

# Exposure of Splenic Hilum Increases Safety of Laparoscopic Splenectomy

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**Abstract:** Laparoscopic splenectomy is becoming the gold standard technique for the treatment of hematological disorders of the spleen. Hemostasis is a fundamental step during laparoscopic splenectomy leading some authors to develop several techniques to control splenic vessels such as hand assistance, preoperative splenic artery embolization, and the use of vascular linear staplers. However, intraoperative bleeding is usually due to inadequate exposure of the hilar splenic vessels itself. The authors describe a standardized technique for the exposure of splenic pedicle using an endoscopic triangular retractor. We have been used this technique in 16 consecutive laparoscopic splenectomies with minimal blood loss. The present technique may increase the safety of laparoscopic splenectomy with adequate exposure of the splenic hilum reducing the conversion rate and intraoperative blood loss.

**Key Words:** Laparoscopy, splenectomy, surgical technique

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Laparoscopic splenectomy is becoming the gold standard technique for the treatment of hematological disorders of the spleen. Several reports showed laparoscopic splenectomy to be a safe and broadly applicable operation with certain advantages over open splenectomy, particularly with regard to blood loss, hospital stay, and return to normal function.<sup>1–3</sup>

The hilar vessels approach is sometimes difficult because of vascular hazard, especially when the tail of the pancreas is firmly adhered to spleen's vascular pedicles. The authors describe a standardized technique for the exposure of splenic pedicle using an endoscopic triangular retractor.

## METHODS

### Technique

The patient is initially placed in supine position and a cushion is placed below its left flank, thus tilting the patient

toward the right lateral decubitus position by approximately 30°. During the operation, the table is rolled in either direction. An orogastric tube is inserted and removed at the completion of the procedure. Using an open technique, a 10-mm trocar is placed in the supraumbilical position; through this port, a 10-mm 30° angled laparoscope is introduced, and 3 additional ports are placed: two 5-mm and one 12-mm described elsewhere.<sup>4</sup> The gastroepiploic ligament and short gastric veins are divided with harmonic scalpel (UltraCision, Ethicon Inc., Cincinnati, OH). This step permits the location and ligation of the splenic artery in the superior border of the pancreas. The upper and lower poles of the spleen are mobilized through partial division of splenophrenic and splenocolic ligaments, respectively. This maneuver is performed to place a laparoscopic 5-mm triangular retractor (Diamond-Flex Retractor; Snowden Pencer, Inc.) around the partially mobilized spleen. Once this accomplished, splenic ligaments are fully divided using the retractor as a guide. The splenic hilum is then completely encircled with the triangular retractor. The retractor is used to lift the spleen and expose its pedicle (Figs. 1 and 2). At this time, splenic hilum is sufficiently exposed to permit a safe application of an endoscopic linear stapler. Another option is to proceed with careful dissection of splenic vessels until the splenic artery and vein are identified (Fig. 3). The splenic artery is ligated with large hemoclips and/or inabsorbable suture, and the splenic vein is divided with an endoscopic linear stapler or in the same way of the artery. Once the spleen is completely devascularized, it is placed inside a plastic bag. This bag is brought through the umbilical port where the spleen is morcellated without contamination of the abdominal cavity with splenic cells. The abdominal cavity is revised for hemostasis and the procedure is terminated.

## RESULTS

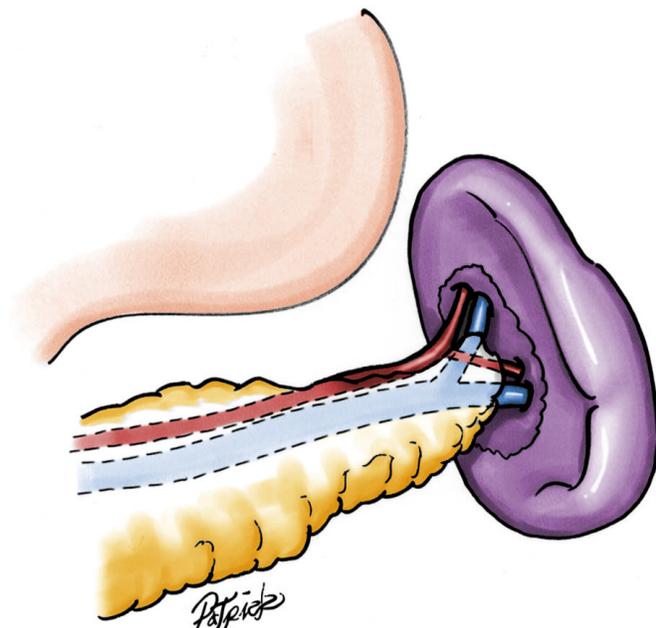
Within the last 14 months, 16 patients with average age of 32 years (range, 13 to 52) underwent successful laparoscopic splenectomy using this technique. Three patients underwent combined laparoscopic cholecystectomy. The main indication for splenectomy in this series was idiopathic thrombocytopenic purpura (12 patients). Three patients presented spherocytosis with splenomegaly and 1 patient presented splenic ham-

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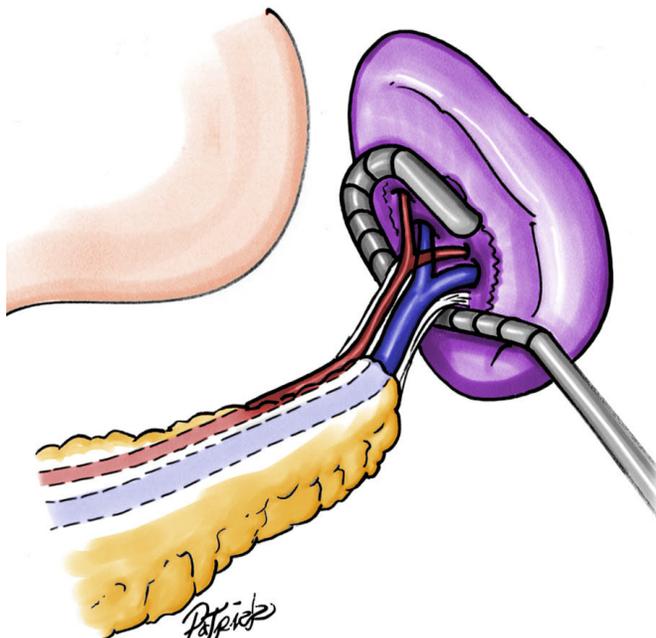
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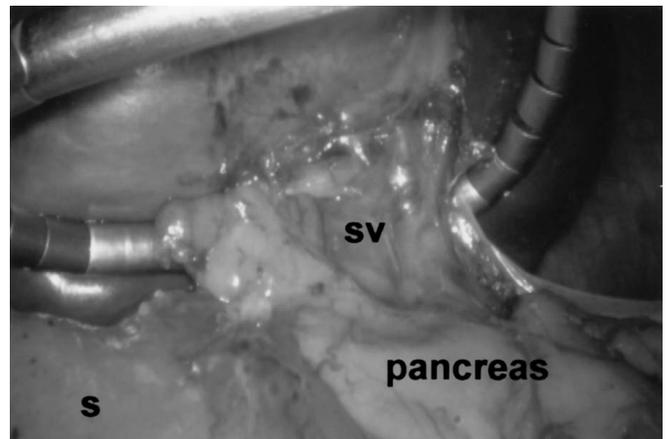
**FIGURE 1.** Schematic view of the tail of the pancreas before the exposure of the splenic hilum.

artoma. All patients received preoperative *Pneumococcus* and *Hemophilus* vaccination.

This technique was successfully employed in all patients without the need of a larger incision, conversion, or use of ad-



**FIGURE 2.** Schematic view with the exposure of the splenic hilum using an endoscopic triangular retractor.



**FIGURE 3.** Intraoperative view. The retractor is placed and the splenic hilum is exposed away from the tail of the pancreas. At this time the splenic vein (SV) is easily identified. S, stomach.

ditional trocar sites, except in those 3 patients who underwent combined cholecystectomy. Early ligation of splenic artery was possible in all patients. Accessory spleens were identified in two patients (12.5%). Operative time averaged 210 minutes, and blood loss was minimal in all cases; no patient required blood transfusion intra- or postoperatively. Median hospital stay was of 2 days. There was no mortality and morbidity was represented by one case of umbilical port infection treated conservatively. There was no hematological disease recurrence and/or missed accessory spleen in any patient of this series during the postoperative period. Compared with our previous cases of laparoscopic splenectomy using other techniques,<sup>4</sup> the mean estimated operative blood loss was reduced (230 mL versus 40 mL;  $P = .002$ ) and mean operative time was shortened in about 1 hour (265.3 minutes versus 210.8 minutes;  $P = .04$ ). The previous conversion rate was of 16%.

## DISCUSSION

Laparoscopic splenectomy is becoming the procedure of choice for the treatment of hematological disorders of the spleen. In the past few years several reports in literature have demonstrated its feasibility, safety, and efficacy, showing some advantages compared with open splenectomy. The benefits include less discomfort, reduced hospital stay and recovery time, and improved cosmesis.

Conversion rates are assessed between 2% to 10% in major series<sup>1-2</sup> being splenomegaly and uncontrolled hemorrhage from splenic hilum the main causes of conversion.

Nowadays laparoscopic splenectomy is being performed with growing enthusiasm and best results are achieved in patients without marked splenomegaly. Splenomegaly is not a formal contraindication for laparoscopic splenectomy,<sup>4</sup> and there are some authors performing this operation even in massively enlarged spleens.<sup>5</sup>

Fortunately in most cases, especially in hematological disorders, splenomegaly is absent and the great jeopardy is uncontrolled bleeding from splenic pedicle. Thus, hemostasis is a fundamental step during laparoscopic splenectomy. This has led to several approaches to control splenic vessels such as hand assistance, preoperative splenic artery embolization, and the use of vascular linear staplers.<sup>6-8</sup> However, intraoperative bleeding is usually due to inadequate exposure of the hilar splenic vessels.

The lateral technique is an excellent technique for the exposure of the splenic hilum,<sup>2-3</sup> and it was employed by our team in several cases. However, in some cases this technique alone was not able to satisfactorily expose the splenic hilum. The lateral approach has been criticized for hampering the realization of simultaneous procedures, preventing early ligation of the artery, and offering poorer access to the abdominal cavity in cases in which quick conversion is required.<sup>1</sup> The goal of the present technique is to help the exposure of the splenic pedicle and may also help the application of ligature, hemoclips, endoscopic vascular stapler, or other hemostatic instruments. The present technique was used in 3 patients with marked splenomegaly and showed to be useful even in those patients but was not used in massively enlarged spleens due to our problematical experience with laparoscopic splenectomy in those patients as recently described by Patel et al.<sup>9</sup>

The use of the triangular retractor is very helpful during the dissection of the splenic peritoneal attachments around the splenic hilum. It can be useful as a guide to divide the ligaments with harmonic scalpel, thus permitting the progressive mobilization of the spleen. With the triangular retractor it is also possible to encircle the splenic hilum, and under traction it is completely exposed from the pancreatic tail (Figs. 2 and 3). This triangular retractor is an atraumatic instrument that can be easily inserted with different angles according to splenic size and anatomy.

For patients with hematological diseases, accessory spleens may be the main cause of recurrence of primary disorders and are found in 10 to 30% of those patients.<sup>10,11</sup> In this series 2 patients presented accessory spleens located in the splenic hilum. The best method to avoid missing an accessory spleen is a diligent search in the splenic hilum and tail of the pancreas, which could be facilitated by the exposure gained

with the present technique. Other preferential sites of accessory spleens are peritoneal attachments of spleen, the greater and lower omenta, and the small or large bowel mesentery.<sup>10,11</sup>

The better control of hemorrhage, lower operative time, and conversion rate in the present series compared with our previous experience may partially reflect the learning curve. However, the average estimated blood loss of 40 mL is much lower than that usually reported in other series.<sup>1-3,9</sup> A significant blood loss makes the dissection difficult due to inadequate visualization of anatomy and is associated with blood transfusion and conversion to laparotomy.

Using this technique, the authors have found laparoscopic splenectomy to be a technically feasible operation, which may be performed within a reasonable operation time. The present technique may help to increase the safety of laparoscopic splenectomy with adequate exposure of the splenic hilum reducing the conversion rate and intraoperative blood loss.

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