

Elective Splenectomy

Richard Davis

Introduction:

Elective splenectomy, especially for very large spleen, is a frequent operation in resource-limited settings. Indications fall under the following broad categories:

- Hematologic: refractory immune thrombocytopenia with purpura or hemolytic anemias. Some hemolytic anemias will lead to pigment gallstones, so the gallbladder should be evaluated and history carefully taken for symptomatic gallbladder disease.
- Splenic vein thrombosis after episodes of pancreatitis, with gastric varices and upper gastrointestinal bleeding.
- Symptomatic enlargement (tropical splenomegaly, schistosomiasis) with or without anemia or thrombocytopenia caused by this enlargement. Symptoms can include left upper quadrant pain or early satiety.
- Abscess that cannot be drained percutaneously (loculated, thin walled)
- Tumor: lymphoma or lymphangiosarcoma. Often the diagnosis will not be known at the time of operation. Lymphangiosarcoma has a very poor prognosis.
- Distal pancreatectomy: The spleen is removed most of the time as the first stage of this operation. It is possible to preserve the spleen's blood supply while resecting some small benign pancreatic tumors.

Portal hypertension caused by liver cirrhosis may be accompanied by massive splenomegaly. Avoid splenectomy, or any abdominal operation, on these patients. Splenectomy will not resolve esophageal varices in patients with cirrhosis and portal hypertension.

Conversely, patients with portal hypertension due to schistosomiasis will have preserved liver function. If these patients have bleeding from esophageal varices, treat them with serial [endoscopic banding](#) until the varices are obliterated. If their bleeding is from gastric varices, or if their splenomegaly is large and bothersome to them, they will be well treated with splenectomy.

In any case of splenomegaly, if the patient is ill enough to have ascites, be very careful about

whether you operate on them. Your operation will not resolve the ascites, and their illness is likely too severe for them to survive the operation.

Prepare these patients by vaccinating them at least 2 weeks before surgery for encapsulated bacteria: *Streptococcus pneumoniae*, *Hemophilus influenzae*, and *Neisseria meningitidis*. Patients should also be counseled to take the vaccination against the influenza virus yearly if possible.

If the patient has thrombocytopenia, have platelets or fresh whole blood available for transfusion. This should be done after the splenic artery is ligated, as described below.

Elective splenectomy proceeds in the following steps

- Abdominal incision and exploration
- Entry into lesser sac and ligation of splenic artery away from hilum of spleen.
- Dissection and division of attachments to the omentum, transverse colon, and lateral abdominal wall
- Serial ligation of vessels entering hilum.
- Further dissection and division of attachments to lateral abdominal wall, diaphragm, and retroperitoneum
- Hemostasis, inspection of tail of pancreas, and closure

Steps:

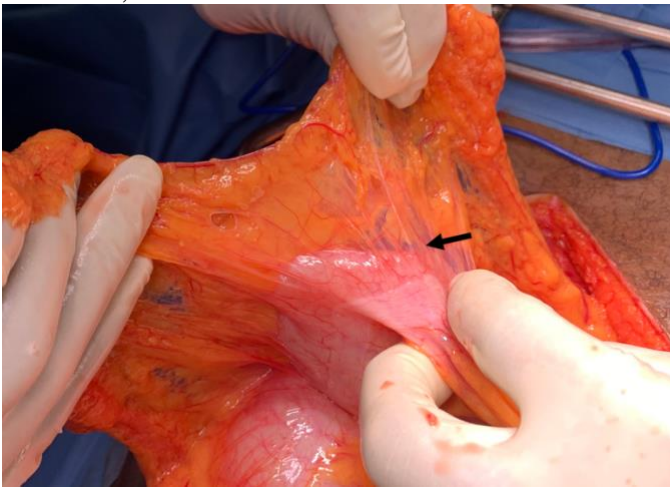
1. Check a complete blood count on the day of surgery. Often a patient who was previously thrombocytopenic while acutely ill will have platelets over 100,000 per microliter on the day of surgery. If the platelet count is between 50 and 100K, proceed cautiously and have platelets or fresh whole blood ready. If platelet count is less than 50K, plan to transfuse after ligating the splenic artery as below. Discuss these concerns with anesthesia and assure adequate IV access.
2. [Subcostal incision](#) provides the best exposure, especially in massive splenomegaly. If the spleen is small, an upper midline incision is acceptable. Using a midline incision forces you to pull on the spleen while dissecting it, which may cause it to tear.



Elective Splenectomy

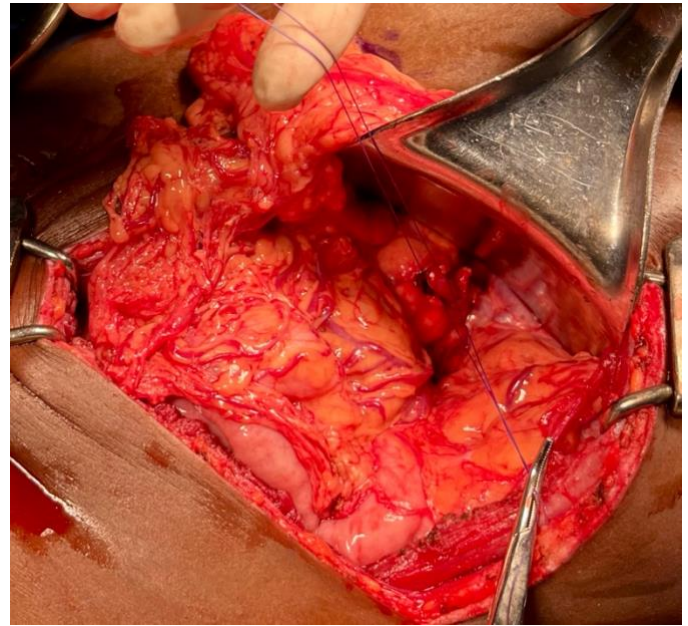
Richard Davis

3. Explore the abdomen. Make note of dilated veins within the omentum indicating portosystemic venous anastomoses, which will make the operation much more difficult. Look in the omentum for accessory splenic tissue. This can be safely preserved if the operation is for symptomatic splenomegaly, but must be removed if the operation is for hemolytic anemia or thrombocytopenia.
4. Lift the omentum anteriorly and find the avascular plane between it and the transverse colon, easiest entered to the left of midline.



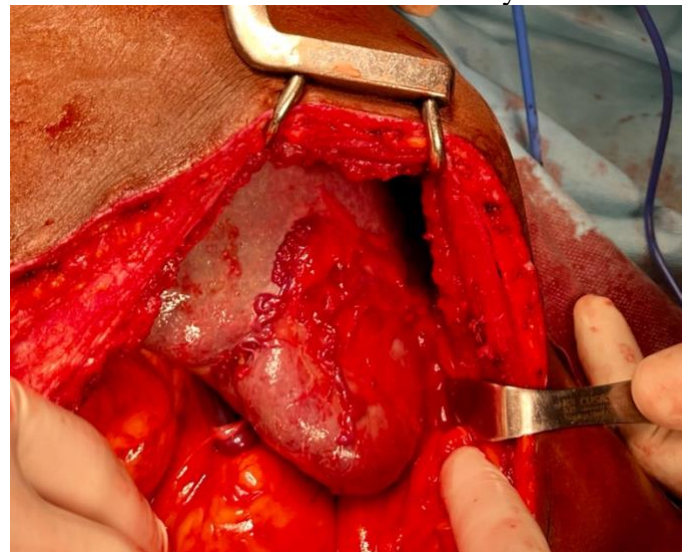
Pull the transverse colon downwards and the omentum upwards. An avascular plane will appear (Black arrow) more distinct on the left side of the transverse colon. Enter the lesser sac, the space between the posterior stomach and the pancreas, here.

5. Find the splenic artery, usually running along the superior border of the pancreas. Confirm it is artery, not vein, by palpation. Encircle it carefully with a fine dissecting clamp and doubly ligate it. Do not divide it. This reduces the blood supply to the spleen. If you mistakenly ligate the splenic vein and leave the artery open at this point, you will have increased blood flow in the spleen and a more difficult operation.



The splenic artery usually runs along the superior border of the pancreas, although it may also be found posterior to it. Carefully dissect it away from pancreatic tissue and ligate it. As with all arteries, there will be an avascular plane around the vessel between the media and the adventitia layers. This plane is easier to dissect than the plane between the adventitia and the pancreatic tissue.

6. Dissect the omental attachments to the spleen and mobilize the omentum and the transverse colon downwards. Divide the omentum if necessary but take care not to divide the mesentery of the colon.

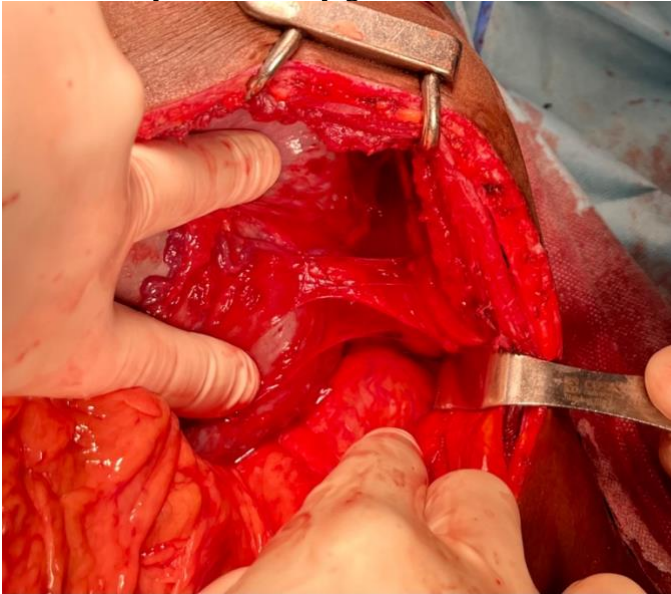


The omentum and the left ("splenic") flexure of the colon will be adherent to the inferior pole of the spleen. Gently dissect these structures off the capsule of the spleen, avoiding entering into the capsule.

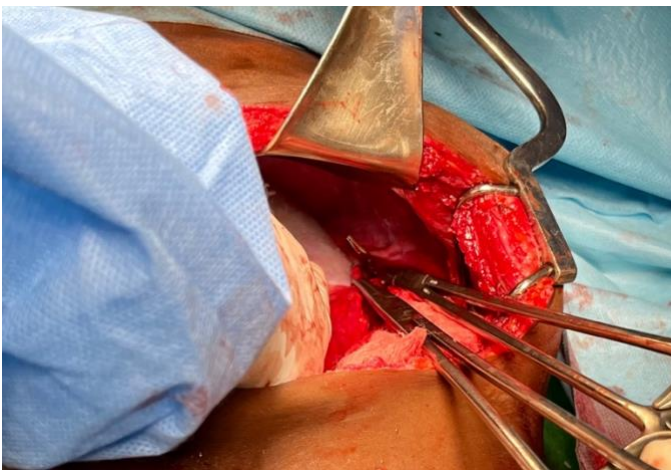
Elective Splenectomy

Richard Davis

7. Carefully enter the plane between the spleen and the lateral abdominal wall. In cases of portal or splenic vein hypertension there will be many large collateral veins here. Carefully ligate and divide each one individually. These veins will continue to bleed throughout the operation if treated carelessly. Continue dissection as far back as you can safely go.

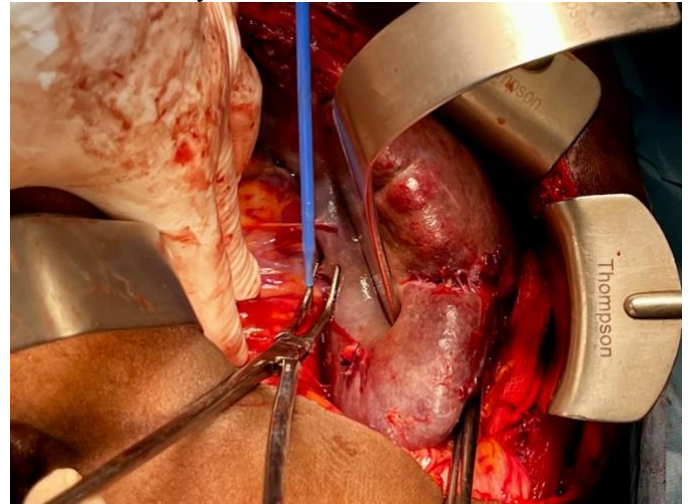


With any type of longstanding splenic disease, there will be adhesions between the spleen and the lateral abdominal wall. These adhesions will contain thick, high pressure veins. Divide them carefully.

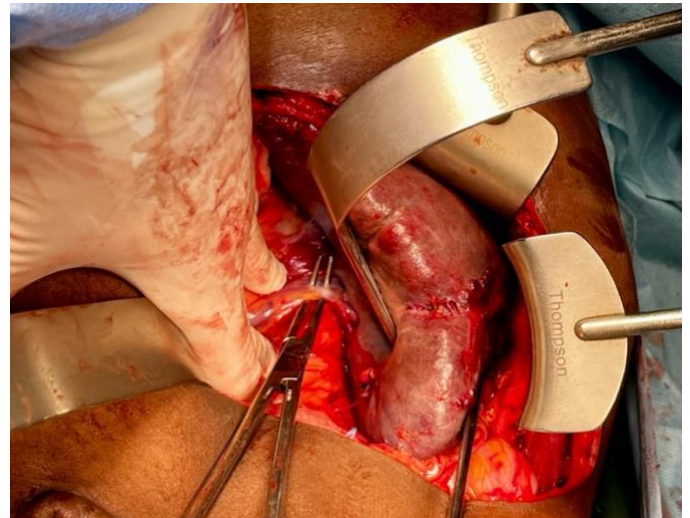


As you proceed posteriorly, your operating space becomes tighter and vessels are more difficult to ligate. Go as far as you safely can: you will get another chance to ligate the deepest of these vessels once you have divided the vessels at the splenic hilum.

8. Turn your attention to the medial side of the spleen. There will be numerous attachments here as you head towards the hilum. If they are avascular, divide them with diathermy. If they are vascular, ligate and divide each one individually.



Careful dissection with a right-angle clamp while moving towards the hilum of the spleen allows you to see which adhesions can safely be divided with diathermy and which require ligation. As you get deeper, it is helpful to reposition your retractors.



Individual vessels entering the hilum of the spleen are ligated and divided one at a time. You will encounter the splenic artery again here, distal to the point where you ligated it before. It must be ligated again.

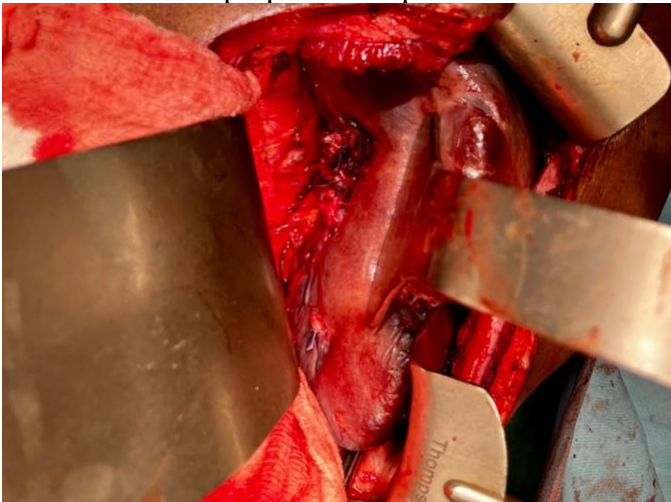
9. As you go between the spleen and the fundus of the stomach, you will encounter the short gastric

Elective Splenectomy

Richard Davis

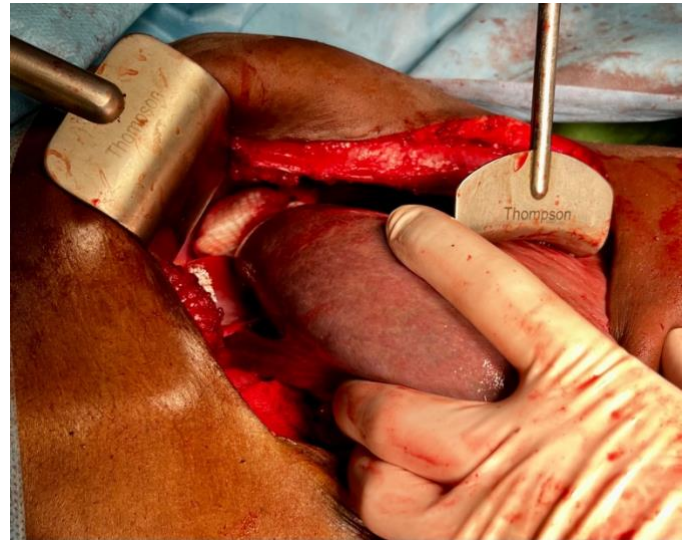
vessels. If present, gastric varices arise from these high-pressure vessels. Ligate these individually as well.

10. At the splenic hilum, you will encounter numerous vessels. It is rare to find one single artery and vein. Ligate and divide each one. You will also see the tail of the pancreas. Careful, bloodless dissection to this point allows you to see it well and dissect it away from the spleen parenchyma. Careless dissection leading up to this point makes it more difficult to see the pancreas in a bloody field and it may be injured, leading to postoperative leakage. Removing part of the tail of the pancreas during a splenectomy may rarely be necessary, but usually can be avoided with proper technique.



Most of the hilar vessels have been divided at this point and the spleen becomes much more mobile.

11. Continue your dissection posteriorly, dividing vessels between the spleen and the retroperitoneum, diaphragm, and occasionally the liver. As the spleen becomes more mobile, return to any vessels you could not reach previously in the posterolateral space.



Once the vessels of the hilum have been divided completely, the spleen can be mobilized medially or laterally, allowing you to reposition it and approach vessels that may have been impossible to ligate earlier.



Another view of the way the spleen can be repositioned after all the hilar vessels have been divided.

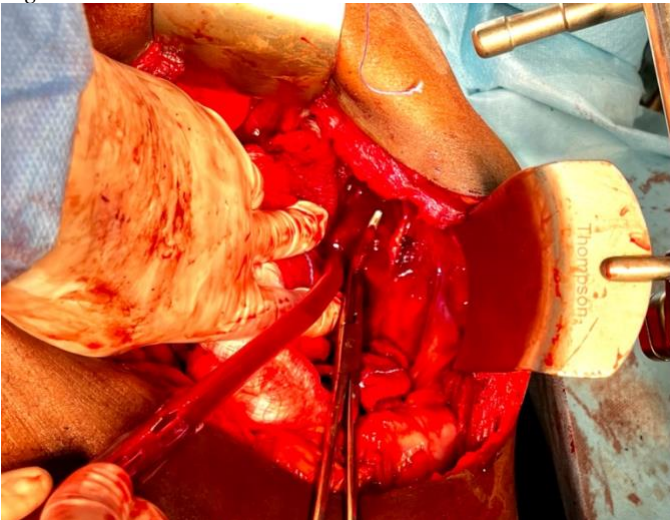
12. Remove the spleen. If there is profuse bleeding from the splenic recess, pack with gauze sponges, hold pressure, and then remove each sponge individually while ligating any bleeding vessels you see.

Elective Splenectomy

Richard Davis

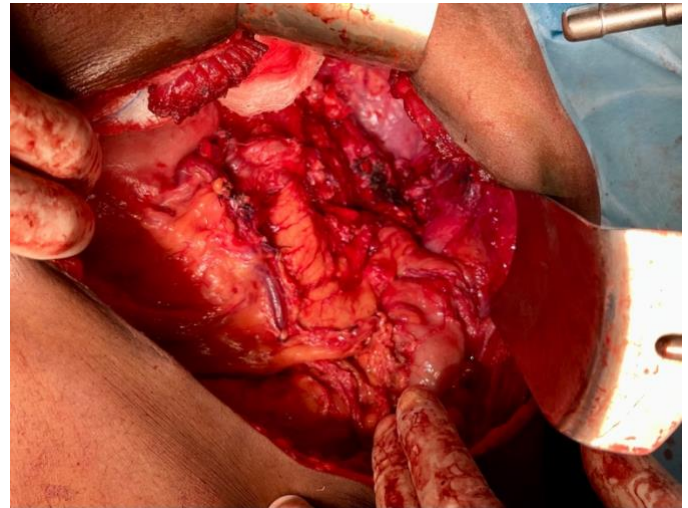


The enlarged spleen, after removal, shows all the places where blood vessels enter it, not only at the hilum but throughout the organ.



After gauze sponges are packed into the splenic bed, they are individually removed and each bleeding point is clamped and ligated.

13. Inspect the tail of the pancreas. If you suspect injury to the tail, carefully suture the lacerated tissue with a 4-0 non-absorbable suture and leave a drain in the splenic bed.



The splenic bed after the spleen has been removed and hemostasis achieved. There are several ties on vessels adjacent to pancreatic tissue, but no sign of injury to the pancreas itself.

14. If the spleen is large, consider leaving a drain to avoid accumulation of fluid in the “dead space.”
15. Assure hemostasis one last time and then close the abdominal wall.

Pitfalls

- Bleeding can be quite serious, especially in patients with portal hypertension or splenic vein thrombosis. These surgeries must be done slowly and meticulously. Ties on veins under pressure can slip off, so examine your surgical field very carefully after the spleen is removed; take your time and make sure hemostasis has been achieved. This is not an operation that favors the “get it out, then control the bleeding” approach!
- Pancreatic injury is an avoidable complication: again, do not allow uncontrolled bleeding to occur, especially during dissection of the hilum of the spleen. Pancreatic fistula is very difficult to manage in a resource-limited setting, so it is best avoided altogether.
- Patients who are coagulopathic due to thrombocytopenia can bleed more than normal during this operation. If you feel that bleeding is excessive despite your excellent surgical technique, transfuse platelets or fresh whole blood. The approach to the splenic artery is a relatively bloodless technique. If the patient has thrombocytopenia due to platelet consumption,

Elective Splenectomy

Richard Davis

ligate the splenic artery before giving platelets or fresh whole blood.

- Post-splenectomy infections can include life threatening infections with the encapsulated bacteria listed above, malaria, or other parasites such as babesiosis. In addition to vaccines pre-splenectomy, patients should get the influenza vaccine yearly if possible. Patients should advise their physician of their splenectomy status, especially if being treated for infectious symptoms. Many guidelines advocate for prophylactic oral penicillin for all children <5 years, and for all adults for 2 years after splenectomy. This advice is especially appropriate for anyone who does not have ready access to medical care.
- Post-splenectomy sepsis is sudden, severe septic shock with coagulopathy and often adrenal insufficiency. Treatment is supportive with standard critical care, antibiotics and stress-dose steroids if needed. Risk is highest in the first 1-4 years after splenectomy or in children <2 years of age. Mortality is 50%. Patients should be counseled about this possibility on several occasions, both before and after surgery. They should be advised to seek medical attention if they have sudden onset of fever, chills, nausea and headache.
- Another post-splenectomy infection of concern is malaria: patients should take measures to avoid exposure, use prophylaxis, and treat malaria when symptoms are present. Episodes of malaria are more severe in patients who have had their spleen removed, and may be more likely fatal.

Richard Davis MD, FACS, FCS(ECSA)
AIC Kijabe Hospital
Kenya

February 2023

