

Developing Subcutaneous Emphysema, Pneumothorax and Pneumomediastinum after Arthroscopic Shoulder Surgery under General Anesthesia: A Case Report

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ABSTRACT

The use of arthroscopic shoulder surgery for diagnosis and treatment is increasing. Although some complications may occur during the operation, subcutaneous emphysema, pneumomediastinum and pneumothorax are rare complications. In this case, we present a patient who developed subcutaneous emphysema, pneumomediastinum and pneumothorax. A 53-year-old female patient presented with right shoulder pain for 8 months. The patient's body mass index is 20. Additional diseases are rheumatoid arthritis (RA) and vertigo. There was no other systemic disease or comorbidity. She was assigned an American Society of Anesthesiologists (ASA) score of 2. Arthroscopic rotator cuff repair was planned. She was operated under general anesthesia (GA). Subcutaneous emphysema, pneumothorax and pneumomediastinum developed at 6 hours after this surgery. The patient was discharged without any complaints on the 6th day of follow-up. No problem was detected in the follow-up of the patient. After shoulder arthroscopy under GA, subcutaneous emphysema, pneumothorax and pneumomediastinum can occur due to the procedure itself, the pleural and alveolar trauma, the endotracheal intubation or extravasation of irrigation fluid during shoulder arthroscopy. In our case, it was not possible to determine the exact cause. However, it is important to keep in mind that subcutaneous emphysema, pneumothorax and pneumomediastinum can occur after arthroscopic shoulder surgery. Although shoulder arthroscopy is a safe procedure, surgeon familiarity with the risk factors for this complication and close monitoring can aid in its identification and allow for appropriate treatment.

Arthroscopy is used for diagnosis and treatment in shoulder surgery. The rate of complication development in arthroscopic shoulder surgery is between 5.8-9.8 % and these may include vessel and nerve damage, tendon injury and fluid extravasation [1]. Subcutaneous emphysema, pneumomediastinum, and pneumothorax are rare complications [2]. Subcutaneous emphysema may occur as a result of tracheal damage due to intubation, but this is very rare [3]. The incidence of postoperative nausea and vomiting (PONV) in patients receiving GA ranges from 25 % to 80 % [4]. Subcutaneous emphysema, pneumothorax and

pneumomediastinum due to esophageal rupture may occur after PONV, but this is a very rare cause. Pleural involvement in RA patients ranges from 38-73 %, but only 20-28 % of these patients show symptoms [5]. Necrosis of the rheumatoid nodule formed in the lung and pneumothorax due to barotrauma may develop. This rate is 5 % in the group with rheumatoid lung disease [6]. In this case, we present a patient who underwent arthroscopic right shoulder rotator cuff repair under GA, no intraoperative complications were detected, vomiting at the 3rd hour postoperatively and subcutaneous

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emphysema, pneumomediastinum and pneumothorax at the 6th hour.

Case Report

A 53-year-old female patient is admitted with right shoulder pain that has been going on for 8 months. Body mass index is 20. Additional diseases are RA and vertigo. There was no other systemic disease or comorbidity. She was assigned an ASA score of 2. Arthroscopic rotator cuff repair was planned by orthopedics. Preoperative laboratory tests, electrocardiography (EKG) and chest X-ray were normal. Mallampati score was evaluated as 1. Fasting for 6 hours is recommended. In addition, the patient stated that she had not used the RA drug (colchicine) for 1 year and did not go to the doctor for a check-up. The patient was taken to the room on the morning of the operation and was standard monitored of EKG, SpO₂, non invasive blood pressure (NIBP). Vital signs were stable. Vascular access was achieved with an 18 gauge cannula. Anesthesia was induced by using 2 mg/kg propofol, 0.6 mg/kg rocuronium, 1-5 µg/kg fentanyl using peripheral venous vascular access. The patient was preoxygenated with 5 lt/min oxygen mask ventilation. She was intubated with a number 7 cuffed tube by direct laryngoscopy and without complications. Bilateral lung sounds were equal. Mechanical ventilator settings were followed as PEEP: 5, tidal volume: 6 ml/kg, respiratory rate is 14. Endtidal CO₂ was monitored. Desflurane was used as an inhalation agent for maintenance of anesthesia. The beach chair (BC) was placed in position. The surgery took about 2 hours. 1500 ml of saline was given intravenously. No complications were detected in terms of intraoperative anesthesia and surgery. The patient was extubated in the operating room. Her vitals were stable, breathing was comfortable. The patient, whose vitals were stable in the recovery room, was transferred to the service after 20 minutes of observation. The patient, who had a history of vomiting twice in the 3rd hour postoperatively, said that she had severe pain in her back and chest. No pathology was detected in the cardiac examination and follow-up. Sinus rhythm was detected in the EKG. Heart rate was 86 / min and cardiac enzyme result was within normal range. The patient, who did not have any respiratory distress in the ward, was conscious, cooperative and fully oriented. Subcutaneous emphysema was detected with the development of swelling in the neck at the 6th hour postoperatively. Subcutaneous emphysema, pneumomediastinum and pneumothorax in the right lung were observed in the chest X-ray (Figure 1) and oral opaque thorax tomography (Figure 2). Trachea and esophagus damage were not detected. Thoracic surgeon was consulted. Antibiotic treatment was started with the recommendation of infectious diseases. Chest tube was not required. On the 1st day in the service, the patient's chest pain decreased and the laboratory tests taken for control purposes were within the normal range. Pneumothorax and subcutaneous emphysema regressed

in the chest radiographs taken during the follow-up. The patient, whose chest radiography on the 6th day was normal and did not have any complaints, was discharged. No problem was detected in the patient who came to the control after 1 week.

Figure 1- Postoperative diagnostic chest radiograph. Subcutaneous emphysema is seen(arrows).

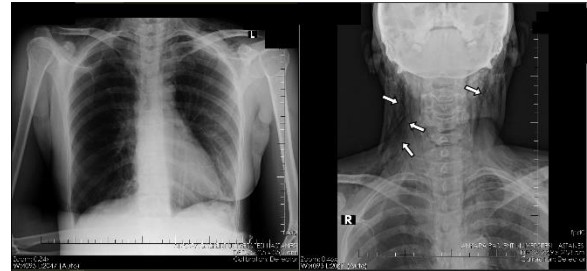
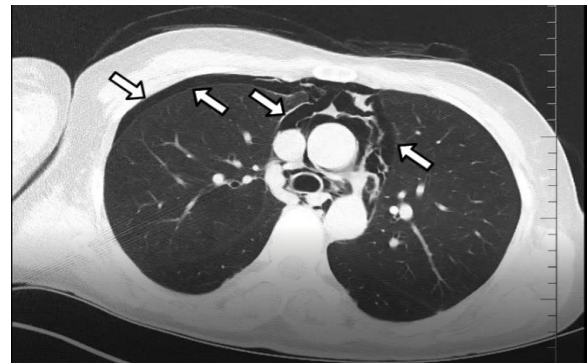


Figure 2- Postoperative diagnostic oral opaque thorax tomography. Pneumothorax, pneumomediastinum and subcutaneous emphysema are seen(arrows).



Discussion

The incidence of complications in arthroscopic shoulder surgery has been reported in many publications as 5.8%-9.5 % [7]. However, the incidence of pulmonary complications is very rare [2]. On the other hand, if we look at patients with RA, the rate of pleural involvement is around 38-73 % [5]. However, only 5 % of these patients have a pulmonary nodule that can cause pneumothorax, subcutaneous emphysema, and pneumomediastinum. First of all, we can attribute the pathogenesis of pneumothorax to three factors: rupture of the parietal pleura, rupture of the visceral pleura and alveolar rupture. The most common of these causes is pneumothorax due to alveolar rupture. And it is caused by rupture of bulla or bleb [8]. Airway trauma that may occur during intubation causes pneumothorax due to visceral pleura rupture [9].

On the other hand, pressure changes in the subacromial space that occur during arthroscopic surgery can cause air to migrate into the prevertebral space. And as a result, rupture of mediastinal pleura, pneumomediastinum and pneumothorax may develop [2].

In this case presented, we can think that subcutaneous emphysema, pneumomediastinum and pneumothorax developed due to tissue trauma that developed during arthroscopic shoulder surgery. If we examine the mechanism of this tissue trauma; large amount of irrigation fluid used can cause connective tissue damage. Extracapsular and other soft tissue damage may be important in the etiology [10].

Although rare, there are some similar cases in literature. In a case presented by Ozhan et al. [11], a 33-year-old male patient has no known systemic disease or comorbidity. Arthroscopic shoulder surgery was performed under GA and accompanied by interscalene block. Tracheal compression and subcutaneous fluid leakage were observed in the patient with intraoperative neck and chest swelling. And irrigation fluid was seen as the cause in this patient. In another case observed by Shariyate MJ et al. [12], a 61-year-old female patient underwent arthroscopic rotator cuff repair under GA. Subcutaneous emphysema and pneumothorax were detected 4 hours after the operation. They considered arthroscopy, GA and patient-related causes in etiology. Kim JB et al. [13] reported a patient who underwent subscapular repair with arthroscopic shoulder surgery under GA. They considered irrigation fluid extravasation in the etiology of the patient who developed postoperative subcutaneous emphysema and pneumothorax.

Also, the patient was diagnosed with RA, interrupted her treatment and did not go to follow-ups. It can also be considered that a necrotic rheumatoid nodule that may be present in the patient may rupture due to barotrauma and cause pneumothorax and other complications [6]. But there was no lung nodule in the preoperative chest X-ray of our patient.

After severe vomiting, subcutaneous emphysema, pneumomediastinum and pneumothorax may develop due to damage to the esophagus and trachea [14]. However, in this case, no pathology was detected in the trachea and esophagus in the oral opaque thorax tomography, and the patient's vital signs were stable, which distracted us from this thought.

Conclusion

After shoulder arthroscopy under GA, subcutaneous emphysema, pneumomediastinum and pneumothorax can occur due to the procedure itself, the endotracheal intubation or extravasation of irrigation fluid during shoulder arthroscopy. In our case, it was not possible to determine the exact cause. Although shoulder arthroscopy is a safe procedure, surgeon familiarity with the risk factors for this complication and close monitoring can aid in its identification and allow for appropriate treatment.

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