

## Radialisation of Ulna in Post Infective Gap Non-union Radius-a Viable Reconstruction Option

Kandarpa Yadav, Vineet Kumar and Ajai Singh\*

Department of Orthopaedic Surgery, King George's Medical University, Lucknow, India

\*Corresponding author: Ajai Singh, Department of Orthopaedic Surgery, King George's Medical University, Lucknow, India, Tel: 918004645439; E-mail: yadavkandarpa0@gmail.com

Received date: May 04, 2017; Accepted date: July 06, 2017; Published date: July 10, 2017

Citation: Yadav K, Kumar V, Singh A (2017) Radialisation of Ulna in Post Infective Gap Non-union Radius-a Viable Reconstruction Option. Trauma Acute Care Vol.2 No.4: 49.

Copyright: © 2017 Yadav K, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

**Background:** Infected non-union of both forearm is a rare complication but bears a brunt on patient and surgeon's skill. Specific management protocols are lacking as each case is dealt individually.

**Case:** A seven year old male was presented as two months old case of fracture both bone forearm (L) which was managed conservatively elsewhere, with chief complaints of pain and high grade fever without discharging sinus. A two staged procedure was planned first with external fixator application (JESS) and then followed by radialisation of ulna.

**Conclusions:** Recent study reveals it is safer to saucerize the bone, remove sequestrum and unstable metal implants, combined with irrigation and renewal of rigid internal or external fixation as a first procedure and then to perform a bony procedure on a freshened pseudo-arthritic bed in a quiet period a few weeks later. Although this procedure leads to certain limitation of movements due to single bone construct but provides acceptable functional status along with cost effectiveness.

**Keywords:** Non-union; Radialisation; Sequestrectomy; Fibular graft; Papineau; Wave plate

### Introduction

Infected non-unions are complications that are rare but have tremendous impact both on the patient and on surgeon's skills. Cases of infected non-union of forearm are rarely encountered with very few reports (<5%) [1]. These are seen especially after treatment of neglected cases or cases with history of smoking, alcohol intake or comorbidities [2]. Management options include staged debridement and internal fixation after control of infection or single staged debridement and external fixator application [3]. Although cases are reported individually, as part of larger series, a definite guideline is difficult to establish. All cases of infected non-union have unique and different presentation and require customized approach.

This case report gives an account of our strategy towards one of such case.

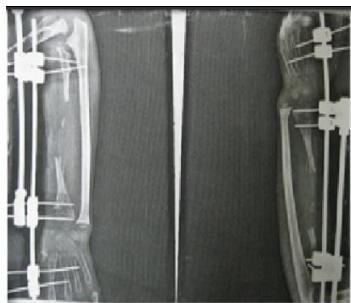
### Case Presentation

A seven year old male child presented to us with fever and pain over left forearm. As per the history retrieved from child's father, he sustained injury two months back as a result of fall on ground following which he developed pain and swelling over his forearm. On consulting from a local practitioner he was diagnosed to be having closed fracture shaft radius for which a plaster of paris cast was applied. One month after this procedure the patient developed high grade fever with pain in his left forearm. The plaster of paris cast was removed and haematological evaluation was done. The white blood cell count came out to be 16500/ $\mu$ l. The patient was started on with a broad spectrum antibiotic and analgesics. Thereafter the patient was referred to us for management. At the time of presentation to us there was no fever. The local skin condition was normal. He was having a manus valgus deformity. On palpation, the local temperature was normal but tenderness was present on deep palpation. The supination was from 0-20 degrees without any pronation movement. Ulnar deviation was grossly restricted. The wrist could manually be brought to neutral alignment with some effort. The wrist could not be ulnar deviated beyond neutral. Flexion and Extension were both 0-30 degrees at the wrist joint. Elbow joint had a normal movement arc. Radiologically, there was loss of mid third of radius bone with disruption of inferior radio-ulnar joint along with presence of sequestrum (Figure 1).

A two staged treatment was planned by us. In first stage, debridement, sequestrectomy and freshening of bone ends was done along with external fixator (JESS) application over forearm, wrist and hand to stabilize the fragments (Figure 2).



**Figure 1:** The above radiographic images representing Pre-op ulna after fixator removal.



**Figure 2:** The above radiographic images representing immediate Post-op ulna after fixator removal.



**Figure 3:** The above radiographic images representing Pre-op, immediate Post-op and post radialisation of ulna after fixator removal.

Distraction was done in order to achieve proper radial length and distal radio-ulnar relationship. Plan was to do a fibular graft in gap created after attaining adequate radial length. As the distal fragment was too small and osteoporotic, it could not withstand the forces applied by the distractor and the fixator had to be removed. Next, after removing the fixator, pin sites were allowed to heal for a period of six weeks. In second stage, radialisation of ulna was done and the distal end of ulna was

removed leaving aside the styloid process. The stabilisation of the fractured ends was achieved with the help of a 1.5 mm K-wire. In the post-operative period an above elbow POP cast was applied in mid-prone position (Figure 3).

#### Follow-up and outcome

After the removal of stitches on tenth post-operative day the patient was called on for monthly follow up. During the follow-up, infection status was assessed clinically by looking for the local temperature, any local soft tissue tenderness and haematologically by ESR and CRP, whereas the union was assessed clinically by evaluating for tenderness and radiologically by X-Rays (standard AP and LATERAL radiographs).



**Figure 4:** Representing sequential radiological images at monthly intervals and movements at 5<sup>th</sup> month of follow up.

Radiologically, union was evident at 2 months follow up (Figures 1 and 2) visit and at 3<sup>rd</sup> post-operative (Figure 3) month the intramedullary wire was removed and range of motion exercises started at the wrist and elbow joint. On follow up at 4<sup>th</sup> month there was a good radiological consolidation at the fracture site with no local tenderness (Figure 4). The wrist on examination was stable (Figures 5 and 6).



**Figure 5:** Representing sequential radiological images at monthly intervals and movements at 5<sup>th</sup> month of follow up.



**Figure 6:** Representing sequential radiological images at monthly intervals and movements at 5<sup>th</sup> month of follow up.

## Discussion

Traditionally, non-union are managed by debridement along with long term antibiotics or in staged manner wherein implant removal is done first followed by temporary stabilisation until infection is controlled followed by revision stabilisation and bone grafting [4]. Other methods mentioned in literature are use of wave plate for ulna non-union, use of local antibiotic beads for infection control [5,6]. Most of the traditional methods require repeated surgical procedures, long hospitalisation, are expensive and also lead to stiffness of joints. Papineu [7], traditionally employed for management of chronic osteomyelitis, provides adequate drainage allows for formation of healthy granulation tissue which resists infection and uses cancellous bone graft which revascularises rapidly. As per earlier studies [8] it is safer to saucerize the bone, remove sequestrum and unstable metal implants, combined with irrigation and renewal of rigid internal or external fixation as a first procedure and then to perform a bony procedure on a freshened pseudoarthritic bed in a quiet period a few weeks later.

In this case we also did a two staged procedure. Radialization of ulna as the final procedure although leaves the patient with certain limitations related to movement at wrist joint (at 5th month follow up dorsiflexion was 0-10 degrees, volar flexion 0-10 degrees, restricted pronation and supination) due to a single bone construct but it leads to less morbidity. Early functional recovery achieving good and early basic functions of hand and cost effectiveness makes it a feasible option. We in this case report promote this procedure in significant radial gap non-unions, as even substituting the gap with fibular graft will not recreate the normal radial bow and thus will lead to unstable distal radio-ulnar joint leading to limitation in pronation-supination movement and graft site morbidity. The

uptake of non-vascularised fibular graft also takes a long time to get incorporated at the recipient site leading to prolonged immobilisation of the limb in a cast which subsequently results in joint stiffness and atrophy of muscles. Thus above described procedures are good alternatives for specific indications.

## Conclusion

The study reveals it is safer to saucerize the bone, remove sequestrum and unstable metal implants, combined with irrigation and renewal of rigid internal or external fixation as a first procedure and then to perform a bony procedure on a freshened pseudo-arthritic bed in a quiet period a few weeks later. Although this procedure leads to certain limitation of movements due to single bone construct but provides acceptable functional status along with cost effectiveness.

## References

1. Kloen P, Buijze GA, Ring D (2012) Management of forearm nonunions: current concepts. *Strategies Trauma Limb Reconstr* 7: 1-11.
2. orthoinfo.aaos.org/ topic. Cfm (2014) topic=A00374.
3. Ring D, Allende C, Jafarnia K, Allende BT, Jupiter JB (2004) Ununited diaphyseal forearm fractures with segmental defects: plate fixation and autogenous cancellous bone-grafting. *J bone joint Surg Am* 86: 2440-2445.
4. Mahapatra S (2015) Suruchi-Management of Infected Non-Union by Implant Retainment and Papineau Open Bone Grafting-Report of Two Cases. *Ind Med Gaz* 149: 120-121.
5. Jason YP, Michael SD, Magovern B (2009) Treatment of isolated ulnar nonunions using wave plate osteosynthesis: a report of four cases. *J Orthop Trauma* 23: 595-599.
6. McKee MD, Li-Bland EA, Wild LM, Schemitsch EH (2010) A prospective, randomized clinical trial comparing an antibiotic-impregnated bioabsorbable bone substitute with standard antibiotic-impregnated cement beads in the treatment of chronic osteomyelitis and infected nonunion. *J Orthop Trauma* 24: 483-490.
7. Polyzois VD, Galanakos SP, Tsiampa VA, Papakostas ID, Kouris NK, et al. (2011) The use of Papineau technique for the treatment of diabetic and non-diabetic lower extremity pseudoarthrosis and chronic osteomyelitis. *Diabet Foot Ankle* 2: 5920.
8. Kanakaris NK, Tosounidis TH, Giannoudis PV (2015) Surgical management of infected non-unions: An update. *Injury* 46: S25-S32.