

Case 6

R.L. is a 9 year-old boy who presented to the Emergency Room complaining of diffuse abdominal pain. He had just sustained an accident while sleighing. His blood pressure was 80, his heart rate was 140, and he appeared to be in shock. An alert surgical resident arranged for an emergent laparotomy, which revealed a ruptured spleen. The patient underwent emergent splenectomy and had an uneventful postoperative course.

The patient was well until age 40, when he developed a productive cough and fever and appeared acutely ill. His temperature was 102°F and her BP was 160/90. Given the patients' history and physical examination, a physician obtained a chest X-ray (Fig. 1). The patient was hospitalized and treated with intravenous ampicillin. The patient gradually improved. A blood culture subsequently grew *Streptococcus pneumoniae*.

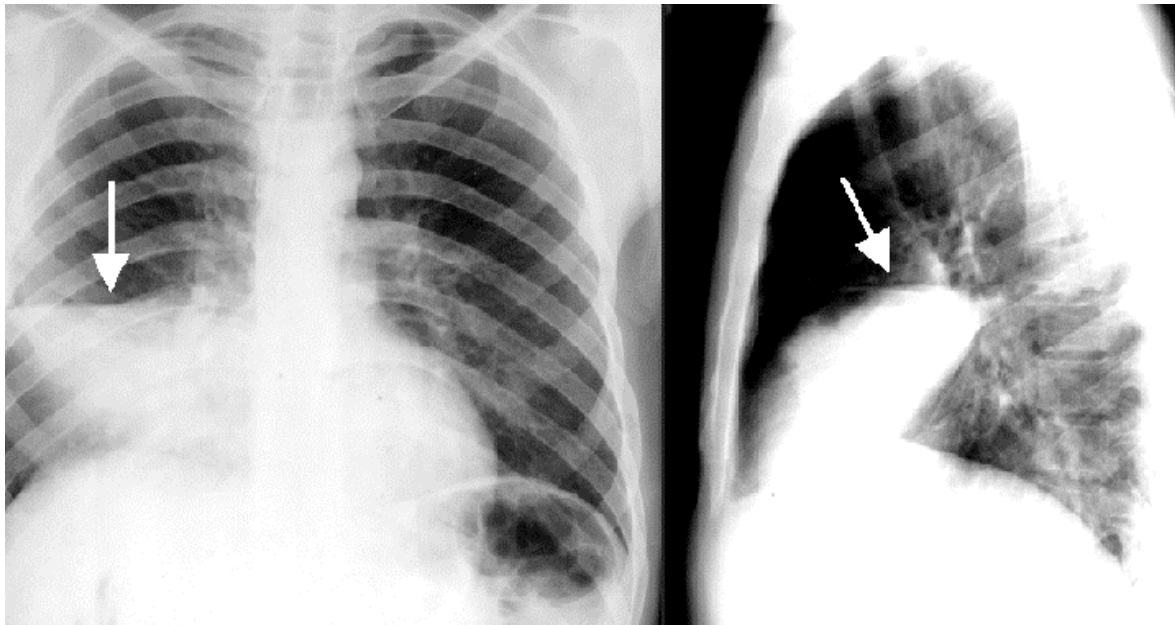


Fig. 1. PA and lateral chest X-ray of R.G. on presentation at age 40. Arrows point to consolidation of the right middle lobe.

Questions for Case 6

- (1) What types of infection are post-splenectomy patients susceptible to and how does the spleen help protect against them? What prophylactic measures can be taken to help prevent these infections? What advice would you give to post-splenectomy patients who plan to travel to a tropical country?
- (2) Describe the cellular events that ensue following inhalation of a virulent strain of *Streptococcus pneumoniae*. Include a discussion of the innate and acquired immune responses.

Questions for Case 6, cont'd

(3) Immunity against encapsulated bacteria depends on adequate phagocytosis; however, the thick polysaccharide coat of these organisms potently resists non-opsonic phagocytosis. This implies that immunity against *S. pneumoniae* depends on adequate titers of antibodies against capsular polypeptides. How can the host generate a primary immune response against this organism if it resists phagocytosis (and hence entry into an MHC Class II-loading compartment in APCs) to begin with?

(4) In several recent studies of mouse models of pneumococcal pneumonia, mice that were rendered deficient in either Surfactant Protein D, C1q, or the macrophage scavenger receptor MARCO demonstrated decreased lung clearance of *S. pneumoniae*. Provide a plausible explanation for these results.

Optional clinical questions:

(5) At the time of presentation, the choice of antibiotic was based on the clinical presentation and the knowledge that patients without a spleen carry increased risk of mortality with pneumococcal infections. Although the patient improved on ampicillin, its spectrum of activity is somewhat limited but does include *S. pneumoniae*. In retrospect, this was a poor, albeit fortuitous choice. Why?

(6) The lifetime risk of overwhelming post-splenectomy infections is about 5% with a mortality of up to 69%. What can the surgeon do during the time of surgery that minimizes the lifetime risk of infectious complications?