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Case Report

The strain – Counter strain technique in the management of anterior interosseous nerve syndrome: A case report

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الملخص

متلازمة العصب بين العظمي الأمامي؛ هي الاعتلال العصبي للعصب المتوسط القريب على مستوى الساعد. يمكن أن تحدث نقاط الزناد في المقصورات الأمامية للساعد ضغطا للعصب بين العظمي الأمامي، وهذا بدوره يسبب ضعف العضلات. يعرض التقرير حالة سيدة عمرها ٣٧ عاما، اشتكت من شعور غير طبيعي عند مسك القلم أثناء الكتابة. وأظهر الفحص السريري (الملاحظة، والملامسة، وقوة القبضة) ضعفا في قوة القبضة، ونقاط الزناد النشطة في منتصف الجانب الأمامي من الساعد وإيجابية علامة الدائرة. بدأ علاجها بالتدليك بالتبريد، والتحريك العصبي، والتحفيز العصبي الكهربائي عبر الجلد، وتقنية الضغط الإجهادي المعاكس أربع مرات أسبوعيا لأسبوعين. وجدت المريضة تحسنا في قوة القبضة، تم قياسه بمقياس القبضة الهيدروليكي الأساسي، كما وجدت تحسنا في نقاط الزناد غير النشطة باللمس، وتحسن خط اليد. يكشف تقرير هذه الحالة فاعلية تقنية الضغط الإجهادي المعاكس في الاعتلال العصبي الانحباسي كإضافة هامة للعلاج التحفظي. كما أظهرت تقنية الضغط الإجهادي المعاكس تحسنا في قوة العضلات.

الكلمات المفتاحية: تقنية الإفراج الموضعية؛ الانزلاقات العصبية؛ متلازمة العصب المتوسط؛ الاعتلال العصبي الانحباسي؛ العلاج الطبيعي؛ الاعتلال العظمي

Abstract

Anterior interosseous nerve syndrome (AINS) is a proximal median nerve neuropathy affecting the forearm. Trigger points in the anterior compartment of the forearm may cause compression of the anterior interosseous nerve (AIN) which, in turn, may result in muscle weakness. Here we present the case of a 37-year-old female who complained of an abnormal pen grip while writing. Clinical examination (observation, palpation, pincer grip strength) showed weak pincer grip strength, an active trigger point in the middle of the anterior forearm and a positive circle sign. Her treatment course included cryomassage, neural mobilization, transcutaneous electrical nerve stimulation (TENS) and the strain-counter strain (SCS) technique four times a week for two weeks. On follow-up, the patient reported an inactive trigger point on palpation, improvement in her handwriting and improved pincer (fingertip pinch) grip strength in pounds (lbs) as recorded by the Baseline Hydraulic Pinch Gauge. This case report explored the effectiveness of SCS as an important adjunct to other conservative treatments for entrapment neuropathies. SCS has also shown its potential to improve muscle strength.

Keywords: Entrapment neuropathy; Median nerve syndrome; Nerve sliders; Osteopathy; Physiotherapy; Positional release technique

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Introduction

Anterior interosseous nerve syndrome (AINS) is also known as Kiloh – Nevin Syndrome. The aetiology of AIN syndrome is poorly understood. However, two commonly known causes are entrapment/compression neuropathy and brachial plexus neuritis.[1] AIN is a rare entrapment syndrome that accounts for less than 1% of upper extremity neuropathies.[2] AIN is a pure motor nerve that supplies the deep muscles of the anterior compartment of the forearm, namely, the flexor pollicis longus (FPL), the radial side of the flexor digitorum profundus (FDP) and the pronator quadratus (PQ). AIN arises from the median nerve 5–8 cm below the level of the lateral epicondyle,[3] as shown in Figure 1. AIN receives contributions from the C5-T1 levels and lies along the radial side of the forearm.[4] It has a course roughly parallel to the median nerve between the superficial and deep heads of the pronator teres and lies directly underneath the arcade of the flexor digitorum superficialis on the anterior interosseous membrane, ending in the wrist capsule.[5] Patients with AIN syndrome present with motor disturbances and functional deficits of the affected muscles.[6] These patients typically exhibit a characteristic inability to form a full circle or an 'O' shape with their index finger and thumb.[7] AINS is difficult to diagnose because of the multiple anatomical compressions and pathologies involved in the proximal median nerve neuropathies. Therefore, appropriate treatment strategies are difficult to implement. This case report explores the treatment of AIN compression syndrome with the release of muscular compression using strain-counter strain (SCS) and other physical and manual therapeutic techniques.

Case report

A 37-year-old female presented with a one-month history of improper pen grip and difficulty writing. There was no history of precipitating trauma affecting her arm. She had no shoulder or neck pain. She is a dentist by occupation, but denied any occupational repetitive stress injury to her hand. She was otherwise healthy with no significant medical or surgical history.

On physical examination, unequivocal abnormal and weak pen grip were found (Figure 2). The patient was able to form only a weak circle or "OK" sign (Figure 3) due to weakness of the flexor pollicis longus and flexor digitorum profundus muscles. Because of this obvious clinical deficit and considering both the economic status of the patient and the non-availability of electrophysiological testing at the treatment centre, the patient was not referred for electrophysiological diagnostic testing. The median nerve had no noticeable changes in nerve conduction velocity (NCV) due to the transient inflammation of AINS, hence, NCV testing was not performed. No sensory abnormalities were noted. Unfortunately, we did not document the important changes in FPL, FDP and PQ muscle function before and after treatment that could have been detected by EMG. Pincer grip strength was measured using a hydraulic pinch gauge (BASELINE® 50 lb Hydraulic Pinch Gauge, Model No: 12-0235; Fabrication Enterprises Inc., White Plains, NY 10602, USA). This pinch gauge has a highly reliable Intra-class Correlation Coefficient (ICC = 0.89 – 0.93) and high Pearson's coefficient validity (r = 0.89 – 0.95) with an isokinetic dynamometer.[8] The tip pinch strength of the patient was five pounds (5 lbs), as compared to the dominant hand standard reference norms of 8–19 lbs for women in the 35–39 year age group,[9] thus representing a significant reduction (Figure 4).

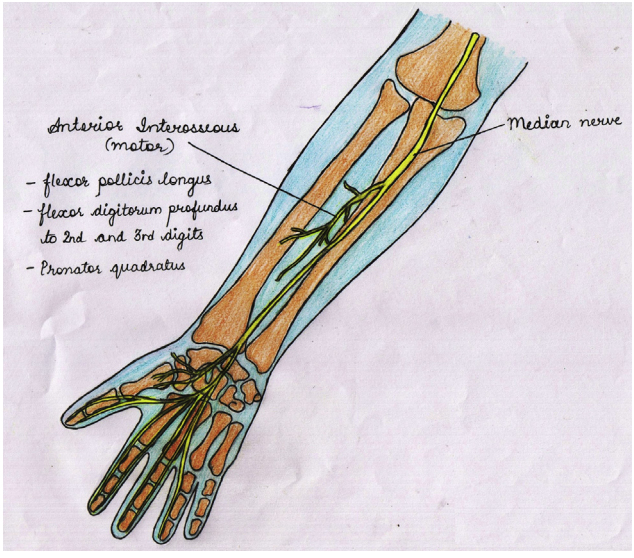

Figure 1: Origin and course of anterior interosseous nerve (AIN) in the anterior aspect of the forearm.

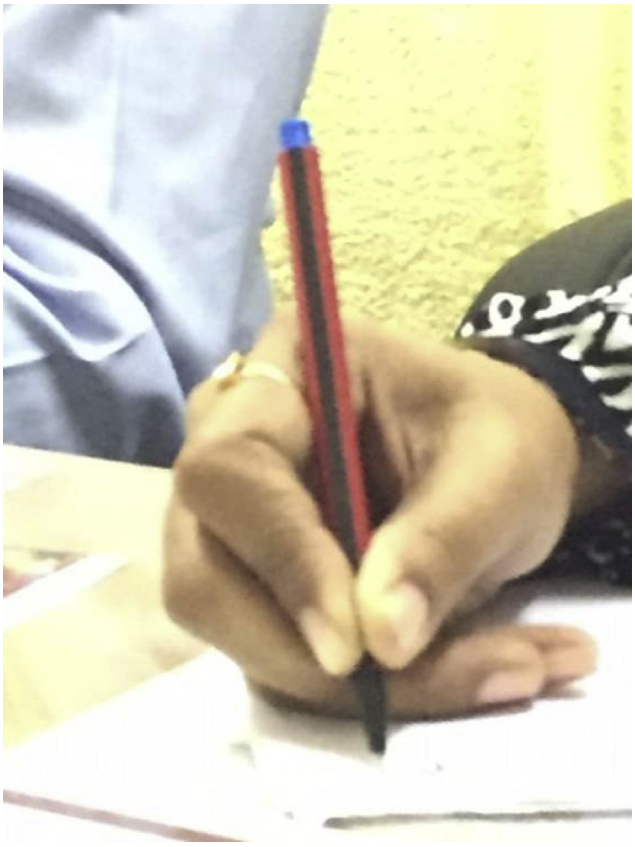

Figure 2: Abnormal pen grip.

Figure 3: Positive circle sign.

Figure 4: Pre-treatment pincer grip strength.

On palpation, an active trigger point was found in the mid-anterior aspect of the forearm with a positive jump sign. Additionally, hypertrophy of the mid-anterior forearm was evident as compared to the other extremity.

Based on physical examination findings, the diagnosis of AINS (proximal median nerve neuropathy) was made. The patient was treated four times a week for two weeks with a regimen of cryomassage, neural mobilization, trans-cutaneous electrical nerve stimulation (TENS) and SCS. Counter-strain at the identified trigger point was provided (Figure 5).

At the next visit, the patient showed an improved pinch grip strength (Figure 6) of eight pounds, an inactive trigger point confirmed through palpation and improved handwriting (Figure 7). After the two-week period of treatment, the patient was lost to follow-up, so the long-term effect of treatment could not be documented. Nevertheless, this is the first study to document the management of AINS with the SCS technique.

Discussion

SCS is defined as an indirect myofascial technique that is used to treat somatic dysfunctions of the neuro-musculoskeletal system.[10] Although median nerve entrapment symptoms vary considerably according to the site of compression, they tend to present in a similar manner. Among the three common median nerve entrapment syndromes, the pronator teres syndrome (PTS) and AINS can occur in close proximity at the elbow.

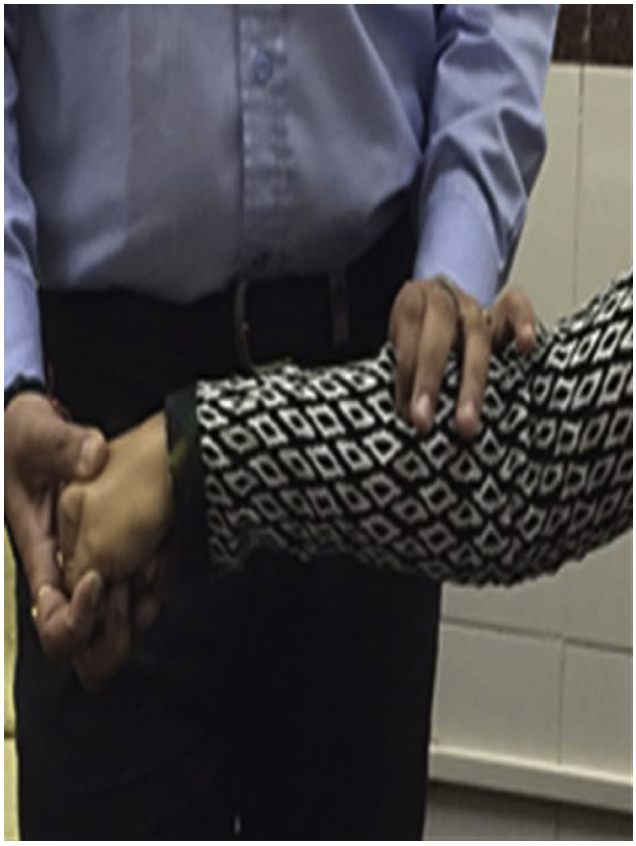

Figure 5: Counter strain applied to the trigger point.

Figure 6: Post-treatment pincer grip strength.

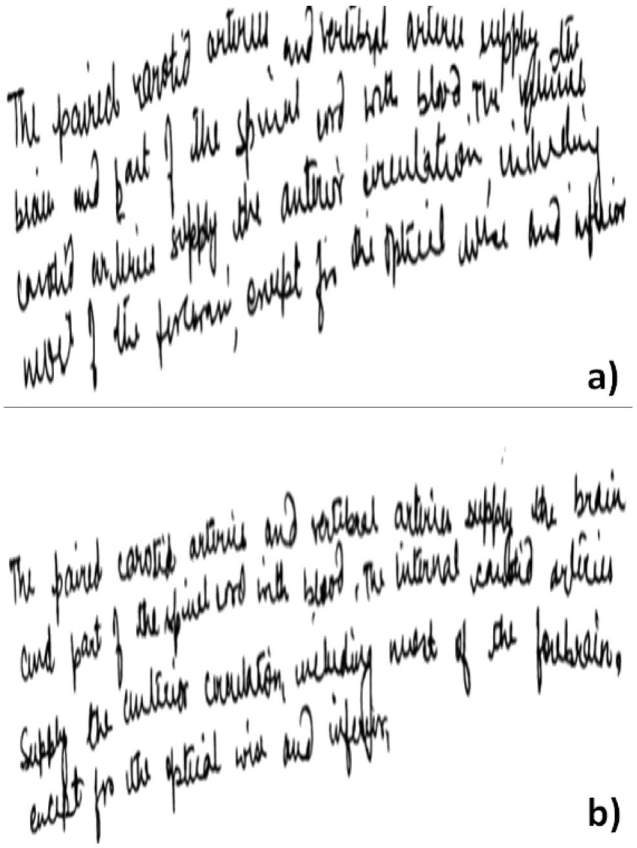

Figure 7: Pre- (a) and Post- (b) treatment handwriting.

In the current case study, the pure motor symptoms of the patient and the positive circle sign confirmed the diagnosis of AINS. The main objective of this case report is to explore the effect of the strain-counterstrain (SCS) technique on an entrapment neuropathy. In this case, pincer grip strength improved from five pounds at presentation to eight pounds after two weeks of treatment, as seen in Figures 4 and 6, respectively. The increased muscle strength seen in this case report is corroborated by the study performed by Christopher K. Wong et al.[11] The increase in muscle strength in this case report is attributed to the SCS technique, as no other muscle strengthening technique was used.

The presenting muscle hypertonicity could be reversed by placing it either in the shortened position or a position of comfort. This improved the gamma gain of the stretch reflex, resulting in reduced pain and increased range of motion, as proposed by Jones.[12]

The application of cryomassage, neural mobilization and TENS improved the extensibility and reduced the sensitivity of the nerve. These techniques, along with improved muscle strength, contributed to the improved handwriting of the patient as seen in Figure 7.

Conclusion

This case report showed the effectiveness of SCS in the management of the entrapment motor neuropathy AINS. In similar cases, SCS may be used as an effective muscle strengthening and trigger point release technique to reduce functional disability. In this case, SCS was also shown to be an alternative effortless muscle strengthening technique. However, its long-term effectiveness remains open to debate.

Conflicts of interest

The authors have no conflict of interest to declare.

Authors' contributions

MG and KG conceived and designed the study, conducted research, provided research materials, collected and organized data and wrote initial and final drafts of the article. AJS and KN analysed and interpreted data. SS and SC provided logistic support.

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