Case Report

Management of Respiratory Failure in Shoulder Arthroscopy: A Case Report

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Introduction

Shoulder arthroscopy is done on a day care basis in many centers. However, the risk of various complications and ICU admissions are sometimes inevitable. Here, we report one such complication during shoulder arthroscopy.

Case Report

A 47-year-old female (weight: 57 kg; height: 145 cm) with no known comorbidities and normal preoperative investigations was posted for shoulder arthroscopic rotator cuff repair. After American Society of Anesthesiology standard monitoring was established, her trachea was intubated with a 7.5 mm endotracheal tube using intravenous (IV) propofol (2 mg/kg), IV Fentanyl (2 mcg/kg), and IV vecuronium 0.1 mg/kg. The patient was placed in a lateral decubitus position with head up. After 20 minutes from the start of surgery and port placement, high peak pressures and a low tidal volume (<100 mL) were noticed on the ventilator. On lifting the surgical drapes, it was identified that the patient was having a torrential nasal bleed with a severe subconjunctival hemorrhage and facial erythema (Figure 1). She had severe tachycardia (up to 150/min), severe hypertension (250/120 mmHg), and desaturation (SpO2-75%). The surgery was abandoned and the patient was turned to supine position. On examination, the subcutaneous emphysema was identified over the chest. The patient was ventilated manually until the saturation gradually increased to 100%. However, there was decreased chest rise and increased

Figure 1. Subconjunctival hemorrhage and facial erythema.

ABSTRACT

Subcutaneous emphysema is a known but rare complication in shoulder arthroscopies. Addition of complications like bilateral hydrothorax confuse the situation to the intensivist. We report the case of a patient posted for shoulder arthroscopy who developed subcutaneous emphysema but later diagnosed to have bilateral hydrothorax. The perplexity in the diagnosis was cleared by investigating further. This case report attempts to resolve the diagnostic confusion involved in managing complications after shoulder arthroscopy.

Keywords: arthroscopy, postoperative complications, respiratory failure, shoulder
peak pressures on manual ventilation. Considering it to be a large subcutaneous emphysema, nicks were given in the infraclavicular zones and the patient was transferred to the ICU for further management. A blood gas analysis was performed and showed severe respiratory acidosis. In the ICU, the patient had severe hemodynamic instability and persistently high peak airway pressures. Crepitus obscured the auscultatory findings. A quick lung ultrasound was run but was of no use due to the air interface masking the findings. A chest X-ray was performed and the results were unremarkable. The patient was then transferred for a High-resolution computed tomography of the chest (cHRCT) scan which revealed massive hydrothorax, more pronounced on the operating side. Various lung complications associated with shoulder arthroscopy which have been reported to date include pneumothorax, hydrothorax, subcutaneous emphysema, tracheal injury, air embolism, and pulmonary embolism. Among them subcutaneous emphysema presented in unity with pneumothorax and tracheal injury but, not with hydrothorax [2-7]. Moreover, to the best of our knowledge these complications were reported in the postoperative period but in this case, the patient deteriorated intraoperatively within 30 minutes of the start of surgery. The irrigation pump was set at 40-60 mmHg of pressure and the flowrate was set at 80-100 mL/min according to the standard guidelines [1]. But upon tracking the reason for the catastrophic series of events, it was determined that the pump delivered more pressure and flow than the preset values. It was considered to be a programming defect and was rectified later.

Any of these lung conditions could be differentiated by their clinical presentation, lung ultrasound, cHRCT, and CT pulmonary angiography findings. In a case reported by A. Hariri et al, the patient presented on postoperative Day 10, after an arthroscopy, with thoracic pain and hemoptysis. This led to a CT pulmonary angiography which revealed pulmonary embolism [2]. Risk factors enumerated for pulmonary embolism in patients for shoulder arthroscopy include lateral decubitus position, inter scalene brachial plexus block, prolonged duration of surgery, and susceptibility of the patient to thrombosis [2]. Presentation of fluid extravasation into the chest wall with pneumothorax has been reported by Kim et al [3], and Connett et al reported isolated complete hydrothorax after revision shoulder surgery. Connett et al reported that the various risk factors involved during complete hydrothorax after revision shoulder arthroscopic surgery were pump pressure >150 mmHg, a large volume of irrigation fluid, obesity, old age, dissection of the glenohumeral capsule, and injury to the periscapular musculature [4]. Van Nieuwenhuyse et al reported an isolated case of subcutaneous emphysema (SE) post-shoulder arthroscopy [5]. There were a few reasons for SE discussed by the author including negative suction causing air entrapment.

Discussion

Shoulder arthroscopy is performed for diagnostic and therapeutic management of shoulder injury. Subcutaneous emphysema and bilateral hydrothorax are known, but rare, complications associated with shoulder arthroscopy. Both presenting at the same time would be a catastrophe and would create diagnostic confusion. Risk factors such as high arthroscopic pump pressure and flow rate, long duration for the surgical procedure, and use of a large volume of irrigation fluid increases the risk of extravasation of fluid and its associated complications. Procedures involving the subacromial space, like in this case where shoulder arthroscopy was performed, there is space without encapsulation, and during these procedures there is an increased chance of extravasation. Another reason for extravasation of fluid could be due to gravity owing to the lateral decubitus position used in shoulder arthroscopy. Physiological factors of the patient such as obesity would also contribute to the extravasation of fluid, as there is a high chance of dissipation of fluid and gas in adipose tissue [1].

The patient initially presented with subcutaneous emphysema. A lung ultrasound and chest X-ray could not depict lung pathology. However, the raised peak airway pressure and severe hemodynamic instability provided evidence to support further investigation. cHRCT scans depicted massive hydrothorax, more pronounced on the operating side. Various lung complications associated with shoulder arthroscopy which have been reported to date include pneumothorax, hydrothorax, subcutaneous emphysema, tracheal injury, air embolism, and pulmonary embolism. Among them subcutaneous emphysema presented in unity with pneumothorax and tracheal injury but, not with hydrothorax [2-7]. Moreover, to the best of our knowledge these complications were reported in the postoperative period but in this case, the patient deteriorated intraoperatively within 30 minutes of the start of surgery. The irrigation pump was set at 40-60 mmHg of pressure and the flowrate was set at 80-100 mL/min according to the standard guidelines [1]. But upon tracking the reason for the catastrophic series of events, it was determined that the pump delivered more pressure and flow than the preset values. It was considered to be a programming defect and was rectified later.

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Fig. 2. Bilateral hydrothorax on the cHRCT scan. cHRCT = high-resolution computed tomography of the chest.
in the subacromial space, disconnection between the irrigation fluid bag and inflow tubing, and inadvertent entry from the ports [5]. Asghar et al reported another case in which a patient developed spontaneous pneumothorax and subcutaneous emphysema [6]. In another case reported by Vetrugno et al the patient had SE following 6 hours of shoulder arthroscopy surgery as a consequence of tracheal rupture which resolved spontaneously [7]. Using this evidence, a flow chart has been devised to trouble-shoot and guide early investigation for respiratory failure in patients who undergo shoulder arthroscopy surgery (Figure 3).

Due caution needs to be emphasized during shoulder arthroscopies. No return of irrigation fluid and cardiorespiratory compromise needs to be attended meticulously. A quick response and escalation of the investigation, and monitoring when in doubt would lead to a good patient outcome.
Author Contributions

Conceptualization: SB. Methodology: SB. Formal investigation: SB and VLMP. Data analysis: SB and VLMP. Writing original draft: SB. Writing - review and editing: SB and VLMP.

Conflicts of Interest

The authors declare that they have no competing interests.

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Ethical Statement

Informed consent was obtained.

Data Availability

All relevant data are included in this manuscript.

References