



## Letter to the Editor

### Cranial nerves VII and XII palsy after shoulder surgery



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#### ABSTRACT

A 46-year-old man underwent a left shoulder surgery in the beach chair position with general anaesthesia and oro-tracheal intubation preceded by a left interscalenic block. Patient's head was attached to the headrest in a position of soft extension and moderate right rotation with adhesive tape surrounding his forehead and mandible. Surgery was marked by repeated vertical tractions on the left arm and by blood resorption of the arthroscopy's irrigation fluid, including epinephrine, which translated in a heart rate and arterial blood pressure rise. Upon waking the patient had severe headaches, left Horner's sign, left facial paresis and a left lingual paralysis. MRI and CT scan did not show any carotid dissection or parapharyngeal lesion. Electromyogram and neurological examination confirmed a VII and XII cranial nerve peripheral lesion, which took several months to regress. An ischaemic complication was suspected although the most probable cause of the patient's symptoms was subsequent to an Eagle's syndrome neurapraxia related to a long styloid process.

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## 1. Introduction

Operative position is a compromise between surgery's approach and patient's tolerance [1]. Subsequently complications are possible and frequency is estimated between 2 and 6% of physicians' declarations [1]. Irrespective of the type of surgery concerns are focused on possible neurological compressions especially around the limbs. In orthopaedics, the beach chair position is commonly used for shoulder surgery. It adds to the risk of compression, haemodynamic and ischaemic cerebral risk [2]. This case report shows an original neurological complication in the form of left cranial nerves VII and XII paralysis subsequent to an ipsilateral shoulder surgery performed in a half sitting position.

## 2. Clinical case

An ASA 2 46-year-old man underwent a left shoulder surgery in a beach chair position with general anaesthesia. This was preceded by an ultrasound guided left interscalenic block with neurostimulation performed without technical issue around the C6 root in a wide-awake patient. The puncture was atraumatic and a single injection of 20 mL of 0.2% ropivacaine was performed. General anaesthesia required an orotracheal intubation, which was easily achieved (Cormack 1). Gradually, the patient was placed in a semi-sitting position checking for any fibular or ulnar nerve compression. The surgeon fixed the patient's head to the headrest in a position of soft extension and moderate right rotation with adhesive tape surrounding his forehead and mandible. Thirty minutes post-incision there was an increased heart rate and blood

pressure. This was unchanged despite repeated injections of Sufentanil<sup>®</sup> and was explained by blood resorption of the arthroscopy's irrigation fluid, including epinephrine (total volume of 3000 mL with 15 mg of epinephrine). No hypotensive events occurred. The minimum mean arterial pressure was 80 mmHg. During the procedure the surgeon and his assistants proceeded to repeated vertical tractions to the patient's left arm. Operative time was 80 minutes. Upon waking the patient had a left Horner's sign and a left hand sensory-motor deficit. The patient had severe headaches requiring Morphine intravenous titration. The anaesthetic motor block subsided uneventfully 9 hours after the initial injection.

At day 1, the patient had speech difficulties and a motor palsy of the tongue. A neurologist described a paretic dysarthria and swallowing disorder subsequent to a left facial and tongue palsy. MRI at day 2 excluded a left carotid dissection or a left lateral bulbar central lesion. The patient was discharged at day 4. However, he wished to meet again with the anaesthetist as he thought his neurological disorders were related to the interscalenic block. Only then did the patient inform us that his neurological symptoms were present at the time he recovered from his anaesthesia. No additional neurological signs were observed. A cervical CT scan with contrast did not show any local compressive lesion especially in the base of the tongue or the left interscalenic and pre-vertebral area. At day 30, the neurologist confirmed a cranial nerve XII axo-myelinic peripheral deficit and persistence of a moderate left facial paresis. An ischaemic complication was suspected. An angiogram was proposed to the patient who declined any further investigation. An association of steroids and vasodilators was prescribed. The evolution at

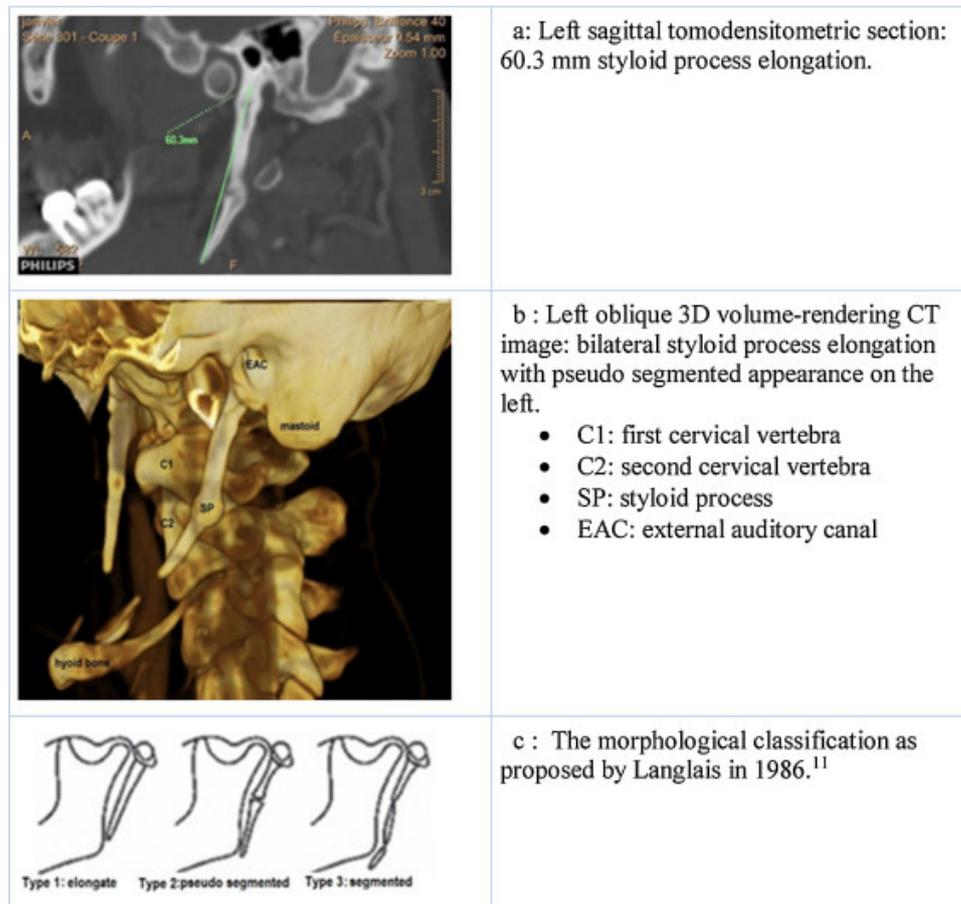


Fig. 1. Anatomical description of the styloid process elongation.

3 months was marked by the regression of the facial paresis but the persistence of the left lingual hemiparesis. At 6 months, electromyography of the left hypoglossal nerve showed an intermediate pattern whereas there was initially a neurogenic deficit. In preparation for writing this case report all radiological imaging was reviewed. It revealed a left styloid process elongation (Fig. 1a and b). The patient was contacted to inform him of this finding. He no longer had any neurological symptoms.

### 3. Discussion

The difficulty in this case report was to investigate the anatomical cause, which could explain the simultaneous injury of the XII and VII cranial nerves, which are not close at the level of the interscalenic injection. The patient wanted to see again the anaesthetist because he thought that these neurological deficits were a complication of loco regional anaesthesia. Even though the needle was introduced below the level of cricoid, and the procedure was made under ultrasonic and neurostimulation control, a CT scan was performed to rule out any haematoma or compressive lesion consecutive to the interscalenic block.

The headaches, Horner's sign and the unilateral XII cranial nerve palsy should have first suggested a carotid dissection which has been already described as a possible interscalenic block complication [3–5]. This was ruled out by an angioMRI scan on day 2. Additionally, interscalenic blocks often have an adverse effect such as an ipsilateral Claude Bernard–Horner's syndrome and disturb the etiological analysis of an asymmetric pupil. Tapia's syndrome includes a paralysis of the XII cranial nerve often associated with other cranial nerves palsies such as the cranial

nerve X if compression occurs in the parapharyngeal space [3,4,6]. Vascular and/or peripheral neurological compressive lesions can occur with ventilation devices (intubation probe or laryngeal mask), which can exert a lateral and compressive force to the carotid space [3,4,6]. It contains the internal carotid, external carotid branches, internal jugular, the last four cranial nerves (IX, X, XI, XII) and the sympathetic chain (Fig. 2a). It extends from the base of the skull to the second cervical vertebra. The irritation of the sympathetic chain leads to intense headaches in the territory of the carotid artery [7]. Laterally are the styloid process and the facial nerve, which emerges from the base of the skull through the stylo-mastoid foramen (Fig. 2a and b). Eagle's syndrome is characterised by neurological and vascular symptoms due to an abnormal lengthening of the styloid process or ossification of the stylo-hyoid ligament (Fig. 1b) [8,9]. A styloid process length of more than 30 mm is considered abnormal [8,9]. According to the length, width, angle and direction of the styloid process and the degree of calcification of the stylo-hyoid ligament, neurological and vascular symptoms may occur [9,10]. In this case the patient had a styloid process length of 60 mm (type 2 according to Langlais Classification) (Fig. 1c) [11]. This anatomical abnormality seems to explain the post-operative cranial nerve VII and XII injury and the headaches.

The following scenario can be considered to explain the neurological symptoms described in this case report. As the patient's head was fixed by an adhesive tape, it could not adapt to the repeated vertical movements applied to the patient's arm by the surgical team. The left arm and trunk being pulled down and the head being fixed created an excessive stretch to the left cervical structures. The adhesive tape surrounding the mandible and fixing it posteriorly alongside the exaggerated endotracheal tube curvature created by the cervical stretch may

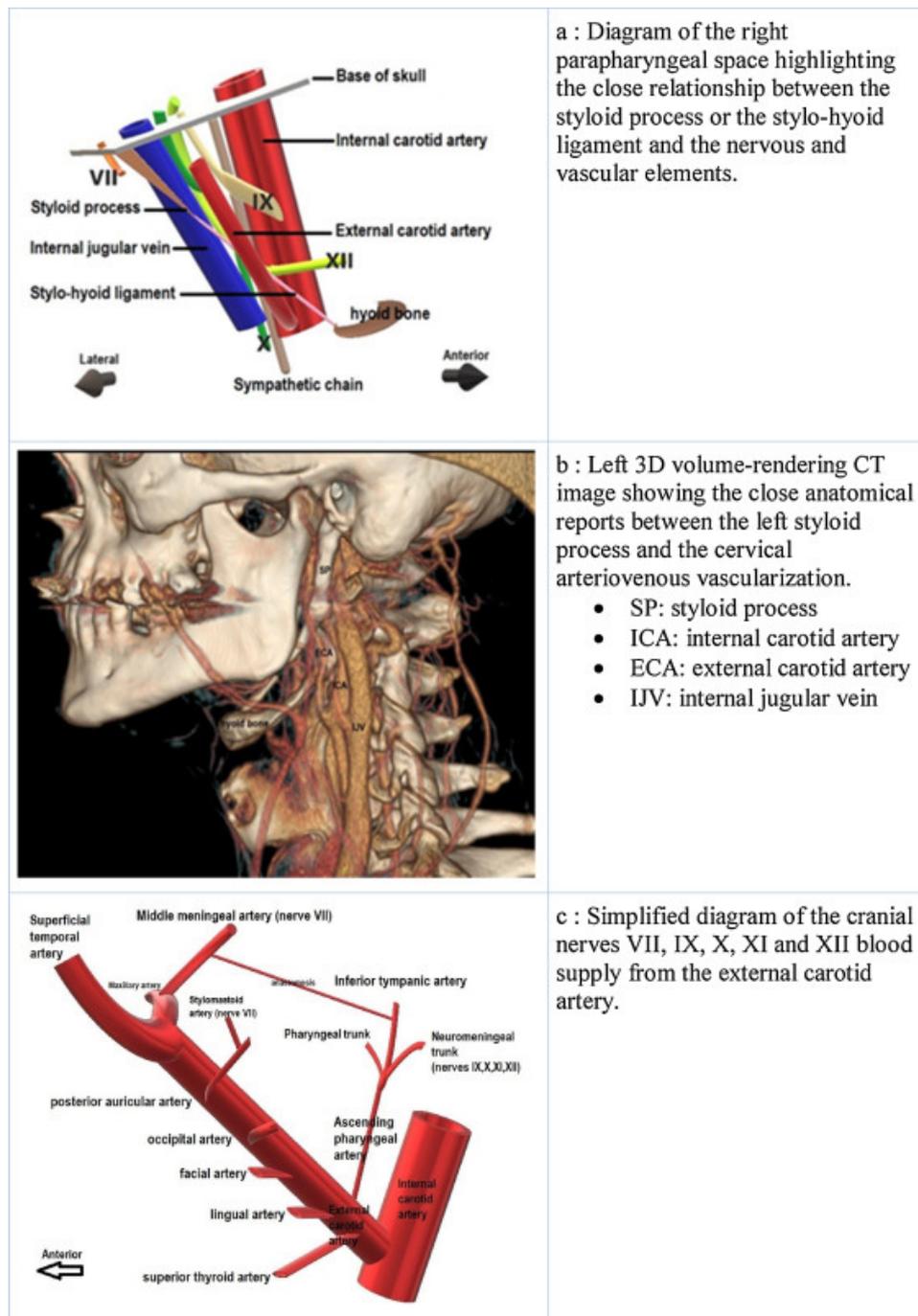


Fig. 2. Anatomical connections between nervous and vascular elements of the parapharyngeal space and the styloid process.

have caused excessive pressure to the ipsilateral structures contained in the parapharyngeal space. The patient's styloid process might have caused an additional obstacle. The forces exerted laterally by the mandibular backdrop and medially by the intubation probe could lead to a compression of the sympathetic chain, XII and VII around the left styloid process explaining the symptoms observed in the immediate postoperative period: headaches, Claude Bernard Horner's syndrome and left cranial nerves VII and XII palsies.

More difficult to demonstrate would be the involvement of the external carotid artery collaterals, particularly the ascending pharyngeal artery or the posterior auricular artery, which are anatomically very close to the styloid process. They are respectively responsible for the cranial nerves XII and VII blood supply

and can be the object of a compressive or embolic ischaemic mechanism, which in turn could explain the peripheral paralysis of these nerves (Fig. 2c) [12].

#### 4. Conclusion

Although the frequency of the styloid process syndrome (around 4% in the general population) is still debated, the frequency of symptomatic forms is low in the order of 4 to 10% [7,9,10]. Our patient with this anatomical variant had an asymptomatic form. It was the surgical position and the subsequent tractions, which induced the neurological manifestations. Considering this favorable outcome neurapraxis seems to be the involved mechanism. This case report reminds us that the

presence of new clinical signs in the postoperative period, even those that seem commonplace such as headaches, require special attention especially if the operating constraints are demanding as is the beach chair position used in orthopaedic surgery.

### Authors' contributions

Manuscript preparation, writing, review and correction was by T.G.; selection of radiological images and analysis was by M.M., M.C, T.A.; figures were prepared by T.G.

### Declaration of interest

The authors declare that they have no competing interest.

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