Partial Splenectomy, Open and Laparoscopic

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Indications and Contraindications

Indications

Trauma

- Selected Class II–III–IV splenic injury with the following:
- Hemodynamic stability
- No evidence of other intra-abdominal organ injury
- No associated head injury
- No coagulopathy
- CT confirmation of isolated splenic injury

Elective

- Resection of non-parasitic cysts
- Hamartomas and other benign splenic tumors
- Inflammatory pseudotumor of the spleen, Type 1 Gaucher's disease
- Cholesteryl ester storage disease, chronic myelogenous leukemia
- Thalassemia major, spherocytosis, staging of Hodgkin's disease in children

Contraindications

- Inadequate exposure
- Inability to mobilize the spleen and tail of pancreas to the midline
- Inability to leave >25 % of splenic mass for complete splenic function

Preoperative Investigation and Preparation for the Procedure

See ► Chap. 105, "Open Splenectomy"

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Procedure

Step 1

Planning the partial splenectomy

Assuming that the spleen is appropriately placed for full evaluation and that hemostasis is adequate, the planning for partial splenectomy can start. In trauma cases, it will be dictated by the extent of the injury and, in elective cases, by the nature of the underlying pathology.

The spleen in the majority of cases can be divided into independent lobes or segments, each with its own terminal blood supply (Fig. 107.1). The superior pole is supplied by the short gastric vessels and the lower pole by branches of the gastroepiploic artery (up to five) known to anastomose with the inferior polar artery. In addition, most patients, despite possible variations, have two or three major vessels entering the hilum. Therefore there are usually five (Fig. 107.1a) or four (Fig. 107.1b) regions or lobes available for partial splenectomy. It is also important to understand that these vessels lie in different supportive ligaments. Vessels to the superior pole (short gastrics) and inferior pole (gastroepiploic branches) rest in the gastrosplenic ligament, whereas the splenic branches proper lie in the splenorenal ligament with the tail of the pancreas.

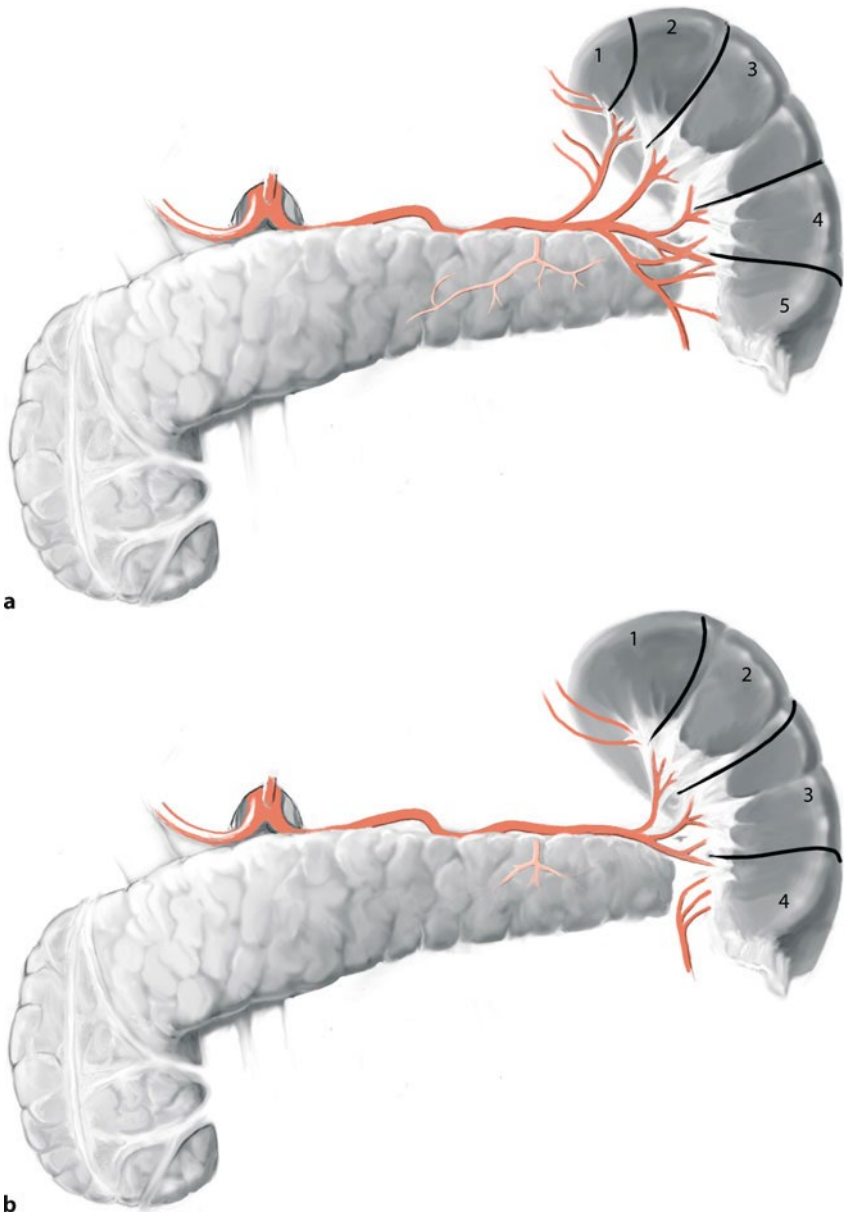


Fig. 107.1

Step 2

Exposing the entire hilum and ligating appropriate arteries

The next step involves exposure of the entire hilum of the spleen close to the parenchyma. The gastrosplenic and splenorenal ligaments need to be separated while preserving the blood supply to both poles. There is a fairly avascular area of this ligament that needs to be opened between the short gastric vessels to the superior pole and the gastroepiploic branches to the lower pole. This will lead to a complete display of the entire splenic blood supply including both poles.

Selected arterial branches then need to be tediously dissected as close to the spleen parenchyma as possible, noting that the veins are situated posteriorly in close proximity.

The vessels can be doubly ligated, transfixed, or clipped. The long slender laparoscopic clip appliers can be used for this step of the procedure. Once the arterial blood supply is controlled, the affected spleen will visibly demarcate rapidly. If the devitalized spleen corresponds to the intended resection, a similar technique is used on the venous side. Access to the venous side can also be achieved from the posterior aspect of the spleen (Fig. 107.2).

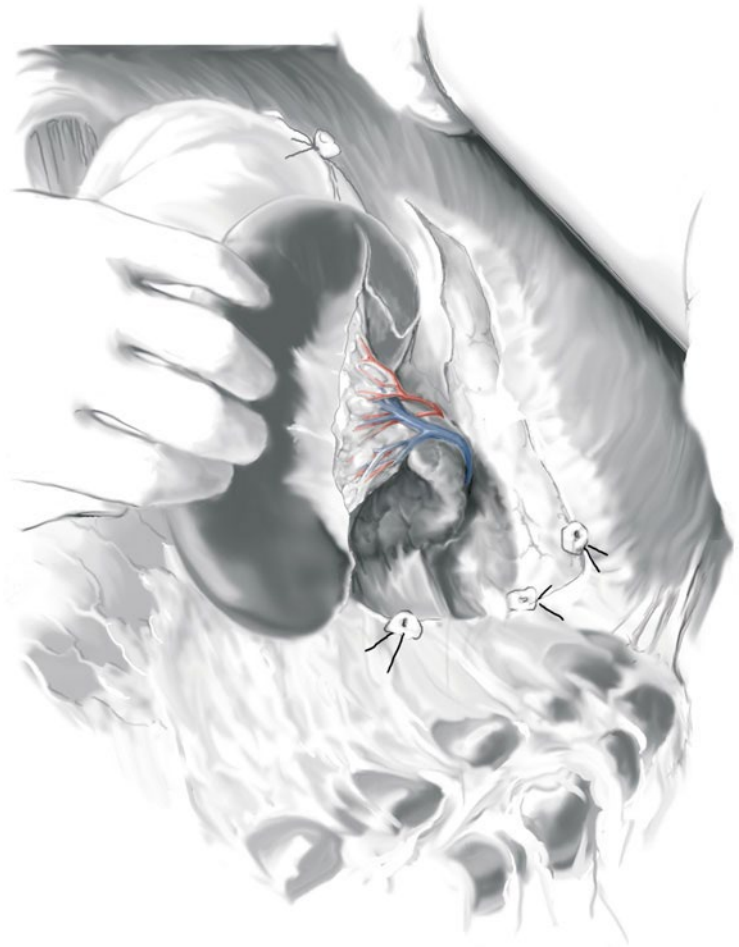


Fig. 107.2

Step 3

Incising the splenic capsule and resection

The capsule of the spleen is incised circumferentially with a scalpel or monopolar cautery, making sure to leave 5 mm of devitalized tissue in situ. The splenic fragments can be transected with a combination of scalpel, scissors, or monopolar cautery. When enough residual devitalized tissue is left behind circumferentially, very little hemostasis is required and it can usually be achieved by simple means and topical agents.

The abdomen is closed, with or without a closed suction drain, after complete hemostasis is achieved (Fig. 107.3).

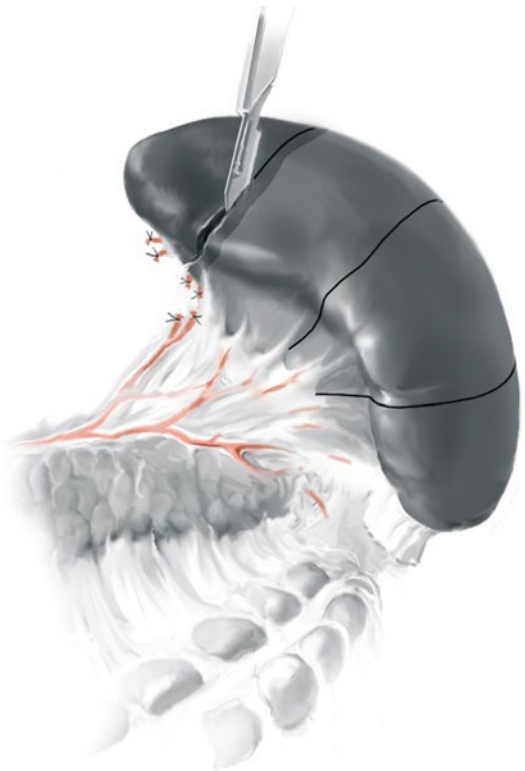


Fig. 107.3

Partial Laparoscopic Splenectomy

Step 1

Patient position, trocar placement, mobilization

Patient positioning, trocar placement, and mobilization of the spleen are performed as described in the ▶ Chap. 106, "Laparoscopic Splenectomy."

Care is taken to leave a 2-cm portion of the splenocolic ligament on the spleen side to allow for easier spleen mobilization. Attention is then given to the gastrosplenic ligament anteriorly. It contains the short gastric arteries to the superior pole and the branches of the gastroepiploic artery (up to five branches) to the lower pole.

This allows definition of the type of splenic blood supply, and the number of splenic branches entering the medial aspect of the hilum, thus helping determine the number of splenic lobes.

Step 2

Dissecting and Clipping the Appropriate Vessels

Once the surgeon has determined what lobe(s) needs resection, tedious dissection of the involved splenic branch(es) is undertaken and the involved artery(ies) is clipped. This dissection can be performed alternatively from the front or the back of the spleen as the spleen can be mobilized fairly easily. The spleen is allowed to demarcate in the chosen region. Once the devascularized area is found to contain the lesion needing resection, attention is given to the corresponding venous drainage, using a similar technique. Veins are situated closely behind the arteries, except at the level of the penultimate and ultimate branches usually within the spleen, where they can be anterior or posterior.

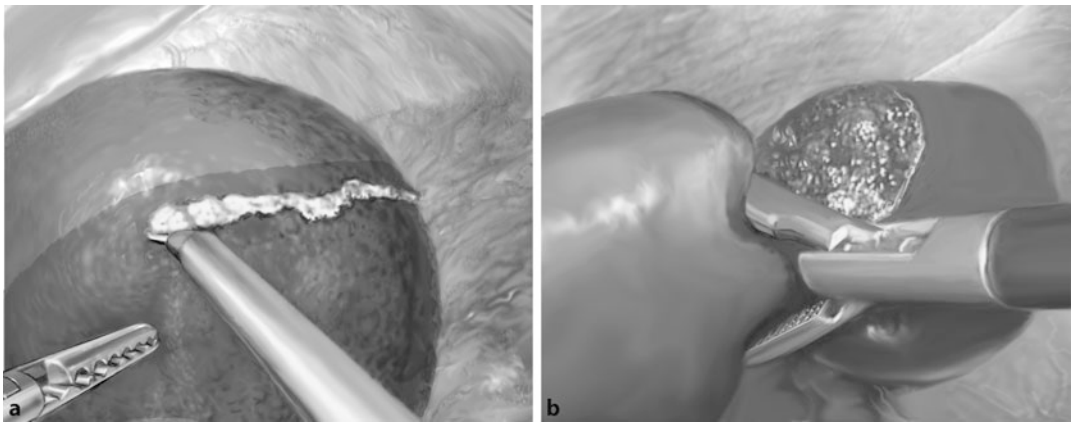
Step 3

Resecting, bagging, and extracting the specimen

The capsule of the spleen is then scored with monopolar cautery on coagulating current circumferentially (30–40 W), ensuring that a 5-mm rim of devascularized splenic tissue remains in situ (◘ Fig. 107.4a). Once the splenic pulp is penetrated, non-crushing intestinal graspers are used to fracture the splenic pulp. A laparoscopic hook and scissors can also be used. If a 5-mm rim of devitalized spleen is left behind, this procedure remains noticeably bloodless. Spot coagulation with monopolar cautery on coagulation or spray current can be used for the remaining hemostasis.

Alternatively the parenchyma can be divided with an endovascular stapler (◘ Fig. 107.4b).

The specimen is removed as per ► Chap. 106, "Laparoscopic Splenectomy."



◘ Fig. 107.4

Tricks of the Senior Surgeon

- Detailed knowledge of splenic anatomy constitutes the single most important factor that will allow the surgeon to consider all the options available to save splenic parenchyma. There are two patterns of terminal artery branching: *distributed* and *bundled or magistral* (see Step 1). Most specimens have two or three terminal branches (superior polar, superior and inferior terminal) determining lobes or segments. Relative avascular planes are identified between lobes and segments. The surgical unit of the spleen is based upon surgically accessible vessels at the hilum.
- The keys to success with partial laparoscopic splenectomy are experience with advanced laparoscopy, case selection, ability to dissect branches of the splenic artery close to the hilum, and foremost the realization that leaving a 5-mm margin of devitalized spleen in situ greatly simplifies homeostasis.
- Especially in the laparoscopic approach, improper use of the cautery can cause iatrogenic injury to the stomach, colon, and pancreas. Structures close to the lower pole in the gastrocolic ligament can be approached aggressively with the cautery, but blind fulguration of fat in the hilum can result in serious bleeding. The instrument should be activated only in proximity to the target organ to avoid arcing and spot necrosis, which may result in delayed perforation and sepsis.
- The role of the assistants is also important in the prevention of complications. In the laparoscopic approach, all instruments, including those handled by assistants, should be moved only under direct vision. Retraction of the liver and stomach and elevation of the spleen require constant concentration to avoid lacerations with subsequent hemorrhage or perforation and jeopardizing the performance of partial splenectomy.