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Case Report

A rare case of idiopathic thumb CMC joint neuropathic arthropathy complicated by blunt trauma

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ABSTRACT

Neuropathic arthropathy (Charcot joints), which most frequently affects the weight-bearing joints of the body, is commonly associated with a variety of medical and neurological conditions, and is notoriously difficult to treat due to the nature of the underlying pathology. We present a case of idiopathic neuropathic arthropathy of the thumb CMC joint of an elderly female complicated by blunt trauma to the thumb. To our knowledge, this is the first reported case in the literature of this rare association.

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1. Introduction

Neuropathic arthropathies, also known as Charcot joints, have been commonly reported in medical and neurological conditions, such as diabetic neuropathy, tertiary syphilis, cerebral palsy, syringomyelia, and spinal cord injury, among others. The common factor is a sensory deficit in the affected extremity.¹ The Charcot joint lacks the ability to respond via reflexes to abnormal stress. Consequently, the subchondral bone of the involved joint disintegrates, leading to joint collapse and considerable joint deformity. The usual clinical

manifestation of a neuroarthropathy is a pain-free joint or mild discomfort, if any, and the symptoms are disproportionately mild in relation to the degree of destructive joint changes seen radiographically.²

The joints most frequently affected are the weight-bearing joints, predominantly the mid-foot but also the ankle, knee, hip, and elbow. In his review of 118 cases of neuropathic arthropathy, Johnson suggested that the pattern of involvement was dependent on the underlying neurological condition – in tabes dorsalis, the knee was predominantly affected; in syringomyelia, the upper extremity joints; and in diabetes, the foot and ankle joints.³ To our knowledge, there have been no

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reported cases of neuropathic arthropathy of the CMC joint of the thumb (unpublished case report from co-authors of this study). We present a case of neuropathic arthropathy of the thumb CMC joint complicated by blunt trauma.

2. Case report

A 68-year-old right hand dominant housewife presented to our institution with alleged history of assault by a blunt stick leading to multiple injuries, with a background of progressive painless stiffness of the thumb of the affected hand.

The patient gave a history of head trauma and blunt trauma to the neck and hand. There was a positive history of loss of consciousness for approximately 5 min and three episodes of vomiting. The patient sustained facial trauma (undisplaced mandible fracture).

The patient described a continuous dull aching pain in the neck radiating into both upper limbs, more on the right side. The patient also complained of pain and swelling to the right thumb, which was pain-free previously. The patient had insidious onset of painless stiffness of the right thumb for a period of 2 years and difficulty in grasping and gripping objects in the hand. There was no history of contralateral hand symptoms, difficult walking, and problems with balance, bowel, or bladder involvement. There was no history of morning stiffness or constitutional symptoms. There was no previous history of trauma to the hand. There was no previous history of tuberculosis, degenerative or rheumatoid symptoms of other joints, neurological disorders, or diabetes.

On examination, the patient had signs and symptoms suggestive of neck injury. Higher center involvement was excluded. Neurological examination revealed a power of grade 4 bilaterally in the upper limbs with normal sensation and reflexes. The lower limbs were neurologically intact. Examination of the right hand (Fig. 1) revealed clinical photograph of thumb with reduced range of motion in all directions. The motion was pain-free. There was tenderness, local warmth, and swelling on the right thumb. There was ecchymosis and crepitus to the proximal phalanx, distal phalanx, and metacarpal of the thumb. There was no evidence of peripheral vascular disease. There was some wasting of the right intrinsic hand muscles (Figs. 2 and 3).

Laboratory investigations were essentially normal, apart from an elevated ESR (35 mm/hr), CRP (22.5), and serum alkaline phosphatase (195).

MRI (Fig. 4) subsequently revealed an odontoid fracture and rupture of the alar ligaments with hemorrhage into the retropharyngeal space. There was no evidence of myelitis or syringomyelia. CT scan of the brain was consistent with age-related degenerative changes, but no evidence of acute or resolving infarcts. Radiographic examination of the thumb was performed (Fig. 5).

In our case, due to patient preference, we adopted non-operative management with oral bisphosphonate therapy, with calcium and vitamin D supplementation, and anti-inflammatory and analgesic medication. The thumb was supported in a thumb spica orthoses. At follow-up at 2 months, the patient had a stable thumb CMC joint, which continued to remain pain-free and had not progressed

Fig. 1 – Clinical picture of thumb.

Fig. 2 – Anteroposterior radiograph of the affected thumb showing severe degenerative changes of the thumb CMC joint and multiple fractures of the metacarpal and proximal phalanx of the thumb.

Fig. 3 – Radiograph examination of neck revealing widening of the atlanto-dens interval with retropharyngeal soft tissue widening.

radiographically despite the trauma. There were signs of early union of the overlying fracture in the phalanx. The patient is being continued with non-operative treatment for 1 more month.

3. Discussion

Neuropathic arthropathy of the CMC joint is a rare condition with no cases reported in the literature (unpublished case by co-authors of this paper accepted for publication). Involvement of the hand joints is extremely rare with only a handful of cases reported in the literature.⁴ Neuroarthropathies are more common in the weight-bearing joints, such as the knee, hip, foot, and ankle.² In our case, we found no underlying medical disorder (diabetes, syphilis, leprosy, or syringomyelia), effectively a case of idiopathic neuropathic arthropathy.

The exact pathogenesis of neuroarthropathies is controversial. The “neurotraumatic” theory postulates that the normal pain mechanism is deactivated by articular denervation, allowing repetitive trauma to occur. If the joint remains unprotected, rapid destruction, hemarthrosis, synovial thickening, and secondary ligament laxity ensue.⁵ The “neurovascular” theory postulates that underlying neurological changes lead to hypervascularity in the subchondral bone.² There may be extensive erosion of the bone, increased bone resorption, bone weakening, microfractures, and subchondral collapse and destruction of the joint.⁶

Fig. 4 – MRI subsequently revealed an odontoid fracture and rupture of the alar ligaments with hemorrhage into the retropharyngeal space. There was no evidence of myelitis or syringomyelia. CT scan of the brain was consistent with age related degenerative changes, but no evidence of acute or resolving infarcts. Radiographic examination of the thumb.

Fig. 5 – Severe degenerative arthritis of the thumb CMC joint with multiple acute fractures to the proximal phalanx and metacarpal bone.

Radiographically, neuroarthropathies are classified as either atrophic or proliferative.² The atrophic form is characterized by substantial bone resorption and near disintegration of the joint.⁶ This form is classically asymptomatic. The proliferative, and more common, form is characterized by significant joint destruction, periarticular new bone formation, bony fragments and fractures, osteophyte formation, and ultimately fusion.⁶ Our case confirmed with the atrophic variant.

Treatment goals are to reduce further articular damage while retaining a functional joint. Initially conservative measures are adopted, including symptomatic treatment, anti-inflammatory medications, orthotics, weight-bearing reduction techniques, and patient education to minimize mechanical trauma.⁷ Recently, several studies have demonstrated a beneficial effect of bisphosphonates in the treatment of neuropathic joints.⁸ Failure of conservative measures is an indication for surgical intervention. Surgical options include prosthetic replacements, resection arthroplasty, and arthrodesis. However, arthroplasty in a neuropathic joint is theoretically a poor option due to lack of protective pain sensation and reflexes, presence of osteopenic bone, and the weakness of

surrounding ligaments and musculature. This leads to high stress of implanted components and subsequent loosening and periprosthetic fractures. Historically, arthrodesis of neuropathic joints also has poor results; however, the use of internal fixation devices may improve outcomes as compared to external fixation.⁹ Our case was treated non-operatively, due to patient preference, with nil further progression of disease at 2-month follow-up.

4. Conclusion

Neuropathic arthropathy of the thumb CMC joint has not been reported previously in the literature. We present a rare case of idiopathic thumb CMC joint neuropathic arthropathy complicated by blunt trauma. The patient was successfully managed non-operatively with no clinical or radiographic progression of the disease at 2-month follow-up.

Conflicts of interest

The authors have none to declare.

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