Subcutaneous Emphysema, Pneumothorax and Intra-abdominal Air after Cystoscopy and Spinal Anesthesia – A Case Report

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Abstract
This article describes an unusual case of subcutaneous emphysema, pneumothorax and intra-abdominal air after cystoscopy and spinal anesthesia. A 65 year-old female was admitted to the hospital with hematuria. She underwent a diagnostic cystoscopy with spinal anesthesia, after which she developed subcutaneous emphysema, pneumothorax and intra-abdominal free air. The patient required a thoracostomy tube and supportive intensive unit care. A Computed Tomography (CT) scan revealed a urinary bladder mass which was diagnosed as an uroepithelial cancer after a Transurethral Resection of Bladder Tumor (TURB). Subcutaneous emphysema, pneumothorax and intra-abdominal air are rare complications after cystoscopy under spinal anesthesia.

Keywords: Subcutaneous emphysema; Spinal anesthesia; Cystoscopy; Pneumothorax

Introduction
Subcutaneous Emphysema (SE) is often a result of traumatic injury to the chest wall, allowing air to escape from the intrathoracic cavity to the subcutaneous tissues. SE may spread to the head and neck, often leading to altered speech tone due to worsened function of the vocal cords, and swollen eyelids, which may cause impaired vision. In most cases it is a self-limiting event, but at times, evacuation of the subcutaneous air with skin incisions may be necessary to allow for quicker resolution of the SE [1,2].

This article describes an unexpected presentation of SE in a female patient after a diagnostic cystoscopy, performed under spinal anesthesia.

Case Presentation
A 65 year-old previously healthy female was admitted to Namsos Hospital in Norway on July 10, 2017 with macroscopic hematuria.

Vital parameters on admission were
- Blood pressure: 144/76 mmHg
- Heart rate: 73 beats per minute
- Temperature: afebrile
- Oxygen saturation: 100% on room air

Laboratory values on admission were
- Creatinine: 55 µ mol/L
- Hemoglobin: 13.5 g/dl
- White blood cell count: 18.5 × 10⁹/L
- C-Reactive protein: 0 mg/L
- Platelet count: 297 × 10⁹/L
- Albumin: 37 g/L
- Sodium: 137 mmol/L
- Potassium: 3.7 mmol/L

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Because of the hematuria causing urinary bladder tamponade, she underwent a cystoscopy at the outpatient clinic on the 11th of July, which was limited due to large blood clots obscuring the endoscopic view. A second cystoscopy was performed on the same day, this time under spinal anesthesia (awake, without endotracheal intubation) in the operating room. Large amounts of coagulated blood were noted again and because of the limited vision, no lesions were detected. To help dissolve the blood clots, a 3-way urinary catheter was inserted and the patient returned to the surgical floor with continuous bladder irrigation. Both the spinal anesthesia and the urological procedure were considered uneventful at the time of transfer to the surgical floor.

Three hours after the second cystoscopy, the patient experienced SE spreading from her pelvis to her eyelids, abdominal pain and breathing difficulties. A subsequent CT scan confirmed the SE but also revealed free intra-abdominal air, a left-sided pneumothorax and pneumomediastinum without mediastinal shift (Figure 1 and 2). A left-sided 16-French pleural drain resolved the pneumothorax and alleviated the patient’s breathing difficulties. The patient became hemodynamically unstable and developed a fever of 39°C. Intravenous vasopressors were administered, and urine as well as blood cultures were obtained before starting broad-spectrum antibiotics.

A new CT scan on the 12th of July revealed an 8 cm × 9 cm urinary bladder tumor as the cause of the patient’s hematuria (Figure 3). The next day, the chest tube was removed, and a subsequent CT scan showed no pneumothorax but a possible 1 mm defect in the anterior trachea, 2 cm proximal to the carina (Figure 4). The patient was then transported to the nearest university hospital, in Trondheim (St. Olavs Hospital), after discussion with the on-call thoracic surgeon. A bronchoscopy performed on the 17th of July at St. Olavs Hospital could not confirm the tracheal defect seen on the previous CT.

The patient underwent a TURB under general anesthesia on the 20th of July, which was a technically demanding procedure that lasted 4 h. She was subsequently discharged from the hospital on the 23rd of July without any clinical evidence of SE. The pathology report from the TURB revealed a low-grade papillary uroepithelial cancer with infiltration in the lamina propria but without infiltration in the muscular layer. The patient was subjected to a repeat TURB and received 3 treatments with intravesical Bacillus Calmette-Guerin (BCG). Unfortunately the patient did not tolerate the BCG treatment, and she underwent a robot-assisted cystectomy with construction of Bricker-bladder in December of 2017. She is currently in good health.

**Discussion**

SE is a rare condition that can accompany certain diseases, such as perforated appendicitis [3] or perforated diverticulitis [4]. SE may also present after some procedures, such as dental procedures [4] or after colonoscopy [6,7]. The course of SE is usually benign, but may also be life threatening, leading to abdominal compartment syndrome [8]. The treatment of SE is either supportive or microdrainage [9].

We do not have a valid explanation for the cause of the SE for this patient and a literature search on pneumoperitoneum and pneumomediastinum after lumbar spinal anesthesia did not yield any results. Microperforation of the bladder wall during the diagnostic cystoscopy and leakage of air during the spinal anesthesia are unlikely, according to our urologist and anesthetist respectively. One could speculate that a spontaneous left-sided pneumothorax could be a possible cause of the SE, but this is improbable given the extent of the SE for this patient (intra- as well as extra-peritoneal).

The close anatomical proximity of the spinal anesthesia administration and the urinary bladder tumor makes it difficult to ascertain the cause of the SE: if two procedures are performed at sites distant from each other, then the initial location of the SE could reveal its source.
In summary, this was a clinically challenging case involving unexpected subcutaneous emphysema, which required a multidisciplinary team approach by surgeons, urologists, anesthetists, radiologists and thoracic surgeons.

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Authors’ Contribution

TP Kakoulidis wrote the article, while E Elden and S Kudra contributed.

References