A Subtle Chest Radiographic Finding*
Where Is the Pathology?

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A 60-year-old corticosteroid-dependent woman with end-stage renal disease and systemic lupus erythematosus was admitted with an acute febrile illness and septic arthritis. The patient had a history of peptic ulcer disease, tuberculosis, and lower gastrointestinal tract bleeding with documented colonic diverticuli. Review of systems was remarkable for bilateral shoulder pain, occasional nausea, vomiting, frequent hiccoughs, and recurrent left lower quadrant discomfort.

Physical examination revealed an oral temperature of 38.8°C, bilateral shoulder stiffness with tenderness, and a benign abdomen. Both upper extremities had arteriovenous (AV) access for dialysis, with no blood flow through the left graft. Arthrocentesis of the shoulder joints revealed purulent fluid. Gram-positive cocci (later identified as Staphylococcus aureus) were isolated from cultures of the blood, synovial fluid, and fluid aspirated from the clotted left AV fistula. After several days of antibiotic therapy, the right AV fistula was surgically removed, and the left graft was declotted. Postoperatively, placement of a left subclavian central venous line was unsuccessfully attempted, and a chest radiograph was subsequently obtained (Fig 1).

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Diagnosis: Subcutaneous emphysema secondary to a perforated diverticular abscess

The chest radiograph was remarkable for subcutaneous air along the left lateral chest wall (Fig 2), with no evidence of pneumothorax related to the attempted central line placement. Necrotizing fasciitis along the surgical wound site and pneumomediastinum were absent. In retrospect, the patient had vague abdominal pain, heme-positive stools, and lower quadrant tenderness for at least two days prior to surgery. Postoperatively, worsening abdominal pain and altered mental status developed. The patient later became hemodynamically unstable. An abdominal computed tomographic scan revealed a left colonic diverticular abscess with extensive extraperitoneal air along the left abdominal and chest walls (Fig 3). There was no pneumoperitoneum. A colostomy and an ileostomy were performed for left colonic diverticulitis with perforation and adhesions to the small bowel and ovary. The patient had a complicated postoperative course and died on hospital day 29.

Subcutaneous emphysema may be due to pathologic changes in the chest or lung, localized infection with gas-producing organisms, abdominal procedures (surgery, colonoscopy, laparoscopy), and intestinal perforation. Prompt identification of the cause of subcutaneous air may lead to the early treatment of a potentially catastrophic event. In our patient, the incidental finding of subcutaneous air on the chest radiograph heralded the development of an acute abdomen from a perforated viscus. Air, either from gas-producing organisms or from the intestinal lumen itself, can track along the retroperitoneal fascial planes into the abdominal and chest walls, causing subcutaneous emphysema. From the posterior pararenal space, air may extend through the diaphragmatic hiatus, resulting in pneumomediastinum. Air may dissect inferiorly along the psoas muscle and vascular bundles into the thigh. The location and spread of the extraperitoneal air is determined by the anatomic barriers and fixed fascial layers surrounding the region of pathologic change. In diverticular perforation of the descending and sigmoid colon, extraperitoneal air is most often localized to the left side.

Subcutaneous emphysema may be the first manifestation of an occult perforation, either from sigmoid diverticulitis or from other retroperitoneal processes. Such pathology must be considered whenever a patient presents with unexplained subcutaneous emphysema of the chest wall, thigh, or abdomen.

REFERENCES
3 McCorkle H, Stevenson J. Subcutaneous emphysema associated with perforated peptic ulcer. Surgery 1937; 2:930
7 Meyers M. Radiological features of the spread and localization of extraperitoneal gas and their relationship to its source. Radiology 1974; 111:17-26