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Case Report

Subcutaneous Emphysema, Pneumothorax, Pneumomediastinum, and Pneumoperitoneum during Cystoscopy: A Case Report

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BRIEF TEXT

Background

Bladder perforation is a well-recognized complication of cystoscopy, which may occur as either intraperitoneal or extraperitoneal. In many cases, the rupture is minimal and presents as a microperforation, often remaining undetected without dedicated imaging modalities. Complications occurring during or immediately after cystoscopy are relatively uncommon; when present, they most frequently manifest as sepsis or urinary tract infection [1]. The reported incidence of bladder rupture during cystoscopy ranges from 1% to 10% across studies, a discrepancy largely attributable to variations in diagnostic approaches [1–5].

Pneumomediastinum, pneumothorax, and subcutaneous emphysema have been described following colonoscopy, colonic perforation during endoscopic procedures, and colorectal cancer surgeries [6–9]. However, the occurrence of these complications in the context of cystoscopy has rarely been documented [10].

Bladder perforation associated with cystoscopy most commonly occurs during diagnostic or therapeutic interventions, such as mass biopsy or tumor resection. Although most of these ruptures are microperforations and may remain clinically silent, extraluminal air leakage along fascial planes can result in extensive subcutaneous emphysema, pneumothorax, pneumomediastinum, and pneumoperitoneum. Prompt recognition and appropriate management are essential to reduce associated morbidity and mortality [11].

Case Presentation

A 67-year-old male was referred for evaluation of gross hematuria. He had no significant past medical history, prior surgeries, or medication use. Laboratory findings were within normal limits, and no coagulopathy was identified. Cystoscopy under spinal anesthesia was performed to evaluate possible malignancy. During biopsy of a suspicious bladder lesion using transurethral resection (TUR) technique, the patient developed sudden progressive swelling in the scrotum and lower abdomen, rapidly extending to the neck and face. The procedure was immediately discontinued, and the patient was monitored. He remained hemodynamically stable without dyspnea, oxygen desaturation, hypotension, or altered consciousness.

A contrast-enhanced computed tomography scan of the chest, abdomen, and pelvis revealed extensive subcutaneous emphysema involving the abdominal wall up to the chest and neck, mild left-sided pneumothorax, pneumomediastinum (Figure 1, 2), and emphysema in the scrotum (Figure 3). Retroperitoneal air around the psoas muscles and perinephric space, as well as pneumoperitoneum, was also observed. A heterogeneous lesion at the left bladder dome with intravesical clot and emphysematous changes confirmed bladder perforation (Figure 4). The patient was admitted to the Intensive Care Unit and managed conservatively with a Foley catheter placement, intravenous broad-spectrum antibiotics, and close monitoring. No surgical intervention was required. Subcutaneous emphysema resolved completely within five days, and the patient was discharged without complications.

Discussion

Cystoscopy is currently a widely available procedure that allows for simultaneous diagnosis and treatment and is commonly used for bladder evaluation as well as therapeutic interventions, such as transurethral

resection of bladder tumors. With the increasing use of this procedure, awareness of potential complications and their appropriate management has become more important. Nevertheless, the incidence of complications requiring further intervention remains low [12]. Hemorrhage and infection are the most common complications; however, they are generally not concerning and are typically managed with supportive care[13]. Another potential complication is bladder perforation during biopsy, which may present as either intraperitoneal or extraperitoneal [13]. Risk factors for bladder perforation include larger tumor size, multiple bladder biopsies, and muscle-invasive tumors. Additionally, tumor location on the posterior wall, advanced patient age, and a history of prior bladder interventions or treatments are considered contributing factors [14, 15].

In a study evaluating a total of 173 TUR of bladder tumor procedures, complications were observed in 10 cases (5.8%), including 4 cases (2.3%) of hematuria requiring blood transfusion and 6 cases (3.5%) of bladder rupture. Among the rupture cases, 4 were small extraperitoneal perforations managed conservatively with prolonged urinary drainage via catheterization, while 2 cases were intraperitoneal [12].

In another study involving 1,570 patients undergoing cystoscopy and biopsy, bladder rupture was reported in 10% (n=158) of the participants, 95% of whom were extraperitoneal. In 86% of the cases, perforation was asymptomatic or associated with mild symptoms or minimal fluid leakage, requiring only prolonged urethral catheterization. However, surgical intervention was necessary in the remaining 21 patients (14%) [1].

In general, complications, such as pneumothorax, subcutaneous emphysema, pneumomediastinum, and pneumoperitoneum, may occur following manipulation of pelvic organs, rectal surgery, biopsy of colonic polyps during colonoscopy, or colonic perforation [6–9]. However, the occurrence of these complications following cystoscopy and bladder rupture is extremely rare and has primarily been reported in case studies [10].

In the present case, the development of pneumothorax, pneumomediastinum, and subcutaneous emphysema during cystoscopy was attributed to bladder perforation and subsequent air dissemination through fascial planes. The condition was successfully managed with supportive treatment alone, without the need for surgical intervention.

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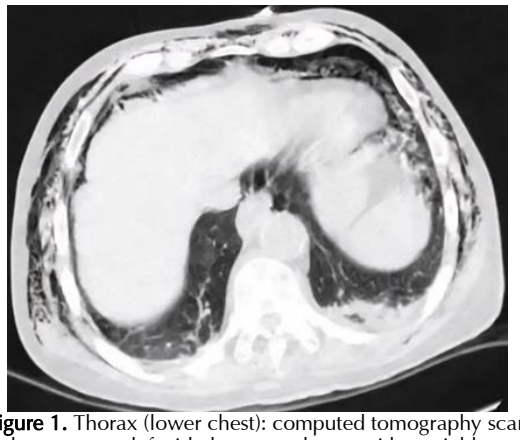

Figure 1. Thorax (lower chest): computed tomography scan demonstrates left-sided pneumothorax with partial lung collapse and chest-wall emphysema.

Figure 2. Abdomen (intraperitoneal): free intraperitoneal air outlining bowel loops.

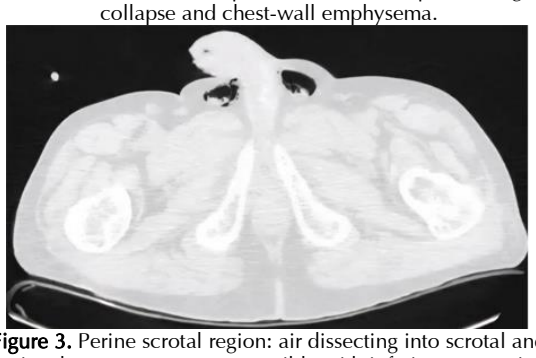

Figure 3. Perine scrotal region: air dissecting into scrotal and perineal compartments, compatible with inferior progression of subcutaneous emphysema from the pelvic cavity along the fascial planes of the perineum.

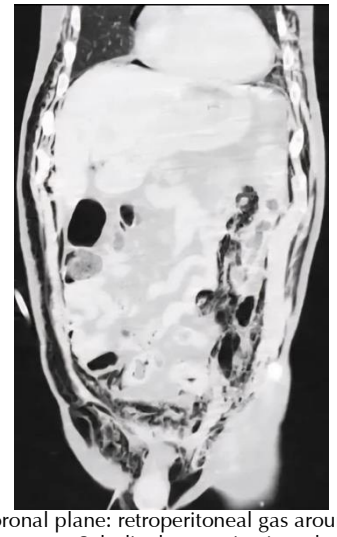

Figure 4. Coronal plane: retroperitoneal gas around psoas and perinephric spaces. Sub diaphragmatic air and subcutaneous emphysema.