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Grossly delayed massive subcutaneous emphysema following laparoscopic left hemicolectomy: A case report



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ABSTRACT

INTRODUCTION: Surgical emphysema is a known early complication of laparoscopic surgery, common during upper gastrointestinal and gynaecological surgery; the authors present the first case of delayed subcutaneous emphysema following a laparoscopic left hemicolectomy.

PRESENTATION OF CASE: A 52-year-old woman underwent a laparoscopic left hemicolectomy for a sigmoid malignancy; on the third post-operative day after an uneventful procedure, she developed a massive surgical emphysema involving her face, neck and chest with associated pneumoperitoneum but without any evidence of pneumothorax. A gastrograffin enema ruled out an anastomotic leak. Apart from a borderline tachycardia, mildly low saturations and an area of erythema in her right flank, she was totally asymptomatic. The emphysema resolved spontaneously around the 6th post-operative day.

DISCUSSION: Massive subcutaneous surgical emphysema after laparoscopic colorectal surgery is a rare complication and can be managed conservatively with a good outcome.

CONCLUSION: To our knowledge, this represents the first case of delayed massive surgical emphysema following colorectal surgery, the aetiology of which has still not been clearly explained, after exclusion of the most common causes.

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1. Introduction

The increasing adoption of laparoscopic or (laparoscopic-assisted) colorectal surgery as standard practice in colorectal cancer management has resulted in reduction in length of stay and improved patient experience.¹ However, one complication, particular to laparoscopic but not to open surgery, is post-operative subcutaneous emphysema.

Although there have been numerous reports of this following laparoscopic upper gastrointestinal and gynaecological surgery, episodes of subcutaneous emphysema following other laparoscopic procedures such as extraperitoneal renal² and colorectal surgery are few.^{3,4}

Subcutaneous emphysema of the scrotum developing 9 days post endoscopic retrograde cholangiopancreatography has been reported,⁵ though there are no documentations of a significant post-operative delay in manifestation of this complication in any form of laparoscopic surgery. In a retrospective single centre review of 889 laparoscopic resections for colorectal cancer, subcutaneous emphysema was the most common intra-operative complication at 1.65%, though there were no reports of subcutaneous emphysema for patients undergoing left hemicolectomy in particular (most

were in anterior resection of the rectum) and there were no such complications recorded for any laparoscopic colorectal patient in the post-operative period.⁶

In this report, we present the first case of massive subcutaneous emphysema which developed on the third day following laparoscopic left hemicolectomy. To perform the literature review for evidence for this case report, Medline and Embase were searched on 29 Jan 2014 using the key terms: *laparoscopy, colorectal cancer, subcutaneous emphysema*; works in all languages were considered.

2. Case report

A 52-year-old female patient, with a large sigmoid tumour and associated mesenteric nodal mass, (detected following colonoscopy and CT staging after referral from the national bowel screening programme,) was admitted for an elective laparoscopic left hemicolectomy. Of note, she had undergone extensive oral dental surgery (apicectomy and retrograde filling) for a recurrent dental pathology 2 months prior to her colorectal surgery. A paternal uncle had been diagnosed with colorectal cancer. She was otherwise fit and well with no underlying lung pathology (ASA I).

The patient underwent uneventful endotracheal intubation and received standard antibiotic prophylaxis consisting of gentamicin and metronidazole. She was placed in lithotomy (slight Trendelenburg) position and 10–14 mmHg carbon dioxide (CO₂)

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pneumoperitoneum (flow 20 L min⁻¹) was maintained throughout (for an estimated time of 130 min). Five ports were used to gain access. Blunt umbilical port entry was gained using an open technique. The initial end tidal CO₂ (ETCO₂) at intubation was 4.1 kPa; it was documented as 5.5 kPa at the end of the procedure. The mean value of documented ETCO₂ during pneumoperitoneum was 5.24 kPa (SD ± 0.38). Standard laparoscopic dissection, aided by pneumoperitoneum, of tissue planes was carried out and the specimen was delivered through a self-retaining atraumatic retractor lining the extended midline wound. The anastomosis was performed laparoscopically using a circular stapled gun and air-leak test was negative. The patient recovered well post-operatively, with a good level of mobilisation and tolerating oral intake.

On the third post-operative day, she developed surgical emphysema on her chest and neck, confirmed by a chest X-ray which showed a massive pneumoperitoneum and subcutaneous emphysema without definite evidence of pneumothorax. Overnight the emphysema extended to involve her face and periorbital tissues bilaterally. There was neither dyspnoea nor chest pain, though her voice developed a 'nasal' tone. The only systemic abnormalities were: a non-compromising borderline tachycardia and oxygen saturations between 94 and 95% on air. Further chest X-ray reported no significant interval change except for a suggestion of pneumomediastinum. Again there was no evidence of pneumothorax. Management was conservative.

On post-operative day 5 a gastrograffin enema ruled out an anastomotic leak. The patient continued to feel well, remained afebrile with persistent tachycardia. A non-tender erythema of her right flank appeared, consistent with cellulitis except for lack of tenderness. CRP rose to 367 (white cell count remained normal) and intravenous antibiotics were administered but discontinued after 2 doses, as a senior opinion determined there was no sign of sepsis. The subcutaneous emphysema resolved spontaneously and the patient was fit for discharge on day 6.

On clinic review, all symptoms had resolved and she was referred for adjuvant chemotherapy for a moderately differentiated adenocarcinoma, staged as III (T3N2M0), positive for extramural vascular invasion.

3. Discussion

Clinical manifestations of hypercarbia including subcutaneous emphysema developing during or very shortly after UGI procedures and TEP procedures have been well documented.^{7,8} It has also been postulated that the incidence of surgical emphysema might be as high as 34%, if assessed radiologically via chest X-ray, after pelvic laparoscopic surgery;¹⁰ McAlister instead stated that up to 56% of the patients who underwent laparoscopic cholecystectomy within the previous 24 h had subcutaneous emphysema on a computed tomography.¹¹

Hypothesised pathophysiology of subcutaneous emphysema includes tracking of gas along fascial planes from port sites (increasing number of ports giving rise to increasing incidence of emphysema), or through diaphragmatic defects. Factors increasing this risk include age of patient (perhaps due to weaker tissues bonding fascial planes), increased number of ports, increased intra-abdominal gas insufflation pressures and long operating times, allowing increased absorption of carbon dioxide.

We are unaware of an instance, prior to this case report, when 72 h have passed before the first signs of subcutaneous emphysema developing after a colorectal procedure.

Hypercarbia, although not confirmed by arterial blood gas sampling in our case, may explain some of this patient's physiological derangement: a resultant acidosis could explain the tachycardia. A massive pneumoperitoneum may also have caused splinting of the diaphragm and decreased oxygen saturations.

Other cases of post-laparoscopic subcutaneous emphysema include an episode presenting after failed ERCP in a patient after bariatric surgery, where gas was thought to pass through a weakened intestinal wall into the retroperitoneum; an exploratory laparotomy for persistent leak excluded a perforation.⁹ Risk factors for hypercarbia related injuries include an operating time greater than 200 min, age >65 and six or more ports).⁷ Subcutaneous emphysema has been shown to be more common when higher CO₂ insufflation pressures are used, though in this case a pressure of 10 mmHg was maintained throughout. Possible explanations include a latent pocket of carbon dioxide in the abdominal wall which disseminated only later, after mobilisation of the patient; a gas leak from the anastomosis, later resealed; a small iatrogenic mucosal disruption, resulting in retroperitoneal air leak, settled spontaneously. On the other hand, an iatrogenic airway injury or a pneumothorax appears unlikely on account of clinical and radiological findings.

In our patient, the observations remained stable until the development of subcutaneous emphysema on the third post-operative day. After this time, she developed an isolated tachycardia with mildly depressed oxygen saturations. Although arterial blood gases were not deemed necessary, retrospectively this new tachycardia could have been a response to hypercarbia, following delayed absorption of carbon dioxide.



3rd day post-operative chest X-ray.

4. Conclusion

Massive subcutaneous surgical emphysema is a rare complication after laparoscopic colorectal surgery. Surgeons should exclude other complications prior to managing the condition conservatively.

Conflict of interest

The authors declare that they have no competing interests.

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy

of the written consent is available for review by the Editor-in-Chief of this journal.

Authors' contribution

AJ, UP and SE performed a search of the literature and wrote the report, under supervision of AJW. All authors read and approved the final manuscript.

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