Case Report

Bowel Perforation Presenting as Subcutaneous Emphysema of the Thigh

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Abstract Necrotizing fasciitis is recognized as a surgical emergency. Early detection and aggressive surgical débridement are crucial to reduce patient mortality and morbidity. There are, however, other causes of subcutaneous emphysema. We present the case of a 64 year-old patient with a history of postsurgical radiation for rectal carcinoma with subcutaneous emphysema of the thigh in the presence of urinary sepsis. Surgical exploration revealed the source of the emphysema to be an enterocutaneous fistula. The patient had an unstable and prolonged hospitalization after débridements of the thigh and abdominal surgery and was readmitted for recurrence of thigh drainage, but eventually was discharged; nine months after the initial diagnosis all wounds had healed and he was walking with a walker. Despite an otherwise benign clinical appearance, the radiographic finding of subcutaneous emphysema in the absence of penetrating trauma must be considered a case of a necrotizing soft tissue infection until proven otherwise.

Introduction

Necrotizing fasciitis is one of the few true emergencies in orthopaedic surgery. It typically involves a gas-forming bacteria such as Group A β -hemolytic *Streptococcus* or a *Clostridium* species [9, 20]. This gas formation leads to the radiographic finding of subcutaneous emphysema. Not all cases of subcutaneous emphysema, however, are attributable to necrotizing fasciitis. It is important to include other causes of subcutaneous emphysema in the differential diagnosis.

We present the case of a patient with urinary sepsis who had subcutaneous emphysema of the thigh attributable to a perforation of the small intestine.

Case Report

A 64-year-old man presented to the emergency room with a 2-day history of dysuria and foul-smelling urine. He also had left thigh pain present since a fall 2 weeks earlier that had decreased his functional status from an independent ambulator to requiring an assistive device for ambulation. The patient lived at home with his wife. He had a history of pelvic irradiation for Stage III rectal carcinoma 7 years previously. Physical examination in the emergency room revealed a patient who was in no acute distress, alert, and oriented. He was afebrile, with an oral temperature of 97.8° F. His blood pressure was 86/61 and pulse rate was 103. An abdominal examination revealed a scaphoid abdomen that was soft and nontender. Normal abdominal bowel sounds were present. Lower extremity examination revealed bilateral 2+ pitting edema to the level of the midtibia and mild tenderness to palpation along the left femur laterally. The patient had mild groin pain with left

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Each author certifies that his or her institution approved the reporting of this case report, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

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hip internal rotation, but he could be flexed to 90° passively with only minimal difficulty. Laboratory tests revealed a peripheral leukocyte count of 20,300 and positive leukocyte esterase on urinalysis. With blood cultures pending, the patient was admitted under care of the internal medicine service with a diagnosis of urosepsis. On the night of admission the patient required vasopressors to maintain his blood pressure.

On the second hospital day his doctors ordered plain radiographs of the left hip and femur (Fig. 1) owing to thigh swelling and pain with movement of the left lower extremity. Subcutaneous emphysema was seen on the radiographs leading to concern for necrotizing fasciitis and a subsequent consultation with orthopaedic surgery. The initial orthopaedic surgery evaluation revealed an elderly man in mild distress. His vital signs were stable without the use of vasopressors. Physical examination showed mild pain with active and passive range of motion of the left hip. There was only mild erythema about the left hip and thigh (Fig. 2), but there was diffuse pitting edema affecting the entire left lower extremity (Fig. 3). MRI of the left hip showed extensive left lateral thigh (6.0- × 2.2- × 30.0-cm) and left pelvic (6.0- × 1.5-cm) rim-enhancing fluid collections most compatible with abscesses (Fig. 4). The patient was taken emergently to the operating room for an irrigation and débridement.

A lateral approach to the femur was used. The initial dissection showed the subcutaneous fat appeared normal.

Fig. 1 An initial radiograph shows subcutaneous emphysema of the thigh.

However, incision of the fascia yielded a substantial amount of purulent and feculent material. A large amount of the vastus lateralis was necrotic as evidenced by its

Fig. 2 The initial clinical examination showed mild lower extremity erythema.

Fig. 3A–B Photographs of the (A) upper and (B) lower portions of the legs taken during the initial clinical examination show diffuse pitting edema affecting the entire left lower extremity.

Fig. 4 A MR image shows extensive left lateral thigh and left pelvic rim-enhancing fluid collections most compatible with abscesses.

abnormal color and consistency, its lack of observed bleeding, and its lack of contractility when stimulated by the electrocautery device. Blunt dissection in the proximal aspect of the wound showed there was a tract that communicated with the pelvis. Blunt probing of this tract with a finger and with a Yankauer suction tip showed this to be the source of the feculent material. An intraoperative general surgery consultation was obtained. However, the patient had intraoperative changes develop on his electrocardiogram and he required vasopressor support to maintain adequate blood pressure; therefore, the consulting general surgeons believed it was wiser to medically optimize the patient before a large exploratory surgery. A wound vacuum was placed on the extensile wound and the patient was transferred intubated to the intensive care unit for completion of his cardiac workup and medical optimization.

An abdominal CT scan was obtained on Hospital Day 4, which revealed multiple dilated loops of small bowel, with the largest measuring approximately 6 cm in transverse diameter with no specific transition point to the decompressed distal ileum and colon. No evidence of extraluminal contrast was seen; however, the free air in the abdomen and thigh were concerning for a fistula extending out of the patient's pelvis into his left thigh. He therefore was taken to the operating room on Hospital Day 5 for an exploratory laparotomy by the general surgeons. An enterocutaneous fistula was found in the small intestine that was adherent to the pelvic floor attributable to the patient's previous irradiation (Fig. 5). One foot of small intestine was resected,

Fig. 5 A photograph taken at the time of laparotomy shows a small bowel perforation that was the source of the lower extremity infection.

adhesions were lysed, and a primary anastomosis was performed.

The patient was returned to the operating room by orthopaedic surgeons for three subsequent surgical débridements and delayed primary closure of the distal portion of his left thigh wound and wound vacuum placement proximally. The patient was discharged to a skilled nursing facility on Hospital Day 22.

His discharge may have been somewhat premature because 1 week after discharge, the patient was readmitted owing to purulent discharge from the proximal portion of his left thigh. The patient was taken to the operating room for repeat irrigation, débridement, and wound vacuum change by orthopaedics. A workup by general surgery did not reveal fistula recurrence. The patient was released on Hospital Day 16 and made marked progress without wound vacuum changes to treat a residual a 3- by 5-cm wound of his proximal thigh. At last followup 9 months after his initial presentation, all wounds were healed and the patient was walking with a walker.

Discussion

Necrotizing fasciitis is one of the few true emergencies encountered by the orthopaedic surgeon. It is a rapidly progressing infection that has been associated with mortality rates of 26% to 34% [17, 29]. Early aggressive surgical débridement provides the best chance for survival [2]. In one review, amputation was necessary for infection control in 22.5% of cases [29]. This rare infection usually involves a gas-forming organism such as Group A β -hemolytic *Streptococcus* species or a *Clostridium* species. There also have been reports of necrotizing soft tissue

infections from methicillin-resistant *Staphylococcus aureus* [6]. This gas formation leads to the finding of subcutaneous emphysema on plain radiographs. As the physical examination and laboratory findings in necrotizing fasciitis often are rather benign in appearance, this radiographic finding of subcutaneous emphysema is often the only sign of necrotizing fasciitis. Thus, despite an otherwise benign clinical appearance, the radiographic finding of subcutaneous emphysema in the absence of penetrating trauma must be considered a case of a necrotizing soft tissue infection until proven otherwise. Owing to the high risk of mortality and the rapidly progressing nature of the infection, prompt diagnosis and surgical débridement are of utmost importance. One possible way to decrease the time from initial consultation to surgical débridement is to eliminate performing MRI. Although MRI can help in directing the particular site of surgical débridement, it should not be obtained in a patient who is unstable. Furthermore, MRI should not be performed if it is time-consuming, as an initially stable patient may decompensate while obtaining the study. MRI should be performed only if it can be obtained expeditiously in a stable patient. If it is too time-consuming to perform MRI, no additional studies should be obtained and the patient should be taken to the operating room for irrigation and débridement. The ultimate outcome for our patient was not adversely affected by the time delay in performing MRI; however, in retrospect, it may not have been completely necessary.

There are other causes of subcutaneous emphysema in an extremity. Any traumatic wound can lead to air in the subcutaneous tissues [1, 7, 22, 23]. Perforations of the trachea or the esophagus can present with upper extremity subcutaneous emphysema [13, 24]. When the location of subcutaneous emphysema is in the upper portion of the lower extremity, an intestinal source must be considered [5, 14, 19]. Subcutaneous emphysema of the hip and lower extremity have been reported several times in the general surgery literature and have been associated with a perforated diverticulum [4, 8, 11], a perforated colon from carcinoma [10, 16, 18], or a perforated appendix [27].

Subcutaneous emphysema of the hip and thigh as the initial presentation of either a perforated colonic diverticulum or an intestinal carcinoma also have been reported in the general surgery literature [12, 25]. There are some reports of this presentation in the orthopaedic surgery literature [3, 15, 21, 26, 28]. As the orthopaedic surgeon is the most likely specialist to be consulted by the emergency room or internal medicine service to rule out and treat a necrotizing soft tissue infection, it is important for the orthopaedic surgeon to consider all possible etiologies of subcutaneous emphysema. Prompt recognition of an enteric source of subcutaneous emphysema is necessary to ensure the proper general surgery consultation is obtained

to appropriately treat the patient's underlying disease process.

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