



## Case Report of Massive Subcutaneous Emphysema: A Benign Postoperative Finding

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### Abstract

The development of postoperative crepitus following abdominal surgery is not a normal physical exam finding and should prompt an immediate concern for necrotizing fasciitis. Imaging using computed tomography (CT) will demonstrate subcutaneous emphysema. This case report presents a patient with benign postoperative surgical subcutaneous emphysema presenting as crepitus on exam. A 44-year-old female presented with a large uterine fibroid with concerns for sarcomatous growth given dramatic short interval increase in size. She underwent exploratory laparotomy, total abdominal hysterectomy, and bilateral salpingoophorectomy (XLap/TAH/BSO) with a final diagnosis of a large 22cm benign cervical and broad ligament fibroid. Significant dissection of the retroperitoneum was required for removal of the fibroid. Five days after surgery the patient was found to have crepitus on abdominal exam surrounding her incision and extending into the left flank. A CT scan demonstrated retroperitoneal air with tracking into the anterior-abdominal wall soft tissues extending to the left flank. The patient underwent serial abdominal exams and close observation for three days. Ultimately the patient looked clinically well and no pathological process was identified. The subcutaneous emphysema was found to be a benign postoperative finding in this patient.

### Keywords

Crepitus, Subcutaneous emphysema, Retroperitoneal air, Hysterectomy

### Introduction

Crepitus in a postoperative patient generally raises concern for necrotizing fasciitis versus perforated viscus. Necrotizing fasciitis is a rare complication following gynecologic surgery, but typically requires immediate surgical attention with extensive debridement. This severe infection is associated with severe pain, toxicity, and deteriorating clinical status. Perforated viscus is also a rare complication following gynecologic surgery. This complication is associated with a quickly deteriorating clinical picture and requires immediate surgical attention. We present a rare case of crepitus and benign subcutaneous emphysema following exploratory laparotomy and total abdominal hysterectomy.

### Case Report

A 44-year-old woman was referred to Gynecologic Oncology for

concerns of sarcomatous growth in a large uterine fibroid (Figure 1a,1b). The patient was a thin Caucasian female, 157cm (5'1") tall, 39.1kg (86lb), with a BMI of 15.9. She had no significant prior medical history. The patient had no prior abdominal surgery. The patient underwent exploratory laparotomy, total abdominal hysterectomy, and bilateral salpingoophorectomy (XLap/TAH/BSO). During surgery, she was found to have a large 22cm cervical fibroid extending into the broad ligament. The fibroid was found to be surrounded by rectosigmoid and small bowel mesentery. Extensive dissection of the retroperitoneum involving the para-rectal space, pre-sacral space, and the pelvic cul-de-sac was required to completely excise the fibroid. Estimated blood loss during the case was 100cc and there were no reported complications during the surgery. It is noted that the patient's upper abdomen, small bowel, and appendix were found to appear normal during surgery. The abdomen was then irrigated with warm sterile saline and the fascia was closed with a running Smead-Jones suture of #1 PDS. The skin was closed with 3-0 Monocryl. The patient was thin, thus subcutaneous closure was not indicated as the subcutaneous adipose tissue was less than 2cm in thickness.

On postoperative day (POD) #5, the patient demonstrated crepitus on abdominal exam that extended into the left flank. The patient also reported significant abdominal pain, although her abdominal exam was soft, without rebound or guarding, and no evidence of induration or erythema (Figure 2a,2b). A CT of the abdomen and pelvis was obtained and demonstrated 'retroperitoneal air which extends into the pro-peritoneal space anterior to the liver and tracks into the anterior-abdominal wall soft tissues also extending towards the left flank region' (Figure 3a-3c). These findings correlated with the physical exam finding of crepitus. Two senior Gynecologic Oncology attending physicians examined the patient as well as a General Surgery attending physician. The patient's pain on serial abdominal examination was found to be appropriate for a postoperative patient. The patient was afebrile with normal vital signs. She had a normal white blood count with a normal differential. The patient overall appeared well and appropriate for the postoperative setting. The patient was monitored closely with daily labs and serial abdominal exams for 3 days. On the day of discharge the patient continued to have crepitus, but otherwise had a normal abdominal exam (soft, appropriately tender, nondistended, no induration/

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**A****B**

**Figure 1:** Preoperative CT imaging of abdomen and pelvis demonstrating large pelvic mass consistent with enlarging uterine fibroids.

**A****B**

**Figure 2:** Photograph of patient's abdomen on postoperative day #5 at the time crepitus was appreciated on physical exam. Overall, her abdominal exam was found to be normal except for crepitus. There was no evidence of erythema, induration, wound discharge, distension, or other abnormal physical findings.

erythema), normal laboratory values, and normal vital signs. The patient presented for postoperative examination 2 weeks following discharge and continued to look well. Her crepitus had improved and her wound was healing well.

## Discussion

The finding of crepitus and subcutaneous emphysema in this patient did not correlate with any pathological finding. She had no evidence of infection, let alone necrotizing fasciitis or perforated viscus. She also did not demonstrate findings of a perforated viscus on CT scan or on clinical examination. The patient's crepitus and subcutaneous emphysema, while is most often an ominous finding, represented a benign process in this postoperative patient.

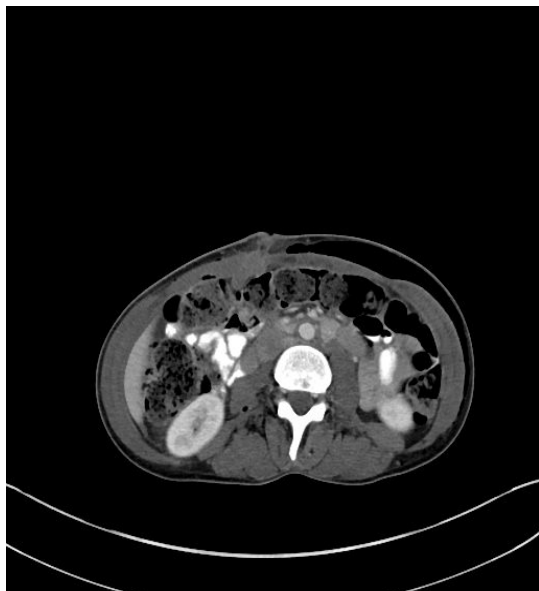
An extensive review of the literature was performed on the topic of subcutaneous emphysema. There are no reported cases of subcutaneous emphysema following abdominal gynecologic surgery. In the thoracic surgical literature, there are a number of reports discussing postoperative subcutaneous emphysema following thoracic surgeries [1-3]. In general, subcutaneous emphysema

following thoracic surgery is a benign condition, albeit it may cause significant worry among family and patients. It is reported to occur in approximately 6% of patients in this setting, and is most often a self-limited phenomenon. One theory postulates that the etiology of subcutaneous emphysema is a result of the portion of the lung that is leaking air has become adhered to the intercostal space that had previously been opened.

Subcutaneous emphysema has also been described in the literature in relation to perforated viscus [4-7]. Fiss et al. reviewed the literature and reported on 7 cases in regards to perforated viscus [4]. While rupture of an extraperitoneal structure is more common, intraperitoneal structures can also present as subcutaneous emphysema. The resulting origin of subcutaneous emphysema in these patients is either a direct effect of the perforated viscus versus results of secondary infection. Sivarajah et al published a case report of a 24 year old male with a ruptured diverticula presenting as subcutaneous emphysema into the retroperitoneum [5]. This patient required surgical exploration, sigmoid colectomy, primary anastomosis, and a covering ileostomy. Subcutaneous emphysema has also been



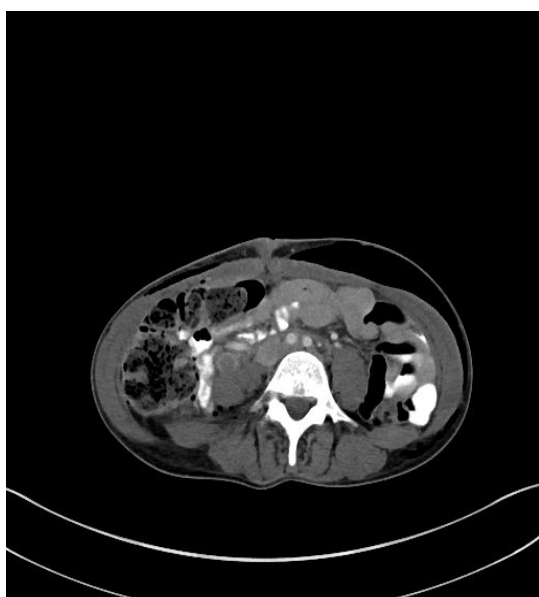
A



B



C



**Figure 3:** CT imaging of abdomen and pelvis on postoperative day #5 demonstrating massive subcutaneous emphysema.

described as a complication of sigmoidoscopy, colonoscopy, and EGD [6,7]. Perforations following colonoscopy or EGD are low,

respectively 0.4-1.9% and 0.03-0.1%. As expected, these patients most often present within 12 hours following their procedure.

In relation to gynecological surgery, a case report involving subcutaneous emphysema following laparoscopic salpingoophorectomy was described by Lindsey in 2008 [8]. An 80 year old female scheduled to undergo laparoscopic BSO for history of multiple ovarian cysts, developed subcutaneous emphysema in the chest and neck 30 minutes after abdominal insufflation. Surgery was aborted after unilateral salpingoophorectomy and the patient remained intubated following surgery until patient was found to be stable. Similar to this laparoscopic case, there are also reports of subcutaneous emphysema following endoscopic extraperitoneal surgery [9,10].

Our case report is the first case report of benign postoperative subcutaneous emphysema following open abdominal gynecologic surgery. While a necrotizing infection or perforated viscus is of utmost concern in the postoperative patient demonstrating subcutaneous emphysema, this case represents the importance of clinical examination of each case. Our patient was clinically stable without evidence of toxicity. Her laboratory values and vital signs were normal and her abdominal exam was benign except for crepitus. As well, the CT findings while demonstrating subcutaneous emphysema, did not reveal intraperitoneal free air or any other pathological finding. In the modern era of medicine where physical examination can become secondary to imaging, this case demonstrates the importance of good clinical examination skills. Good clinical examination skills identified the physical exam finding of crepitus which led to the identification of subcutaneous emphysema on CT imaging. Good clinical examination skills in this case also prevented unnecessary surgical exploration as the patient was not ill appearing as would be expected in the setting of a necrotizing infection or ruptured viscus. Subcutaneous emphysema following abdominal surgery is a rare and serious complication and should prompt appropriate workup. However, in the setting of a clinically stable patient, benign subcutaneous emphysema can be considered, although reserved strictly as a diagnosis of exclusion. In this case, benign subcutaneous emphysema likely developed secondary to normal postoperative intra-abdominal free air traveling into the subcutaneous spaces along the extensively dissected retroperitoneum. Migration of postoperative intra-abdominal air through the anterior abdominal fascia does not explain the extent of subcutaneous emphysema in this patient. There are a number of case reports of subcutaneous emphysema reported in perforated retroperitoneal viscus. It is clear that air can travel along the retroperitoneal space into the subcutaneous space. For this same reason, the extensive retroperitoneal dissection in this thin female resulted in massive benign subcutaneous emphysema as normal postoperative intra-abdominal air traveled along the retroperitoneal planes into the subcutaneous space.

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