SPLENIC VACCINE PROPHYLAXIS

SUMMARY
The splenectomized patient should be vaccinated to decrease the risk of overwhelming postsplenectomy sepsis (OPSS) by organisms such as Streptococcus pneumoniae, Haemophilus influenza type b, and Neisseria meningitidis. Patients should be educated prior to discharge on the risk of OPSS and their immunocompromised state. An understanding of the need for prompt medical attention should be instilled in such patients to reduce the morbidity and mortality of postsplenectomy infection.

RECOMMENDATIONS
- Level 1
  - Non-elective splenectomy patients should be vaccinated on postoperative day 14.
- Level 2
  - Asplenic patients should be revaccinated at the appropriate time interval for each vaccine.
- Level 3
  - Elective splenectomy patients should be vaccinated at least 14 days prior to operation.
  - Asplenic or immunocompromised patients (with an intact but nonfunctional spleen) should be vaccinated as soon as the diagnosis is made.
  - When adult vaccination is indicated, the following vaccinations should be administered:
    - Polyvalent pneumococcal vaccine (Pneumovax 23)
    - Quadravalent meningococcal polysaccharide vaccine (Menomune-A/C/Y/W-135)
    - Haemophilus b conjugate vaccine (Hib TITER)

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Dose</th>
<th>Route*</th>
<th>Revaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyvalent pneumococcal</td>
<td>0.5 mL</td>
<td>Subcutaneous</td>
<td>Every 6 yrs</td>
</tr>
<tr>
<td>Quadravalent meningococcal polysaccharide</td>
<td>0.5 mL</td>
<td>Subcutaneous</td>
<td>Every 3-5 yrs</td>
</tr>
<tr>
<td>Haemophilus b conjugate</td>
<td>0.5 mL</td>
<td>Intramuscular</td>
<td>None</td>
</tr>
</tbody>
</table>

* Administered in the deltoid or lateral thigh region

- Pediatric vaccination should be performed according to the recommended pediatric dosage and vaccine types with special consideration made for children less than 2 years of age.

INTRODUCTION
Blunt abdominal trauma commonly injures the spleen resulting in either irreparable parenchymal disruption (necessitating removal of the injured organ) or devascularization of varying degrees. Non-operative management may avoid splenectomy, but can also result in functional asplenia if the devascularization is extensive. Elective splenectomy may be indicated for specific primary diseases of the spleen. Loss of functional splenic tissue places such individuals at high risk for infection by encapsulated organisms such as Streptococcus pneumoniae, Haemophilus influenza type b, and Neisseria meningitidis. Although the risk of fulminant septicemia or meningitis as a result of infection by such organisms appears to be less in the adult population (by virtue of prior exposure to these bacteria), overwhelming postsplenectomy sepsis (OPSS) remains a significant concern in the asplenic patient (1).

The incidence of OPSS is estimated to occur in 0.05% to 2% of splenectomized patients (2). It may develop immediately or as late as 65 years postsplenectomy (2-4). Mortality is significant and reported to be as high as 50% (4,5). OPSS incidence reduction is dependent upon prophylactic education of the
patient and physician as to its risk and prevention and rapid recognition of the asplenic individual when infection may be present (2,5-7).

Reduced postsplenectomy levels of opsonins, splenic tufsin, and immunoglobulin (IgM) (which promote phagocytosis of particulate matter and bacteria), hamper the body’s ability to clear encapsulated organisms (4,6,7). Vaccination, to impart immunity against such infections, is commonly performed despite the absence of Class I or Class II data to support its efficacy. As 50 to 90% of OPSS infections are secondary to Streptococcus pneumoniae infection, the polyvalent pneumococcal vaccine has been most commonly administered with the meningococcal and haemophilus influenza type b vaccines being additionally advocated in recent years (2-15). The timing of such vaccinations with respect to splenectomy has been a longstanding topic of debate due to concern over their immunogenicity in the perioperative period or especially in the critically ill who possess impaired immune function (2,14,15).

The polyvalent pneumococcal vaccine is known to cause a transient and self-limited fever (in 5% of vaccinated patients), pain, and redness at the site for 1-2 days. A hypersensitivity reaction can occur at the injection site of the haemophilus vaccine with occasional fever, aches, and malaise resolving within 48-72 hours. Both the pneumococcal and meningococcal vaccinations are non-immunogenic in patients less than two years of age; therefore, it is recommended that these vaccinations be given after the age of 2 years (12,13).

LITERATURE REVIEW

Two recent Class I studies have demonstrated that the polyvalent pneumococcal vaccine results in the highest antibody titers, for the most common serotypes, when administered 14 days post-splenectomy (14,15). These prospective, randomized trials evaluated the efficacy of the vaccine when administered at 1, 7, 14, and 28 days postsplenectomy. As these trials were designed to demonstrate immunogenicity of the vaccines and not prevention of OPSS, they cannot be used to advocate administration of the pneumococcal vaccine, but rather only the timing of vaccination.

Class II data supports the vaccination of asplenic patients based on studies of the spleen’s role in immune function and its ability to provide defense against encapsulated organisms (5). Current Center for Disease Control (CDC) recommendations for postsplenectomy vaccinations include the polyvalent pneumococcal, quadravalent meningococcal, and haemophilus influenza type B vaccines (12,13). Revaccination needs have been established by Class II studies of immune antibody levels and efficacy after initial vaccination (3).

There is no Class I data identifying the appropriate timing for pre-splenectomy Haemophilus, Pneumococcal, or Meningitidis vaccination for patients with nonfunctional or diseased spleens. Vaccination two weeks prior to surgery is commonly practiced, but this is supported only by Class III data (16,17). Pre-splenectomy vaccination has been demonstrated to induce antibody formation in both adults and children (18). The types of antibody produced and time to antibody formation (generally 1 to 4 weeks) does vary from patient to patient (18-20). The antibody titer required to prevent either Pneumococcal carriage or disease is unknown and has been extrapolated from data obtained from literature on Haemophilus titers (21). In the elective splenectomy patient, therefore, vaccination as soon as splenic disease is diagnosed appears prudent to allow time for antibody production (22). The Centers for Disease Control (CDC) has outlined recommendations for both initial vaccination in the pediatric patient population as well as booster (revaccination) requirements in patients with an anatomically present, but nonfunctional spleen (23).

The CDC recommends that asplenic travelers contact an international health clinic or the CDC (www.cdc.gov) to obtain information on disease risks within the intended country of travel. Asplenic travelers should be advised of the increased risk for Meningococcal meningitis and recommendation of the A and C vaccine for all asplenic individuals traveling to sub-Saharan Africa, India, and Nepal.
REFERENCES

POST-SPLENECTOMY PATIENT INFORMATION SHEET

NAME_____________________________________________________

Splenectomy (splee-nek-tuh-mee) is the name of the operation that was done to remove your spleen. The spleen is a fist-sized organ located in the upper left side of your abdomen (belly). The spleen helps you fight infection, get rid of old or damaged red blood cells, and store blood for your body. Because of either disease or damage to your spleen, it had to be removed. You can live without a spleen, but you may be at a higher risk for certain types of blood infection. To help you fight these infections in the future, you have been given the following immunizations (shots):

- Pneumococcal vaccine, polyvalent (Pneumovax 23) Date___________
- Meningococcal polysaccharide vaccine (Menomune-A/C/Y-135) Date___________
- Haemophilus influenzae type b conjugate vaccine Date___________

It is important that you go and see a doctor IMMEDIATELY if you have any of the following symptoms:

- Fever
- Chills
- Abdominal pain
- Skin rash, swelling, redness, or infection
- Diarrhea
- Achy or weak feeling
- Cough
- Vomiting

These are signs that you may have an infection. Without your spleen, a small or minor infection may become very serious and your doctor needs to examine you and possibility start antibiotics to help your body fight the infection. Always check with your doctor before any dental or invasive procedures, as you may need to take antibiotics before the procedure.

The effect of the vaccines in preventing infection varies from patient to patient and depends on the strength of your immune system when the vaccines were given. You will need to be reimmunized (have the shots again) approximately every 5 years for the rest of your life. You should make sure that your doctor has a copy of this information sheet so that they can help remind you when it is time to be reimmunized.

If you or your doctor have any questions about the above information, you should contact your surgeon:

Surgeon’s Name: ____________________________________________________

Surgeon’s Phone Number: ____________________________________________

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