

Vesalius SCALpel™ : Spleen (see also: abdomen => spleen folios)

Anatomy

15-30% accessory spleens: 80% hilum, splenocolic ligament, omentum, pelvis, small bowel mesentery (scrotum male)

white zone: lymphatic nodules & germinal centers

red zone: thin walled sinuses, sinusoids, clear old, damaged RBCs

4-5 discrete vascular territories

marginal zone: interface

splenic cyst: true or post-traumatic (pseudocyst)(75%):

25% unknown cause

LUQ pain, US, CT: symptomatic: aspirate (recurrence, bleeding), unroof, partial splenectomy

congenital: epidermal, simple

parasitic: echinococcal most common; liver > lung > spleen in frequency

neoplastic: resect

dermoid: 3 layers, rarest, congenital, resect

neoplastic, echinococcal and dermoid resect; congenital and traumatic if symptomatic

no percutaneous aspiration, can bleed, recur

Splenic artery aneurysm

3rd most common abdominal aneurysm after aorta, iliac

CT scan Dx

most near tail of pancreas, multiparous female, 5-10% incidence rupture

indications for surgery:

> 2cm asymptomatic

all pregnant women or of childbearing age

rupture during pregnancy maternal and fetal mortality 80%

if proximal can ligate proximally and distally, if distal may require splenectomy

embolization option: splenic infarction very painful

Function

clear abnormal RBCs, platelets, cellular debris

RBC life cycle normally ~120d, 20cc removed daily by spleen

RBC membrane defect: spherocytosis (splenectomy), elliptocytosis

sickle cell autosplenectomy; increased risk of infection

should not see Howell-Jolly (residual nuclear chromatin), Heinz or Pappenheimer bodies

with normally functioning spleen, cleared by spleen

if splenectomy is complete (no accessory) will see the above on smear; if not still

have residual splenic tissue, accessory spleen

miss rate for accessory spleen lap-scope = open

platelets 10d lifespan, 1/3 of platelets pooled in spleen, can rise to 80% with splenomegaly

wbc 6h half life

abnormal function splenic antibodies (IgM) cause excess cell destruction, bind to platelets

opsonins

properdin: initiates alternate pathway of complement activation

tuftsin: binds granulocytes to promote phagocytosis

ITP

Primary or secondary

Dx of exclusion:

SLE, antiphospholipid syndrome, immunodeficiency, lymphoproliferative, HIV,

hepatitis C, heparin, drug related antibodies (quinidine), thyroid disease

peripheral smear to R/O pseudothrombocytopenia, inherited giant platelet syndrome & other hematological disorders

immune disorder with IgG antibodies, F:M 3:1

IgG antiglobulin on platelets verifies

can follow upper respiratory infection

spleen is the major source of IgG in ITP, increased 5-6X

antibodies bind to platelets which are destroyed by spleen

platelets <50k, normal bone marrow

30-50K bruising

10-30K spontaneous ecchymosis

<10K internal bleeding

bleed: vaginal, mucosal, UGI, nose

usually sporadic, increasing with AIDS, SLE

spleen rarely palpable. if palpable consider Dx of hypersplenism

50% of cases children ~5yo, M=F

child good prognosis, 80% recovery without treatment < 6mo (usually within a few wks), do not do splenectomy, rare (<1%) intracranial hemorrhage

adults require Rx at presentation, 50% platelets < 10K

treatment

initial trial of steroids, 1mg prednisone/kg/d

3-6w, if responds wean, 50-75% success

initial response to steroids suggests good response to splenectomy

IV immune globulin for internal bleeding, platelets < 5K despite steroids, extensive progressive purpura

80% respond, but common relapse

if no response, requirement for high dose (10-20mg/d) or recurrent drop platelets:

elective splenectomy, 85% success

splenectomy

surgery 92% response v 30% medical Rx, surgery treatment of choice

predictors of response to surgery

young age, most common positive predictor

short interval diagnosis to surgery

initial response to steroids

HIV+

high pre-op platelets
40K platelets OK to proceed
don't give platelets unless untoward bleeding post op
look for accessory spleen: 30% in hematological disorder v 20%
plasmapheresis takes 4-5d for response, not beneficial in acute crisis
emergency splenectomy only for neurologic crisis (intracranial bleed, pl < 10K)
recurrence
accessory spleen, observe
search for other causes of thrombocytopenia: hemolytic disorder, thyroid, pregnancy,
infection
moderate, 40-50K try cytoxan, steroids, plasma exchange
persistent: reoperate after CT, US, Tc scan looking for accessory spleen; gamma probe with
indium labeled platelets

TTP

autoimmune response to endothelial cell antigen (arterioles, small capillaries)
disease of arteries with diffuse platelet trapping in small vessels (arterioles and capillaries)
platelet aggregation, hyaline deposits in/under endothelium
normal size spleen
pentad: fever, purpura (thrombocytopenia), hemolytic anemia, neurologic abnormalities, renal failure
profound thrombocytopenia, elevated WBC, elevated bilirubin (hemolysis), hematuria, protein casts
peak 20-30yo, F>M
may be initiated by viral or bacterial infection, pregnancy, drugs (BCP)
untreated 10% 1y survival
Rx steroids, plasmapheresis, rarely splenectomy

Hereditary spherocytosis

autosomal dominant, defect in RBC membrane structural protein spectrin
shortened RBC lifespan, osmotic fragility
anemia, reticulocytosis, jaundice, splenomegaly, pigment gallstones (94% by 13)
increased osmotic fragility, high sequestration, destruction by spleen
wait until at least age 4 before splenectomy, cholecystectomy at same time

Sickle cell disease

HbA replaced by HbS (valine substitution for glutamic acid 6th position on beta chain of Hb)
with decreased O₂, RBC elongates and distorts causing increased viscosity, stasis, crenation, clotting,
worsening hypoxemia, cycle
mortality from recurrent infection, renal failure, heart failure
spleen autoinfarcts, rarely need splenectomy
Howell-Jolly bodies seen
splenic infarction may result in splenic abscess

Thalassemia

autosomal dominant defect in Hb synthesis

presents early in life

persistence of HbF (fetal) and decreased HbA

accumulation of intracellular material causes structural abnormality RBC

need recurrent transfusion, can't maintain Hb > 10

need for splenectomy

high risk OPSS

Primary hypersplenism : rarely responds to steroids

Secondary hypersplenism

portal hypertension may result in splenic enlargement, anemia, leucopenia,

thrombocytopenia

treat portal hypertension, no need for splenectomy

Splenic vein thrombosis

acute or chronic pancreatitis, pancreatic tumor

splenic enlargement, trapping

normal liver (thrombosis may propagate into portal vein)

isolated gastric varices, no esophageal varices

gastric varices lower incidence of bleeding than esophageal, not amenable to banding

splenectomy cures gastric varices and hypersplenism

Acquired immune hemolytic anemia: medical Rx 1st

Hairy cell leukemia: high recurrence after splenectomy; now treated with alpha2 interferon

Portal vein thrombosis

hypercoagulable state, stasis, (long splenic v stump?)

abdominal pain 1-2w post splenectomy, may result in dead gut

anticoagulate, thrombolytic: heparin to coumadin X 6mo

Felty's syndrome

rheumatoid arthritis, neutropenia, recurrent leg infection/ulcer, splenomegaly

splenectomy may be beneficial if medical Rx fails

Sarcoidosis

lung and liver disease, 20% incidence splenomegaly

splenectomy may be beneficial

Gaucher's

disorder of lipid metabolism
splenectomy may be beneficial

Myeloid metaplasia

progressive marrow fibrosis
peripheral extramedullary hematopoiesis
immature precursors in peripheral blood
highest incidence of portal vein thrombosis
splenectomy

Splenic abscess

chills, fever, LUQ tenderness, splenomegaly
contiguous spread, hematogenous spread, immunocompromise, (sickle infarct)
splenic enterococcus abscess may seed diseased mitral valve
staph, salmonella, e.coli, enterococcus (ICU pts), fungus
salmonella increased in ICU pts, sickle cell disease, typhoid, immunocompromised
poultry, turtle sources

Dx: US, CT
percutaneous drainage 20-30% success for unilocular
splenectomy may be necessary for multiple

Trauma

penetrating LUQ with intraabdominal bleeding requires surgery
blunt

FAST exam has replace peritoneal lavage, go to CT scan if positive or suspicious for injury
CT grading more accurate in pediatric than adult
grade

- I < 10% of surface, < 1cm deep
- II non-expanding subcapsular hematoma 10-50% of surface, non-expanding
intraparenchymal hematoma < 2cm, bleeding capsular tear or parenchymal
laceration 1-3cm deep without trabecular vessel involvement
- III expanding subcapsular or intraparenchymal hematoma, bleeding subcapsular
hematoma > 50% of surface, intraparenchymal hematoma > 2cm,
parenchymal laceration > 3cm deep or trabecular vessel involvement
- IV ruptured intraparenchymal hematoma with active bleeding, laceration involving
segmental or hilar vessels resulting in major (> 25% of volume)
devascularization

V completely shattered or avulsed, hilar laceration with total devascularization
non-op management (grade I-III)

stable patient, grade I-III, ability to do serial exams (even on vent), <2U blood loss related to spleen (v pelvic, femur fx)
low failure rate (80% of blunt trauma, 90% success)
incidence of missed injuries ~2%
failure: hemodynamic decompensation, new or increased abdominal pain (other visceral injury), dropping Hct
contrast blush on angio indicates active bleeding, poor prognosis, to OR
24h ICU observation, 3-4d bed rest, minimal activity 1-2w, no contact sports 3 mo
no need for CT or US f/u
indications for splenectomy: hemodynamic instability, peritoneal signs, ongoing blood loss
splenorrhaphy (those who are candidates with isolated splenic injury don't go to the operating room anymore)
blood loss <500cc, minimal associated injuries, no hilar involvement, minimal-moderate splenic disruption, normal coag, no associated injuries
suture, cautery, surgical, hemostatic glue, partial splenectomy, mesh wrap

Spontaneous rupture

malaria most common cause worldwide, mono in US
sarcoid, leukemia, delayed rupture from blunt

Overwhelming post-splenectomy sepsis (OPSS)

avoid splenectomy < 4
highest risk 1st 2y post splenectomy (60% of adult cases, 80% of child)
the earlier the infection, the higher the mortality
risk varies with indication for splenectomy
accessory spleen not enough to confer immunity
greatest risk children, less common in adults
hematologic disease higher risk than trauma
highest risk thalassemia, lymphoma, Hodgkins, don't do as well
strep pneumonia (70%), h. flu, neisseria (encapsulated BT)
pneumococcal vaccine (covers 73% of strains, 40% of strains penicillin resistant), h. flu, n. meningitis vaccines
give early, 2w before elective, otherwise prior to discharge, revaccinate @5y
prophylactic antibiotics 6mo-1y, penn, amoxicillin, erythromycin
child with febrile illness after splenectomy take to ER