

## CASE REPORT

# Subcutaneous emphysema of the extremities: Be wary of necrotizing fasciitis, but also consider occult rupture or perforation

Maurizio Tosi<sup>1</sup>  | Alexandre Al-Awa<sup>2</sup>  | Steven Raeymaeckers<sup>2</sup>  | Johan De Mey<sup>2</sup>

<sup>1</sup>Department of Anesthesiology, UZ Brussel, Brussel, Belgium

<sup>2</sup>Department of Radiology, UZ Brussel, Brussel, Belgium

**Correspondence**

Maurizio Tosi, Department of Anesthesiology, UZ Brussel, Laarbeeklaan 101, 1090 Jette, Belgium.  
Email: maurizio.tosi@uzbrussel.be

**Funding information**

None

**Abstract**

Not all causes of subcutaneous emphysema are attributable to necrotizing fasciitis. Consider other causes of subcutaneous emphysema in the differential diagnosis.

**KEYWORDS**

intestinal perforation, necrotizing fasciitis, occult rupture, soft tissue infection, subcutaneous emphysema

## 1 | CASE

Subcutaneous emphysema of the extremities can be associated with necrotizing fasciitis but can also be caused by local spreading of air. If the lower extremity is affected, an intestinal rupture should be explored. The diagnosis of a retroperitoneal perforation is usually impeded by a lack of signs of peritoneal irritation.

A 69-year-old male patient presented at the ER with fever and an infectious and inflammatory bloodwork. The patient was previously diagnosed with a rectal carcinoma in 2016 (T3N2M0), for which he had undergone neoadjuvant radiochemotherapy and robot-assisted resection of the rectum. In 2018, a solitary metastatic lung lesion was diagnosed, for which the patient underwent a left upper lobectomy. Recently, a new solitary metastatic liver lesion was diagnosed. For this, the patient was started on chemotherapy (FOLFOX/bevacizumab) for two months. The patient now presented with persistent pain in the gluteal region for several days, local redness with calor, and swelling in the right buttock was seen with an abrasive wound on the skin (Figure 1). The diagnosis of erysipelas was

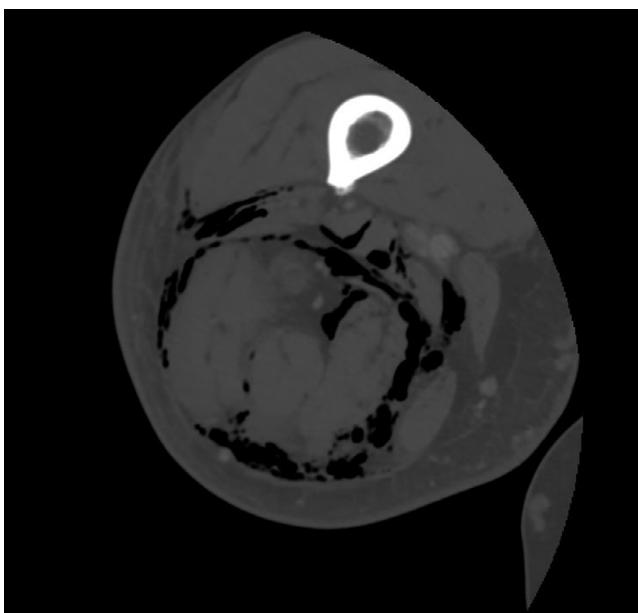
withheld, and the patient was admitted to the hospital and started on IV flucloxacillin. Oxycodone was given for the pain. The next day, the patient developed a progressive swelling of the ipsilateral upper leg with subcutaneous emphysema. The edema had spread to the level of the knee, and necrotizing fasciitis was suspected. The attending dermatologist then switched the antibiotic treatment to broad-spectrum antibiotics using a combination of amoxicillin/clavulanic acid and clindamycin. The dermatologist also ordered a contrast-enhanced CT of the leg to confirm the presence and the extent of collections. Axial slices through the upper leg demonstrate the diffuse presence of air, both subcutaneous and dissecting the muscles (Figure 2). This free air extends up to the buttocks and into the retroperitoneum where the radiologist suspected a rectum perforation (Figure 3). No collections were present in the upper leg, so the diagnosis of necrotizing fasciitis seemed less likely. The abdominal surgeons performed an emergency laparoscopy, confirming the presence of a rectum perforation. The surgeons performed a resection, draining a localized collection. A protective loop colostomy was constructed. Over the next 6 days, three other surgical procedures with

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2021 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

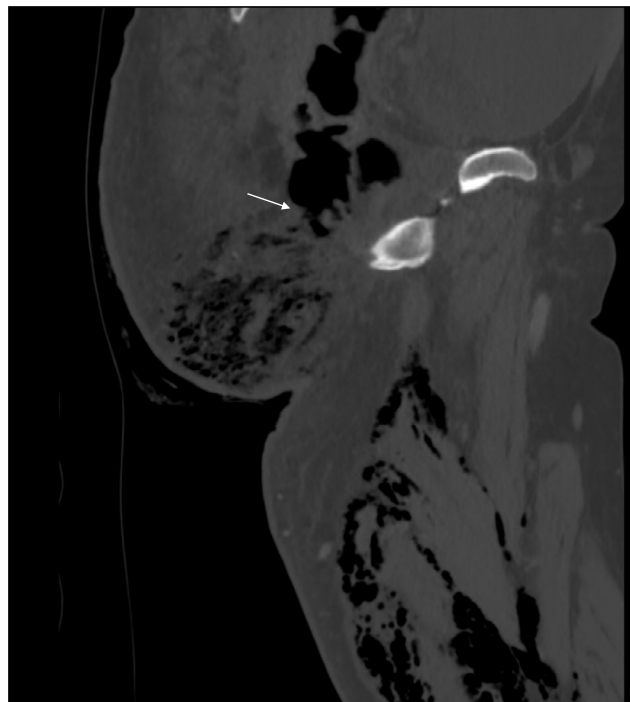


**FIGURE 1** Swollen aspect and redness of the inflamed right buttock as present at initial presentation. The diagnosis of erysipelas was withheld



**FIGURE 2** Contrast-enhanced CT of the upper leg, axial plane. Diffuse presence of air in the soft tissues, both subcutaneous and dissecting the muscles of the posterior compartment

debridement of the gluteal region were performed. Wound swab specimens were found to be positive, with a rich mixed culture of aerobic (predominately *Escherichia coli*) and anaerobic (*Bacteroides*) bacteria. Broad-spectrum antibiotics were continued. The patient eventually developed profound neutropenia and thrombocytopenia, probably attributed to the combination of chemotherapy and sepsis. The patient was admitted to the ICU in reverse isolation, and platelets were administered to combat the thrombocytopenia. Ten days after the initial laparoscopy, the patient was returned to the ward. Vacuum-assisted closure was



**FIGURE 3** Contrast-enhanced CT of the upper leg, sagittal plane. The air extends upward into the soft tissues of the buttocks and continues into the retroperitoneum, where a rectal perforation is suspected (arrow)

installed to aid the healing process of the wound. The patient remained in the hospital for the treatment of the gluteal wound for another three months while continuing the remainder of his chemotherapy, eventually being treated with a gluteal graft. After this procedure, the patient could be discharged in reasonable health.

## 2 | DISCUSSION

Necrotizing fasciitis is a surgical emergency. Risk factors include poor immune function as can be found in patients with diabetes or cancer. Obesity, alcoholism, intravenous drug use, and peripheral artery disease are also associated risk factors. Early detection and aggressive surgical intervention are crucial to reduce patient mortality and morbidity.<sup>1</sup> Not all cases of subcutaneous emphysema, however, are attributable to necrotizing fasciitis. It is a well-known fact that subcutaneous emphysema can occur in the upper extremities due to an underlying pneumothorax or even a tracheal or esophageal rupture.<sup>2,3</sup> Free air in the retroperitoneum resulting from bowel perforation can also spread extra-abdominally.<sup>4</sup> When subcutaneous emphysema is located in the upper portion of the lower extremity, an intestinal source should be explored.<sup>5</sup> Subcutaneous emphysema of the leg has been previously described in cases of perforated diverticulitis,<sup>6</sup> perforation

of the colon due to underlying carcinoma<sup>7</sup> and also in a case of perforated appendicitis.<sup>8</sup> Perforation of the rectum is frequently observed in malignant diseases: perforation can be spontaneous as a result of tumor progression or iatrogenic as a result of endoscopic procedures or radiotherapy. The diagnosis of retroperitoneal perforation is usually impeded by lack of signs of peritoneal irritation.<sup>9</sup> Exploration of the thigh can be avoided if the abdominal pathology is promptly managed.<sup>10</sup> In our described case, the pathology was probably already insidiously present for days at least. In this case, the condition of the wounds required repeated debridement procedures, prolonged VAC treatment and eventually even skin grafting. In summary, it is important to consider other causes of subcutaneous emphysema of the extremities in the differential diagnosis to allow for swift and appropriate medical therapy.

#### ACKNOWLEDGEMENTS

None.

#### CONFLICT OF INTEREST

None declared.

#### AUTHOR CONTRIBUTIONS

MT authored and revised the text and researched the literature. AA coauthored the text. JDM supervised and approved the article. SR authored and revised the text, made the images, and supervised the article.

#### ETHICAL APPROVAL

No approval was warranted.

#### CONSENT

Informed consent was obtained from the patient included in the manuscript.

#### DATA AVAILABILITY STATEMENT

Data available on request from the authors.

#### ORCID

Maurizio Tosi  <https://orcid.org/0000-0001-7518-8675>

Alexandre Al-Awa  <https://orcid.org/0000-0003-3549-3274>

Steven Raeymaeckers  <https://orcid.org/0000-0003-0822-1919>

#### REFERENCES

1. de Tullio D, Rossi C, Bolzon S, Scagliarini L, Occhionorelli S. Necrotizing fasciitis: a surgical emergency. *Updates Surg.* 2010;62(2):83-87. <https://doi.org/10.1007/s13304-010-0019-6>
2. Hirose K, Visser BC. Images in clinical medicine. Massive subcutaneous emphysema after tracheal perforation. *N Engl J Med.* 2004;351(3):e2. <https://doi.org/10.1056/ENEJMicm030421>
3. Sriram KB, Jersmann H. Pneumothorax, pneumomediastinum and subcutaneous emphysema following closed percutaneous pleural biopsy: a case report. *Cases J.* 2008;1(1):274. <https://doi.org/10.1186/1757-1626-1-274>
4. Saldua NS, Fellars TA, Covey DC. Case report: Bowel perforation presenting as subcutaneous emphysema of the thigh. *Clin Orthop Relat Res.* 2010;468(2):619-623. <https://doi.org/10.1007/s11999-009-1015-3>
5. Lee K-B, Moon E-S, Jung S-T, Seo H-Y. Subcutaneous emphysema mimicking gas gangrene following perforation of the rectum: a case report. *J Korean Med Sci.* 2004;19(5):756-758. <https://doi.org/10.3346/jkms.2004.19.5.756>
6. Haiart DC, Stevenson P, Hartley RC. Leg pain: an uncommon presentation of perforated diverticular disease. *J R Coll Surg Edinb.* 1989;34(1):17-20.
7. Gallagher E, Weingarten M, Swirsky M. Carcinoma of colon appearing as subcutaneous emphysema of lower extremity. *N Y State J Med.* 1982;82(2):219-221.
8. Tomaso NB, Ultee JM, Vrouenraets BC. Retroperitoneal abscess and extensive subcutaneous emphysema in perforated appendicitis: a case report. *Acta Chir Belg.* 2008;108(4):457-459. <https://doi.org/10.1080/00015458.2008.11680263>
9. Welch JP, Donaldson GA. Perforative carcinoma of colon and rectum. *Ann Surg.* 1974;180(5):734-740. <https://doi.org/10.1097/0000658-197411000-00005>
10. Mekhail P, Saklani A, Philobos M, Masoud AG. Thigh subcutaneous emphysema: is that a clear indication for thigh exploration? *J Surg Case Rep.* 2011;2011(2):1. <https://doi.org/10.1093/jscr/2011.2.1>

**How to cite this article:** Tosi M, Al-Awa A, Raeymaeckers S, De Mey J. Subcutaneous emphysema of the extremities: Be wary of necrotizing fasciitis, but also consider occult rupture or perforation. *Clin Case Rep.* 2021;9:e04831. <https://doi.org/10.1002/ccr3.4831>