

CASE REPORT

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Intercostobrachial neuralgia—a case of bizarre diagnosis?

Tejinder Singh*  and Parijat Kumar

Abstract

Background: Intercostobrachial neuralgia is a rare and bizarre diagnosis usually missed by many clinicians. The rare occurrence and absence of clear diagnostic criteria could be a result of this missed diagnosis. The symptoms could range from debilitating pain in the axilla, medial arm, and forearm at rest and with specific shoulder movements. The symptoms are very distinct from axillary web syndrome in which the patient could have thickening of subcutaneous tissue of axilla with affected shoulder mobility but absence of neural symptoms. The diagnostic and treatment procedure involving breast cancer may cause injury or lesion of the intercostobrachial nerve and is of particular interest to the surgeons, pain physicians, and physical therapists. The diagnosis is reached after excluding all the other possible diagnoses. The treatment of this post-surgical intercostobrachial neuralgia can range from cryoneurolysis, ultrasound-guided nerve block, steroid injection, and paravertebral nerve block. Lidocaine injection and avoiding certain positions like flexion and abduction are helpful in certain patients. Unfortunately, there is not much literature available on possible manual therapy treatments of this diagnosis. Therefore, this case report focuses on potential manual therapies to address this intricate diagnosis.

Case presentation: The patient is a 38-year-old Asian female reported to an outpatient orthopedic physical therapy clinic with left medial arm and forearm pain for the past 5 years. Medical history included left breast lump removal surgery 9 years ago and cervical laminectomy C6–C7 with little success. The quick disability arm and hand scale showed a 36% disability score of function. The manual therapy approach targeted the cervicothoracic junction, second and third costovertebral joint, thoracic spine (T1–T8), and atlantooccipital joint (C0–C1). The patient showed significant improvement in function with a DASH score falling to 0% disability with a hands-on approach.

Conclusion: The intercostobrachial neuralgia is usually undiagnosed by various practitioners, physicians, and surgeons. The clinicians must consider manual treatments to the second and third rib and soft tissue mobilizations around the axillary region. The patient demonstrated significant improvement in symptoms with this approach.

Keywords: Intercostobrachial nerve (ICBN), Breast cancer, Neuralgia, Rib mobilization

Background

The intercostobrachial nerve (ICBN) is a cutaneous nerve that provides sensation to the inner arm, lateral chest, and axilla [1]. It is present in 98% of the human population [1]. The intercostobrachial nerve originates from T2 and may communicate with the brachial plexus through the medial cutaneous nerve of the forearm via the medial cord [2–4]. It branches with the medial cutaneous nerve

after exiting from the 2nd intercostal space. The intercostobrachial nerve is sensory and has no motor supply. The literature reports the presence of anatomical variations where the intercostobrachial nerve may supply the intercostals and serratus anterior, and in some instances, provide collateral branch to the pectoralis major and minor [5, 6]. The nerve is of particular interest to the surgeons as it is commonly dissected or entrapped in surgeries involving the axilla. The diagnostic and treatment procedure involving breast cancer may cause the intercostobrachial nerve injury or lesion, causing various

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symptoms. The proximity of the intercostobrachial nerve to the axilla makes it prone to an iatrogenic injury with lesions such as axillary lymph node dissection (ALND), sentinel lymph node biopsy (SLNB), and mastectomy [6, 7]. The diagnosis is very tricky as no specific test is available to diagnose intercostobrachial neuralgia. There is no nerve conduction test available in the literature to examine the integrity of myelin or axonal damage of the intercostobrachial nerve. The detailed clinical reasoning, robust anatomy understanding, and accurate differential diagnosis can help make accurate diagnoses. The symptoms could vary from sharp pain in the axilla, radiation of symptoms to the medial side of the forearm and arm. The symptoms of intercostobrachial neuralgia can mimic C5–C6/C6–C7 radiculopathy or medial cord plexopathy [8]. Electromyography can rule out radiculopathy and plexopathy with a reasonable level of accuracy. Myocardial ischemia can also radiate in the medial arm and forearm, but a negative cardiovascular screen can rule it out. The diagnosis of intercostobrachial neuralgia is usually the diagnosis of exclusion after ruling out other possible diagnoses. The patient also usually has a history of surgery or trauma to the chest. The treatment of this post-surgical neuralgia can range from cryoneurolysis, ultrasound-guided nerve block, steroid injection, and paravertebral nerve block [9, 10]. There is a lack of literature available on possible manual therapy treatments of this diagnosis. Zhang et al. have found lidocaine injection and avoid certain shoulder positions like flexion and abduction to be helpful [11]. The soft tissue restrictions secondary to surgical procedures and proximity to the rib cage make the intercostobrachial nerve susceptible to entrapments and compression.

Case presentation

The patient is a 38-year-old Asian female referred to an outpatient orthopedic physical therapy clinic with left medial arm and forearm pain (VAS-8-9/10) for the past 5 years. The patient had a history of left breast nodule removal surgery 9 years ago. A year ago, the patient also had failed cervical laminectomy at the level of C6-C7.

The quick disabilities of the arm, shoulder, and hand (Quick DASH) questionnaire showed a 36% disability score of function [12]. The minimum clinical difference to show significant improvement on the Quick DASH score is 15.9 [13]. Electromyography performed on the left upper extremity was negative for possible radiculopathy or plexopathy. All the values were within normal limits with the absence of any spontaneous activity. The physical examination demonstrated near-normal cervical ROM except for left cervical rotation. The segmental mobility testing showed restriction in T2–T6 extension and left side bending. The palpation and spring testing

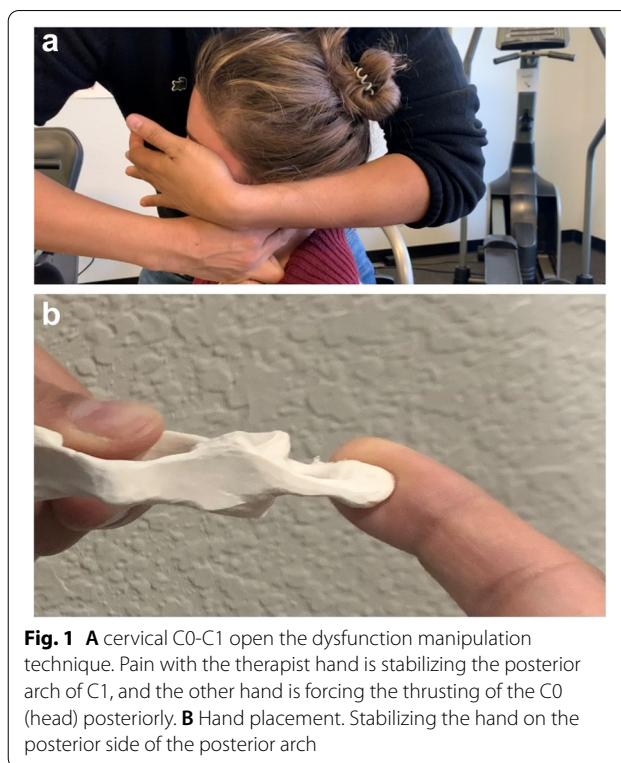


Fig. 1 **A** cervical C0-C1 open the dysfunction manipulation technique. Pain with the therapist hand is stabilizing the posterior arch of C1, and the other hand is forcing the thrusting of the C0 (head) posteriorly. **B** Hand placement. Stabilizing the hand on the posterior side of the posterior arch

indicated hypomobility of the second and third rib might reproduce symptoms of the left arm/forearm [13]. The static palpation of the thoracic spine has moderate reliability, but the reliability is higher in the presence of tenderness in the thoracic spine [14, 15]. The physical exam showed some signs of axillary cording with physical palpation of the axilla. The neural tissue was adhered to the subcutaneous tissue of the axilla and presented with mild symptoms of active shoulder flexion and abduction [16]. The cervical segmental testing showed extension, left side bending restriction in C0–C1, and open dysfunction of C1–C2. The patient reported pain in the left C1–C2 with right cervical rotation during physical examination. The manual treatment focused on improving left cervical mobility (Fig. 1), second and third rib mobility (Fig. 2), and extension/side-bending mobility of T2–T6 using cervicothoracic manipulation and thoracic manipulation techniques [17] (Figs. 3 and 4). The techniques were performed by a skilled and fellowship-trained manual therapist. The exercise regimen focused on improving thoracic spine mobility. Home education is provided to focus on enhancing thoracic mobility and maintaining the thoracic range of motion. The patient was advised to stretch the axillary cord and massage (Fig. 5) the area at 90° of abduction for 4 to 5 min a couple of times/day for the next 4 weeks [18]. The technique was advised as home soft tissue mobilization to restore sub-cutaneous



Fig. 2 Therapist-assisted thoracic extension. The therapist hands between the interspinous space of T1–T8. The patient's head is rested on the therapist's chest. The therapist creates an extension torque with his fingers

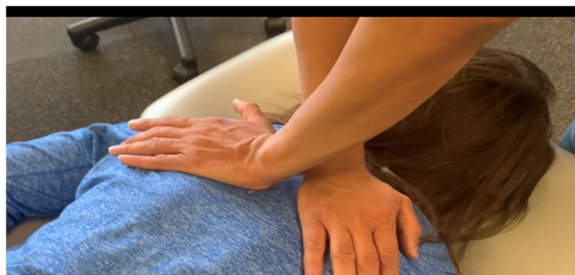


Fig. 3 Prone rib cage manipulation. The therapist hands on the second or third rib angle. The therapist thrusts the rib angle posterolateral in the direction of the fingers. The stabilizing hand is on the contralateral transverse process of the same level. Pictures are taken with verbal and written consent

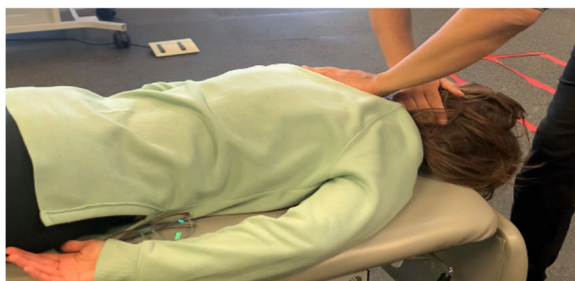


Fig. 4 Cervicothoracic manipulation. The therapist hands on the transverse process. The stabilizing hand is on occiput. The therapist side flexes the head and thrust the transverse process at 60° angle in the posterolateral direction

mobility in the axilla. The patient was seen for a total of five appointments and reported remarkable improvement during the fifth appointment with nearly no symptoms of pain (VAS-0-1/10). The quick disability arm and hand scale demonstrated 0% functional disability (DASH score) with negative palpatory findings and



Fig. 5 Axillary cording technique. Deep friction perpendicular to the scar tissue in the axilla at various degrees of the shoulder abduction (painless)

second and third rib springing. The patient was advised to continue with the home exercise regimen and seek care if the symptoms revert. The exercise program consisted of four thoracic mobility exercises and was advised for 5 min each. The telephonic follow-up 6 weeks after the discharge and reported no change from the last appointment.

Discussion

Intercostobrachial neuralgia is a rare diagnosis and is usually confused with more common diagnoses. The absence of any clear diagnostic criteria and unavailability of clinical prediction rules can make it very difficult even for an expert clinician to rule in this diagnosis with reasonable accuracy. Therefore, after ruling out the more common conditions, the diagnosis is established. Intercostobrachial neuralgia can cause debilitating symptoms with pain in the pectoral region and down the medial arm/forearm. The critical anatomical distinction is that no other structure below T1 can supply the cutaneous distribution of the medial arm/forearm apart from the intercostobrachial nerve except the post-fixed brachial plexus [19]. The palpatory exam and rib springing are unreliable but can provide essential information in ruling the diagnosis when a skilled manual therapist performs. The reproduction of medial arm symptoms with palpatory exam to the second and third rib angle can be an indicator of this diagnosis. The history of the upper thoracic rib cage or axillary lymph node surgery can directly affect the intercostobrachial nerve via trauma or indirectly by affecting the arthrokinematics and biomechanics of the upper rib cage [20]. Entrapment of the intercostobrachial nerve affected by indirect factors can be managed by addressing soft tissue restrictions in the pectoral region and by restoring the arthrokinematics of the second and third costovertebral and costotransverse joint. The role of manual therapy in managing symptoms of intercostobrachial neuralgia is almost non-existent in the literature but can play a key role due to proximity to the second and third rib. Therefore, there is a definite

need for more randomized control trials to study the effects of manual therapy in patients with intercostobrachial neuralgia. The rarity and absence of solid clinical criteria remain a challenge for the researchers and clinicians to study this diagnosis.

Conclusion

The entrapment of the intercostobrachial nerve can be a highly debilitating condition and can produce severe arm/forearm pain. There are limitations to the medical treatment and risk of misdiagnosis due to poor understanding of the condition and lack of diagnostic literature. The manual therapies targeting the costovertebral and costotransverse joints can improve symptoms of intercostobrachial neuralgia. Thoracic mobility exercises must be performed in the clinic and as a home exercise program to maintain mobility. Patient education also plays a crucial role in managing this complex clinical condition.

Abbreviations

ICBN: Intercostobrachial neuralgia; VAS: Visual analog scale; ALND: Axillary lymph node dissection; SLND: Sentinel lymph node biopsy list of abbreviations.

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Patient perspective informed consent

The patient gave verbal and written consent to participate in the study. The patient reported that none of the other providers were aware of the diagnosis. She believes that manual therapy was very successful in managing the condition and complete resolution of symptoms.

Authors' contributions

TS provided the interventions to the patient in the case study. TS and PK wrote the main manuscript. The authors have read and approved the manuscript.

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Availability of data and materials

Available.

Declarations

Ethics approval and consent to participate

Written consent was given to participate, and all images were taken with verbal/written permission.

Consent for publication

All patients included in this research gave written informed consent to publish the data contained within this study. If the patient was less than 16 years old, deceased, or unconscious when consent for publication was requested, written informed consent for the publication of this data was given by their parent or legal guardian.

Competing interests

None.

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