Increased risk of sepsis afer splenectomy

H A Deodhar, R J Marshall, J N Barnes

The risk of pneumococcal sepsis to patients who have had a splenectomy is lifelong and many patients remain unnecessarily vulnerable.

The occurrence of overwhelming sepsis in patients who have had a splenectomy was first described by King and Shumacker in 1952.[1] Further studies have shown the increased risk of sepsis to be lifelong,[2] with a particular susceptibility to encapsulated organisms such as the pneumococcus.[3] Several measures have been advocated to reduce the risk of sepsis after splenectomy, and the Department of Health has issued specific guidelines including the use of pneumococcal vaccine, prophylactic antibiotics, and patient education.[4] The Immunisation Practices Advisory Committee in the United States has issued similar guidance.[5]

This hospital serves a population of around 350 000 people, and appreciably more during the summer months. In recent years we have noticed that an apparently large number of local people and visitors with splenectomies have been admitted to this hospital without having been given any form of prophylaxis against or advice about sepsis. Some of these patients have suffered life threatening infections. To confirm or refute our impression we reviewed the postmortem records of all patients who had had a splenectomy and died in Cornwall during the past 11 years. We also studied all patients who had had a splenectomy in Cornwall during the same period.

Patients and methods

We examined all this hospital's postmortem records between 1 January 1981 and 31 December 1992 and identified all the patients who had had a splenectomy. These patients' hospital records were examined to determine their demographic details, diagnosis, and cause of death; the date and reasons for splenectomy; any history of infections; and whether pneumococcal vaccine and antibiotic prophylaxis had been given or recommended to their general practitioner.

We reviewed the histological records of the pathology department and identified all the patients who had undergone splenectomy in Cornwall between 1 January 1981 and 31 December 1992. These patients' records were also examined to determine the patient's demographic details and diagnosis, the date and reasons for surgery, any history of infections, and whether pneumococcal vaccine and antibiotic prophylaxis had been given or recommended to their general practitioner. Patients still living were then sent a questionnaire inquiring (*a*) whether they had received pneumococcal vaccine, (*b*) whether they were receiving penicillin or antibiotic prophylaxis, (*c*) whether they had received advice on the dangers of infection and the importance of seeking urgent medical help in the event of any infections, and (*d*) whether they had been admitted to hospital for any infections since splenectomy. In addition, the general practitioners of all these patients were contacted directly by telephone and asked for the same details.

Results

At necropsy 55 patients were noted to have had a splenectomy. The age range was 6 to 82 years (median 56) and 38 patients were male. The reasons for splenectomy were haematological in 24 patients; in 21 patients splenectomy had been incidental to or had resulted from an accident during other surgery and in the remaining 10 trauma necessitated the operation. Twenty one patients had died of sepsis: six of pneumococcal septicaemia, two of unspecified fulminant sepsis, seven of bronchopneumonia, one of Gram negative septicaemia, and five of other infections. Two of the six patients who had died of pneumococcal septicaemia had been visiting Cornwall; none of the six had received any form of prophylaxis (table).

We identified 206 patients as having had a splenectomy between 1 January 1981 and 31 December 1992. Full medical records were obtainable on 184 patients. Medical records were obtained on a further four patients, but details of splenectomy and prophylaxis were not recorded. The records of 18 patients had been destroyed.

The age range of the 184 patients was 1 to 83 years (median 47) and 114 patients were male. Splenectomy was most commonly due to haematological causes (86 patients); trauma was the reason in 56 patients and 42 patients required splenectomy as an incidental procedure or because of accidental damage to the spleen during another operation.

Sixty three patients had died, four (6%) of them of pneumococcal septicaemia. All four patients had had their spleens removed for haematological reasons, one, three, eight, and nine years before. Only one of them had received any form of prophylaxis, and he had died of pneumococcal pneumonia one year after splenectomy despite having received pneumococcal vaccine and penicillin prophylaxis. Fourteen (22%) patients had died of sepsis: four of bronchopneumonia (two *Haemophilus influenzae*), two of staphylococcal septicaemia, two of Gram negative septicaemia, one of cytomegalovirus pneumonia, and five of unspecified fulminant sepsis. In eight of the 14 patients splenectomy had been performed for haematological reasons; six of them died within one year of splenectomy, one after two years, and one after seven years. In the remaining six patients splenectomy had been incidental to or had occurred accidentally during other surgery; all of them had died within one month after splenectomy. In total only 10 of the 63 patients who had died had received any form of prophylaxis. Of the 121 living patients, 94 responded to our questionnaire.

Comparing these data with those available from hospital and general practitioner records, we found that 66 of the 184 patients had received pneumococcal vaccine, 56 had received prophylactic antibiotics, and 59 had received advice about their risk of infection. One hundred and seven patients had not received prophylaxis or advice. One patient reported that she had survived a pneumococcal infection requiring three weeks' admission to an intensive care unit. She was still not receiving prophylaxis.

Discussion

The postmortem data clearly confirm the previously described increased incidence of pneumococcal sepsis in patients who have had a splenectomy. Sadly, the potentially lethal primary condition of several of the patients (table) had effectively been cured, only for the

Renal Unit and Department of Pathology, Royal Cornwall Hospital, Truro, Cornwall TR1 3LJ
H A Deodhar, *registrar*
R J Marshall, *consultant histopathologist*
J N Barnes, *consultant physician*

Correspondence to:
Dr Barnes.

BMJ 1993;307:1408-9

Charaacteristics of patients who had had a splenectomy and died of pneumococcal septicaemia

Case No	Age and sex	Diagnosis	Years since splenectomy	Pneumococcal vaccine given	Penicillin prophylaxis	Visitor to Cornwall
1	66 F	Felty's syndrome	9	No	No	No
2	24 M	Congenital spherocytosis	8	No	No	No
3	63 M	Hodgkin's lymphoma	24	No	No	No
4	42 M	Hodgkin's lymphoma	14	No	No	No
5	39 F	Chronic myeloid leukaemia	3	No	No	Yes
6	65 M	Haemolytic anaemia	NK	No	No	Yes

NK=Not known.

patients to die of pneumococcal infection. None of these six patients had received immunisation with pneumococcal vaccine and they were not taking antibiotic prophylaxis. We do not know what advice—if any—they had been given about the need to seek early medical attention for infections. Although the numbers are too small for statistical analysis, two of the six patients were visitors to Cornwall—suggesting that this is a national and not just a local problem.

There has been debate about the effectiveness of the various strategies used to try to reduce the risks of infection after splenectomy.[6] There can be no doubt about the need to educate patients about the risks they face. Our data show a failure to provide this education. Some of our data have relied solely on medical notes, which are often poor, particularly at recording advice given to patients. When possible we consolidated the data with patient questionnaires and by directly contacting general practitioners. However, we considered it unethical to approach the families of patients who had died, and some patients may therefore have been given advice that was not recorded.

Pneumococcal vaccine is undoubtedly effective in raising antibody concentrations, particularly when given before splenectomy but also when given postoperatively.[7] Although the vaccine may be less effective in immunocompromised patients, studies have shown benefit in various such groups.[8,9] Pneumococcal vaccination therefore seems worth while. Revaccination may be necessary after 5 to 10 years.[3] A strategy for antibiotic prophylaxis is perhaps less clear.[10] The Department of Health recommends that all children receive penicillin prophylaxis after splenectomy, and recent reviews suggest that all patients receive penicillin prophylaxis for at least two years after the operation.[11,12] Although the maximum risk of infection probably occurs during the first two years, the risk is nevertheless lifelong. This is again amply illustrated by the postmortem data in the table.

The need for patient education, pneumococcal vaccination, and at least some use of prophylactic antibiotics is therefore clear. In addition, these patients are susceptible to other infections.[13] Our data show that the current strategy of advice to medical practitioners is failing. A more active approach is now warranted. We have four recommendations.

(1) A national publicity campaign should be undertaken to highlight the dangers to patients after splenectomy and to advise such patients to seek medical advice.

(2) A circular should be sent to all practitioners outlining the course of action to be taken when patients contact them.[4,12]

(3) Purchasers should require provider units to produce a protocol to ensure that all new patients undergoing splenectomy receive appropriate prophylaxis.

(4) Patients already at risk should be specifically identified and contacted by using histological records when available.

With the help of the district health authority and the local medical committee for general practitioners we have acted on all of these recommendations in Cornwall. We have initiated a publicity campaign with advertisements in the local newspapers, and the health authority is producing a card specifically for patients after they have had a splenectomy.

1 King H, Shumacker HB Jr. Splenic studies: susceptibility to infection after splenectomy performed in infancy. *Ann Surg* 1952;**136**:239-42.
2 O'Neal BJ, McDonald JC. The risk of sepsis in the asplenic adult. *Ann Surg* 1981;**194**:775-8.
3 Traub A, Giebink GS, Smith C, Kuni CC, Brekke ML, Edlund D, *et al.* Splenic reticuloendothelial function after splenectomy, spleen repair, and spleen autotransplantation. *N Engl J Med* 1987;**317**:1559-64.
4 Department of Health. *Immunisation against infectious disease.* London: HMSO, 1992:100-3.
5 Centers for Disease Control. Recommendations of the Immunization Practices Advisory Committee: pneumococcal polysaccharide vaccine. *JAMA* 1989; **261**:1265-7.
6 Shaw JHF, Print CG. Postsplenectomy sepsis. *Br J Surg* 1989;**76**:1074-81.
7 Addiego JE, Ammann AJ, Schiffman G, Baehner R, Higgins G, Hammond D. Response to pneumococcal polysaccharide vaccine in patients with untreated Hodgkin's disease. *Lancet* 1980;ii:450-3.
8 Shapiro ED, Clemens JD. A controlled evaluation of the protective efficacy of pneumococcal infections for patients at high risk of serious pneumococcal infections. *Ann Intern Med* 1984;**101**:325-30.
9 Sims RV, Steinmann WC, McConville JH, King LR, Zwick WC, Schwartz JS. The clinical effectiveness of pneumococcal vaccine in the elderly. *Ann Intern Med* 1988;**108**:653-7.
10 Zarrabi MH, Rosner F. Rarity of failure of penicillin prophylaxis to prevent post-splenectomy sepsis. *Arch Intern Med* 1986;**146**:1207-8.
11 Foster PN, Losowsky MS. Hyposplenism—a review. *J R Coll Physicians Lond* 1987;**21**:188-91.
12 Baddeley PG. Splenectomy and prevention of overwhelming infection. *Hospital Update* 1993;**19**:365-7.
13 Splenectomy—a long-term risk of infection [editorial]. *Lancet* 1985;ii: 928-9.

(Accepted 23 August 1993)

UNDERSTANDING FUNDAMENTALS

What is HIV?

Although it is clear that HIV is the cause of AIDS and AIDS related disease, its origin remains obscure. It seems to have infected humans for the first time 15-20 years ago, but earlier unrecognised infections may have occurred. There is firm serological evidence of infection on the east and west coasts of the United States of America from the mid-1970s, and HIV infection in central Africa may have antedated infection in North America. With modern tissue culture techniques several human and simian retroviruses in addition to HIV have come to light. Like other RNA viruses, these are potentially labile, and shifts in host range and virulence which might explain how a new pathogenic retrovirus could arise in man are therefore conceivable. Alternatively, HIV may have been a latent, mainly vertically transmitted infection in a sequestered population, the virulence and effects of which have recently been amplified as a result of travel, population dislocation, and promiscuous sexual contact.

Retroviruses are so named because their genomes encode an unusual enzyme, reverse transcriptase, which allows DNA to be transcribed from RNA. Thus HIV can make copies of its own genome, as DNA, in host cells such as the human CD4 "helper" lymphocyte. The viral DNA becomes integrated in the lymphocyte genome, and this is the basis for chronic HIV infection. This integration of the HIV genome into host cells is likely to be a formidable obstacle to the development of any antiviral agent that would not just suppress but also eradicate the infection. The inherent variability of the HIV genome and the failure of the human host to produce neutralising antibodies to the virus, as well as technical difficulties and concerns about safety, have so far frustrated attempts to make an effective vaccine.

From P P Mortimer "The virus and the tests" in Michael W Adler (ed) *ABC of AIDS*, 3rd ed. BMJ Publishing Group, 1993, price £12.95 (£11.95 to BMA members).