The Spleen and Surgery

The most common indication for spleen surgery is trauma. In the absence of trauma, spleen surgery is relatively rare and seldomly required. When indicated it may be curative and lifesaving. In this podcast we discuss elective, non-trauma general surgical aspects of the spleen.

The most common indications for elective splenectomy will be addressed separately.

Hypersplenism

This is defined as a decrease in blood cellular content in the presence of a normal bone marrow. The condition is characterized and diagnosed by four entities.
These are a mono- or multilineage peripheral cytopenia of platelets, red blood cells and/or white blood cells. A bone marrow with features of a compensatory hyperplastic (reactive) bone marrow which is diagnosed by a raised reticulocyte count. The bone marrow aspirate and trephine then is used to confirm a normal reactive bone marrow. The majority of these patients will present when splenomegaly is already evident clinically. The spleen can be palpated in the left upper quadrant and feels like a disk. It enlarges towards the umbilicus and is not ballotable. The exact size of the spleen could be measured using ultrasound or CT imaging. This will then also confirm the splenic enlargement for earlier disease. CT imaging assists the surgeon. Accessory spleens may be evident and vascular variations of the trabecular vessels and pancreas tail may be evaluated pre-operatively.
With all the above, hypersplenism is diagnosed only if the cytopenia corrects post splenectomy, is the diagnosis of hypersplenism confirmed. There is no other treatment for hypersplenism.

Splenectomy is also sometimes indicated ss second line treatment:
For Immune mediated Thrombocytopenia (ITP) steroids or immunoglobulin is the first line treatment but when these are unsuccessful in treating the thrombocytopenia, splenectomy is indicated. This will then be effective in 60-70% of cases in normalizing platelet count.

Splenic Marginal B-cell Lymphoma
This is a low-grade B-cell Non-Hodgkin lymphoma with a very slow and indolent course. The diagnosis is made on peripheral blood smear and these patients have splenomegaly. In contrast to most lymphoma's, chemotherapy is not the treatment of choice here. There has been reports of Rituximab being effective but these immunomodulatory drugs are not readily available, extremely expensive and not superior to splenectomy. Splenectomy is seen as curative with a median survival of more than 8years.

Hereditary Spherocytosis
This is a familial haemolytic disorder characterized by abnormal red cell morphology. The red cells are spherical instead of biconcave shaped. This makes the red cell less pliable and leads to haemolysis of the red cells as they move through the spleen. The process when these red cells are removed from the circulation by the spleen is called sequestration. Spherocytosis is found in central African populations and these patients

have an inherited protection against malaria. This Spherocytosis can range from asymptomatic to fulminant haemolytic anaemia. The asymptomatic requires no active treatment but for the symptomatic cases there are indications for splenectomy. Symptomatic cases with an Heamoglobin of less than 11g/dL will require splenectomy. Once the spleen has been removed, haemolysis by sequestration no longer occurs and they will no longer become anemic.

Left sided Portal Hypertension
This refers to a very rare condition of isolated left sided portal hypertension. This is mostly caused by splenic vein thrombosis due to various causes such as severe acute pancreatitis, neonatal sepsis with umbilical vein catheterization. These patients have normal liver functions and parenchyma(no cirrhosis) with hepatopetal (normal) main portal vein flow. The main portal vein pressures are also normal. Therefor the only part of the portal flow affected are those draining the pancreatic tail, spleen, stomach and distal oesophagus. These patients may be asymptomatic or present to hospital with upper gastro-intestinal bleeding from gastric or oesophageal varices or portal gastropathy.

Splenomegaly in Primary Myelofibrosis is now treated with the new JAK-2 inhibitors as first line treatment. Availability and cost is a factor. Patient compliance and preference is also considered. Therefor is treatment is not available, affordable or successful a surgical splenectomy will remove the enlarged spleen.

Pre-operative preparation of the elective splenectomy

Consent should be an informative process including counselling the patient on what to expect. There after the patient must be fully prepared prior to the procedure.

Counselling
This is the first step to a splenectomy and may be done by the referring GP. This will prepare the patient mentally for what is to come and improve compliance. It is important to explain the entire process. Remember to mention and if the indication is clear even administer the immunizations. Mention that there are different options available to the planned procedure. These options may be used in isolation or in combination with each other. The approach may be Endovascular / Laparoscopic / Open surgery. Always mention the immediate post op risks and complications and include to mention pain and the scar. Discussed the long-term effect of living without spleen. Explain the long-term risks for infection by OPSI organisms. Advise the patient to seek early medical assistance if fever or malaise should occur.

Immunization
Elective Splenectomy is always the preferred option. This decreases the risk for complications, improves preparation and patient compliance. Immunizations should be given at least 14 days prior to surgery to optimize the acquired immune response before the spleen is removed. When this is not possible i.e. for the trauma splenectomy, immunizations should be delayed till day 14 or later after splenectomy.

The spleen helps with immunity against encapsulated bacteria and therefor the immunizations are aimed at these organisms. They are Pneumococcus vaccine, Meningococcus vaccine and the Haemophilus Influenza B vaccine. Repeat vaccinationis needed by 5 yearly boosters. The yearly flu vaccine should be encouraged in these patients.

Splenic artery embolization
In cases where bleeding is concern or cases with a very large spleen endovascular coils are used to embolize the splenic artery. This may decrease intra-operative bleeding, allow for shrinkage of the spleen and could allow for laparoscopic rather than the open approach. This effect takes 48hrs to occur optimally. Access is via the femoral artery (groin) and guided by fluoroscopy. The short gastric vessels still supply spleen of O2 rich blood and therefor splenic ischaemia rarely is of concern.

Blood product management
Red Cell Concentrate units are ordered if the Heamoglobin is less than 8 g/dL. Ideally optimization by transfusion is preferred pre-operatively. The timing should be to optimize the patient for anaesthesia and surgery. The usage of "BRB's" (blood ready in a box) has gained popularity as unused blood in a box may be returned to blood bank. This decreases unnecessary wastage of blood as a scarce resource.
Platelets are required when the platelet count is below 50. Platelets should be avoided pre-operatively and be given as an intra-operative infusion. Pre-operative platelets will be sequestrated by the overactive spleen. Where possible the platelet transfusion should be delayed until after splenic artery control unless there is excessive bleeding prior. Once the artery has been clamped the platelet transfusion will be more affective.

Splenectomy
Laparoscopic (Preferred approach)
Requires a Pfannenstiel incision for spleen delivery
Spleen could be very large (more difficult laparoscopy)
Embolize Splenic Artery 48hrs prior
Always also consent patient for open procedure
A mega unit of platelets are often required in theater, do not transfuse these in the ward before the surgery as the spleen will sequestrate them by the time patient is in theater.

Open surgical approach
When laparoscopic Splenectomy is not possible
Size of spleen (Very large: typically stretch beyond the umbilicus)
Previous procedures making it less feasible
Intra-operative bleeding may necessitate conversion to open procedure
Control the artery first, this allows for spleen shrinkage prior to vein control, and importantly acts as an auto-transfusion from the large spleen
Platelet sequestration no longer occurs and platelet transfusion becomes more effective
Inspect mesentery and pelvis for ***accessory spleens (Splenunculi)***
May enlarge and cause recurrent disease at later stage
Avoid capsule rupture , as this can bleed a lot, and should be avoided for malignant indications

Post splenectomy complications

Overwhelming Post Splenectomy Infection (OPSI)
Most severe complication (10% mortality in modern era)
Caused by encapsulated bacterial infection after splenectomy
May occur in the acute post-operative period or any time there after
Prevention better than cure
Immunization by vaccination
5 yearly boosters
Yearly flu vaccine
Early detection and antibiotics
Patients are counselled of risk of OPSI
Any flu-like symptoms, fever or malaise should prompt urgent medical consult (<48hrs)
Antibiotic of choice is 3rd Generation Cephalosporin (Ceftriaxone)
Prescribed empirically for post splenectomy patients

Pancreatic Fistula
Increased risk in the trauma splenectomy
2nd to pancreatic tail injury
Avoided by meticulous surgical technique
Treatment is drainage and conservative but may require a distal pancreatectomy

Bleeding
Splenic artery or vein bleed could be massive and fatal
Sudden signs of shock should prompt investigation urgently
May be secondary to thrombocytopenia

Thrombocytosis
Rebound thrombocytosis in hypersplenism leads to hypercoagulable state
Monitor platelet count
Rarely may require anti-coagulation

Post splenectomy effusion
This occours due to surgery which mobilised the left side of the diaphragm.

Splenic Trauma

Most common is blunt trauma.
As opposed to elective surgery in the trauma scenario we try to preserve the spleen, whereas during elective surgery we remove the whole spleen.

Most traumatic splenic injuries can be managed non-operatively.
NB Grade the injury
Monitor the patient in intensive care unit or high care unit for
Haemodynamic stability
Haematocrit/Haemoglobin levels
Response to fluid resus vs requirement of blood products

Indications for surgical intervention
Grade V splenic injury
Haemodynamic unstable patient
Failure of conservative therapy
Inability to monitor In high dependency unit
More than 3 units red cell concentrate / 24hrs
Documented recurrent bleed
Decrease in Hct/Hb post transfusion
Sudden haemodynamic instability in H/C or ICU
Other intra-abdominal injuries requiring surgical management

Spleen preserving surgery
Splenorrhaphy with or without mesh/net
Partial splenectomy
Haemostatic patches and/or glues
Splenic Artery Embolization
Combination of above
Spleen preserving options
May be expensive
Higher risk of rebleed or failure
May be time consuming
Do not require immunization
Avoids risk of Overwhelming Post Splenectomy Infection(OPSI)

Conclusion

Splenectomy comes with a risk of complications and requires lifelong adjustments
Patients should be counselled and well prepared prior to surgery
This includes vaccination, possible endovascular procedures, blood products and anti-biotics
OPSI can occur at any time after splenectomy
A high index of suspicion and prompt anti-biotic usage may be life saving
Medical indications for splenectomy are rare and more alternative therapies are arising
Early surgical referral to a specialist will ensure appropriate therapy
Counselling and vaccination starts at primary health care level