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BRIEF REPORT

Postsplenectomy Prophylaxis: A Persistent Failure to Meet Standard?

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A retrospective case review of patients that underwent emergency splenectomy or splenic preservation from May 2003 to April 2014 was undertaken at a single center. The results highlight failures in administration of postsplenectomy vaccination for emergency splenectomy patients. In this study, we highlight methods to improve postsplenectomy care.

Keywords. antibiotic prophylaxis; emergency splenectomy; vaccination.

Splenic rupture, through blunt abdominal trauma or hematological disease, may necessitate emergency splenectomy. Asplenic patients are at risk of overwhelming sepsis, and therefore splenic preservation is advised where possible. However, splenic preservation may lead to functional asplenia, particularly if devascularisation is extensive or if therapeutic embolization of part or all of the spleen is required. Patients with asplenia are at high risk of infection, primarily by encapsulated organisms such as *Streptococcus pneumoniae*, *Haemophilus influenzae* type B, and *Neisseria meningitides*. Less commonly encountered pathogens such as *Capnocytophaga canimorsus*, *Babesia microti*, and possibly *Plasmodium falciparum* are also significant pathogens in asplenic individuals. The lifetime risk of overwhelming postsplenectomy infection (OPSI) varies according to the indication of the splenectomy; however, a 5% risk is commonly stated [1], and mortality rates for OPSI have been reported as high as 50% [2].

Prevention of infection strategy in these "at risk" patients depends on 3 components: (1) education of patients, (2) adoption of appropriate vaccination schedules, and (3) use of prophylactic antibiotics. The British Committee for Standards in Haematology (BCSH) recommends administration of polyvalent pneumococcal vaccine (PPV), *H influenzae* serotype B conjugate (HiB), and meningococcal group C conjugate (MenC) 2 weeks postoperatively [3]. Original guidelines advised lifelong antibiotics to all patients; however, in 2011 the BCSH adapted their antibiotic prescribing policy such that "high-risk patients" should receive lifelong antibiotic prophylaxis. All other patients should receive an emergency supply to be started for sudden acute severe illness prior to emergency ward presentation. Patients with functional hyposplenism should undergo the same vaccination regime; the BCSH do not comment on antibiotic prophylaxis. The vaccination guidelines are in agreement with the Infectious Diseases Society of America (IDSA) recommendations; however, the IDSA does not comment on antibiotic prophylaxis [4]. The aim of our study was to review practice within our center and compare it with the current guidelines.

METHODS

This study comprised a retrospective review of case notes of all patients over the age of 18 who underwent (1) emergency/urgent splenectomy or (2) splenic salvage procedures between May 2003 and April 2014 in a single center. Electronic and physical records were collected, and case management was compared with a modified data collection tool supplied by the BCSH. Both traumatic and atraumatic ruptures were included. Patients were excluded who died within 30 days of admission or if their records were incomplete.

Vaccinations were considered as administered based on documented evidence within patient records or discharge letters. Antibiotic regime was determined based on discharge and follow-up clinic letters. Data regarding operative outcomes, including complications and cause of death, were collected. All patients were followed up according to standard, postsplenectomy procedure within our center.

RESULTS

Seventy-one patients underwent splenectomy, and 5 were excluded due to early mortality (within 30 days). Three patients died due to exsanguination, 2 patients died due to complications of hospital-acquired infections postoperatively. Of 66 survivors, 42 were male, median age was 53 (range 18–89), and median length of stay was 10 days (range 3–93). Fifty-eight (88%) patients underwent emergency splenectomy: 42 for traumatic rupture, 15 for atraumatic rupture, and 1 due to ruptured splenic artery. Eight patients underwent urgent splenectomy for splenomegaly, oesophageal varices, and splenic abscess.

Nine (14%) patients had clear documentation that the patient was at risk of OPSI. Of these, we identified 5 (33%) patients that were high risk according to the new BCSH guidelines; of these, only 1 of 5 (20%) was documented as such. According to BCSH

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Table 1. Vaccination Administration After Emergency Splenectomy and Splenic Preservation

Procedure		PPV (%)	MenC (%)	Hib (%)	Influenza (%)
Emergency splenectomy	Administered in hospital	37 (56)	36 (55)	38 (58)	19 (29)
	GP advised to administer	10 (15)	10 (15)	10 (15)	8 (8)
	Missed vaccinations*	19 (29)	20 (30)	18 (27)	39 (59)
Splenic conservation	Administered in hospital	1 (7)	1 (7)	1 (7)	0 (0)
	GP advised to administer	0	0	0	0
	Missed vaccinations*	14 (93)	14 (93)	14 (93)	15 (100)

Abbreviations: GP, general practitioner; Hib, *Haemophilus influenzae*; MenC, meningococcal group C; PPV, polyvalent pneumococcal vaccine.
*Vaccinations were recorded as missed when there was no documentation that they were given and it was not communicated to the GP to administer them.

guidelines, all patients should be offered overseas travel advice and an "At Risk" card. Two patients (3%) received an At Risk card; however, none received overseas travel advice.

Sixteen patients underwent conservative management for splenic injury. Median age was 30.5 (range 18–94), 1 patient died in hospital (deemed unfit for surgery) and was therefore excluded, and 2 patients were readmitted after further hemorrhage (both successfully managed conservatively).

Just over half of splenectomized patients were administered PPV, MenC, and Hib before discharge (Table 1). Less than one third received influenza vaccination. In an additional 10 cases (15%), when vaccinations were not administered in hospital, advice to the general practitioner (GP) regarding vaccinations was provided in the discharge letter. In approximately 30% of cases, vaccinations were not administered in hospital and recommendations to the GP were not provided. These cases were recorded as "missed vaccinations". This rose to almost 60% with influenza. In those that underwent conservative management of splenic rupture, only 1 of 15 received the appropriate vaccinations.

Before 2011, 92% of patients received the appropriate antibiotic treatment (Table 2). After 2011, all "low-risk" patients were inappropriately prescribed lifelong antibiotics and all "high-risk" patients were correctly prescribed lifelong antibiotic prophylaxis, resulting in the guidelines being followed in 33% of patients. With regards to those who underwent conservative management of splenic rupture, all were managed incorrectly.

If overall appropriate management is considered to be administration of PPV, MenC, and Hib with appropriate antibiotics (long term for all patients pre-2011, long term for high risk post-2011, and emergency for low risk), 40% of patients were treated correctly. This rises to 50% if requesting the GP to deliver the vaccinations is considered appropriate.

DISCUSSION

Despite guidelines by the BSCH, our findings are similar to previous studies [5, 6]: there is a persistent failure to appropriately advise, vaccinate, and provide antibiotics for splenectomized patients. Our study has highlighted deficiencies in all 3 aspects of care: documented evidence of patient education is nonexistent. Over one third of patients are discharged without appropriate vaccination cover, and use of prophylactic antibiotics is also inappropriate.

Failure to deliver best practice postsplenectomy care is not limited to the United Kingdom. In 2003, The Victorian Spleen registry for splenectomized patients was developed in Melborne and later expanded to cover several other regions including Queensland and Tasmania [7]. It was developed as a systematic attempt to combat the failings in patient education and vaccination delivery noted in Eastern Australia. Upon registration, patients receive information regarding their condition—a "spleen alert card"—to ensure clinicians are made aware of their hyposplenia and an annual letter to remind patients of flu and booster vaccinations [8]. The measures show some success. Through self-reporting questionnaires Wang et al [9] showed those taking prophylactic antibiotics within 2 years of splenectomy to be 82.9%, >80% patients received annual influenza vaccination, and the number receiving booster vaccinations remained high. Woolley et al [10] attempted to evaluate the cost effectiveness of the Splenic registry in Australia. It was estimated that over 60 years, 12.5 cases of OPSI would be avoided, at a cost of AUD 1 318 093 (approximately £660 000).

Table 2. Antibiotic Prescribing After Emergency Splenectomy and Splenic Conservation

Procedure		Lifelong Antibiotics (%)	2-Year Antibiotics (%)	Emergency Antibiotics (%)	Nil Antibiotics (%)
Emergency splenectomy	Pre-2011 (n = 51)	45 (88)	2 (4)	–	4 (8)
	Post-2011 Low risk (n = 10)	10 (100)	–	0 (0)	0 (0)
	High risk (n = 5)	5 (100)	–	0 (0)	0 (0)
Splenic conservation	Pre-2011 (n = 1)	1	0	0	0
	Post-2011 Low risk (n = 7)	0	0	0	7
	High risk (n = 9)	0	0	0	9

Abbreviations: Nil, not in list.

Although the introduction of a Splenic registry is unlikely to occur overnight, there are several changes that can be made to our approach to postsplenectomy care. Our results show that 45% of patients are discharged from hospital without vaccinations. From here the responsibility of administering the immunizations has traditionally resided with the GP, yet there is an argument for transferring this responsibility back to the discharging team. Communication between primary and secondary care has often been criticized. Murphy et al [11] have shown that only 70% of discharge letters are received by the GP within 2 weeks. Further evidence suggests that the availability of the discharge letter at the first postdischarge visit is low (12%–34%), and often they do not convey enough information for primary care givers to provide adequate postdischarge treatment [12]. This suggests that a delay in vaccination administration is almost inevitable, or it may not occur at all. To obviate this risk, a 2-week, postoperative outpatient appointment would provide ample opportunity for both vaccination administration and patient education.

As well as vaccinations, the postoperative consultation should be structured to deliver several key points. These include timing of revaccinations, reinforcement of antibiotic prophylaxis, provision of an At Risk card or bracelet, and delivery of overseas travel advice. It should be noted that a number of institutions recommend the discharging doctor to provide the patient with this information. However, many junior clinicians are ill equipped both in time and knowledge to be able to fully explore these topics. Therefore, an outpatient consultation would allow time for the patient to fully process the information. Delivery of this by the surgeon is not required, and specialist nurse practitioners would be well placed to provide this service. It should be stressed that ensuring patient education is not simply fulfilling an obligation towards patient-centered care. El-Alfy and El-Sayed [13] showed patients displaying greatest knowledge had a prevalence of OPSI of 1.4% compared with 16.5% among those with poor knowledge ($P < .001$). Finally, the opportunity can be taken to place an electronic "Tag" upon the patients' records. These alerts appear when the electronic documents are reviewed by the attending clinician. They are predominantly used to highlight patients at risk of neutropenic sepsis, yet they can be adapted to include splenectomy patients at risk of OPSI.

The role of active surveillance of splenectomized patients should pass to primary care. Although most countries lack a national database of asplenic patients, primary care teams can maintain a record of splenectomized patients within their care. From here, invitations for repeat vaccinations can be directly distributed to the patients' homes, as is common practice for most patients requiring the annual influenza vaccine. Dexter et al [14] showed the most effective method for increasing influenza vaccine uptake was to have a designated member of staff to coordinate the campaign. A similar approach could be adopted for splenectomized patients—a practice lead for splenectomized patients, ensuring antibiotic adherence, vaccination administration, and up-to-date patient information distribution.

CONCLUSIONS

Despite a drive to raise awareness of the risks of asplenia, there is an ongoing failure to meet best practice. High-risk patients are not identified, vaccination administration is low, and use of antibiotic prophylaxis is excessive. To address these issues, the authors have advised a number of changes to modify the approach we take to postsplenectomy care. This, alongside education within teams caring for asplenic patients, should improve postsplenectomy care.

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