CLINICAL REPORT

Cranial nerves neuropraxia after shoulder arthroscopy in beach chair position

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Summary We report a case of neuropraxia of the 9th, 10th and 12th cranial nerve pairs after arthroscopic rotator cuff repair in the beach chair position. The elements in the medical file seem to exclude an intracranial cause of the lesions and support a mechanical, extracranial cause due to intubation and/or the beach chair position. This clinical case report shows the neurological risks of the beach chair position during arthroscopic shoulder surgery and presents the essential safety measures to prevent these risks.

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Introduction

Arthroscopy is practiced to repair shoulder damage with patients in the beach chair or the lateral decubitus position. The choice of position mainly depends upon the surgeon’s preferences. In the beach chair position joint distraction can be obtained without traction of the arm thanks to the weight of the limb, thus avoiding the risk of pulling the brachial plexus. This position may also reduce the risk of injury to axillary and/or musculocutaneous nerves when an anterior portal is used [1]. The arm can be manipulated and the entire joint can be explored. [2]. If necessary open surgery is easy to perform [2]. This position is compatible with locoregional anesthesia, and allows easy access to the upper airways [3].

Despite all these advantages, complications, including thromboembolic or neurological events, may occur [4–6].

We report a case of palsy of the three cranial nerves following arthroscopic repair of the rotator cuff with the patient in the beach chair position. The mechanism of injury

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is discussed as well as the precautions to be taken to avoid this complication.

**Clinical case**

An active, retired, right hand dominant 66 year old patient (78 kg, 1 m 79), presented with a transfixing rupture of the right supraspinatus tendon without retraction or muscular degeneration, resulting in pain which had not responded to long term medical treatment. In addition to the cuff injury, arthrosan also revealed an acromioclavicular arthropathy compressing the myotendinous junction.

The patient underwent arthroscopy in the beach chair position under general anesthesia without complementary interscalenic nerve block (Fig. 1) for reinsertion of the supraspinatus tendon. During surgery subacromial debridement was performed in association with acromioclavicular resection and repair of the tear, by the double row suture anchor technique (Ancre Swive Lock, Arthrex, Naples, EU). Two arthroscopic canulla were used: one in the anterolateral position and one in the lateral position. Pump pressure was adjusted to 50 mmHg. A total of 12 litres of draining was necessary.

During anesthesia, oxygen saturation ranged between 99 à 100%, blood pressure between 19/5 and 13/7 and heart rate between 50 and 70. Anesthesia lasted 170 minutes and surgery 120 minutes.

When the patient awoke, he had difficulty chewing and speaking and his voice had changed. Facial asymmetry and a deviated tongue were observed. Consultation with an ENT confirmed complete palsy of the 9th and 12th cranial nerve pairs and partial palsy of the 10th. (insensitivity of the hemi-soft palate, homolateral hemi-ageusia). The cardiologist concluded that there was no emboliogenic disease.

The presence of vascular lesions in the medulla oblongata was excluded by CT scan and MRI. The patient gradually and completely recovered after 6 months.

**Discussion**

The rate of neurological complications after shoulder surgery in particular by arthroscopy is very low Rodeo S.A [7]. In a series of 14000 shoulder arthroscopies Small identified 4 cases or a rate of 0.03% (three in the brachial plexus and one in the axillary nerve). The lateral decubitus position seems to present a higher risk of complications because of the traction to the arm, with a rate of 6—30% of permanent or temporary palsy involving the brachial plexus or the nerves of the forearm [8,9].

Neuropraxia of the three hypoglossal nerves (cranial nerve XII), glossopharyngeal (cranial nerve IX) and vagus nerves (cranial nerve X), has never been reported following shoulder arthroscopy in the beach chair position. Only isolated injuries have been reported. Isolated neuropraxia of the large hypoglossal nerve for example, may occur during numerous interventions such as tooth extractions, during an anterior surgical approach of the cervical spine, or carotid endarterectomies [10,11]. Mullins et al. were the first to report nerve injury during shoulder arthroscopy in the beach chair position [12]. Two other cases of isolated unilateral palsy of the hypoglossal nerve have been published [13]. The first in a 41-year old man after open Bankart repair in the beach chair position, and the second in a 71-year old man after arthroscopic acromioplasty associated with mini-open repair of the rotator cuff. All of these cases resolved spontaneously.

Multiple injury to the cranial nerves in the present case could be explained by several mechanisms. An intracranial cause is suggested because the three nerves originate in the medulla oblongata on the medial side of the jugular bulb. This suggests cerebral hypoperfusion or a thromboembolic event [5,6,14]. Insufficient perfusion of the vertebral artery may also be the cause due to the hyperextension associated with rotation and lateral direction of the head, or even gas embolisms. However, none of the perioperative data support this hypothesis, such as the results of perioperative pressure monitoring of the arm, the negative results of brain imaging or postoperative cardiological tests.

Thus a mechanical, extracranial cause is more probable. The hypoglossal nerve emerges from the skull by the hypoglossal canal, which is very close to the jugular foramen where the other nerves pass (Figs. 2 and 3). They are at risk of being pulled, especially during anesthesia [15,16]. During intubation the patient’s tongue is pushed forward and the head is pushed back which can cause pulling. [17]. The pressure on the cricoid cartilage during intubation has also been described as a cause of traction to the hypoglossal nerve, which is fixed in this area [18]. When the patient is positioned with the head rotated to the left for surgery of the right shoulder, positional injury can occur due to nerve compression and pulling, or “rack” type effects caused by various anatomical structures (Fig. 2).
Figure 2  Physiopathology of nerve damage on the transversal plan with an inferior view of the base of the skull, and the aerodigestive track of the three nerves. When the head is rotated to the left for surgery of the right shoulder, the hypothesis of positional injury can be explained by compression-pulling of the nerve or rack type effects caused by different anatomical structures. For clarity, we only show the angle of the jaw, which could compress the 12th pair of cranial nerves.

Figure 3  Physiopathology of nerve damage in the saggital plane with a left lateral view of the neck. The projection of the angle and the ascending branch of the jaw are presented as dotted lines with shading of subjacent structures. A zoom centered on the angle of the jaw is represented in the inset. This emphasizes the close relationship between this angle and the 12th pair of cranial nerves thus emphasizing the "chopping block" type effect, which could explain nerve compression.

During surgery any change in position which modifies the angle of the trunk in relation to the headrest, can cause nerve compression under the angle of the jaw, which can become a block. This chopping block effect (Fig. 3) of the angle of the jaw can also occur if there is too much flexion of the headrest during initial installation. The craniospinal axis should be respected and manipulated with care during this type of surgery. The head should be firmly attached to the headrest with no ocular or jugular compression. The patient’s position should be checked frequently during surgery by the members of the surgical and anesthesi team especially if the angle of the operating table is changed.

Conclusion

This clinical report describes a neurological complication involving neuropraxia of 3 cranial nerves. The medical file seems to exclude an intracranial cause for the lesions and support a mechanical extracranial cause due to intubation and/or set-up. This clinical report is a reminder of the neu-
neurological risks of the beach chair position during arthroscopic shoulder surgery, and the essential safety precautions that should be taken to avoid these complications

Disclosure of interest

The authors have not supplied their declaration of conflict of interest.

References