CASE REPORT

# Fatal Pneumococcal Sepsis Eleven Years After Distal Pancreatectomy with Splenectomy For Pancreatic Cancer

**Enrico Dalla Bona[1], Valentina Beltrame[1], Federica Liessi[2], Cosimo Sperti[1]**

[1]Department of Surgery, Oncology, and Gastroenterology,
Fourth Surgical Clinic, University of Padua. Padua, Italy.
[2]Department of Radiology, Bassano General Hospital. Bassano del Grappa, VI, Italy

**ABSTRACT**

**Context** Overwhelming post-splenectomy sepsis is defined as septicaemia and/or meningitis, usually fulminant, occurring days to several years after removal of the spleen. We report a case of a fulminant pneumococcal sepsis with a fatal outcome, occurring 11 years after distal pancreatectomy and splenectomy for pancreatic adenocarcinoma. **Case report** A 58-year-old woman presented to the emergency room in December 2011 with a 2-day history of mild fever and diarrhea, followed by hypotension, dyspnea, and peripheral cyanosis. Past medical history revealed a left breast quadrantectomy for lobular carcinoma, and distal pancreatectomy with splenectomy for ductal pancreatic adenocarcinoma in October 2000. The patient was not aware of the need for prophylactic antibiotics and vaccination after splenectomy. At admission, blood tests revealed abnormal coagulation screen, abnormal liver and kidney function, and metabolic acidosis. Despite the administration of intravenous fluid, vasopressor agents, antibiotics and mechanical ventilatory support, the patient died for multiorgan failure 7 hours after admission in intensive care unit. Blood culture showed the growth of *Streptococcus pneumonia*. Necropsy showed multiorgan failure with adrenal necrotic hemorrhage due to pneumococcal septicemia. No recurrence of pancreatic cancer was noted. **Conclusions** Overwhelming post-splenectomy sepsis is a well-known fatal complication which can occur in asplenic patients. The role of vaccination and antibiotics in preventing such complication is well-defined, but cases of fatal post-splenectomy sepsis are still reporting, also in vaccinated patients. High index of suspicion must be maintained for any febrile illness in asplenic patients.

## INTRODUCTION

Overwhelming post-splenectomy sepsis is defined as septicemia and/or meningitis, usually fulminant, occurring days to years after removal of the spleen [1]. The risk of overwhelming post-splenectomy sepsis is estimated to be 0.23-0.42% per year with a lifetime risk of 5% [2]. The highest risk of developing overwhelming post-splenectomy sepsis is within the first few years after splenectomy, particularly in children younger than 2 years, and elderly patients [3]. The incidence of sepsis is also associated with the underlying pathology, with higher incidence for patients splenectomized for hematologic disease rather than for trauma [4]. We report a case of fulminant pneumococcal sepsis with a fatal outcome, occurring 11 years after distal pancreatectomy and splenectomy for pancreatic ductal adenocarcinoma. To our knowledge, this is the first case of overwhelming post-splenectomy sepsis reported for patients who had undergone resection for pancreatic cancer.

Received July 11th, 2012 – Accepted September 24th, 2012

**Key words** Pancreatectomy; Pancreatic Neoplasms; Pneumococcal Infections; Sepsis; Splenectomy

**Correspondence** Cosimo Sperti
Department of Surgery, Oncology, and Gastroenterology; Fourth Surgical Clinic; University of Padua; Via Giustiniani 2; 35128 Padova; Italy
Phone: +39-049.821.8845; Fax: +39-049.821.8821
E-mail: csperti@libero.it

## CASE REPORT

A 58-year-old woman presented to the emergency room with a 2-day history of mild fever and diarrhea, followed by cough and petechial rash. As suggested by her general practitioner, she had taken paracetamol tablets. Past medical history revealed a left breast quadrantectomy for lobular carcinoma (pT1N1M0G2) in June 2000, and distal pancreatectomy with splenectomy for ductal adenocarcinoma of the tail of the pancreas (pT3N1M0G2) in October 2000, followed by cycles of breast and upper abdomen radiotherapy and chemotherapy (5-fluorouracil plus gemcitabine). The patient was not aware of the need of prophylactic antibiotics and vaccination after splenectomy.

Two years after surgery, abdominal CT scan showed an enlarged left para-aortic lymph node. Whole-body positron emission tomography (PET) showed high uptake of the radiotracer in the corresponding area, and the patient underwent relaparotomy with node excision. Pathologic examination confirmed a metastatic pancreatic adenocarcinoma: adjuvant chemotherapy

(gemcitabine plus cisplatin) was performed, and oncologic follow-up was planned. Vaccination against *Streptococcus pneumonia* was also recommended, but the patient did not follow the advice to undergo vaccination. For 11 years after splenectomy she remained in good health, and no tumor's recurrence was detected.

At admission in December 2011, she presented tachycardia, dyspnea, mental confusion, widespread dark-blue petechiae over almost the entire skin: diarrhea or other abdominal symptoms were not present. Blood tests (Table 1) revealed abnormal coagulation screen, abnormal liver and kidney function, metabolic acidosis. Chest radiograph demonstrated a poor inspiratory effort, normal heart size, and no focal opacities.

Despite the administration of intravenous fluid, vasopressor agents, wide spectrum antibiotics and mechanical ventilatory support, the patient rapidly deteriorated, and finally she died seven hours after admission at the emergency room.

The blood cultures taken on admission revealed the growth of *Streptococcus pneumonia*, serotype 1 .At necropsy, the main findings were petechial hemorrhages on several internal organs, including small bowel and colon, and bilateral, massive adrenal hemorrhages (result of diffuse intravascular coagulation) due to pneumococcal septicemia. Moreover, the autopsy confirmed the absence of recurrent cancer.

## DISCUSSION

Asplenic patients are susceptible for infection with encapsulated bacteria. *Streptococcus pneumonia* is the most common pathogen implicated in overwhelming post-splenectomy sepsis accounting from 50% to 90% of all infections; furthermore 60% of fatal infections are caused by *Streptococcus pneumonia* [5]. There are other encapsulated bacteria such as *Haemophilus Influenzae* type B, *Neisseria meningitides, Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* also known to be causative agents.

Other pathogens less commonly involved may be *Capnocytophaga canimorsus* (a bacteria transmitted by dog bites), and parasites such as *Babesia microti* and *Plasmodium falciparum* [6].

Although the highest risk of developing overwhelming post-splenectomy sepsis occurs within the first few years after surgery, the risk of developing life-threatening infections for splenectomized patients remains for life, as demonstrated by several reported cases occurred 10-30 years after splenectomy [1, 7].

Overwhelming post-splenectomy sepsis is still considered a fatal infection without treatment, and the mortality rate still remains 50-70% despite aggressive therapy [8]. The clinical presentation of overwhelming post-splenectomy sepsis usually starts with mild fever and aspecific symptoms which can degenerate in a quick worsening of patient's condition till septic shock and multi-organ failure. Death can occur in 24 to 48 hours of the symptoms onset [6,7].

Our patient developed a pneumococcal sepsis several years after splenopancreatectomy for pancreatic cancer, and died few hours after hospital admission. Blood culture showed the growth of *Streptococcus pneumonia* serotype 1, a type eventually covered by the 23-valent vaccine actually administered after splenectomy. However, the patient did not receive vaccination either at the time of splenectomy or during the follow-up (as suggested after the second operation) or during the program of vaccination of high-risk patients (i.e. splenectomy) by local health care providers in 2005-2007. Moreover, she was not aware of the risk of severe infection and the needs of prompt antibiotic therapy. Finally, the patient survived her pancreatic cancer, but died for a fulminant infection. Obviously, the incidence of overwhelming post-splenectomy sepsis after distal pancreatectomy and splenectomy for pancreatic cancer is not known, since most of the patients with carcinoma of the pancreas die within few years after surgery. However, as in our case, long-term survivors (more than 5 years) after resection for pancreatic cancer have been reported [9]: so, clinicians should pay attention to patients splenectomized for digestive malignancies.

According to the difficulty of treating overwhelming post-splenectomy sepsis once it rises, prevention has a key role in all asplenic patients. Immunization is essential to prevent disease caused by encapsulated bacteria *Streptococcus pneumonia*; several studies suggest that the best clinical practice is to give the 23-valent polysaccharide vaccine for elective splenectomy 2 weeks before and after splenectomy, and a revaccination every 5 years [10, 11]. Patients should

**Table 1.** Blood tests on admission.

| Test | Values | Reference range |
|---|---|---|
| WBC ($x10^9$/L) | 5.38 | 4.5-10 |
| Platelets ($x10^3$/μL) | 36 | 150-400 |
| INR | 6.19 | 0.90-1.20 |
| APTT (sec) | 181.4 | 23.5-34.0 |
| D-dimer (ng/mL) | >10.000 | 0-500 |
| AST (U/L) | 320 | 0-35 |
| ALT (U/L) | 129 | 0-35 |
| Urea (mg/dL) | 103 | 20-50 |
| Glucose (mg/dL) | 49 | 50-110 |
| Sodium (mEq/L) | 134 | 135-145 |
| Potassium (mEq/L) | 3.2 | 3.3-5.1 |
| CRP (mg/dL) | 13.37 | 0-0.50 |
| P-calcitonin (ng/mL) | 15.9 | <0.50 |
| sLactate (mmol/L) | 12.0 | 0.5-1.6 |
| pH | 7.25 | - |
| Base excess (SBE; mmol/L) | -17.4 | - |
| $O_2$ saturation (%) | 95.6 | - |

ALT: alanine aminotransferase; APTT: activated partial thromboplastin time; AST: aspartate aminotransferase; CRP: C-reactive protein; INR: international normalized ratio; WBC: white blood cell count

also be immunized against *Haemophilus influenzae* and *Neisseria meningitidis*, and a yearly administration of influenza vaccine is recommended [12]. Although the risk of infection is lowered by vaccination [13], cases of fatal sepsis also in vaccinated patients are reported [14].

Antibiotic prophylaxis against encapsulated bacteria after splenectomy is controversial due to poor compliance rate to lifelong antibiotic therapy, increased risk of developing antibiotic resistance and risk of underestimate eventual initial symptoms of infection [15].

Education of the patient is necessary for successful prevention of overwhelming post-splenectomy sepsis; asplenic patients and their familiar should be made aware of their increased risk of developing overwhelming post-splenectomy sepsis, they have to be educated to seek medical attention at the first sign of febrile illness. The medical staff have to be informed about the asplenic status of the patients, and they should be empirically and promptly treated, without delay while waiting for blood test results. Despite such efforts, reports of overwhelming post-splenectomy sepsis cases continue to occur [16], suggesting a continuing broad failure to attain current recommendations in the management of asplenic patients [17, 18]. Pebody *et al*. [19] in 2006 reported the findings of a questionnaire survey of pneumococcal disease (IPD) surveillance practice in Europe. Over a 12-month period, the incidence of pneumococcal sepsis was quite variable in different countries, ranging from 0.4 to 20/100,000 in general population, with a total of 23,470 reported cases. Surveillance in Europe was very heterogeneous, since some countries had no IPD surveillance, and a number of others had surveillance only for pneumococcal meningitis. Adults who had a splenectomy many years ago may not be aware of the risks and may never been offered antibiotic prophylaxis or vaccination [18]. The role of healthcare professionals may be important. A register of patients at high risk of developing pneumococcal sepsis (i.e. splenectomized patients) is advisable. The goal should be to vaccinate at risk subjects through the National Health System, not only through general practitioner [16].

In conclusion, overwhelming post-splenectomy sepsis is a rare but fatal complication which can occur to asplenic patients. Prevention is crucial to reduce the risk of overwhelming post-splenectomy sepsis and unnecessary death, we therefore recommend pneumococcal vaccine within two weeks after surgery and patient education.

**Conflict of interest** The authors have no potential conflict of interest

**References**

1. Waghorn DJ, Mayon-White RT. A study of 42 episodes of overwhelming post splenectomy infection: Is current guidance for asplenic individuals being followed?. J Infect 1997; 35: 289-294 [PMID:9459404].

2. Davidson RN, Wall RA. Prevention and management of infections in patients without a spleen. Clin Microbiol Infect 2001 ;7:657-660 [PMID: 11843905].

3. Romano F, Garancini M, Ciravegna AL, Uggeri F, Degrate l, Maternini M, et al. The implications for patients undergoing splenectomy: post-surgery risk management. Open Access Surgery 2011:4 21-34. [DOI: 10.2147/OAS.S10156]

4. Singer DB. Postsplenectomy sepsis. Perspect Pediatr Pathol. 1973;1:285-311 [PMID: 4596312].

5. Bisharat N, Omari H, Lavi I, Raz R. Risk of infection and death among post splenectomy patients. J Infect 2001; 43: 182-186. [PMID: 11798256]

6. Lynch AM, Kapila R. Overwhelming postsplenectomy infection. Infect Dis Clin North Am 1996 ; 10: 693-707. [PMID: 8958164]

7. Moffett SL.: Overwhelming postsplenectomy infection: managing patients at risk. JAAPA 2009 ; 22:36-39,45. [PMID: 19697570]

8. Spelman D, Buttery J, Daley A. Isaacs D, Jennens I, Kakakios A, et al. Guidelines for the prevention of sepsis in asplenic and hyposplenic patients. Intern Med J 2008; 38: 349–356. [PMID: 18284463]

9. Adham M, Jaeck D, Le Borgne J, Oussoultzouglou E, Chenard-Neu MP, Mosnier JF, et al. long-term survival (5-20 years) after pancreatectomy for pancreatic ductal adenocarcinoma: a series of 30 patients collected from 3 institutions. Pancreas 2008; 37: 352-357 [PMID: 18665012]

10. Okabayashi T, Hanazaki K. Overwhelming post-splenectomy infection syndrome in adults - A clinically preventable disease World J Gastroenterol. 2008; 14: 176–179 [PMID: 18186551].

11. Mourtzoukou EG, Pappas G, Peppas G, Falagas ME. Vaccination of asplenic or hyposplenic adults. Brit J Surg 2008; 95:273-280 [PMID: 18278784].

12. Davies JM, Barnes R, Milligan D. Update of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen. Clin Med 2002;2:440-443 [PMID: 12448592]

13. El-Alfi MS, El- Sayed MH. Overwhelming post-splenectomy infection: is quality of patient knowledge enough for prevention? Hematol J 2004; 5: 77-80 [PMID: 14745434]

14. Klinge J, Hammersen G, Scharf J, Lutticken R, Reinert R. Overwhelming post-splenectomy infection with vaccine-type Streptococcus pneumonia in a 12-year-old girl despite vaccination and antibiotic prophylaxis. Infection 1997; 25: 368-371 [PMID: 9427057].

15. Castagnola E, Fioredda F: Prevention of life-threatening infections due to encapsulated bacteria in children with hyposplenia or asplenia: a brief review of current recommendations for practical purposes. Eur J Hematol 2003;71:319-326 [PMID: 14667194].

16. Chironna M, Sallustio A, De Robertis A, Quarto M, Germinario C. Case report: fulminant pneumococcal sepsis in an unvaccinated asplenic patient in Italy. Euro Surveill 2010; 15(23): pii=19585 [PMID: 20546695]

17. Waghorn DJ. Overwhelming infection in asplenic patients: current best practice preventive measures are not being followed. J Clin Pathol 2001; 54: 214-215 [PMID: 11253134].

18. Davies JM, Lewis MPN, Wimperis J, Rafi I, Ladhani S, Bolton-Maggs PHB. Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: prepared on behalf of the British Committee for standards in Hematology by a Working Party of the Haemato-Oncology Task Force. Br J Haematol 2011; 155: 308-317 [PMID: 21988145

19. Pebody RG, Hellenbrand W, D'Ancona F, Ruutu P. Pneumococcal disease surveillance in Europe. Euro Surveill 2006; 11(9):646. [PMID: 17075159].