

CASE REPORT

Ultrasound-guided Intercostal Nerve Block in Chronic Musculoskeletal Chest Pain: A Case Report

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ABSTRACT

Introduction: Chronic musculoskeletal chest pain, though not life-threatening, is a disabling condition and is often left untreated or improperly managed.

Case description: A 45-year-old male presented with pain in the lower part of the left lateral chest wall (visual analog scale (VAS) for pain = 6) for the last 4 months aggravating with deep inspiration (VAS = 7). On examination, there was grade III tenderness over anterior end of the 10th rib but no swelling. Examination of both upper limbs (including shoulder joints), spine, and abdomen was unremarkable. Cardiac and respiratory systems were within normal limits. We investigated the patient to exclude various differential diagnoses. Ultrasound evaluation of the 10th rib at the most tender point was suggestive of costochondritis. Three weeks of conservative management yielded inadequate relief (VAS = 6, both at rest and deep inspiration). As a case of recalcitrant costochondritis, ultrasound-guided intercostal nerve block was performed for the left 9th and 10th intercostal nerves. The patient achieved immediate reduction in pain at rest (VAS = 2) and deep inspiration (VAS = 3). At 2 weeks of follow-up, pain reduced further (VAS = 1) both at rest and deep inspiration. At 4 weeks of follow-up, pain reduced completely (VAS = 0) both at rest and deep inspiration.

Conclusion: The ultrasound-guided intercostal nerve block is a relatively simple day-care procedure that can prove effective in a properly selected patient. Despite perceived simplicity of the procedure, there are risks involved that should be carefully considered while planning and performing the procedure.

Keywords: Chest wall, Nerve block, Pain.

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INTRODUCTION

Causes of chest pain range from life-threatening conditions to those that are relatively innocuous. Various etiologies can be grouped into cardiac, pulmonary, gastrointestinal, systemic, and musculoskeletal.¹ Cardiac causes include myocardial ischemia, aortic dissection, and pericarditis, among others. Pulmonary causes include pleuritis, pneumonia, and pulmonary embolism predominantly. Gastrointestinal causes include esophagitis, gastritis, esophageal rupture, perforation, pancreatitis, cholecystitis, and splenic infarction, among others. Though the focus of diagnostic evaluation for chest pain includes primarily cardiac and pulmonary problems, a vigilant look at data drums down the fact that approximately 50% of all cases presenting with chest pain in the emergency department are musculoskeletal in nature.¹ Various causes of musculoskeletal chest pain include costochondritis, rib-tip syndrome, Sternalis syndrome, Tietze syndrome, posterior chest wall pain syndrome, fracture of the rib, and infections such as tuberculosis. Systemic diseases such as metastatic neoplasms to sternum and ribs and multiple myeloma also may result in chest pain and should be considered. Chronic musculoskeletal chest pain, though not life-threatening, is a disabling condition, and is often left untreated or improperly managed in a chest pain clinic run predominantly by acute care physicians and cardiologists due to its nonemergent nature.

CASE DESCRIPTION

A 45-year-old male, cook by profession, presented with pain in the lower part of the left lateral chest wall (visual analog scale (VAS) for pain = 6) for the past 4 months, which was not radiating in nature. Pain used to aggravate with deep inspiration (VAS = 7). It was not associated with palpitations, sweating, or breathlessness

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on exertion. There was no history of trauma, fever, loss of appetite, weight loss, or heartburn. He did not have diabetes mellitus or hypertension. He was a smoker with 10 pack-years of cigarettes. On examination, there was grade III tenderness over anterior end of the 10th rib but no localized swelling. Examination of both upper limbs (including shoulder joints), spine, and abdomen was unremarkable. Cardiac and respiratory systems were within normal limits except for aggravation of pain during deep inspiration or expiration. We investigated the patient to exclude various differential diagnoses. Complete blood count, liver function test, kidney function test, erythrocyte sedimentation rate (ESR), C reactive protein (CRP), fasting blood sugar (FBS), and post prandial blood sugar (PPBS) were within normal limits. Chest X-ray showed no fractures with a normal cardiac shadow. A 12-lead ECG was normal. Ultrasound evaluation of the 10th rib at the most tender point demonstrated hypoechoic echotexture, perichondral edema, and irregularities of the margins compared to the contralateral (unaffected) side (Fig. 1).

A diagnosis of costochondritis was made based on ultrasound findings after excluding cardiac, pulmonary, gastrointestinal, and

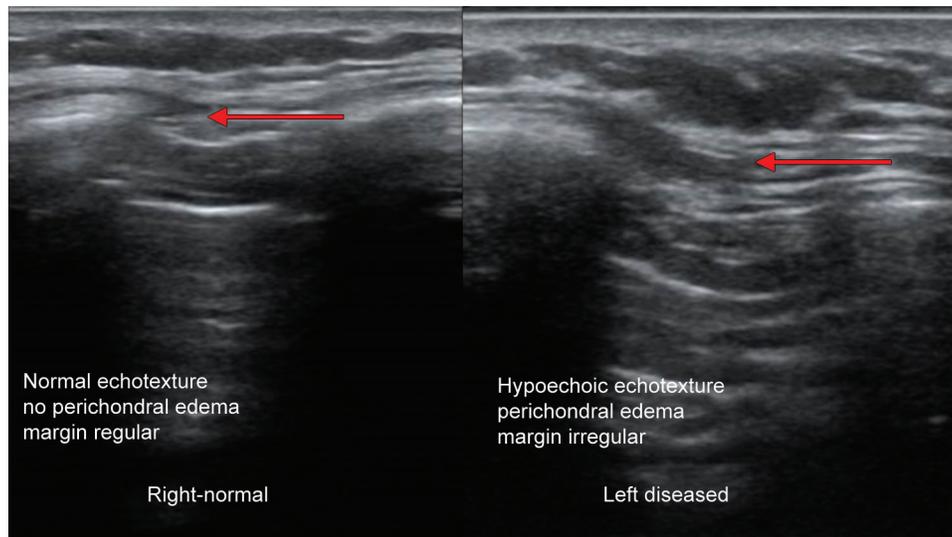


Fig. 1: Ultrasound evaluation of the 10th rib at the most tender point and comparison with the contralateral side



Fig. 2: Needle targeting neurovascular bundle in the lower border of the rib

systemic disorders. Three weeks of conservative management with activities of daily living modifications, non steroidal anti inflammatory drugs (NSAIDs), and physical modalities yielded inadequate relief (VAS = 6 both at rest and deep inspiration). As a case of long-standing and recalcitrant costochondritis, the ultrasound-guided intercostal nerve block was planned for the left 9th and 10th intercostal nerves. Around 5 mL of 1:1 mixture of 2% lignocaine and 0.5% bupivacaine was infiltrated into the 9th and 10th intercostal spaces near the neurovascular groove in the inferior borders of the ribs along the posterior axillary line under ultrasound guidance with direct visualization of the needle in the plane of ultrasound probe to ensure that the needle does not puncture the pleura (Fig. 2).

The procedure was uneventful and the patient achieved immediate reduction in pain at rest (VAS = 2) and deep inspiration (VAS = 3). At 2 weeks of follow-up, pain reduced further (VAS = 1) both at rest and deep inspiration with pill count (tab paracetamol 500 mg) of five tablets that were prescribed on an SOS basis. At 4 weeks of follow-up, pain reduced completely (VAS = 0) both at rest and deep inspiration with pill count of zero. Follow-up ultrasound revealed no change in echo structure in this time period.

DISCUSSION

Costochondritis is an inflammatory process of the costochondral junction/s causing localized pain, tenderness, and activity limitation. The cause is usually unknown but it may result from increased

activity involving the arms or from a chronic fungal or tubercular infection.^{2,3} Primary cases resulting from minor trauma, overactivity, and resulting peripheral and central sensitization are usually self-limiting with NSAIDs and rest within a period of 1 month to 1 year.³ Most common sites of costochondritis are the second to fifth rib; however, it was the 10th rib that was involved in this case. But when long-term analgesics yield inadequate relief besides having potential for renal and hepatic damage, further evaluation with a more invasive treatment is warranted. The commonly done intervention is local infiltration of steroid and local anesthetic after confirmation of noninfective and nonneoplastic pathology. The only confirmatory investigation for this is fluorodeoxyglucose positron emission tomography (FDG PET) that is expensive and not easily accessible.⁴

Tietze syndrome was the closest differential diagnosis, but we could effectively exclude that from clinical presentation and ultrasound. It is characterized by localized swellings in the regions of pain along with radiation to ipsilateral shoulder and arm. Ultrasound findings of Tietze syndrome include dishomogeneous increase of the echogenicity in the pathological cartilage and an increased thickness in contrast to the hypoechoic picture in our case.⁵

An intercostal nerve block can be an extremely valuable intervention in this situation as this does not entail injecting steroid into area of tenderness and, therefore, does not disturb the local pathology, which essentially means no risk of flare-up or dissemination. It effectively disrupts the cycle of central sensitization

by providing a pain-free period and is also an effective localized sympathetic block. Moreover, the need for analgesic intake is greatly reduced. Though the ultrasound picture is unchanged at 4 weeks, we expect normalization of the cartilage structure in the longer term considering a relatively slower turnover rate of cartilage remodeling.

Though intercostal nerve block has been listed as an option in costochondritis in a few text books of pain medicine,⁶ we failed to find out any evidence for this modality being used in costochondritis after a thorough review of literature.

The ultrasound-guided intercostal nerve block is a relatively simple day-care procedure that can prove effective in a properly selected patient. Anatomical knowledge to do this procedure is relatively straightforward. Despite perceived simplicity of the procedure, there are risks involved (pleural, hepatic, or splenic injury or intravascular injection) that should be carefully considered while planning and performing the procedure.⁶

We recommend further studies regarding costochondritis considering its high prevalence, poorly understood pathophysiology, and inadequate evidence of existing treatment options.

TAKE HOME MESSAGE

Physiatrists can play an important role in the management of musculoskeletal chest pain. This remains a largely inadequately managed group of disorders.

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