

## Case Report

# Neck fluid extravasation in shoulder arthroscopic surgery-a life-threatening complication: a report of two cases

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## ABSTRACT

Fluid extravasation in shoulder arthroscopy may lead to life-threatening consequences, such as airway compromise. These cases are rare and few were reported in the literature. Clinical cases of 2 female patients submitted to shoulder arthroscopy for a rotator cuff tear repair, complicated with fluid extravasation that led to trachea compression and need for intensive care unit (ICU) admission with postponed extubation. Neither patients showed any sequelae in the follow-up period. Report of these rare complications, with detailed and reproducible information, is vital for their comprehension and future elaboration of surveillance and treatment guidelines.

**Keywords:** Shoulder, Rotator cuff, Arthroscopy/adverse effects

## INTRODUCTION

Shoulder arthroscopy has replaced open surgery in many pathologies because it allows better joint visualization, faster recovery, less complications and often better outcomes. Nevertheless, it's not exempt of complications.<sup>1</sup> Some were not reported in open surgery and may be life-threatening, as fluid extra-vasation and air embolism.<sup>2-4</sup>

Present 2 patients submitted to arthroscopic rotator cuff tear repair, in which fluid extravasation led to trachea compression and need for ICU admission with postponed extubation. There are only 17 cases described where intubation was required for management of fluid extravasation.<sup>2,3</sup>

## CASE REPORT

### Case 1

A 63-year-old woman presenting with a reparable rotator cuff tear refractory to conservative treatment-medication

NSAIDs and proper physical therapy rehabilitation for six months. As surgical past history, she had a contralateral arthroscopic rotator cuff debridement and long head biceps tenotomy, with no related complications. She had a BMI of 23.9 kg/m<sup>2</sup> and was classified as an American society of anesthesiologists (ASA) class 2 (Table 1).

**Table 1: Patients' demographics and preop diagnosis.**

| Variables                       | Patient 1  | Patient 2                  |
|---------------------------------|--|----------------------------|
| <b>Age (In years)</b>           | 63   | 54                         |
| <b>Genre</b>                    | Female   | Female                     |
| <b>Weight (kg)</b>              | 62   | 101                        |
| <b>Height (cm)</b>              | 161  | 160                        |
| <b>BMI (Kg/m<sup>2</sup>)</b>   | 23.9   | 39.45                      |
| <b>ASA</b>                      | 2  | 3                          |
| <b>Relevant medical history</b> | Contralateral irreparable cuff tear arthroscopic surgery | Obesity                    |
| <b>Diagnosis</b>                | Complete rotator cuff tear                               | Complete rotator cuff tear |

She was submitted to an arthroscopic double-row rotator cuff repair, along with long head biceps tenotomy and subacromial bursectomy (Table 2).

**Table 2: Intraoperative parameters related to fluid infiltration.**

| Variables                     | Patient 1  | Patient 2  |
|-------------------------------|--|--|
| <b>Procedure</b>              | Arthroscopic double-row rotator cuff repair (2 anchors) + long head biceps tenotomy + subacromial bursectomy | Arthroscopic double-row rotator cuff repair (3 anchors) + long head biceps tenotomy + subacromial bursectomy |
| <b>Arthroscopic portals</b>   | 4 (1 with cannula)   | 4 (1 with cannula)   |
| <b>Duration (min)</b>         | 95   | 140  |
| <b>Positioning</b>            | Lateral decubitus  | Beach chair  |
| <b>Anesthesia</b>             | Combined-PNB (interscalene) + general anesthesia   | Combined-PNB (suprascapular and axillary) + general anesthesia   |
| <b>Irrigation fluid</b>       | Normal saline (total-less than 18 L)   | Normal saline (total-less than 21 L)   |
| <b>Irrigation pump (mmHg)</b> | 50 (brief periods of 70)   | 50 (brief periods of 70)   |
| <b>Use of electrocautery</b>  | Yes  | Yes  |
| <b>Intra-op BP (mmHg)</b>     |  |  |
| Systolic                      | From 90 to 145   | From 80 to 130   |
| Diastolic                     | From 55 to 85  | From 40 to 80  |
| <b>Intra-op HR (bpm)</b>      | From 45 to 85  | From 55 to 70  |

At the end of the surgery, upon the removal of drapes a diffuse asymmetrical fluid infiltration was noticed. While starting to extubate the patient, a considerable bronchospasm was noted, which required the administration of bronchodilators and new curarization (Table 3).

The extubation was postponed and the patient was admitted to the ICU. Computed Tomography scan performed one hour and half after the surgery showed significant infiltration in the side of the intervention with a contralateral deviation of the upper airways, and mild lung atelectasis. The patient was extubated at about 23 hours postoperative and transferred to the orthopedic infirmary in the following morning with the almost complete resolution of the infiltration (Table 3).

She was discharged in the second postoperative day from the hospital with no respiratory symptoms.

**Case 2**

A 54-year-old woman, obese (BMI of 39.45 kg/m<sup>2</sup>) and ASA class 3 (Table 1). She also presented a reparable rotator cuff tear refractory to conservative treatment and was submitted to an arthroscopic double-row rotator cuff repair, along with long head biceps tenotomy and subacromial bursectomy (Table 2).

**Table 3: Post-operative findings, delay in discharge and treatment instituted.**

| Variables  | Patient 1  | Patient 2  |
|--|--|--|
| <b>Vital signs</b>                                 | Never hemodynamically instable or low O <sub>2</sub> saturation          | Never hemodynamically instable or low O <sub>2</sub> saturation                        |
| <b>Time from surgery to</b>                        |  |  |
| Extubation (hours)                                 | 23   | 17   |
| Discharge from ICU (hours)                         | 36   | 19   |
| Discharge from hospital (days)                     | 2.5  | 2  |
| Resolve the clinical edema (days)                  | 2  | 2  |
| <b>Radiology findings in the day of surgery</b>    | CT scan-contralateral deviation of upper airways; mild lung atelectasis  | X-ray-pulmonary congestion   |
| <b>Specific treatment</b>                          | Furosemide   | None   |
| <b>Hb variation (g/dL) (pre-op → post-op)</b>      | 13.65 → 10.90  | 13.61 → 12.20  |
| <b>Hematocrit variation (%) (pre-op → post-op)</b> | 40.2% → 33.5%  | 40.5% → 36.8%  |
| <b>pH impact</b>                                   | None/compensated   | Metabolic acidosis   |
| <b>Ionogram impact (pre-op → post-op)</b>          | K <sup>+</sup> 4.3 → 3.2   | K <sup>+</sup> 4.3 → 3.5   |
| <b>Support treatment</b>                           | K <sup>+</sup> IV supplementation O <sub>2</sub> -nasal cannula (4L/min) | K <sup>+</sup> IV supplementation O <sub>2</sub> -venturi masks (FiO <sub>2</sub> 40%) |
| <b>Long term complications</b>                     | None   | None   |

CT-Computerized tomography; FiO<sub>2</sub>-fraction of inspired oxygen; Hb-Hemoglobin; Ht-Hematocrit; ICU-Intensive care unit; IV-Intravenous; Post-op-Postoperative; Pre-op-Preoperative.

Once again, after removing the drapes, an asymmetrical fluid infiltration was noticed in the shoulder, upper chest and neck base with airway deviation. Considering the patient obesity and physical status ASA three, it was decided to postpone the extubation and to admit the patient to the ICU. A chest radiography was promptly performed, showing signs of pulmonary congestion (Table 3).

She was extubated and transferred to the Orthopedics infirmary in the following morning (about 17 hours postoperative) and was discharged from the hospital in the succeeding day, with almost complete resolution of the fluid infiltration and no respiratory symptoms (Table 3).

To date, neither patients showed any sequelae due to this complication.

## DISCUSSION

Several risk factors for fluid extravasation have been mentioned in the literature. However, most are postulated on a rational/logical way, instead of being evidence based.

In the first case, the most relevant risk factors were the older age (looser soft tissues), the lateral decubitus positioning (gravity effect) and the execution of extra-articular procedures, namely subacromial bursectomy and rotator cuff repair (higher pressure and weak fluid containment).<sup>5,6</sup> No other determinant factors were identified in this case.

In the second case, the patient was obese, the surgery was lengthier (140 minutes) and extra-articular procedures were also performed.<sup>5,6</sup>

In both cases, intraoperative preemptive efforts were made to reduce the risk of this complication, by maintaining joint irrigation pump pressures at 50 mmHg in the irrigation pump (increased to 70 mmHg for brief periods for improved visibility) and maintaining low arterial blood pressures to allow lower irrigation pressures while aiding in visual clarity.

During the procedure, the surveillance of the edema by the team, especially in the neck and chest wall, is crucial to evaluate the need for airway protection-intubation or postpone extubation. The ultrasound may be a valuable tool to access airways compromise and to establish the differential diagnosis with other complications-anaphylaxis, pulmonary edema, cardiac failure, pneumothorax, and others.<sup>7</sup> This is especially important if the procedure is done under regional anaesthesia and because the airway is usually not protected, and intubation may be hard after the establishment of the fluid infiltration.

In the described cases, it was vital that the neck fluid infiltration was noticed before extubation, because reintubation or even salvage cricothyrotomy might prove difficult due to the neck edema.

In some cases, the fluid infiltration leads to electrolyte imbalances and blood count panels alterations.<sup>8</sup> In these cases, both showed a mild hypokalemia in the early postoperative period, which was uneventfully treated with intravenous supplementation of potassium.

During the follow-up period, no medical sequelae was known to be directly related to the operative complications we report. Nonetheless, hospital discharge was considerably delayed and a comprehensible anxiety was caused in the patients and respective family. We hereby highlight the importance of informing patients about this possible complication before the procedure, especially those more susceptible.

## CONCLUSION

Shoulder surgeons need to be aware of all potentially life-threatening complications. Fluid extravasation can cause harm due to physical compression of surrounding tissues or due to systemic absorption and subsequent changes in electrolyte balance and blood count panels. Both the surgeon and the anesthesiologist play a key role in preventing, detecting and treating this complication.

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