



Penelope Jones
Karin Leder
Ian Woolley
Paul Cameron
Allen Cheng
Denis Spelman

Postsplenectomy infection

Strategies for prevention in general practice

Background

The spleen plays a crucial role in human defence against infection. Patients who are asplenic or hyposplenic are at increased risk of severe sepsis due to specific organisms. Overwhelming postsplenectomy infection (OPSI) has a mortality rate of up to 50%.

Objective

This article describes the causes of OPSI and provides strategies to reduce it.

Discussion

Streptococcus pneumoniae is responsible for over 50% of cases of OPSI. Strategies to prevent OPSI include education; vaccination against *S. pneumoniae*, *Haemophilus influenzae* type b, *Neisseria meningitidis* and influenza (annually); and daily antibiotics for at least 2 years postsplenectomy and emergency antibiotics in case of infection. Asplenic patients should carry a medical alert and an up-to-date vaccination card. Asplenic patients require specific advice around travel and animal handling as they are at increased risk of severe malaria, and OPSI (due to *Capnocytophaga canimorsus*) may result from dog, cat or other animal bites. The Victorian Spleen Registry was established to improve adherence to best practice preventive guidelines and thereby reduce the incidence of OPSI.

Keywords: splenectomy; antibiotic prophylaxis; immunisation; patient education as a topic



reasons for surgical removal of the spleen are: trauma (40%), haematological disorders and malignancies (35%), and incidental trauma at the time of intra-abdominal surgery (24%). Less commonly, an asplenic state may occur in medical conditions such as coeliac disease or sickle cell anaemia. Congenital asplenia is rare; screening of family members is recommended in affected patients.

Overwhelming postsplenectomy infection

Patients who are asplenic or hyposplenic are at increased risk of severe sepsis due to specific organisms. Overwhelming postsplenectomy infection (OPSI) is defined as 'septicaemia and/or meningitis, usually fulminant but not necessarily fatal, occurring at any time after removal of the spleen'.¹ These septic episodes have a mortality of up to 50% and may be associated with significant long term morbidity.¹ Organisms that can cause OPSI include:

- *Streptococcus pneumoniae* (responsible for over 50% of cases of OPSI¹)
- *Haemophilus influenzae* type b
- *Neisseria meningitidis*
- *Capnocytophaga canimorsus* (acquired by dog or cat bites).

The annual and lifetime risk of OPSI for an asplenic patient varies between reports. An Australian study reported an incidence of 0.42 cases per 100 person years.² Another shows that 4.4% of children less than 16 years of age and 0.9% of adults develop postsplenectomy sepsis.³ The risk was assumed to be the greatest in the first 2 years after splenectomy; however, reports indicate that the increased risk of OPSI is lifelong. In a series of 77 OPSI cases, the majority occurred

The spleen is the largest lymphatic organ in the body and plays an important role in fighting infection. It works to remove micro-organisms and their products circulating within the bloodstream, and to produce antibodies to enhance the immune response. The asplenic or hyposplenic state can be confirmed by the detection of Howell-Jolly bodies on a blood film or by the demonstration of decreased IgM memory B cells in the blood.

Splenectomy is the most common cause of asplenia. In patients on the Victorian Spleen Registry, the authors have found the most frequent

10–30 years after splenectomy.¹

Prevention of OPSI

Recommended strategies to prevent OPSI include education of patients and their families, vaccination, and preventive and emergency antibiotics (Table 1). Consensus guidelines appropriate to the Australian setting were published in 2008.⁴ There is some evidence that these strategies work. In one series, asplenic patients with a better knowledge of the infectious risks, those who received pneumococcal vaccine and those who had taken postsplenectomy antibiotics had a lower incidence of OPSI.⁵ Sadly, despite the availability of best practice guidelines, preventive strategies are not always implemented and preventable cases of severe postsplenectomy sepsis continue to occur.⁶

Education

Education of the patient and their family members about OPSI is paramount and must be reinforced throughout the patient’s life. In one study, 28% of asplenic patients were unaware of the potential infection risks and the main reasons were that correct advice was not given, or that that advice was forgotten. Asplenic patients should always carry a medical alert in the form of a laminated card or medallion and an up-to-date vaccination card.

Vaccination

The pneumococcal vaccine (usually the 23 valent polysaccharide vaccine) is important in preventing OPSI. The initial vaccine is given around the time of splenectomy with a booster after 5 years and a second booster given either after a further 5 years or at 65 years of age (or 50 years of age for indigenous adults), whichever is the later (Table 1). There is no evidence currently to support the use of the pneumococcal conjugate vaccine, although a study involving the Victorian Spleen Registry is in progress to examine its immunogenicity in asplenic patients.

Patients also need vaccination against *H. influenzae* type b, *N. meningitidis* and influenza (annually). Influenza vaccination is important because influenza may be complicated by secondary bacterial infection due to *S. pneumoniae* in this patient group (Table 1). *N. meningitidis* vaccination involves an initial

Table 1. Victorian Spleen Registry recommendations for the prevention of infection in asplenic or hyposplenic adults and children aged >10 years of age (for children <10 years of age please refer to the Australian Immunisation Handbook¹)

Vaccine	Which	Route	Timing	Revaccination
Pneumococcal polysaccharide vaccine	Pneumococcal 23 valent polysaccharide vaccine PPV23 (Pneumovax 23)	0.5 mL SC or IM	>2 weeks before elective surgery, or 7–14 days after emergency splenectomy or before discharge	First after 5 years Second*
<i>Haemophilus influenzae</i> type b	Hib (liquid PedvaxHIB, Hibberix)	0.5 mL IM upper arm/thigh	>2 weeks before elective surgery, or 7–14 days after emergency splenectomy or before discharge	No booster required
Meningococcal conjugate	<ul style="list-style-type: none"> Meningococcal C conjugate vaccine MenCCV (NeisVac-C, Menjugate, Meningitec) 	0.5 mL IM upper arm/thigh	>2 weeks before elective surgery, or 7–14 days after emergency splenectomy or before discharge	No booster required
Polysaccharide	Then 6–8 weeks later: <ul style="list-style-type: none"> Meningococcal quadrivalent polysaccharide ACWY vaccine 4vMenPV (Mencevax ACWY) 	0.5 mL SC	6–8 weeks after MenCCV	First after 5 years
Influenza vaccine		0.5 mL IM or deep SC	Annually (pre-winter)	Annually

If the patient has a bleeding disorder and there is a concern about giving vaccinations, delay administration until corrected and contact the Victorian Spleen Registry (email spleenregistry@alfred.org.au, telephone 03 9076 3828) or a hospital haematology department

Antibiotic – prophylaxis

- Oral phenoxymethyl penicillin 250–500 mg twice daily, or amoxicillin 250–500 mg once daily
- Penicillin allergy: patient may have roxithromycin 150 mg once daily or erythromycin 250 mg twice daily
- Duration: immunocompromised patients – lifelong; otherwise healthy patients recommend daily antibiotics for at least 2 years

Antibiotic – emergency

Emergency supply of antibiotic, irrespective of prophylaxis: all patients to have amoxicillin 3 g sachet, kept at home and taken if fever occurs. Penicillin allergy: roxithromycin 300 mg/day or erythromycin 1 g four times per day – patients should initiate antibiotics immediately and then seek medical advice as soon as possible

Pneumococcal vaccinations*

- Pneumococcal conjugate 7 valent vaccine PCV7 (Prevenar) is recommended for asplenic children (<18 years). Currently there are insufficient data to recommend PCV7 for adults
- If PCV7 has been given, the patient should receive the pneumococcal polysaccharide vaccine (Pneumovax 23) 6–8 weeks later
- Second revaccination*: at age 65 years (50 years for Indigenous Australians), or at least 5 years after first revaccination if >65 years

Patient education

Inform patients (and their families) of increased risk of bacterial infection and strategies to prevent these infections. Patients should not worry about afebrile upper respiratory tract infection symptoms. Discuss OPSI, risk of tick and animal bites/scratches. Immunisation card, information sheet, laminated health advice card, spleen alert card, fridge magnet and spleen registry details should be given to patient

Blood tests

Full blood examination (FBE) and film – lack of splenic function shown by Howell-Jolly bodies on film and lowered IgM memory B cell markers

Travel recommendations

- Seek medical advice before travel
- Where malaria is endemic, antimalarials, insect repellent and barrier precautions should be recommended
- Ensure meningococcal vaccination is current for travel to high incidence countries

Alerts

Patients should wear or carry a Medialert medallion or wallet card. Patient's medical notes should display medical alert sticker

Seek medical attention

Possible symptoms of a serious bacterial infection include fever, shivers and/or vomiting. Patients with these symptoms should take emergency antibiotics and should call a doctor or present to a local hospital emergency department

dose of the conjugate serogroup C vaccine, followed 6–8 weeks later by the quadrivalent meningococcal vaccine. A booster quadrivalent vaccine needs to be given after 5 years (Table 1).

Vaccination timing is important. For those undergoing an elective splenectomy the optimal time for these vaccinations is at least 2 weeks before the splenectomy. After urgent splenectomy, the optimal time is when the patient has recovered from surgery (usually about 2 weeks postoperatively). However, vaccination at the time of discharge from hospital may be more convenient.

Antibiotics

The Australian *Therapeutic Guidelines* recommends daily antibiotics for a least 2 years postsplenectomy, usually amoxicillin 250–500 mg/day or phenoxymethylpenicillin 250–500 mg twice per day.⁷ Amoxicillin is often favoured because it is taken once daily and is not required to be taken on an empty stomach. For patients with penicillin allergy, a macrolide, such as roxithromycin, is recommended. Long term antibiotics should be strongly considered for those patients who have an additional underlying ongoing immunosuppressive condition.⁸

Patients should keep an emergency or standby antibiotic supply. These should be taken at the onset of fever and shivers, especially when urgent medical review is unavailable. Current recommendations suggest amoxicillin 3 g, or in a person with penicillin allergy, a macrolide.

Travel

People with asplenia or hyposplenia are at increased risk of severe malaria,⁹ so expert travel advice for malaria prevention when travelling to a malaria endemic region should be encouraged. This advice includes vector avoidance (eg. wearing long sleeved clothing, using insect repellent), antimalarial medications, and early medical attention in the setting of symptoms.

Animal handling

There is an increased risk of severe OPSI (due to *C. canimorsus*), following dog, cat or other animal bites. Tick bites are also a concern. Early medical attention is recommended.

Why a spleen registry?

The listed recommendations are lifelong. Unfortunately, most reports document suboptimal rates of adherence in this patient group.⁶ Reports proposed that a spleen registry may result in improved adherence to recommended guidelines.^{1,10}

The Victorian Spleen Registry was established in 2003 at The Alfred Hospital in Melbourne, Victoria. This was extended to a state wide service with support from the Victorian Department of Human Services. The role of the registry is to ensure that patients, families and carers have ready access to up-to-date recommendations for the prevention of OPSI. Once registered, patients receive a copy of the Victorian Spleen Registry recommendations (see *Resources*) and educational resources. Patients also receive an annual reminder about vaccinations at the time that the annual influenza vaccine is available. A web based online registration process is being developed and additional funding is being sought to expand this service to become an Australia wide service.

Data from the Victorian Spleen Registry annual questionnaire in 2007 shows an overall 59% adherence to antibiotics in the first 2 years postsplenectomy and 84% adherence in the trauma group. This is significantly better than those achieved in published data.

Summary of important points

- Asplenic or hyposplenic patients are at increased risk of OPSI, which has a mortality rate of up to 50%.
- *S. pneumoniae* is responsible for over 50% of cases of OPSI.
- Strategies to prevent OPSI include education; vaccination against *S. pneumoniae*, *H. influenzae* type b, *N. meningitidis* and influenza (annually); daily antibiotics for at least 2 years postsplenectomy and emergency antibiotics in case of infection.
- Asplenic patients should carry a medical alert and an up-to-date vaccination card.
- Asplenic patients require specific advice around travel and animal handling as they are at increased risk of severe malaria, and OPSI (due to *C. canimorsus*) may result from dog, cat or other animal bites.

Resources

- Information for patients and GPs about the Victorian Spleen Registry: www.spleen.org.au
- To obtain a copy of the Victorian Spleen Registry annual newsletter please email spleenregistry@alfred.org.au.

Authors

Penelope Jones RN, GradDipEpid, is Manager, Victorian Spleen Registry, The Alfred, Melbourne, Victoria. p.jones@alfred.org.au

Karin Leder MBBS, FRACP, PhD, MPH, is Head, Infectious Diseases, Epidemiology, Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria

Ian Woolley MBBS, FRACP, DTMH, is Deputy Director, Infectious Diseases Department, Monash Medical Centre, Melbourne, Victoria

Paul Cameron MBBS, PhD, FRACP, FRCPA, is Clinical Immunologist, Infectious Diseases Unit, The Alfred, Melbourne, Victoria

Allen Cheng MBBS, FRACP, MPH, PhD, is Associate Professor, Infectious Diseases, Epidemiology, Infectious Diseases Unit, The Alfred, Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria.

Denis Spelman MBBS, FRACP, FRCPA, MPH, is Head of Microbiology and Deputy Director, Infectious Diseases Unit, The Alfred, Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria

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correspondence afp@racgp.org.au