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CASO CLÍNICO

Shoulder Arthroscopy and Fluid Extravasation: A Rare but Potentially Fatal Complication

Artroscopia do Ombro e Extravasamento de Fluído: Uma Complicação Rara, mas Potencialmente Fatal

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ABSTRACT

Fluid irrigation is performed to ensure optimal visualization of the surgical field when performing arthroscopic procedures. However, excessive irrigation pressure or flow may cause fluid extravasation into the soft tissues. Although considered rare, this can be life-threatening due to potential airway edema. We describe the case of a patient submitted to shoulder arthroscopy, who developed complications related to fluid extravasation.

RESUMO

Uma visão ótima do campo cirúrgico é necessária para procedimentos artroscópios, usando para isso irrigação de fluídos. No entanto, pressão ou fluxo excessivos de irrigação podem causar extravasamento de volume para os tecidos moles. Apesar de raro, este evento pode colocar a vida do doente em risco devido ao edema da via aérea. Descreve-se o caso clínico de um doente submetido a artroscopia do ombro, que desenvolveu complicações relacionadas com o extravasamento de fluídos.

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INTRODUCTION

Shoulder arthroscopy (SA) requires pressurized irrigation fluid for distension of the operative joint and optimal surgical field visualization.[1] However, as with other endoscopic procedures, there are complications associated with the intraoperative use of irrigation fluid. These may include fluid overload, which can produce laboratory abnormalities of electrolytes (hyponatremia), ultimately leading to dysfunction of remote organs, including the central nervous system.[2]

Another complication includes fluid extravasation into the surrounding tissues, which can create a regional mass effect. Associated risk factors include excessive pressure/flow or poor surgical technique.[2,3] Although considered rare, fluid extravasation can be a life-threatening complication, due to its proximity to the airway, potentially leading to significant airway edema and airway compromise.[2]

Other risk factors associated with fluid extravasation include obesity, hypertension, lateral decubitus position, large volume of irrigation fluids, prolonged surgical times, and subacromial arthroscopic surgery due to the lack of encapsulation of the subacromial space.[1,2,4]

We describe the case of a patient submitted to arthroscopic rotator cuff repair surgery who experienced facial, neck, and chest edema, requiring orotracheal intubation maintenance and monitoring in the intensive care unit (ICU).

CASE REPORT

A 63-year-old woman, ASA II, with painful rotator cuff rupture and acromioclavicular and bicipital tenosynovitis, underwent right shoulder arthroscopy (SA). The patient had no relevant history and physical and laboratory findings were unremarkable.

A balanced general anesthesia, together with superficial cervical plexus and interscalene brachial plexus blocks were performed. Anesthetic induction with propofol (120 mg), fentanyl (150 mcg), and rocuronium (80 mg), desflurane was used for anesthetic maintenance. An ultrasound-guided peripheral single shot nerve block was performed using ropivacaine 2 mg/mL, total volume of 20 mL (10 mL for superficial cervical plexus block and 10 mL for interscalene brachial plexus block) while the patient was awake (before induction), without complications and good ultrasound visualization and anesthetic dispersion.

The patient was positioned in left lateral decubitus (LLD) and basic anesthetic monitoring as per the American Society of Anesthesiologists standards was present. Neuromuscular blockade monitoring and neuromonitoring were performed with TOF count/TOF ratio and Conox®, respectively.[5] Before induction, the patient was normotensive (130/75 mmHg) and SpO_2 100% at room air.

Throughout the surgery, the patient remained normotensive (140 - 105 mmHg systolic blood pressure, 95 - 60 mmHg diastolic blood pressure) and hemodynamically stable without additional intervention. Likewise, there was no desaturation, with a FiO_2 38% and SpO_2 remaining at 100%. During the intraoperative period, multimodal analgesia was provided: paracetamol (1 g), ketorolac (30 mg), dexamethasone (8 mg), and ketamine (30 mg).

Regarding the surgical approach, the orthopedic surgeon opted for an arthroscopic repair in LLD, using saline solution as irrigation fluid and an irrigator pump at 100 mmHg. Clinical monitoring was also performed intraoperatively.

After 30 L of saline were infused, the patient was examined for signs of edema in the chest and cervical tissues. This assessment was hindered by the LLD position and the placement of surgical drapes, with no clinical signs of edema in the aforementioned regions being found. The surgeon was informed of the volume of saline infused and the procedure resumed.

From that point on, the surgeon was informed by the anesthesiologist of every additional 10 L of saline infused.

Approximately at 2 hours of surgery, and after a total saline volume of 69 L was infused, clinical signs of edema were again searched for and extensive edema of the chest wall, face and neck was identified (Fig. 1). The SA was interrupted to prevent further complications and maintain airway patency and converted to conventional open surgery to avoid additional fluid irrigation. Intravenous furosemide (20 mg) was administered. Intubation was maintained due to epiglottis edema observed through videolaryngoscopy, which motivated an unprogrammed postoperative admission to the ICU.

Postoperatively, there was a decrease in the patient's hemoglobin and hematocrit levels by 1.3 g/dL and 4.4%, respectively due to hemodilution. In the ICU, a single dose of intravenous furosemide (40 mg) was given to reduce fluid overload. The patient was assessed 24 hours after surgery and showed no signs of edema or difficulty breathing. Two days after surgery, cervical computed tomography (Fig. 2) confirmed the resolution of the edema in the face and neck. The patient was safely extubated and discharged from the ICU 36 hours after admission and discharged home 4 days after surgery.

Figure 1. Intra-operative facial, neck, and chest wall edema

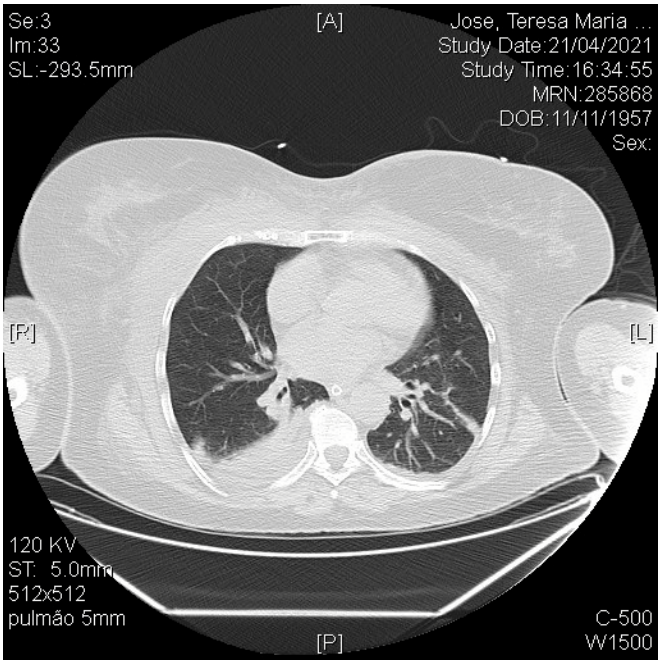

Figure 2. Day 1 post-operative: Thorax computed tomography showing edema mainly in the right breast and right pleural effusion

DISCUSSION

In this case, several surgical risk factors might have contributed to fluid extravasation, including lateral

decubitus positioning, high volume of fluid irrigated (69 L), and prolonged surgical time (2 hours).

Lateral decubitus position increases the risk for fluid extravasation due to gravity-assisted movement from shoulder to neck.[2] When the edema was first identified, repositioning to beach-chair position could have been considered to allow gravity to direct the fluid away from the airway.[1] About 65% of the patients who experienced fluid extravasation were positioned in the lateral decubitus position compared to 30% in the beach chair position.[2] However, the beach-chair position also poses risks, such as air embolism, hypotension, and cerebral hypoperfusion[1], so the risk/benefit of each position must be weighted on an individual basis.

Regarding irrigated volume, in a review published by Memon et al., the authors suggest limiting the total irrigation volume to 20 L, as patients were found to be symptomatic between 20 and 36 L.[2] As high pump pressure, it is recommended to be under 150 mmHg[2], which was fulfilled in this case.

Careful intraoperative monitoring is paramount in early detection of SA-associated fluid extravasation and preventing further extravasation. One difficulty in observing possible complications from fluid extravasation is the barrier created by surgical drapes.[2] Edema and airway compromise may easily go unnoticed when developing under the drapes. Care must be taken in placing surgical drapes to allow for adequate exposure of face, neck, shoulder, and chest in the adjacent area. It is also important monitoring continuously for swelling in these areas.[2] In this case, an endotracheal airway was in place when the condition was identified. This ensured airway protection. Finally, to achieve better patient outcomes, a clear and efficient communication between anesthesiologist and surgeons must be ensured. In this case, the team decided to quickly end the procedure by converting it to open surgery without further fluid irrigation, so that adequate monitoring and supportive care in a high care unit could be initiated.

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