ORIGINAL RESEARCH PAPER

Orthopaedics

MANAGING A CASE OF INFECTED GAP NONUNION ULNA HAVING PAST MULTIPLE FAILED SURGERIES - WITH SURPRISING OUTCOME BY NATURE.

KEY WORDS: Infected gap nonunion, ulna

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ABSTRACT

Introduction: Infected Gap nonunion of ulna are rare and difficult to deal. We report a case of successfully managed infected Gap non-union of forearm bones with unusual fruitful outcome. **Case Report:** A 22year male presented with history of closed ulna fracture one year back for which he was operated with open reduction and internal fixation using dynamic compression plate. There was pain and fever post-surgery and discharge and wound gaping. This was treated with repeated debridement and resuturing of the wound and oral antibiotics. He continued to have pain fever and discharge and consulted another surgeon who removed the ulna plate and sequentially did thorough debridement and stabilization by Talwalkar Nail. But the discharge continued and the infection persisted. He was again operated and nail removal and debridement were done, but the discharge was still present. He presented to us at 1 Year post injury with Infected Gap Nonunion of ulna with sequestrum on radiograph and discharge from operated site. A staged treatment was planned for him. At first stage, thorough debridement was done and sequestrectomy was done and antibiotic Calcium Sulphate cement bead insertion was done. Patient was explained for the second stage surgery of cement removal and fixation post infection subsidence. Culture report was awaited and due to Covid lockdown the patient was lost. The infection was controlled during this period. Now after a year he followed up for the second stage surgery which was explained to him during his first surgery by us. But when XRAY was done to our surprise there was complete consolidation of the gap nonunion with the cement beads incorporated in the gap nonunion fracture. Also, he was able to do all his routine activity including body building exercises. **Conclusions:** Infection control in such isolated ulna fracture with intact radius acting as internal splint helped to achieve goals with good functional outcome.

Theoretical Background

Infected gap non-union are complications that are rare but have extreme impact on the patient and on the surgeon's skills. Infected non-union of forearm bones are rarely encountered with very few reports in literature [1-5]. These are seen especially after treatment of neglected cases or cases with history of smoking, alcoholism or other co-morbidities [5]. Management options include staged debridements and internal fixation after control of infection or single staged debridement and external fixator [5]. Although cases are reported individually, and as part of larger series, a definite guideline is still difficult to establish. A recent case series of 15 such cases reported a protocol of aggressive debridement, early definitive fixation within 7-14 days with good results [5]. All cases of infected nonunion have a unique and different pattern and requires a customized approach.

Case Introduction

Twenty-two-year-old student had a fall and sustained a closed ulna fracture. Open reduction and internal fixation with Dynamic Compression Plate (DCP) was done at by a previous surgeon. He developed infection for which repeated debridement and implant removal was done. Bone was stabilized with Talwalkar Square Nail; however, the infection was still not controlled and again was operated for nail removal and debridement. He came to us with infected gap non unions of ulna with discharge from the wound.

Case History

Patient complained of fall and sustained a closed fracture on April 2019. He went to a nearby hospital and was operated on the same day with open reduction and internal fixation using dynamic compression plates (Fig 1). Later after a week of surgery, he developed a high-grade fever. Blood counts were asked and a WBC count of 16000 was noted. The antibiotic was changed and may be, a higher antibiotic was given. The fever settled, however there was wound gap noted and there was discharge from the surgical site. This was debrided and secondary suturing was done on the 12th day and he was sent home. However, the patient continued to be not well and had pain and swelling in the affected limb, and decided to take a second opinion. The second surgeon debrided the wound, removed the ulna plate and introduced Talwalkar Nail. He was administered oral antibiotics. He continued to be troubled by discharge from the incision and after 4 weeks the ulnar incision wound began discharging seropurulent fluid. But the discharge continued and the infection persisted. Nail removal and debridement was done again, but the discharge was still present. He presented to us at 1 Year post injury with infected Gap nonunion and ulna sequestrum on radiograph.

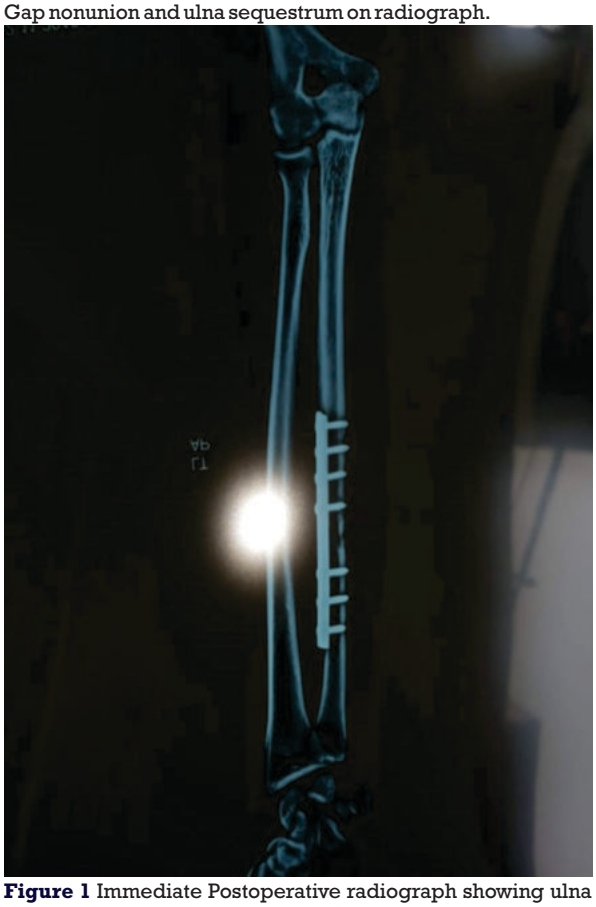

Figure 1 Immediate Postoperative radiograph showing ulna fractures stabilised by DCP plate by previous first surgeon elsewhere

Figure 2 Clinical picture of Infected ulna gap nonunion

Figure 3 Radiograph showing ulna gap non-union site

Case Assessment

The general condition of the patient was fair, he had been having fever on and off with pain and discharge from wound (Fig. 2). Wound was dressed daily and oral medication [antibiotics and anti- inflammatory] were being administered. Surgical scars over ulna showed sinuses with granulation tissue [as seen in Fig. 2] and had discharge on pressing the edges. There was wide gape and fulminant signs of infection Sequential radiographs were available with first radiograph showing fixation of the ulna done using DCP plates Radiograph at presentation showed that the middle of the ulna at fracture site had gap and sequestered edges(Fig. 3).

Figure 4 Intraoperative picture of debridement of ulna gap non-union site

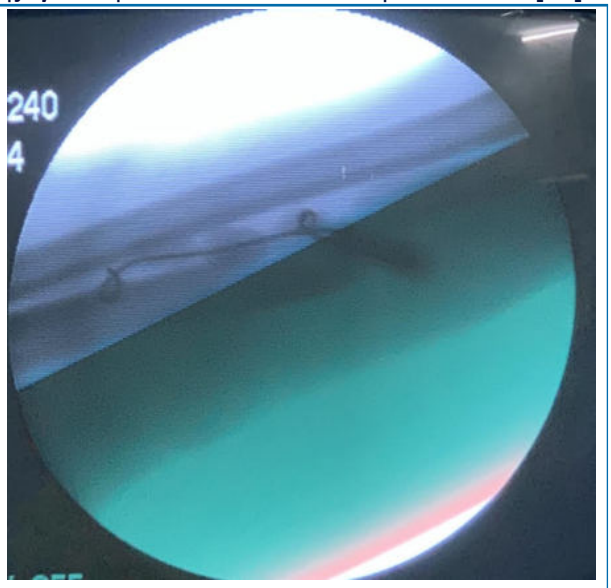

Figure 5 Radiograph intraoperative position of antibiotic impregnated cement beads in ulna gap non-union site

Case Conceptualization & Management Options

Problems of the Case: On presentation the patient had already undergone four surgeries [primary surgery, wound gape resuturing, ulna plate removal with Ulna nailing and later removal]. As these surgeries were not done at our centre we were not sure about the extent and details of the debridement. The reason for continued infection may be inadequate debridement or a resistant organism. Culture done at the previous centre had shown E coli and appropriate antibiotics were given without good outcome.

Problems with the patient:

The patient was anxious. He was a student and also an earning member in his family and since last one year he had been at home without job. He was very unsure of his future. We explained him the outcome aspects of the current situation and the further surgical plan. He was difficult to convince and seemed to have lost a lot of faith.

Problems to surgeon: We were looking at a case with active infection, secondary to inadequate debridement with radiological sequestrum in ulna. In current scenario there were three goals to achieve; clearance of infection, bony union, and facilitate maximum possible functional restoration. Plan was laid down according to our goals above

1. Clearance of infection: The radiograph showed sequestrated ulna fracture edges. A preoperative culture was sent which grew staphylococcus aureus sensitive to vancomycin. Plan was to debride the wound, sequestrectomy and antibiotic cement beads insertion was made.

2. Achieving union: After infection has settled achieving union was the next step. There are two main options here bone transport or bone graft. Bone transport in ulna is technically difficult and very less work is available on this. Application of fixator can functionally limit the patient for long time in cases with long gaps [as in this case]. Vascular or nonvascular bone grafting can be used successfully with the help of plastic surgeon thus these modalities were planned and explained to patient by us. In this case the soft tissues is scarred and are less vascular, addition of new vascular graft would be more favorable in attaining successful graft incorporation.

Treatment Given

In May 2020, debridement, cement beads insertion were done. The debridement and excision of all dead bone was done till bleeding bone was found. We filled in the empty space with beads made out of 40 Gms of Bone Cement(PMMA) loaded with 4 gms of vancomycin,beads

were made out of it. Multiple tissue samples were taken, from multiple areas in the wound, for culture (which would guide the post operative IV antibiotics).

Figure 6 Radiograph showing complete resolution of the gap non-union with complete resolution of infection and the union along with the antibiotic impregnated cement beads

Intermittent period and second surgery:
He was called after a month for follow-up after healed suture removal but patient didn't follow up after surgery and went to his native place due to covid protocols during that period.

Follow up: At 1 year after that surgery, he comes to visit our centre for his second surgery which he was counselled before first surgery at our centre.

To our surprise he is back to an active life(Fig. 7), happy, with all function able to do everything that he needs to do including all exercises in gymnasium.

We advised Xray forearm and to our surprise the ulna gap non-union had completely healed with full of callus also incorporating the antibiotic cement beads!!!! (Fig. 6)

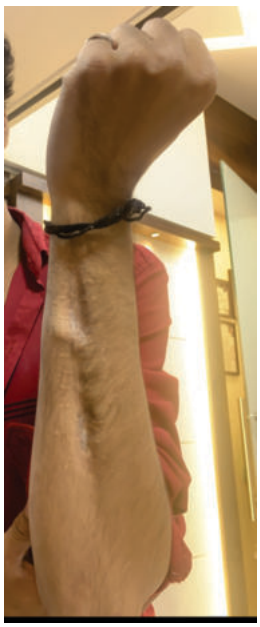

Figure 7 Excellent Function with complete resolution of the gap non-union with complete resolution of infection and the union along with the antibiotic impregnated cement beads

Inference Of This Case:

Infected gap non-union require a infection free environment which was given by the antibiotic cement beads and stability which was given by the intact Radius though the gap required bone grafting which has been taken care by the nature

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