ΠΤΕΡΥΓΟΕΙΔΗΣ ΩΜΟΠΛΑΤΗ ΣΕ ΕΔΑΦΟΣ ΝΕΥΡΟΠΑΘΕΙΑΣ ΜΑΚΡΟΥ ΘΩΡΑΚΙΚΟΥ ΝΕΥΡΟΥ – Η ΣΥΜΒΟΛΗ ΤΗΣ ΜΑΓΝΗΤΙΚΗΣ ΝΕΥΡΟΓΡΑΦΙΑΣ

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ΠΕΡΙΛΗΨΗ

Εισαγωγή: Η πτερυγοειδής ωμοπλάτη μπορεί να προκληθεί από πάρεση του μακρού θωρακικού νεύρου, του παραπληρωματικού νεύρου ή του ραχιαίου νεύρου της ωμοπλάτης, οδηγώντας σε αδυναμία του πρόσθιου οδοντωτού μυός, του τραπεζοειδούς ή των ρομβοειδών μυών, αντίστοιχα. **Μέθοδοι**: Στην παρούσα εργασία παρουσιάζουμε ένα περιστατικό με πτερυγοειδή ωμοπλάτη σε έδαφος νευροπάθειας μακρού θωρακικού νεύρου. **Παρουσίαση Περιστατικού:** Γυναίκα 23 ετών με ελεύθερο ατομικό ιστορικό παρουσίασε από εξαμήνου σταδιακά επιδεινούμενο άλγος στην περιοχή του δεξιού ώμου, με συνοδό μυϊκή αδυναμία. Κατά την αδρή νευρολογική εξέταση, διαπιστώθηκε απόσπαση της ωμοπλάτης από το οπίσθιο θωρακικό τοίχωμα, ανύψωση της άνω γωνίας και μετατόπιση του έσω χείλους προς τα μέσα. Από τον ηλεκτροφυσιολογικό έλεγχο, η μελέτη αγωγιμότητας των νεύρων ανέδειξε μειωμένο ύψος κινητικού προκλητού δυναμικού από τον πρόσθιο οδοντωτό μυ δεξιά, χωρίς στοιχεία ενεργού απονεύρωσης. Η Μαγνητική Νευρογραφία, με ειδικές ακολουθίες T2-weighted short-tau inversion recovery (STIR), ανέδειξε διάχυτα αυξημένο σήμα κατά μήκος του μακρού θωρακικού νεύρου, χωρίς παθολογική σκιαγραφική ενίσχυση. Περίπου εννέα μήνες μετά την έναρξη των συμπτωμάτων και έπειτα από εντατική φυσικοθεραπεία, η ασθενής παρουσίασε πλήρη υποχώρηση των συμπτωμάτων. **Συμπεράσματα:** Η παρούσα περιγραφή περιστατικού αναδεικνύει τη χρησιμότητα της μαγνητικής νευρογραφίας ως μια αξιόπιστη απεικονιστική μέθοδο στην ανίχνευση προσβολής του μακρού θωρακικού νεύρου σε ασθενείς με πτερυγοειδή ωμοπλάτη.

Λέξεις-κλειδιά: πτερυγοειδής ωμοπλάτη, μακρό θωρακικό νεύρο, νευροπάθεια, μαγνητική νευρογραφία

SCAPULAR WINGING DUE TO LONG THORACIC NERVE NEUROPATHY DETECTED WITH HIGH-RESOLUTION MR NEUROGRAPHY

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ABSTRACT

Background: Scapular winging may be caused by palsies of long thoracic, spinal accessory or dorsal scapular nerves, leading to serratus anterior, trapezius, or rhomboid muscles weakness, respectively. **Methods**: We report a case of scapular winging due to long thoracic nerve neuropathy. **Case report:** A 23-year-old woman with unremarkable medical history presented with 6-month history of right shoulder pain and weakness. Neurologic examination revealed scapular protraction and upward rotation impairment associated with medial displacement of the right scapula. Nerve conduction study showed decreased compound muscle action potential (CMAP) amplitudes exclusively over the right serratus anterior, without

acute denervation of the muscle. High resolution Magnetic Resonance Neurography (MRN) disclosed T2-weighted short-tau inversion recovery (STIR) diffuse hyperintense signal across the long thoracic nerve without gadolinium enhancement. Approximately nine months following symptoms onset and intensive physiotherapy, neurological examination revealed complete symptom resolution. **Conclusion:** This case highlights the high resolution MRN utility, as promising and versatile technique on detecting isolated long thoracic nerve palsy in patients with scapular winging.

Keywords: scapular winging, long thoracic nerve, neuropathy, magnetic resonance neurography

INTRODUCTION

Scapular movements of rotation, abduction, and tilting contribute to optimal shoulder function and accurate placement of upper extremity. Scapular pathology leads to scapular winging with shoulder dysfunction and weakness in elevation of the arm.[1] Scapular winging can mainly result from long thoracic nerve palsy leading to serratus anterior dysfunction and medial winging, with an incidence ranging from 0.003% to 0.210%.[2,3] Additionally, spinal accessory and dorsal scapular nerves involvement, leading to trapezius and rhomboid muscles dysfunction, respectively, causes lateral winging.[3] Herein, we report the case of a 23-year-old woman who presented with pain and weakness in her right arm and clinical manifestation of right scapular winging. Nerve conduction study confirmed isolated long thoracic nerve involvement and high-resolution Magnetic Resonance Neurography (MRN) demonstrated diffuse hyperintense signal across the long thoracic nerve without gadolinium enhancement. Approximately nine months after symptom onset and following intensive physiotherapy, complete resolution of symptoms was noted.

CASE REPORT

A 23-year-old woman with an otherwise unremarkable medical history presented with right shoulder pain and weakness with progressive worsening during the past six months. She reported no history of trauma, infection, or systemic illness. Her symptoms had progressively worsened, leading to significant functional impairment in her daily activities. On neurological examination, the patient exhibited notable weakness in her right shoulder, scapular protraction and upward rotation impairment, indicating potential dysfunction of the serratus anterior muscle, which is primarily innervated by the long thoracic nerve. There was a visible medial displacement of the right scapula, commonly referred to as scapular winging (**Figure 1**). Lumbar puncture was performed with unremarkable cerebrospinal fluid (CSF) findings and comprehensive diagnostic workup for autoimmune and other neuromuscular disorders was negative.

Figure 1: Clinical features. Neurological examination revealing medial displacement of the right scapula, caused by weakness of the right serratus anterior muscle.

Detailed nerve conduction studies were also performed, revealing decreased compound muscle action potential (CMAP) amplitudes exclusively in the right serratus anterior, indicative of isolated long thoracic nerve involvement. Notably, there was no evidence of acute denervation in the muscle, suggesting a subacute or chronic process rather than an acute nerve injury. To further elucidate the underlying pathology, high-resolution MRN was employed. T2-weighted short-tau inversion recovery (STIR) sequences disclosed diffuse hyperintense signal across the right long thoracic nerve (**Figure 2**). Absence of gadolinium enhancement suggested that there was no active inflammation or structural nerve lesion.

The patient was enrolled in an intensive physiotherapy program aiming at strengthening the shoulder girdle muscles and improving scapular stabilisation. Approximately nine months following symptom onset and consistent physiotherapy, the patient experienced complete resolution of her symptoms. Neurological examination at this point revealed full restoration of scapular function with no residual weakness or winging.

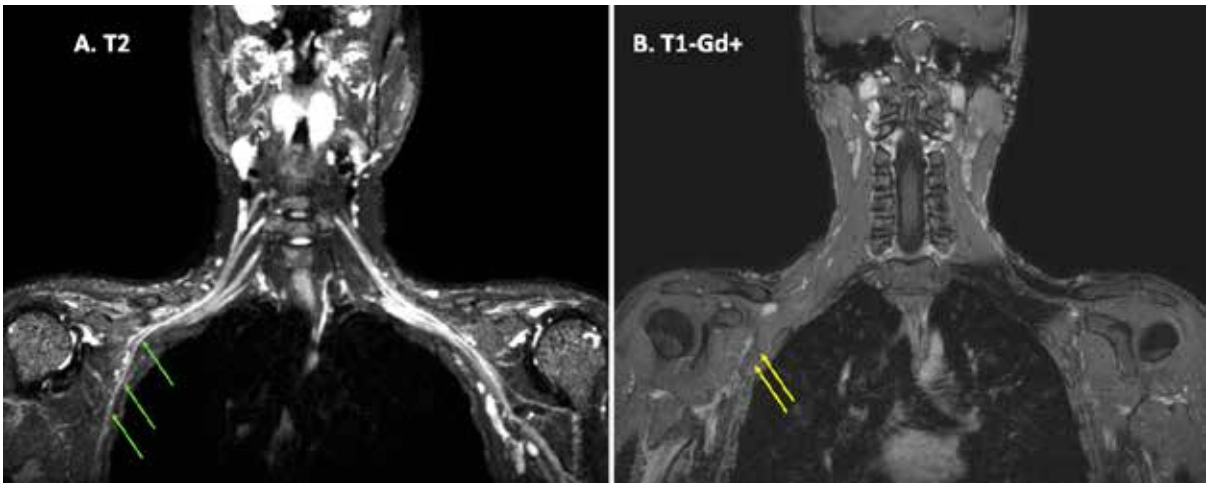

Figure 2: High resolution 3 Tesla Magnetic Resonance Neurography. Coronal T2-weighted STIR sequences demonstrating characteristic diffuse hyperintense signal across the right long thoracic nerve (Panel **A**; green arrows), without distinct gadolinium enhancement (Panel **B**; yellow arrows).

DISCUSSION

The first description of scapular winging was reported by Winslow in 1723.[4] Scapular winging leads to loss of strength and restricted flexion and abduction of the upper extremity, often causing significant pain.[5] It can result from various aetiologies, including iatrogenic, traumatic, infectious, neoplastic, or idiopathic causes.[1] When medical history is taken, it is important to include questions regarding occupation, hobbies and sports, recent injuries and surgeries especially in the neck and thorax, as well as inflammatory or neoplastic diseases.[5] In our case, the isolated long thoracic nerve involvement without clear precipitating factor along with unremarkable diagnostic investigation, suggested an idiopathic neuropathy.

Scapular winging can result from long thoracic, spinal accessory, or dorsal scapular nerve palsies, which innervate the serratus anterior, trapezius, and rhomboid muscles, respectively. Detailed clinical examination is the first step towards the localisation of the lesion. Long thoracic nerve palsy, manifested with arm flexion difficulty leads to medial displacement of scapula, which becomes more pronounced when arms are flexed to horizontal position against a wall, as illustrated in our case.[6] Spinal accessory nerve palsy affects arm abduction and in clinical examination, drooping of the effected shoulder is present along with lateral sifting of the superior scapula angle that is more prominent in arm abduction.[7] Dorsal scapular nerve palsy may lead to scapular winging with scapula's inferior angle shifted laterally and may be more evident when extending elbow backwards.[2,8]

Electromyography and nerve conduction studies are the main diagnostic methods for scapular winging investigation, assessing the involvement of specific muscles, the extent of denervation and the degree of reinnervation.[5] Additionally, as indicated in our case, high-resolution MRN can provide detailed visualisation of the long thoracic nerve, which is often challenging to be assessed with conventional imaging modalities. The diffuse hyperintense signal on T2-weighted STIR sequences indicated an underlying neuropathic process, while the gadolinium enhancement absence ruled out active inflammation or neoplastic infiltration.[9]

Most patients with isolated serratus anterior palsy respond well to conservative management (e.g. prevention of overuse, pain relief, and physical therapy) and complete symptom resolution has been described within 1-24 months.[3] Tendon transfer surgery could be considered for those patients with persistent symptomatic after 24 months.[3] Early recognition and prompt appropriate treatment initiation, including targeted physiotherapy, could lead to favourable functional outcome.

In summary, this case highlights the clinical utility of high-resolution MRN as a promising and versatile technique for detecting isolated long thoracic nerve palsy in patients presenting with scapular winging. MRN offers a non-invasive assessment of peripheral nerves, aiding in the differential diagnosis of neuropathic processes from other potential causes of scapular dysfunction.

CONFLICT OF INTEREST

All the authors declare that they have no conflict of interest.

FUNDING INFORMATION

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None.

ETHICAL APPROVAL

The approval for the study protocol was not necessary because our institutional review board does not require approval for case reports.

INFORMED CONSENT

Informed consent was obtained from the patient in the study.

DATA AVAILABILITY

All data needed to evaluate the conclusions in the paper are present in the paper. Additional data related to this paper may be requested from the corresponding author, upon reasonable request.

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