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Case Report

The thoracobrachial outlet syndrome, a false negative on MRI is possible: About a case ☆

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ABSTRACT

The diagnosis of thoracobrachial outlet syndrome is one of the most discussed diagnoses. We report the case of a 33-year-old woman who presented to the consultation for pain, edema, and paresis of the left upper limb. Magnetic resonance imaging makes it possible to make the diagnosis, but it happens in certain situations that it reveals certain limits for the confirmation of this syndrome. This case highlights the false negatives of this examination in front of a very telling clinical picture.

Introduction

The thoracobrachial outlet syndrome (TOS) corresponds to all the clinical signs related to the compression of the vasculonernous pedicle during the cervical-thoracobrachial crossing [1]. It can manifest as neurological and/or vascular symptoms. Its diagnosis is difficult due to the low sensitivity and specificity of the clinical and paraclinical examination. The anatomical complexity of this region poses a significant challenge for clinicians and radiologists [2]. MRI remains the best examination for detecting compression of neurological and vascular structures and identifying underlying anatomical abnormalities.

Medical observation

This is a 33-year-old patient who presented with edema and pain in the left upper limb associated with paresis. The onset of the symptoms dates back to 13 years with the progressive installation of neck pain and diffuse tingling throughout the left upper limb. Clinical examination found edema (Fig. 1), cyanosis of the left upper limb and limitation of the extension of the third, fourth and fifth finger (cubital claw) with reduced muscle strength. The radial pulse of the affected limb is present with disappearance on abduction.

Doppler ultrasound of the left upper limb showed a reduction in the flow of the left subclavian artery during abduction

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Fig. 1 – Left hand edema.

compared to adduction (Fig. 2). The electromyogram is borderline normal.

In the face of this symptomatology; two successive MRIs examinations were performed and were unremarkable. Considering the clinical picture, a third examination by 1.5T MRI in a specialized center was requested, carried out in coronal T2, coronal short tau inversion recovery (STIR), coronal T1 after fat sat injection, then in 3-dimensional Fiesta, with the demonstration of a moderate infiltration of the left brachial plexus in its fasciculo-troncular portions (interscalene and costoclavicular clamp), slightly intense, increasing discreetly after the injection (Figs. 3 and 4).

The angiographic MRI sequences after injection of contrast product show a notch on the vein subclavian which remains however permeable with adjacent collateral network and development of the perispinal venous plexus.

The patient benefited from a resection of the first rib with release of adhesions and fibrous structures compressing the vasculo-nervous elements; the evolution was marked by a good clinical improvement.

Discussion

MRI makes it possible to determine the presence of compressive elements, within the interscalene triangle and the proces-

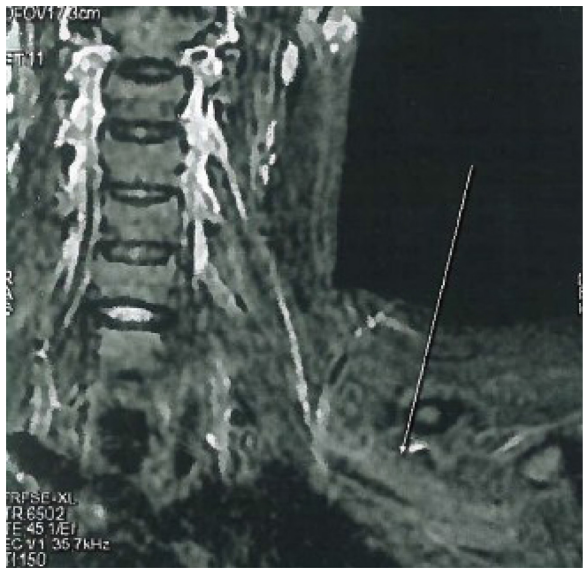
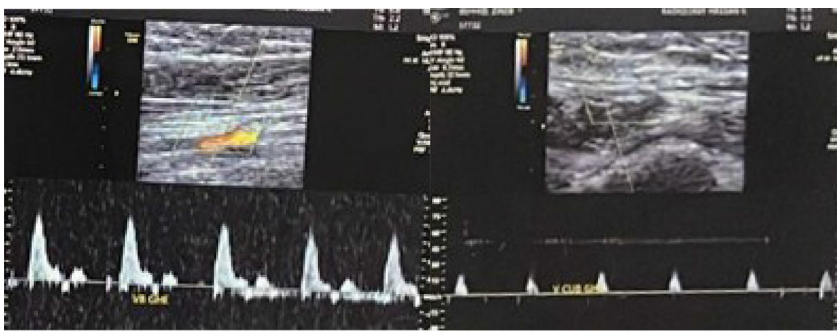


Fig. 3 – Coronal short tau inversion recovery (STIR) image showing compression of the brachial plexus (arrow) with infiltration at the level of the left fasciculo-troncular portions interscalene and by the costoclavicular clamp.

sion of the suspensory apparatus of the pleura. Its sensitivity and its specificity are discussed on a case-by-case basis; in a retrospective study published by Hardy et al. [3] which was related to 48 cases operated on for TOS and having had an MRI during the preoperative assessment. MRI revealed a lesion responsible for TOS in 71% of cases. There were 29% false negatives. The sensitivity of MRI at the level of the pleural suspensory apparatus was 28%, 81% for diagnosing hypertrophy of the anterior scalene muscle, and 50% for diagnosing an accessory scalene muscle. As in this work, the corresponding data for the costoclavicular space were 3 cases by MRI, and none by surgery [3].

In our case, we found false negatives twice when reading the elements collected by MRI, the latter being the imaging of choice in the exploration of a soft tissue pathology. The muscles, bony structures, and vessels silhouetted by the adjacent



A B

Fig. 2 – The flow in adduction (A) and arterial spectra on Doppler echocardiography of the left artery under Clavier showing a demodulation of flow in abduction (B).

Fig. 4 – Coronal T1 image showing compression of the brachial plexus.

fat are perfectly visualized [4]. In addition, MRI allows direct visibility of the different nerve branches of the brachial plexus.

The normal brachial plexus in the MRI has a fascicular aspect with a continuous evolution. In T1-weighted sequences, the signal is isointense to muscle and hyperintense to it in T2-weighted sequences. In T1 sequences, a thin plane of fat surrounds each plexus structure. The 3 trunks of the brachial plexus generally have the same diameter, they are symmetrical between the 2 sides and do not show any change after the injection of contrast product [5,6].

False-negative MRI for the diagnosis of TOS was observed in the supine position; thus in a retrospective study published by Cornelis et al. [7]. In 48 patients, supine angiography showed arterial stenosis in 6% of cases and dynamic supine angiography showed stenosis in 81% of cases, with severe stenosis in only 35% of cases. Sitting angiography was performed in 33 patients, showing worsening stenosis in 91% of cases, with severe stenosis in 87%. This work concluded that MRI in a sitting position associated with the dynamic maneuver improves the detection sensitivity of TOS. For our patient, the 3 examinations carried out were in the supine position given the absence of open-field MRI in our structures.

The SSFP sequence (Steady State Free Precession), which it has different acronyms like FIESTA, is a gradient echo sequence that gives a high signal-to-noise ratio and is sensitive to respiratory movements. The clinical value of this sequence comes from its ability to provide an adequate tissue signal with a high T2/T1 ratio [8].

This FIESTA sequence was not specified at the request of the first 2 MRIs, used in the third MRI and made it possible to establish the diagnosis of TOS, which shows its ability to highlight the compressive elements of the brachial plexus and explain the false negatives of the first 2 MRIs, hence the interest of specifying the performance of this mode of examination each time an MRI is requested in front of this table.

Several studies have assessed the diagnostic performance of MRI in TOS; Singh et al. [9] evaluated the diagnostic performance of 1.5 T MRI using surgery as a reference. The results of this work were that MRI and surgery agreed in only 17 cases (40%), MRI had a sensitivity of 41%, a specificity of 33%, a positive predictive value of 89%, and a negative predictive of 4%.

Conclusion

MRI has low sensitivity for the diagnosis of TOS; hence the interest of being correlated with the results of other clinical and paraclinical examinations.

The SSFP sequence and the magnetic field 3 T give better performance and image quality to prove the diagnosis of TDS.

Author contributions

All authors have participated in the article preparation, and have approved the final article.

Patient consent

Informed written consent was obtained from the patient for publication of the case report and all imaging studies. Consent form on record.

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