

Laparoscopic Splenectomy

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Several indications for laparoscopic splenectomy are represented mainly by hematological disorders such as Idiopathic Thrombopenic Purpura (ITP) or hereditary spherocytosis. Patients with ITP who do not respond, have relapses of the disease under steroid treatment, or need a gradually increased dose of steroids, represent an excellent indication for laparoscopic splenectomy, as the spleen is not enlarged. Patients are usually small, thin, young females, making the procedure much easier. The size of the spleen in hereditary spherocytosis varies, sometimes making the procedure a little more difficult, especially as those patients have pigmented gallbladder stones necessitating a concurrent laparoscopic cholecystectomy. Other indications are represented by staging of Hodgkin's disease, lymphoma of the spleen, and splenic infarcts without abscesses. Some patients with autoimmune hemolytic anemia might benefit from laparoscopic splenectomy, but hypersplenism due to cirrhosis is strongly contraindicated, as the risk of intraoperative hemorrhage is great and not usually managed easily laparoscopically.¹⁻⁴

PREOPERATIVE REQUIREMENTS AND WORKUP

This procedure should be performed by confirmed laparoscopic surgeons or under their direct guidance, as laparo-

scopic splenectomy is a difficult procedure. It is mandatory to have adequate blood supply in the operating room and to make sure to have a checklist of all the necessary instruments. It is also useful to educate and train the nursing team and

the assistants about the procedure in order for them to follow the different steps and avoid any delays or confusion during the performance of this delicate procedure.

The surgeon must check his instru-

ments personally and make sure that everything is available, especially the clip applicators, atraumatic Babcock graspers, retractors, and a functioning irrigation-suction machine with hydrodissection capacity (American Hydrosurgical Instruments, Inc.). A practical tool is the harmonic scissors (Ultracision, Inc.), whose use reduces the number of clips needed during the division of all the short gastric vessels. It can also be employed as a grasper.

Again, it is mandatory that patients presenting with ITP are carefully checked preoperatively—in particular, that they have a reasonable platelet count of at least 45,000. Care is taken to inform the anesthesiologist and to ensure that proper blood supply is avail-

able. An open surgical tray must be immediately available in case of an urgent need to convert to conventional laparotomy. Finally, the patient should be vaccinated prophylactically against pneumococcal infections.⁵⁻⁷

PATIENT POSITIONING

This is a critical step of the procedure. The patient will be placed on a bean bag at a 60° angle (Fig. 1), left side up to enable gravity to act and retract the organs in a limited working space (Fig. 2). This is the so-called "Hanging Spleen Technique" as described by Professor Delaitre from Paris, France.⁸

The patient is then secured safely on the table with the left arm positioned in

the same manner as for a left posterior lateral thoracotomy (Fig. 3). The surgeon stands on the right side of the patient, facing the left monitor and his camera assistant at his side. His first assistant is opposite to him on the left side of the patient, but the three members of the team look at the left monitor to avoid mirror imaging and poor hand coordination by the first assistant. Once the trocars are inserted, the patient will be positioned in reverse Trendelenburg position, head up.

TROCAR PLACEMENT

Five trocars are needed for this operation (Fig. 4). After achieving pneumoperitoneum by using a Veress needle through the umbilicus, the first trocar to be inserted will be the videolaparoscope in the umbilicus. This will enable full exploration of the abdominal cavity, inspecting for other anomalies and eventual accessory spleens that might require an additional laparoscopic removal. Two other trocars are inserted for the right and left hands of the surgeon and will be surrounding the umbilical trocar in a triangulated fashion. The two final trocars are then inserted—one laterally, under the left costal margin for the first assistant and the other, the sub-xiphoid trocar for the irrigation-suction probe or the camera assistant's grasper. Once the trocars are in place, the procedure can proceed using a step-by-step approach:

1. Division of the short gastric vessels and opening of the lesser sac.
2. Exposure of the tail of the pancreas.
3. Division of the splenocolic ligament.
4. Lateral and superior traction of the inferior pole of the spleen and dissection of the inferior polar vessels.
5. Division of the hilar vessels.
6. Division of the phrenosplenic ligament.
7. Extraction of the spleen in the bag.

TECHNIQUE

The first step is the division of the short gastric vessels, subsequently entering the lesser sac along the greater curvature of the stomach. This is similar to a Nissen fundoplication where the first assistant on the left gently grabs the fatty tissue surrounding the short gastric vessels and retracts superiorly, while the surgeon gently retracts the stomach to the right. This will expose

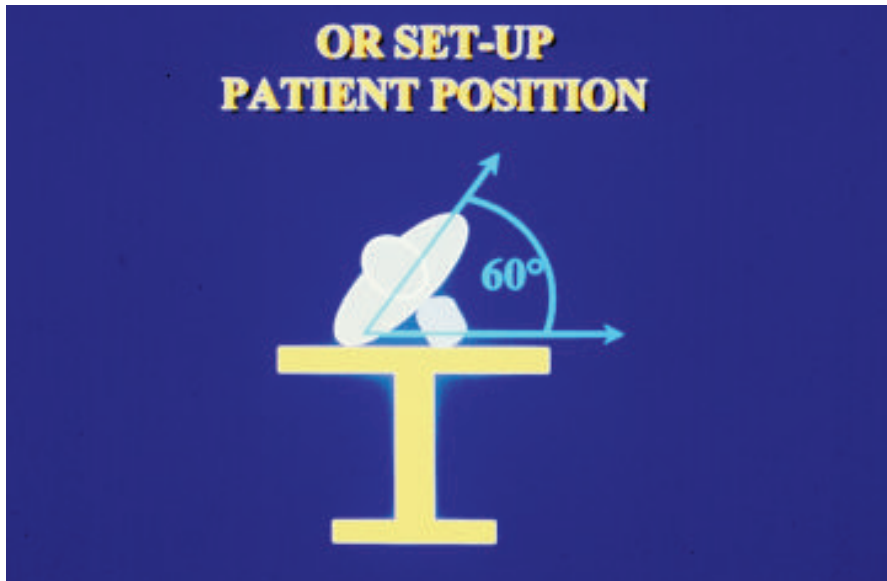


Figure 1. Patient position.

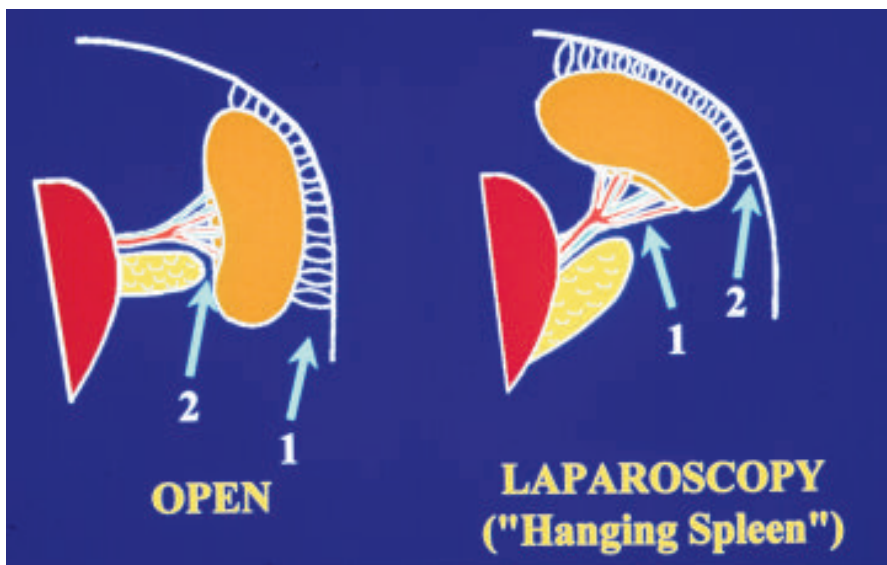


Figure 2. Different approaches for splenectomies. (Left) Open. 1: Division of phrenic attachments. 2: Control of hilum. (Right) Laparoscopy. 1: Control of hilum. 2: Division of phrenic attachments.

the short gastric vessel, and small windows are created under each vessel using a “scooping motion” of the electric scissors. The vessels are transected either between two clips or by using the harmonic scissors that will divide the vessels smaller than 3 mm in diameter. The division is then proceeded inferiorly until the tail of the pancreas is totally exposed.

The next step is the exposure of the inferior pole of the spleen. A gentle traction on the spleen, superiorly and laterally using the closed Babcock grasper by the first assistant, will expose the splenic flexure. The left hand of the surgeon will then retract the splenic flexure of the colon inferiorly, exposing the splenocolic ligament which will be divided between clips. This will allow the safe dissection of the inferior pole of the spleen. Once the adhesions between the colon and the spleen are removed, the same gentle traction will expose some inferior polar vessels and terminal branches of the splenic vessels. Those vessels will be controlled at this point, enabling full mobilization of the inferior pole of the spleen.

Two different retractions will expose the hilar vessels: the left assistant will retract the mobilized inferior pole of the spleen superiorly and laterally, and the camera assistant using the xiphoid port will gently push inferiorly on the exposed tail of the pancreas, giving access to the splenic artery and vein at the hilum.

The division of the hilar vessel (splenic artery and vein) is a critical step and should be performed meticulously to avoid any hemorrhage. A blunt right angle dissector is essential to proceed with the dissection. Two techniques are possible—either transection of the hilar vessel with one firing of an ELC 35 using white vascular staples, or a more academic approach, i.e., division of both the artery and vein separately between clips which are then secured by endoloops. Finally, the different attachments of the spleen to the diaphragm (phrenosplenic ligament) are divided, and this will allow the mobilization of the spleen from all its attachments.⁹⁻¹²

The next step is the introduction of a solids bag (Cook Medical). This bag will be inserted after removal of one of the trocars which will enable the introduction of any caliber bags. A good trick is to push the bag to the diaphragm, with the bag opening facing

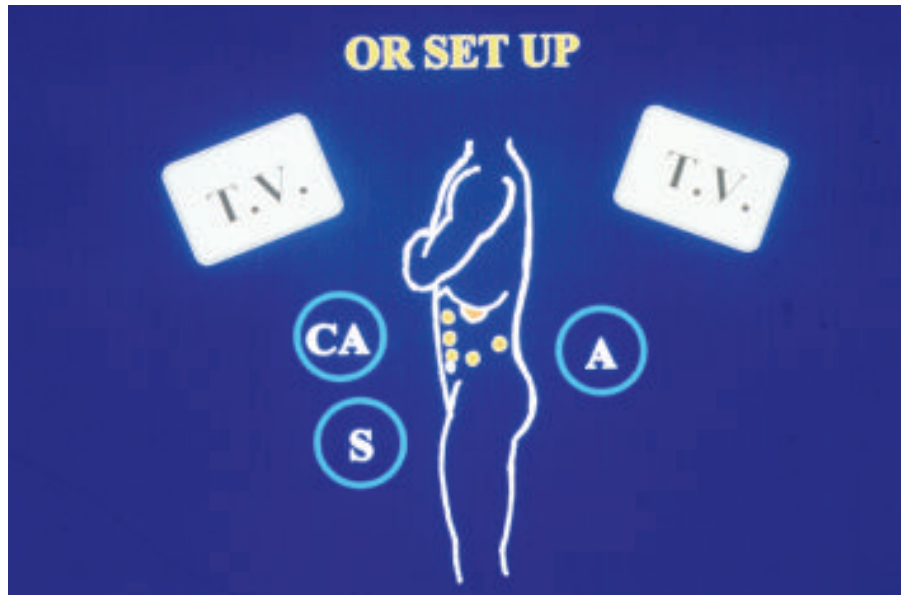


Figure 3. Operating room setup.

the surgeon. This allows the introduction of the spleen into the bag using the peri-splenic fibrotic attachments around the hilum as a handle. The spleen will be inserted in the bag using a gentle sliding motion. Finally the bag is closed and brought through the umbilical port which will be removed. The fascia of the umbilicus will be slightly enlarged, allowing the extraction of the bag and the introduction of two fingers or a Kelly clamp to perform a finger fracture technique, squeezing the spleen between the fingers and the anterior abdominal wall which will enable the safe extraction of both the splenic fragments and the bag itself. Care is taken not to spill any splenic fragments leading to splenosis and a recurrence of the

disease. Finally the trocar ports are secured for air leaks.

The area of the spleen is carefully checked for hemostasis, irrigated copiously using hydrodissection techniques, and finally a 10-mm JP drain is placed in this area. Drainage is not always needed and depends on the operative findings—in particular, the degree of trauma inflicted to the pancreas during the dissection. The drain should be exteriorized through a separate incision to avoid any difficulties in closing the fascia of the trocar ports, which is absolutely mandatory to avoid small bowel obstruction.

The postoperative course of a laparoscopic splenectomy is very simple. The patient is fed the next day and

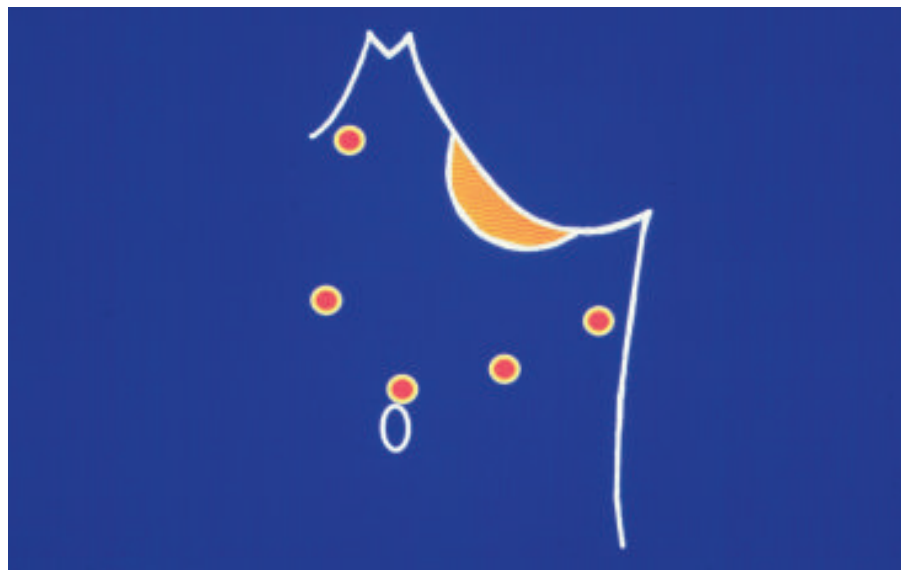


Figure 4. Trocar positions.

discharged after 48 hours. A check on the serum amylase and lipase levels is recommended to make sure that there have been no pancreatic injuries during the splenectomy. Normal levels at 48 hours are reassuring and will allow a safe discharge of the patient.

MANAGEMENT OF COMPLICATIONS DURING LAPAROSCOPIC SPLENECTOMY

Intraoperative bleeding is the major problem. Two types of bleeding are possible: one type is related to an unnamed vessel, usually a short gastric vessel or an inferior polar branch, and the other type is related to a named vessel.

Control of hemorrhage related to an unnamed vessel should be attempted and is usually successful. The first step is to "pan out" (i.e., pulling back on the telescope) to protect the lens from being covered with blood. The second step is to clamp the vessel using the atraumatic grasper held by the left assistant. Those graspers should be long, atraumatic, and without teeth. The third step is irrigation of the area to evaluate the rate of the bleeding. If the bleeding is controlled, clips are placed appropriately. Sometimes, using electrosurgical current will control the situation and allow precise placement of the clips. Finally, compression can be applied laparoscopically using an endoscopic 2 x 2 piece of gauze.¹³⁻¹⁹

The situation is different when a named vessel is injured such as the splenic artery or vein or their direct terminal branches at the hilum. The flow is usually very high, and blood rapidly pools in the left upper quadrant of the abdomen and obscures the view. It is possible to try to control the bleeding using the above-described steps (e.g., by using a larger atraumatic clamp such as a bowel clamp), but usually it is wiser to convert to an open procedure using a left subcostal incision.¹³⁻¹⁹

Another annoying incident is an injury to the spleen itself during dissection. Although this incident could obscure the view during dissection, simple compression with a 2 x 2 gauze and appropriately prudent electrocautery should get the problem under control. **STI**

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