

Postoperative abdominal free air: How much and when is enough? Report of two cases

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Abstract

Postoperative intraperitoneal or ectopic free air may occur after abdominal surgery, gynecologic surgery, laparoscopic surgery, or endoscopic procedures and, in rare cases, represent gastrointestinal perforation, requiring emergency laparotomy. Evaluating patients with postoperative signs of bowel perforation may be difficult, especially when day-case laparoscopic or endoscopic surgery is performed, with the patient readily discharged from hospital. Delayed diagnosis of gastrointestinal perforation due to underestimation of postoperative free air is associated with a high morbidity and mortality rate. We report two cases of patients presenting with postoperative free air along with the clinical presentation and management.

Keywords

Pneumoperitoneum, pneumomediastinum, laparoscopic hysterectomy, abdominal free air

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Introduction

Minimally invasive surgery and its improvements in technology, instrumentation, and surgical technique now allow many intra-abdominal procedures to be performed in a minimally invasive manner. During the past two decades, the role of minimally invasive and/or robotic surgery has expanded rapidly with the development of more effective instruments and smaller endoscopes.

Despite these advances, postoperative abdominal free air is a puzzling problem for clinicians. Delayed diagnosis of visceral perforation results in high morbidity and mortality rates.

Clinical signs of abdominal or ectopic free air cannot be easily interpreted, especially when iatrogenic pneumoperitoneum has taken place or opioid analgesia has been administered. Among minimally invasive approaches (robotic/laparoscopic surgery, endoscopy), despite the evaluation of survival, perioperative and postoperative outcomes remain to be defined.^{1–3} After written informed consent for publication, we report two cases of patients with postoperative free air along with the clinical presentation and management.

Case series

Case 1

A 76-year-old ASA II (American Society of Anesthesiologists) physical status woman underwent total hysterectomy, bilateral salpingo-oophorectomy, omentectomy, and pelvic lymphadenectomy due to ovarian serous, borderline tumors through a midline abdominal incision. No intraoperative complications were noted; the surgical wound was closed via mass closure technique.

On the second postoperative day, after mobilization, the patient complained of mild abdominal pain and right shoulder pain. Pain was attributed to the extensive operation and the mobilization itself, and was relieved by an epidural bolus of ropivacaine 0.2% (8 mL) and paracetamol (1 g). Three

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days after surgery, the patient developed fever with no other signs of colonic perforation. On the fifth postoperative day, subcutaneous emphysema of the chest wall and serosanguinous discharge of the wound were noted. The upright posteroanterior chest radiography revealed free abdominal air and pneumomediastinum, and the patient underwent a second surgical intervention on emergency basis without signs of hemodynamic instability. A small injury of the small bowel with a length of 2 cm, in contact with the suture of the fascia, which was not disrupted, was found. The patient recovered well, after a short stay in the intensive care unit.

Case 2

A 50-year-old ASA I physical status woman (60 kg, 165 cm) underwent routine colonoscopy. The colonoscope was passed through the anus under direct visualization and was advanced only to 40 cm due to technical difficulties. Biopsies were obtained from the sigmoid, but the doctor performing the colonoscopy was suspicious of perforation. The patient tolerated the procedure well and was transferred to the ward for a 3-day monitoring. The next day, she developed subcutaneous emphysema with air tracking up into the neck, excruciating pain to the chest, and radiating to the right shoulder; dyspnea; and tachycardia. Pain was not alleviated by intravenous administration of morphine 2 mg and paracetamol 1 g. An upright chest radiography revealed subdiaphragmatic air. Conservative approach was the method of choice and the subcutaneous emphysema resolved on the second postoperative day. The patient had an uncomplicated postoperative course and was discharged, in a stable condition, home shortly.

Discussion

Postoperative free air has been described in the past after various kinds of surgical operations: abdominal surgery, gynecologic surgery, laparoscopy, and endoscopy. Postoperative free air can be a puzzling finding especially when procedures involving iatrogenic insufflation of CO₂ are performed.³

Initial intraperitoneal air has been reported to “travel” to various uncommon locations such as the mediastinum, neck and face, and scrotum, retroperitoneally or subcutaneously.⁴⁻⁶

As far as post-laparoscopic pneumoperitoneum is concerned, it has been stated that it resolves within 3 days in 81% of the patients.⁷ Normal excretion of CO₂ is 100 to 200 mL/min and is increased by 14 to 48 mL/min when CO₂ is administered intraperitoneally. CO₂ has a high solubility, and thus, complications like capnothorax, subcutaneous emphysema, pneumothorax, and pneumomediastinum due to laparoscopy are expected to occur within 24 h after laparoscopic surgery.

But what about patients with possible visceral perforation after surgery involving CO₂ insufflation? Is free air (ectopic or abdominal) due to pneumoperitoneum and will be soon absorbed or is it due to gastrointestinal perforation? How

much subdiaphragmatic air is justified by pneumoperitoneum or residual postoperative air after open surgery and how much by visceral perforation?

Anesthesiologists are the first doctors who are called to cope with patients with subcutaneous emphysema and/or hemodynamic collapse in the early or late postoperative days, after all kinds of surgical procedures: open, laparoscopic, endoscopic, or day-case. They are also the first doctors who are called to rule out if judicious postoperative pain management (in many cases not administered by them) masks symptoms of visceral perforation. As minimally invasive and laparoscopic surgery becomes more popular, anesthesiologists encounter the patients less and are only called when emergency occurs. Newer technologies such as Thunderbeat Technology (Olympus Medical Systems Corp., Tokyo, Japan) are getting into routine laparoscopic gynecologic surgery, with reduced rates of burnt tissue and complications comparing to standard electrosurgery.⁸ Although robotic approach has been associated with significant lower costs even for oncologic procedures, physicians of the perioperative setting have to carefully evaluate the clinical implications of the investment in new technologies.⁹ Can day-case clinics afford litigations due to visceral perforations of patients who were too rapidly discharged to develop symptoms?

The diagnostic value of abdominal free air detection on a plain chest radiography in the early postoperative period has been underlined by Milone et al.;⁷ however, air in the abdominal cavity, even if it is not always due to visceral perforation, may pass into other spaces such as the pericardium, mediastinum head, and neck with loud clinical signs, leading to emergency laparotomy.

Conclusion

In conclusion, as minimally invasive surgery is continuing to expand, physicians of the perioperative setting should stay closer to their patient than before; complications may be less but possibly left underdiagnosed. The optimal timing to evaluate postoperative abdominal free air, through plain radiograph, remains to be determined. The analgesic treatment administered to the patient with postoperative abdominal free air after laparoscopy should not mask symptoms. The medical and nursing staff involved in the postoperative care of these patients should be aware of the mechanisms of air leak and the atypical symptomatology that can readily evolve to emergency.

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Ethical approval

Ethical approval to report this case series was obtained from Aretaieion University Hospital Ethics Committee AΠ37168.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

Written consent

Written consent was taken from Aretaieion University Hospital Ethics Committee: reference number AΠ37168.

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