Peer reviewed article

Anti-infectious prophylaxis after splenectomy: current practice in an eastern region of Switzerland

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Summary

Overwhelming post-splenectomy infection (OPSI) is a long-term risk in asplenic patients, which may be minimised by appropriate preventive measures. In this survey anti-infectious strategies after splenectomy were evaluated in an eastern part of Switzerland. We found 91 individuals in the canton of Thurgau, who underwent splenectomy between 1998 and 2003. We assessed adherence to vaccination guidelines, the use of antibiotics and the awareness of the infectious risks by review of hospital charts and by structured interviews with patients and their general practitioners.

The total vaccination rate was 64/91 (70%). 6 patients were vaccinated pre-operatively, 50 during the hospital stay and 8 after discharge by the general practitioner. 64 received vaccination against pneumococci, 6 against haemophilus influenzae and 3 against meningococci. Although 39 died during the study period, none died of overwhelming sepsis. None of the patients received a booster vaccination. Prophylactic long-term antibiotics were given to 2 children but to none of the 89 adults. Three adults had a supply of stand-by antibiotics at home. Less than half of the patients who were interviewed knew that asplenia puts them at greater risk for life-threatening infections and few practitioners were aware that travel and animal bites pose a special threat.

We conclude that after splenectomy vaccination discipline and patient education should be substantially improved and suggest the publication of comprehensive guidelines.

Key words: asplenia; vaccinations; OPSI; patient education

Introduction

Asplenic individuals are known to be at increased risk for fulminant and life-threatening infections with encapsulated bacteria including *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis* [1]. The estimated lifetime risk of overwhelming post-splenectomy infection (OPSI) is approximately 5% [2]. Although no prospective data exist, it is generally accepted that OPSI are preventable by appropriate vaccination and by life-long antibiotic chemoprophylaxis [3, 4]. Other important precautions include specific advice to the patient in case of a febrile illness, of travel and of animal and tick bites [5, 6]. In the United Kingdom, in the U.S. and in Canada, guidelines have been issued for the appropriate management for prevention and treatment of infections in asplenic and hyposplenic individuals [5–8]. Despite these efforts, anecdotal reports of OPSI cases continue to occur [9, 10].

In Switzerland, vaccination recommendations for asplenia are included in the vaccination guidelines against infections with *St. pneumoniae* and *N. meningitidis* published by the Health Department of the Swiss Federal Government (BAG) [11–13]. It is not known how strict and accurate these guidelines are followed. Moreover, comprehensive national recommendations regarding other anti-infectious strategies such as the use of antibiotic prophylaxis and patient education are not available.

We have recently taken care of a patient with OPSI, which motivated us to evaluate the current practice of anti-infectious strategies after splenectomy in the canton of Thurgau, an eastern canton of Switzerland. We collected data from hospital charts and performed structured interviews with general practitioners and their patients who were splenectomised within the last six years. We found that vaccine compliance is insufficient, antibiotic prophylaxis is rarely performed, and few patients are aware of the infectious risks and precautions after splenectomy.

There was no financial support for the submitted manuscript.

Methods

In the case vignette a report of the patient with OPSI, who prompted us to initiate this study, is given. We included all patients who underwent splenectomy from 1998 to 2003 in the two largest hospitals of the canton of Thurgau: the cantonal hospital of Münsterlingen and the cantonal hospital of Frauenfeld. Neither of the hospitals had written guidelines how to manage asplenic patients. The patients were identified by the registry of the Institute for Pathology of the Spital Thurgau AG, where spleens removed by surgery are continuously registered. Since spleens from both hospitals are routinely sent to pathology after removal, the list of patients was thought to be complete. We wanted to know details of each patient with regard to the following preventive interventions: 1) vaccination and revaccination, 2) long-term antibiotic prophylaxis, 3) antibiotic use in case of fever and 4) patient education, particularly awareness of the risks of asplenia. To collect the data, the hospital charts of all cases were reviewed and data were extracted by a standardised data collection sheet. In addition, all patients alive until June 2004 and their treating general practitioner (GP) were interviewed by telephone with a structured questionnaire. In patients who have died during the study period, the cause of death was collected from hospital charts and information from the GP.

Case-vignette

In 2001, a 41 year-old man reported to the hospital because of a 2-day history of headache, fever and diarrhea. His medical history was significant for a splenectomy in 1977 after a skiing accident. He was not vaccinated after his operation nor was he aware that splenectomy posed an infectious risk. On admission he presented numerous petechiae and suffusions on his extremities. He was in septic shock with metabolic acidosis and disseminated intravascular coagulation. Antibiotic therapy with ceftriaxon was started immediately. In the blood smears, diplococci were visible and *St. pneumoniae* grew in blood cultures within 5 hours. He was intubated and haemofiltration was started because of anuria. The distal parts of hands and feet became necrotic within a few days (figure 1). Six weeks later, when his condition was stabilised, all fingers and toes were amputated. Several additional reconstructive surgical interventions were necessary. He stayed 10 weeks in the intensive care unit and left the hospital disabled four months later.

Figure 1

41 year-old patient 24 years after splenectomy: Hands and feet three days after admission (left photos) and three weeks later (right photos).

Results

91 patients were splenectomised in the years 1998 to 2003. The median age was 60 years with a range from 8 to 90 years. 40 patients were women, 49 patients were men and 2 patients were children (<16 y). Characteristics are summarised in table 1. Almost half of the patients (47%) had their spleen removed because of a malignancy and in one fifth (20%) it was removed because of trauma. In 45 cases, splenectomy was an emergency procedure and in 56 it was planned or at least expected prior to the operation. All our patients received antibiotics peri-operatively on a routine basis to prevent

Table 1
Patient characteristics.

Patients [n]	91
Gender [n (%)]	
Male	49 (54)
Female	40 (44)
Children	2 (2)
Ethnicity [n (%)]	
Caucasian	90 (99)
Black	1 (1)
Mean age at operation [years (range)]	60 (8–90)
Reason for splenectomy [n (%)]	
Cancer/ Lymphoma	43 (47)
Trauma	18 (20)
Iatrogenic lesion	14 (15)
Haematological disorders	8 (9)
Spontaneous rupture	3 (3)
Other reasons	
Pancreatitis	2 (2)
Diverticulitis of sigma with abscess formation	2 (2)
Cyst formation of spleen	1 (1)
Use of prophylactic antibiotics during operation [n (%)]	86 (95)
Infectious complications [n (%)]	
Pneumonia	10 (11)
Wound infection	8 (9)
Abscess formation in the replaced stomach	1(1)
Urinary tract infection	2 (2)
Sepsis	5 (5)

post-surgery complications, but only five received a penicillin depot after splenectomy to bridge the time until pneumococcal vaccination was effective. Post-operative complications occurred in 44 patients, most of them being of infectious origin so that a prolonged use of antibiotics were necessary. No case of OPSI occurred peri-operatively.

Of the 56 patients with planned splenectomy, only 6 (11%) were vaccinated before the operation. 50 patients received their vaccination after splenectomy still during their hospital stay. The time interval was 4 to 38 days; three-fourths of the patients received the vaccine between 9 and 18 days post-operatively. In 40 of the 56 vaccinated patients, the accomplished vaccination was mentioned in the discharge letter. Of the 35 patients who did not receive a vaccination during their hospital stay, the vaccination was recommended in the discharge letter in 10 cases. Of these, yet 8 were vaccinated later by their general practitioner. Thus, the total vaccination rate was 64 out of 91 (70%) (figure 2). The vaccines used included a polysaccharide vaccine against *St. pneumoniae* (Pneumovax-23®), the conjugate vaccine against *N. meningitidis* (Meningitec®) or the conjugate vaccine against *H. influenzae* (Hiberix®). 64 patients received Pneumovax®, 6 Hiberix® and 3 Meningitec®.

In the discharge letters specific recommendations concerning antibiotic chemoprophylaxis were only given in 7 of the 91 patients. 2 out of these 7 patients were children, who were advised to take penicillin for at least three years. The remaining 5 patients were informed that they needed a supply of stand-by antibiotics at home. None of the adults received long-term antibiotics. Specific information related to dog bites or international travel was not provided to the patients.

Patient interviews could only be held with 41 patients. 39 patients had already died in the mean time and for 11 patients had moved without leaving a change of address (figure 2, table 2). Most of the patients who died were cancer patients. None died of OPSI. Of the 41 patients interviewed, 24 were vaccinated and 17 were not. Of the 24 vaccinated individuals, 18 knew about it. Of the 17 non-immunised individuals, 6 falsely thought to have received a specific vaccine after splenectomy. One patient did not know that he was asplenic. Only 17 out of 41 patients knew that an asplenic state leads to a greater risk for life-threatening infections. Only 5 patients would seek medical advice urgently in case of fever and only 3 patients had a supply of stand-by antibiotics at home. 30 patients thought that neither the hospital doctor nor their general practitioner informed them sufficiently about the problems related to an asplenic state. No patient knew that special precautions should be taken when travelling.

Details of the interviews with the general practitioners who are caring for the 41 patients are summarised in table 2. Nine GP's were caring for 2 patients, thus in total 32 physicians were interviewed. All GP's knew of the asplenic state of their patients and reported to know the danger of OPSI in asplenic individuals. The physicians knew the vaccination status of the 24 patients who were immunised against *St. pneumoniae* and *N. meningitidis*. However, none knew that the patients should be revaccinated after a certain time. Twelve patients were splenectomised in 1998 and 1999 and were therefore candidates for a pneumococcal revaccination. Two-thirds of the doctors recommended that asplenic patient seek urgent medical advice in case of fever, 5 recommended the use of amoxicillin/clavulanic acid. Only 5 physicians knew that special precautions have to be taken when an asplenic patient travels. None of the GP knew that asplenic persons have a special risk after animal bites.

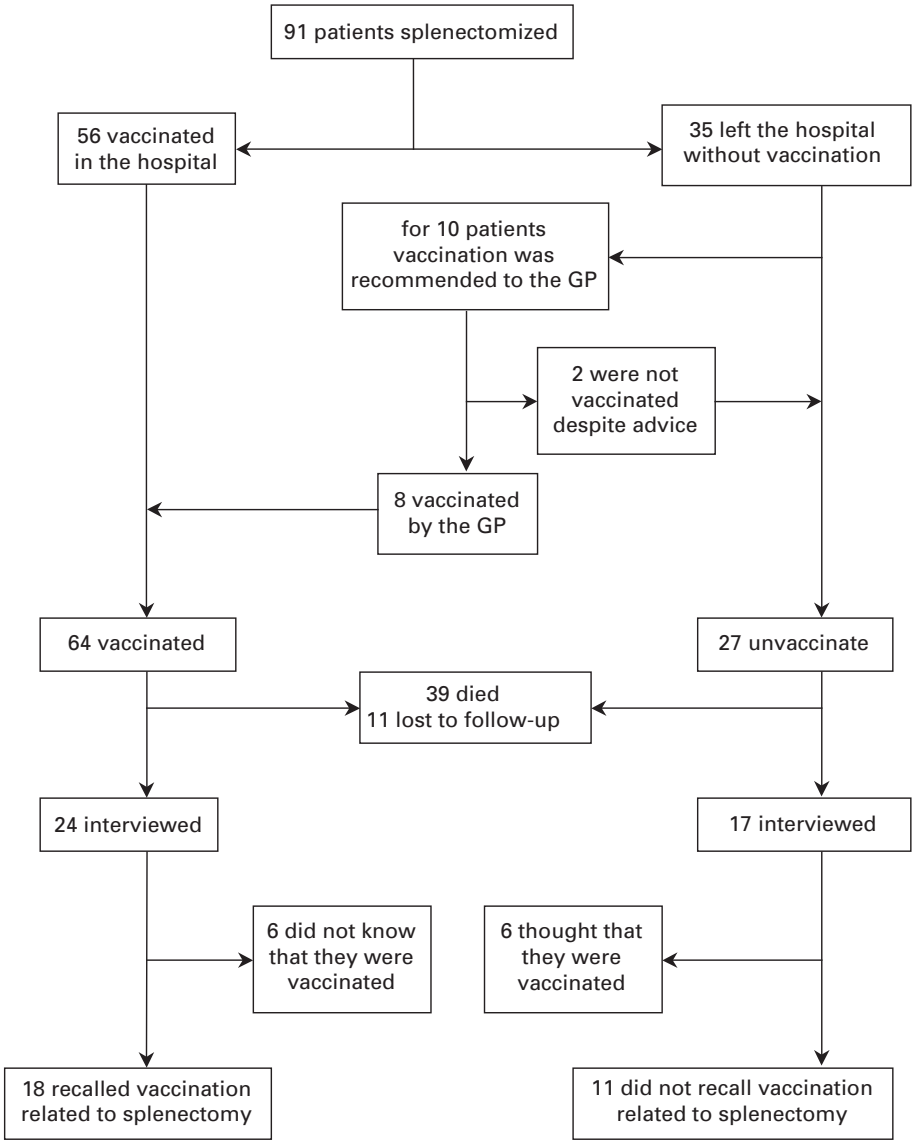

Figure 2
Vaccination compliance after splenectomy.

Discussion

In this survey, we assessed the anti-infectious strategies in 91 patients who were splenectomised in the canton of Thurgau of Switzerland from 1998 to 2003. In Switzerland, specific immunisation recommendations for patients with asplenia have been released on a national basis [11–13], whereas other health precautions remain the responsibility of discipline-related societies or regional health organisations. Such precautions include a variety of measures such as long-term prophylactic antibiotics, urgent systemic antibiotics in developing infections and patient education for travel, animal and tick bites.

In the Swiss vaccination guidelines, immunisations against *St. pneumoniae* and *N. meningitidis* are recommended for people with absent or dysfunctional spleens. 27 of the 91 patients (30%) were not vaccinated against *St. pneumoniae* and 88 (97%) did not receive an immunisation against *N. meningitidis*. However, six (8%) were immunised against *H. influenzae*, which is not recommended in the Swiss guidelines for adults. 30% is an alarming high proportion of individuals that was not given the chance to develop protection against these microorganisms. The omission of vaccination puts asplenic patients not only at a higher risk to develop life-threatening infections, but might also have legal implications.

Whenever possible, vaccination should be performed before splenectomy [14, 15]. Unfortunately, only 6 of 56 patients were pre-operatively immunised. If the vaccination is omitted or in case of emergency splenectomy, it should be performed after the operation. Who is responsible for the delivery of the vaccines? As shown in our analysis, most of the patients who left the hospital unvaccinated were not immunised by the GP later on. Moreover, in the 10 cases where immunisation was advised in the discharge letter, the vaccination was given only in 8 (figure 2). In recent years, efforts to improve professional management of asplenic patients have been made with special regard to a close collaboration between hospital doctor and general practitioner [6, 7, 14]. We suggest that

Table 2

Patient and general practitioner interviews.

Patient interview n = 41		Physician interview n = 41*	
Patient education			
Do you know that you are asplenic?		Do you know that your patient is asplenic?	
Yes	40 (98%)	Yes	41 (100%)
No	1 (2%)	No	0
Do you feel that the hospital doctor informed you sufficiently about the risks and precautions after splenectomy?		Do you know that asplenia puts your patient at risk for infections?	
Yes	10 (24%)	Yes	41 (100%)
No	31 (56%)	No	0
Did your physician at home inform you sufficiently about the risks and precautions after splenectomy?		Do you have any special recommendations for asplenic patients in international travel?	
Yes	8 (20%)	Yes	5 (12%)
No	31 (80%)	No	36 (88%)
Do you know that asplenia puts you at risk for infections?		Do you know that animal bites can be dangerous for asplenic patients?	
Yes	17 (41%)	Yes	0
No	24 (59%)	No	41 (100%)
Antibiotic prophylaxis			
Do you visit your doctor instantly when you develop fever?		What do you recommend to an asplenic patient when he develops fever?	
Yes	5 (12%)	Immediate visit in my cabinet	25 (61%)
No	36 (88%)	Immediate antibiotics	5 (12%)
Do you keep antibiotics at home?		Hospitalisation	2 (5%)
Yes	3 (7%)	Nothing special	9 (22%)
No	38 (93%)		
Vaccination			
Did you receive a vaccination because of the splenectomy?		Was your patient vaccinated?	
Yes	24 (59%)	Yes	24 (59%)
No	17 (41%)	No	17 (41%)
Have you ever been revaccinated because of your asplenia		Which vaccinations?	
Yes	0	Pneumovax,	24 (100%)
No	16 (39%)	Hiberix,	3 (12%)
Don't know	25 (61%)	Meningitec,	2 (10%)
		Have you ever revaccinated your asplenic patient?	
		Yes	0
		No	41 (100%)

* 32 physicians were interviewed. 9 of them were caring for two asplenic patients.
We counted one doctor per patient

patients should always be vaccinated prior to discharge from the hospital at which splenectomy is performed. This would avoid vaccine omissions due to misunderstandings between hospital doctors and GP's. It is important that the immunisations are mentioned in the discharge letter. During the hospital stay, it seems preferable to vaccinate as late as possible, since functional antibody response against pneumococci has been reported to be superior if the vaccine is given with a delay of 7 days or more after the operation [16]. In our study, the majority of patients were immunised between 9 and 18 days after splenectomy.

According to the recommendations of the Health Department of the Swiss Federal Government and of other countries, revaccination against *St. pneumoniae* is recommended every five years. Some authors recommend the control of antibody titers after vaccination to confirm retained immunity. This is, however, not common practice [11, 15]. None of the GP's in our survey knew about these recommendations and none of the 12 patients in this study that qualified for a reimmunisation received a booster. This underlines the importance of a well-documented vaccination file in splenectomised patients, which would enable the GP to keep up with the vaccination schedule.

The use of prophylactic antibiotics over several years is recommended by some authorities [5, 17], whereas in other countries, asplenic patients

are encouraged to keep a supply of stand-by antibiotics at home. In Switzerland, national guidelines for the use of antibiotics in adults do not exist. Both children in our survey took prophylactic antibiotics for more than two years in accordance to paediatric guidelines. None of the adults took antibiotics over a longer period and only 3 patients kept antibiotics available at home. Such a "no antibiotic prophylaxis"-practice has been criticised [17, 18]. However, no prospective study exists to support or reject long-term antibiotics after splenectomy. Prophylactic antibiotics might be indicated in adult patients who are not vaccinated immediately after the operation, because they receive chemotherapy or corticosteroids, which can impair humoral immunity.

Asplenic individuals should be taught and repeatedly reminded about the risks and health precautions, which are required to avoid infectious hazards [20]. These include the need for revaccination, urgent medical support with antibiotics in developing infections, and education about the risks of animal bites and infections acquired by international travel. The knowledge of our patients with regard to all these aspects was poor (table 2). Only 7 knew about the significance of rapid administration of antibiotics in case of fever. The lack of patient education has been observed in other studies as well [9, 10].

In conclusion, we found that in adults with splenectomy, adherence to vaccine guidelines, the use of antibiotic prophylaxis and patient education about infectious risks should be improved substantially. This could be achieved by i) routine vaccination and its documentation before discharge from the hospital, ii) use of prophylactic antibiotics in case vaccination is not performed in the hospital until vaccination is accomplished and iii) continuous patient education by the primary care physicians. The issue of comprehensive national guidelines that include all anti-infectious strategies would help to fulfil these tasks and hopefully prevent further devastating infections after splenectomy.

We thank all patients and general practitioners participating in this study. A special thank goes to Robert Thurnheer for his helpful comments.

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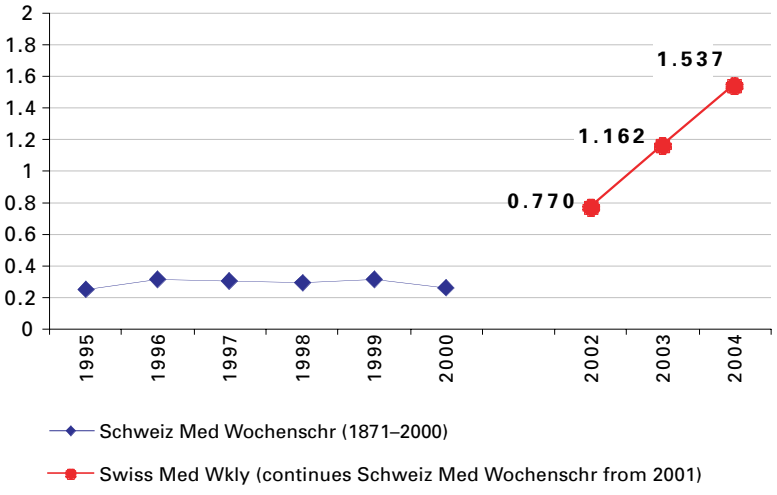

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