

CASE REPORT

Intramedullary nail fixation following failed plating for humerus fracture

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ABSTRACT

Our casestudy evaluates the outcome of intramedullary nail fixation in a patient who underwent revision surgery following failed plating for humerus fractures. Non-union of humeral fractures presents a challenging clinical scenario often requiring surgical intervention. Intramedullary nail fixation has emerged as a viable option due to its mechanical stability and biological advantages. However, limited literature exists on its specific efficacy for humeral non-union. This study aims to address this gap by analysing our institution's experience with intramedullary nail fixation for humeral non-union.

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INTRODUCTION

Intramedullary interlocking nail a good alternative for management of non-united humerus fracture which developed after failed Locking Compression Plating (LCP). Non-union is seen in 15% of humerus fractures. LCP is gold standard for treating humerus fractures. Patient developed non-union after getting treated by Single LCP. In such cases when single plate fails than it is mostly treated by thorough debridement followed by Bigger LCP or Double LCP with screw fixation and bone graft. Concerning to the incidence of non-union after compression plating, we avoided using LCP as there was decreased vascularity at and near non-union site, loss of periosteum, loss of bone tissue, and risk of damaging neurovascular structures and instead used Intramedullary nailing as an alternative.

A 46-year-old male came to Shadan Hospital Orthopaedic OPD with pain and swelling of left arm since few months aggravated from last 2Months. On examination Swelling was hard, Abnormal movement, Deformity was seen, No tenderness, No Open Wounds, No Fever, No Discolouration, Normal range of motion of both shoulder and elbow.He had history of diaphyseal fracture of left humerus seven years back which was surgically managed by locking compression plate. Surgical scar seen on posterior surface of arm. X ray revealed displaced plate and humeral shaft non-union. Intramedullary Interlocking Nail a good alternative for treating non-united humerus fracture which developed after failed plating.

INTRA-OPERATIVE PROCEDURE

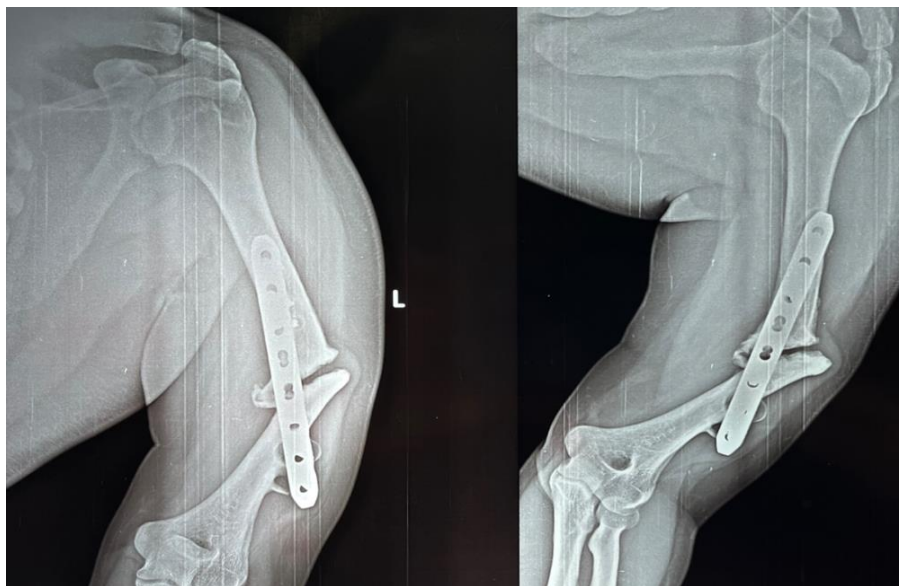
A) Under strict sterile condition after scrubbing, painting and draping. B) The patient was positioned in a beach-chair position on aradiolucent operating table. Incision was made on posterior surface of arm.C) Fibrous tissue identified above the Plate and was removed making sure there was minimal damage to neurovascular structures.D) Compression Plate with screws was removed.E) Fibrous tissue which was formed between non-union ends was removed after which edges of non-union part of bone was freshen up till bleeding. F) The humeral head diameter is palpated from anterior to posterior to locate the midline. A 3-cm longitudinal incision is made from the edge of the acromion and carried distally. The deltoid muscle is split in line with its fibers. The subacromial bursa is cleared bluntly with finger dissection. An incision is made inline with the fibers of the supraspinatus tendon, and the tendon edges are retracted. The correct starting point is critical. A curved awl is used to initiate the starting point just medial to the greater tuberosity and posterior to the bicipital tuberosity. Adduction of the arm and extension of the shoulder will improve clearance of the acromion and facilitate awl access to the correct portal location. The awl is advanced into the intramedullary canal. Satisfactory position of the awl is confirmed. Reduction of the fracture is usually achieved by a combination of adduction (arm against chest), neutral forearm rotation (forearm straight up toward ceiling), and traction. An assistant is necessary to maintain this reduction during reaming and nail insertion. A fracture gap should be avoided when nailing due to the

potential of iatrogenic injury to the radial nerve. A ball-tipped guide wire is inserted and passed down the medullary canal. Reaming is performed in 0.5-mm increments until 1.5 mm of cortical chatter is achieved. G) Docking was done at non-union site. H) Intramedullary Interlocking Nailing was done along with Autogenous bone graft from Cancellous Iliac Crest was used to fill up the defect. I) Haemostasis secured. Parts closed in layers. J) Intra-Operatively 1 Unit of PRBC was transfused. K) Surgery was uneventful. Drain was kept. Patient shifted to POST-OP with above elbow slab. L) Drain was removed one week after surgery. Staples and suture were removed two weeks after the surgery, wound was clean, healthy with no discharge. N) Above elbow slab was applied for 3 weeks and then shoulder immobiliser

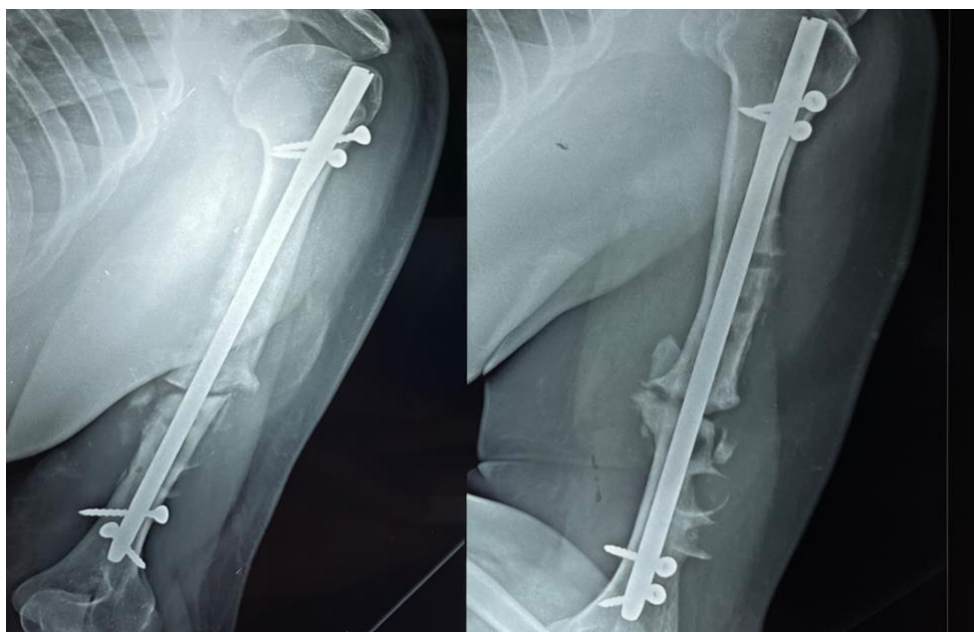
was applied for 3 weeks. Physiotherapy was advised 6 weeks after surgery.

POST-OPERATIVE CARE

The arm is placed in a shoulder immobilizer for 2 Weeks. Postoperative dressing was removed after 2 Days followed by gentle shoulder and elbow range-of-motion exercises was initiated. A sling is routinely used for the first 4 to 6 weeks after surgery. Formal physical therapy is not necessary, but the range-of-motion and shoulder pendulum exercises are required to prevent stiffness and loss of elbow extension. Large rotational stresses to the arm are avoided until radiographic evidence shows healing. Nail removal after healing is usually not required. However, if implant or soft-tissue irritation develops, the nail may be removed.



PRE-OP XRAY MAY 2022



POST-OP XRAY JULY 2022

**POST-OP DAY 7****POST-OP DAY 30 (Hypertrophic Scar)****DISCUSSION**

Intramedullary nailing as salvage treatment for failed plating of humerus fracture demonstrates promising outcomes, with favourable union rates and functional recovery in select patients. Factors contributing to plating failure, bone quality, and soft tissue condition influence revision surgery success and should guide patient selection. Manageable complications did not outweigh the benefits of revision surgery in most cases.

CONCLUSION

Intramedullary nailing serves as an effective salvage option for failed plating of humerus fractures, offering satisfactory fracture union and functional recovery.

Further research is warranted to refine patient selection criteria and validate these findings, but our results support its consideration in select cases of failed plating. Several prospective randomized trials have shown comparable outcomes in patients with humeral shaft fractures treated with a plate or nail. Nevertheless, plate osteosynthesis remains the standard in surgical management of the majority of operative fractures of the humerus. Advantages of plating include anatomic reduction and compression fixation of noncomminuted fracture patterns. In addition, open surgery allows for exposure and protection of the radial nerve. In comminuted fracture patterns, bridge plating with restoration of length, alignment, and rotation is usually possible. With the

advent of periarticular, anatomic specific plates, fixation can be performed for fractures that extend proximally or distally into the epimetaphyseal regions. Nevertheless, there are a number of disadvantages with plating, generally related to the large surgical exposure through the zone of injury, avoid lifting heavy weights and gentle rom for immediate post op care. Plating carries with it the risk of fragment devascularization, iatrogenic nerve injury, and infection. In addition, it often leaves a long unsightly scar along the length of the arm just like in this case. Reason for plate failure in our case was immediate massage after surgery and lifted heavy weights. In such case with low patient compliance Intramedullary nailing of the humerus, while used less frequently than plate osteosynthesis, has several mechanical and biologic advantages. Mechanically, intramedullary nails are strong implants, which can effectively share load. They are inserted using "minimally invasive" closed techniques. This eliminates direct exposure of the fracture site, reducing blood loss and decreasing the risk of infection. Intramedullary nails are ideally used to stabilize fractures in the middle three-fifths of the humerus. Many fractures that extend above the humeral diaphysis can be treated with either a plate or a nail. In the past decade, advances in nail design have improved fixation stability by the addition of multiplanar interlocking screws that often lock into the nail. This has expanded the range of fractures that are amenable to intramedullary nailing. Retrograde nails are rarely used because of the risk of insertion portal comminution or fractures in the distal humerus. Numerous studies support the preferential use of a reamed antegrade intramedullary nail, rather than a plate, in the following circumstances: (a) pathologic or impending pathologic fractures, (b) segmental fracture patterns, (c) severe osteoporosis, (d) long zones of comminution. (e) compromised soft tissues. The main disadvantages of antegrade humeral nailing are postoperative shoulder pain and higher incidence of hardware removal. Intramedullary interlocking nail became a good alternative, as locking screws are away from the non-union site, IMILN also solved large bone defect which was managed by autogenous iliac bone graft.

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