigs studied by Herd et al.²² Childers et al.²³ reported a single case of laparoscopic para-aortic node biopsy that was successful in establishing a diagnosis of non-Hodgkins lymphoma in a 76-year-old man. Lefor et al.²⁴ also reported a single case of splenectomy with full-staging laparoscopy, as was undertaken in six of our patients. Another report of splenectomy, liver biopsy, and lymph node sampling in a 30-year-old man comes from Germany,²⁵ again with no complications and discharge 4 days after surgery.

In our hospital, laparoscopic lymph node biopsy currently is used as a routine diagnostic tool in the investigation of unexplained intra-abdominal lymphadenopathy. It compliments percutaneous methods of tissue sampling, and although it does require a general anesthetic and short inpatient stay, it has the advantage of more complete histology from diseased lymph nodes.

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