Postsplenectomy Syndrome
“Topic Review”
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Done By:
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Objectives

• Brief introduction about the spleen and its role in the human body

• Identify splenectomy and its indications

• Explain what’s postsplenectomy syndrome

• Identify in details each complication of splenectomy with its management
What’s the spleen?
Historical Review

THE SPLEEN

‘In Englysche it is named a man’s Splene. A spongious substance lienge under the ribbes on the left side, and it doth make a man to bee mery and to laughe, although melancholy resteth in the splene if there be impedimentes in it. If any man be splenitike let him use mery company, be joconde, and not to study upon any supernatual thynges.’

(Andrew Boorde; The Breviarie of Helthe, 1547).
• Largest lymphoid organ
• Contains approx. 25% of the total lymphoid mass
• Not a vital organ
• Soft, spongy and vascular
Functions:

- Filtration
- Immunological functions
- Reservoir
- Hematopoietic function
What’s Splenectomy?

• Removal of the spleen
## Indications for Splenectomy:

<table>
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<th>Indication</th>
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<td>Trauma</td>
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<td>Hematological diseases</td>
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<td>Symptomatic splenomegaly</td>
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<td>Splenic mass</td>
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<td>Bloc resection for malignancy in adjacent organ</td>
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<td>Splenic hemorrhage</td>
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What’s Postsplenectomy Syndrome?

A group of complications that occur after splenectomy

- Infections (OPSI)
- Thrombocytosis
- Thrombosis
- Malignancy
Postsplenectomy sepsis
• “OPSI” or “Asplenia sepsis”

• Spleen serve as a "fine tooth comb”

• Rapidly fatal illness that complicates bacteremic infections

• Increased mortality from pneumonia and ischaemic heart disease was recorded in World War II soldiers splenectomized for abdominal trauma (Robinette & Fraumeni, 1977)
Incidence:

- 1 per 175 patient-years in children
- 1 per 400 to 500 patient-years among adults
- 50%-70% mortality rate
- The highest risk of sepsis occurs during the first few years following splenectomy

Pathogens:

Encapsulated pathogens:
- **Streptococcus pneumoniae**
  - 57% infections, 59% death
- **Haemophilus influenzae**
  - Mortality 32%, in children prior to H.influenzae vaccine
- **Neisseria meningitidis**
  - Lower incidence
Symptoms:

- Fever
- Upper and lower respiratory tract symptoms
- Fatigue
- Headache
- Nausea, diarrhea and abdominal pain
- Rapid manifestations of bacteremia

**TABLE 1. Diagnostic Criteria for Sepsis**

Infection, documented or suspected, and some of the following:

**General variables**
- Fever (> 38.3°C)
- Hypothermia (core temperature < 36°C)
- Heart rate > 90/min⁻¹ or more than two SD above the normal value for age
- Tachypnea
- Altered mental status
- Significant edema or positive fluid balance (> 20 mL/kg over 24 hr)
- Hyperglycemia (plasma glucose > 140 mg/dL or 7.7 mmol/L) in the absence of diabetes

**Inflammatory variables**
- Leukocytosis (WBC count > 12,000 µL⁻¹)
- Leukopenia (WBC count < 4000 µL⁻¹)
Risk Factors:

• Age at which splenectomy occurred

• Time interval from splenectomy

• Reasons for splenectomy

• Overall immune status
Management:

- Patient education
- Antibiotics
- Vaccinations
• Antibiotic recommendations are based on:
  • Expert opinion
  • Assessment of the epidemiology
  • Antimicrobial susceptibility patterns
**TABLE 5. Recommendations: Initial Resuscitation and Infection Issues**

### A. Initial Resuscitation

1. Protocolized, quantitative resuscitation of patients with sepsis-induced tissue hypoperfusion (defined in this document as hypotension persisting after initial fluid challenge or blood lactate concentration ≥ 4 mmol/L). Goals during the first 6 hrs of resuscitation:
   - a) Central venous pressure 8–12 mm Hg
   - b) Mean arterial pressure (MAP) ≥ 65 mm Hg
   - c) Urine output ≥ 0.5 mL/kg/hr
   - d) Central venous (superior vena cava) or mixed venous oxygen saturation 70% or 65%, respectively (grade 1C).

2. In patients with elevated lactate levels targeting resuscitation to normalize lactate (grade 2C).

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- **Fluid Resuscitation and vasopressors/inotropes**
- **Intubation and mechanical ventilation**
• Initial empiric therapy for adults should include
  - **Vancomycin** (15-20 mg/kg IV Q8 hrs)
  - Achieve trough level of 15-20 mcg/mL

• Plus meningitis doses of either
  - **Ceftriaxone** (2 g IV Q12 hrs)
  - **or Cefotaxime** (2 g IV Q4-6 hrs)

• Beta-lactam allergy:
  - **Moxifloxacin** 400 mg IV Q24 hrs in addition to vancomycin
Prevention:

- Vaccinations against:
  - Pneumococcal vaccine
  - H.Influenzae type B vaccine
  - Meningococcal vaccine

- Should be administered at least 14 days prior to scheduled splenectomy

- If not possible, day 14 postoperatively

- Inactivated influenza vaccination annually is recommended, as well as other routine vaccines according to age-based recommendations

- Routine prophylaxis with antibiotics in asplenic adults is not recommended
Pneumococcal and influenza immunization in asplenic persons: a retrospective population-based cohort study 1990-2002

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Abstract

Background: Splenectomy is associated with increased risk for bacteremia, due to impaired clearance of bloodborne agents and to altered phagocytosis and humoral immunity. We conducted a retrospective cohort study of patients at risk for splenectomy for a 13-year period to determine immunization coverage, and outcomes of those with and without splenectomy, and with or without receipt of influenza or pneumococcal vaccine.

Methods: Data were extracted from the provincial Medical Services Insurance database for insured services rendered by a physician for 1990-2002, and from the Vital Statistics Death database. The eligible cohort was selected based on diagnostic codes for hematologic conditions for which splenectomy might be considered, such as immune thrombocytopenia. Each patient was followed longitudinally from the date of first diagnosis until 31Dec2002, or death, or relocation out-of-province. In addition, persons with splenectomy and no hematologic condition were identified and followed for 6 months post-surgery. Infectious illness rates per 100 person-years of observation and death rates were calculated with and without splenectomy. Death rates were determined using splenectomy status as a time-dependent covariate. The relationship between splenectomy and death according to immunization status was examined using Cox proportional hazard ratios.

Results: Of 38,812 persons in the cohort 427 subjects with a hematologic diagnosis had splenectomy and another 452 subjects without a hematologic diagnosis had this surgery. 72% were > 18 years of age. Pneumococcal immunization was recorded in 16.5% of asplenic patients overall, and was not associated with reduced risk of death in these persons (adjusted Hazard Ratio [HR] = 1.07, 95% CI 0.70 - 1.65). Influenza immunization was recorded in 53.1% of asplenic patients overall, and was associated with reduced risk of death (adjusted HR = 0.46, 0.33-0.62). No pneumococcal or influenza immunization was recorded in patients with a hematologic diagnosis without splenectomy. Infectious illness visits were higher among all patients who had a splenectomy than among those without a splenectomy (151 visits/100 person-years of observation in the post-splenectomy period vs. 120 visits/100 person-years; p < 0.0001).

Conclusions: In asplenic patients, influenza immunization is associated with a 54% reduced risk of death compared to unimmunized asplenic persons; no reduction in risk was demonstrated with (polysaccharide) pneumococcal vaccine. Vaccine coverage in the entire cohort was less than routinely recommended. Improved delivery of infection prevention programs to this population is warranted. Conjugate pneumococcal vaccines should be urgently studied in this immunocompromised population.
Postsplenectomy Reactive Thrombocytosis
• Thrombocytosis is defined as a platelet count > 450 x 10^9/L

• The spleen plays a major role in platelet regulation; it is the primary site of destruction of platelets

• Postsplenectomy thrombocytosis has an incidence of 75%-82%

• Extreme thrombocytosis may result in many thrombotic events or bleeding

• Risk of thrombotic complications with reactive thrombocytosis is 4–6%

• Resolves with resolution of the underlying disorder
Other Causes of Reactive Thrombocytosis:

- Iron deficiency anemia
- Infection
- Inflammation
- Tissue damage
- Hemolysis
- Malignancy
Diagnosis:
Platelet count >450×10^9/l

- Review blood film
  - Acute phase reactants (e.g. CRP; ESR)
  - Iron status

  - Acute phase response
  - Reactive thrombocytosis

  - Normal

  - Iron deficiency
    - Treat
    - Repeat blood count

Repeat blood count

Persistent unexplained thrombocytosis

Further investigation

- Molecular genetics (JAK2 V617F; MPL)
- Bone marrow examination (aspirate and trephine biopsy)
- Cytogenetics

2010 Blackwell Publishing Ltd, British Journal of Haematology, 149, 352–375
Management:

• Treat the underlying cause
• Consider aspirin 75 mg although there is no published data to support this practice
• Hydroxyurea has been the treatment of choice in ET
• Plasmapheresis is an option for rapid reduction
Case Report
• A 64 years old female, a case of pseudomyxoma peritonei, hypertension, type 2 diabetes mellitus, with a history of pulmonary embolism that developed and treated more than 20 years.

• She developed severe thrombocytosis post Hyperthermic Intraperitoneal Chemotherapy (HIPEC) with Splenectomy.

• Day 6 post-op platelet count started to abnormally increase (575 \(10^9/L\)) till it peaked on day 13 with platelet count of (1618 \(10^9/L\)).
• Started on aspirin 81 mg to prevent thrombosis secondary to thrombocytosis on (day 9) postoperatively in addition to enoxaparin as DVT prophylaxis

• On (day 11) hydroxyurea 500 mg twice daily was initiated to manage thrombocytosis and to rule out any participated hematologic diseases

• During that, Hgb level from (72 g/L) to (68 g/L) requested withholding aspirin and enoxaparin therapy after 7 days from aspirin initiation

• After 5 days on hydroxyurea, platelet count did not decrease to less than 1000 10^9/L
Neutrophils were high, and reticulocyte count is within normal range during and after discontinuation of hydroxyurea on (day 15) post-op day 16 post-op, a single dose of 1000 mcg of IM cyancobolamine was administered together with a daily 5 mg of oral folic acid.

Next day, platelets count dropped significantly to 766 10^9/L.
Postsplenectomy Portal vein Thrombosis
• Incidence of SPVT ranged 6.3%-10%

• Could be asymptomatic, sometimes associated with abdominal pain

• Interval to asymptomatic SPVT about 6 days, 8-12 weeks to symptomatic
Risk factors:

• Preoperative general risk factors (age, obesity, previous thrombosis)
• Underlying disease (Ex. Malignancy)
• Surgical intervention (duration, open vs. lap)
• Postoperative thrombocytosis
Management:

• Prophylaxis with UF or LMWH at least 2-4 weeks after surgery

• Documented asymptomatic or symptomatic SPVT, IV UH or therapeutic doses of LMWH followed by oral anticoagulation therapy for 3-6 months
Spleen-preserving Techniques

- Partial splenectomy
- Splenic angioemobolization
- Splenic autotransplantation
Prevention of overwhelming postsplenectomy infection in thalassemia patients by partial rather than total splenectomy

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Objective: We aimed to evaluate the protective role of partial versus total splenectomy against sepsis in patients with thalassaemia when other preventive measures are not available. Overwhelming postsplenectomy infection is a serious complication of splenectomy in these patients, and most present with pneumococcal septicemia. Pneumococcal vaccine given before surgery is a well-established preventive measure.

Methods: In this study, we compared 2 populations of patients from Iraq and Saudi Arabia, both of whom underwent splenectomy for thalassaemia. All patients from Saudi Arabia were given a preoperative pneumococcal vaccine and underwent total splenectomy after about 4 weeks. Unfortunately, this vaccine was not available for the Iraqi patients. Partial splenectomy was offered to many of these patients as a protective measure against this fatal complication. Results: A significant difference was found between the total splenectomy fatalities in the 2 groups. There were 5 deaths in the 30 enrolled Iraqi patients over 4 years. One death over a 12-year period was reported in the 22 patients from Saudi Arabia. Partial splenectomy was associated with a dramatic reduction of mortality in the Iraqi patients. None of the 12 patients died during a follow-up period of 4 years. Conclusions: Pneumovax is a powerful prophylactic tool against overwhelming postsplenectomy infection in patients with thalassaemia and should be used whenever available. In poor or problematic countries with limited health resources, partial rather than total splenectomy could offer an alternative measure to avoid this fatal complication.
To-take home messages

- The spleen possesses a major role in the body
- Postsplenectomy syndrome is a group of symptoms
- Main complications of splenectomy includes:
  - OPSI
  - Thrombocytosis
  - Portal/splenic vein thrombosis
- The ideal management of these complications needs further clarification and future studies
Thank You

Questions?