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Case Report

Titanium elastic nail for infected humerus fracture with wrist drop: a rare case report

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ABSTRACT

Humerus mid-shaft fractures are typically managed with ORIF and plate fixation but a rare attempt for CRIF with titanium elastic nail (TENS) nail done even with infection *in situ*. A 28 year old male, a daily wage worker presented to us with mid-shaft humerus fracture with wrist drop after an incident of fall while carrying heavy load on his head. On X-ray evidence of osteolysis at the fracture site was found and following bone biopsy infected foci was discovered. Later, managed with CRIF with TENS nail and antibiotics. CRIF for infected long bone fracture is rare, but a bold attempt was made for internal fixation which yielded good results and post-operative 3 months showed great results with full active range of motion without any infective foci and with recovery of wirst range of motion.

Keywords: CRIF, Humerus, TENS nail, Antibiotics, Wrist drop, IMN

INTRODUCTION

The human skeleton system is a dynamic organ which is always active in maintaining a balance between osteoblastic and osteoclastic activity of the bone and thus maintaining an optimal bone mineral density.[1] Most fractures start heeling by themselves with time. The mid shaft humerus fracture usually occurs in elderly after the age of 50 years. The middle third shaft fracture of humerus is one of the most vulnerable sites of fracture in humerus and is usually associated with radial nerve injury leading to wide range of presentation from neuropraxia to complete wrist drop.[2]

A wide of treatment modalities from conservative to surgical fixation with nerve exploration and grafting is done for humerus mid shaft fracture. One such case presented to us of mid-shaft humerus fracture due to fall while carrying load and associated wrist drop. But this usual fracture presented an unusual finding where on plain radiograph showed fracture site progressive osteopenia with osteolysis.

CASE REPORT

A 28 year old man, from a low socioeconomic family daily wage worker by occupation presented to our casualty with a history of fall while carrying heavy load on his head 1 day ago. Following which he complained of decreased range of motion in the right shoulder, mid arm fracture site mobility and inability to extend his right wrist. On examination, he had radial nerve weakness and fracture site pain and swelling. On X-ray he showed middle third humerus shaft oblique fracture with fracture site osteopenia and osteolysis (Figure 1).

This was a very unusual presentation for a young patient of 28 years with no prior metabolic or inflammatory diseases. The patient received primary conservative treatment with a U-slab and wrist drop split. On MRI, lytic fracture margin was seen with radial nerve edema. Further, CT-angiography was done to rule out any cause of the osteonecrosis of the fracture site or any sub-chondral bone micro-circulation pathology. But results were non-conclusive. Meanwhile serial X-ray were done which

showed progressive osteolysis and widening of the fractured ends.

Further, we planned for a punch biopsy under c-arm guidance from the fracture site to determine the cause of this presentation. Biopsy from the fracture site yielded-sclerotic bone fragments, moderate callus and plenty of pus cells but failed to produce a definite diagnosis. Antibiotics as per culture sensitivity was given for a period of 10 days following which radiological improvement was also seen with callous formation and no sign of active infection.

The patient was managed with closed reduction and internal fixation with titanium elastic nail (TENS nail) fixation and open reduction of the fracture site along with radial nerve exploration and intra-operative nerve conduction study was done. He was followed up at 3, 6 and 24 weeks and showed signs of fracture heeling with active range of motion both in shoulder and wrist.

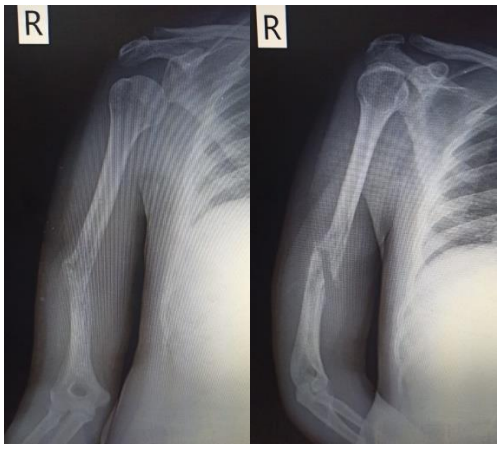

Figure 1: Pre-operative X-ray.

DISCUSSION

The humerus mid shaft fracture with radial nerve involvement is usually managed with open reduction with dynamic compression plating and with or without radial nerve exploration. The incidence of radial nerve involvement in closed midshaft fracture was rare and the need for exploration was even lower as per the analysis from different literature.[3-5]

Changulani et al in a study of DCP vs IMN it suggested that IMN had a fairly good prognosis and an early union rate for diaphyseal humerus fractures. It even showed better results with a decreased post-operative infection rate.[6]

But, in our case we went ahead with TENS nail fixation for this patient as it was a less traumatic approach for an already infected patient thereby reducing the distortion of normal anatomy of the bone and soft tissue caused by both DCP and IMN fixation with the chance of early mobilisation.[7]

The challenge this case provided was the diagnosis as why the fracture ends underwent osteolytic changes in spite of normal radiological and routine investigations. The dilemma was solved after histopathological analysis that an *in situ* infection without any prior history in a fresh closed fracture. This shed light on the fact how osteoclastic activity was triggered by infection but we failed to isolate a single organism from the culture and sensitivity of the bone biopsy sample. This pathophysiology was explained in Mbalaviele et al inflammatory osteolysis: a conspiracy against bone, where he explained how immune activation during infection of fractured bone caused bone loss which is due to and interplay between pathogen, cellular and matrix constituents of bone and immune system which killed osteoblasts and induced osteoclastogenesis and osteolysis.[1,8]

The difficulties in this fracture didn't end with just treating the infection but to come up with a plan which not only would prevent further infection but also help in regaining full range of motion as it was his dominant arm along with a treating his wrist drop. The second part of this dilemma was solved when intraoperative nerve stimulation confirmed neuropraxia hence no secondary reconstructive methods were needed. But the fracture fixation was still a problem, when at last we decided to do retrograde TENS nail for this patient (Figure 2).

For this we first minimally opened the fracture site, dissected the radial nerve checked for any compression to it followed by removing of the soft callus that formed and an antibiotic wash with Gentamicin was given. Two similar size TENS nail was passed holding the fracture site in anatomical position thus the fracture was managed with any further soft tissue damage. Followed by this the arm was immobilised for twelve days till suture removal and then discharged with U slab for another one week. After 3 weeks the U-slab was replaced with a functional humerus brace and active and passive mobilization was started.

At 6 weeks the fracture showed signs of perfect union and at 3 months he gained full range of motion with near total wrist range of motion (Figure 3 and 4).

Figure 2: Post-operative X-ray.

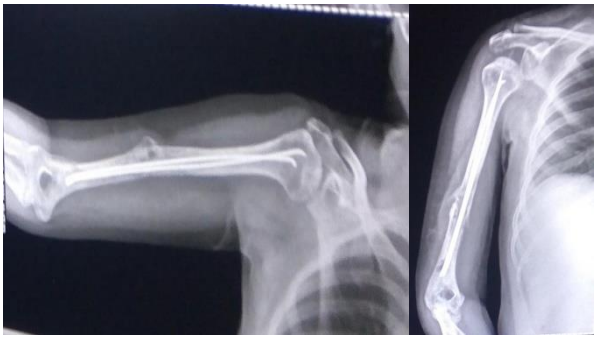

Figure 3: Follow up X-ray at 3 weeks.

Figure 4 (a-d): Active range of motion.

The management options for a humerus middle third shaft fracture is diverse ranging from conservative management to surgical fixation with dynamic compression plating to IMN or even TENS nail. Even though literatures point towards osteosynthesis plating as the best modality but IMN and TENS nailing provide equal if not better results.[6]

CONCLUSION

Thus a novel approach was tried in our case to provide early mobilisation in a socially demanding individual where we tried TENS nail for an infected fracture humerus shaft and achieved good results in terms of fracture union and range of motion with no signs of any infections.

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REFERENCES

1. Mbalaviele G, Novack DV, Schett G, Teitelbaum SL. Inflammatory osteolysis: a conspiracy against bone. J Clin Invest. 2017;127(6):2030-9.
2. Klenerman L. Fractures of the shaft of the humerus. J Bone Joint Surg Br. 1966;48(1):105-11.
3. Dameron TB, Grubb SA. Humeral shaft fractures in adults. South Med J. 1981;74(12):1461-7.
4. Ecke H. Complications of humerus-shaft-fractures. Langenbecks Arch Chir. 1972;332:395-8.
5. Schwarz B, Jelasic F. Traumatic lesions of the radial nerve following fractures of the humerus. Etiology, prognosis, therapy. MMW Munch Med Wochenschr. 1982;124(51-52):1150-2.
6. Changulani M, Jain UK, Keswani T. Comparison of the use of the humerus intramedullary nail and dynamic compression plate for the management of diaphyseal fractures of the humerus. A randomised controlled study. Int Orthop. 2007;31(3):391-5.
7. Shah MH, Heffernan G, McGuinness AJ. Early experience with titanium elastic nails in a trauma unit. Ir Med J. 2003;96(7):213-4.
8. Birt MC, Anderson DW, Bruce TE, Wang J. Osteomyelitis: Recent advances in pathophysiology and therapeutic strategies. J Orthop. 2016;14(1):45-52.

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