

MANAGEMENT OF PSEUDOARTHROSIS OF SHAFT HUMERUS BY PLATING (FIVE YEARS FOLLOW UP) – A CASE STUDY

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ABSTRACT

Pseudoarthrosis is a condition where union at fracture site is very difficult to obtain. But sticking to the very basic principles of management of non-union – that is freshening at fracture site, removal of sclerotic bone, reaming of medullary canal, rigid fixation and abundant bone grafting-helps in achieving the goal. In the below case, all the steps were carried out and the fracture has healed two months postoperatively.

KEYWORDS

Pseudo-arthrosis, Humerus, locking plate.

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INTRODUCTION: 65 years old male patient came to our institute with the nail broken at two places and deformity of left arm since two months. Interlocking nail was removed through incision at supracondylar region. Then anterolateral approach was taken and the broken nail was removed. Pseudoarthrosis site was exposed and freshening of fracture ends was done. Reaming of proximal and distal fragments was done. All fibrous tissue was excised Seven hold locking compression plate was applied and bone grafting was done. Incision was closed over negative suction drain. Sutures were removed on 12th postop day. Shoulder immobilizer was given for 3 weeks. Pseudoarthrosis is a condition where union at fracture site is very difficult to obtain. But sticking to the very basic principles of management of non-union – that is freshening at fracture site, removal of sclerotic bone, reaming of medullary canal, rigid fixation and abundant bone grafting-helps in achieving the goal. In the above case, all the steps were carried out and the fracture has healed two months postoperatively.

CASE REPORT: A 65 years old male patient came with deformity of left arm since 3 months. He was operated for fracture shaft humerus by retrograde interlocking nail at Govt. Hospital, Mumbai in 1998. After one year follow up, he was told that there was non-union at the fracture site and advised implant removal, but he refused. He come to our institute with the nail broken at two places and deformity of left arm since two months. Then anterolateral approach was taken and the broken nail was removed. Pseudoarthrosis site was exposed and freshening of fracture ends was done.

Reaming of proximal and distal fragments was done. All fibrous tissue was excised Seven hold locking compression plate was applied and bone grafting was done. Incision was closed over negative suction drain. Sutures were removed on 12th post-op day.

Shoulder immobilizer was given for 3 weeks. Pseudoarthrosis is a condition where union at fracture site is very difficult to obtain. But sticking to the very basic principles of management of non-union – that is freshening at fracture site, removal of sclerotic bone, reaming of medullary canal, rigid fixation and abundant bone grafting-helps in achieving the goal. In the above case, all the steps were carried out and the fracture has healed two months postoperatively.



Fig. 1: Post-operative X-ray (1999)
Nail is bent and there is non-union at the fracture site.



Fig. 2: Pre-operative X-ray (2010)
Nail is broken and pseudoarthrosis at the fracture site

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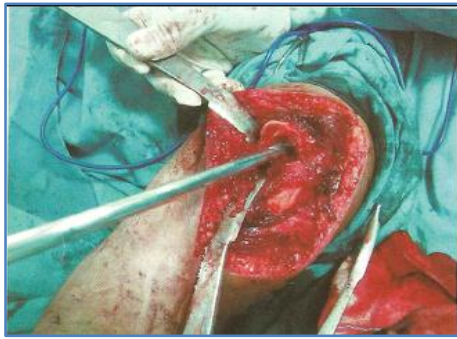


Fig. 3: Pseudoarthrosis site opened, fibrous tissue removed and reaming of medullary canal done.



Fig. 4: AP view & Lateral View (Immediate post-operative X-Ray)- Locking compression plate and bone grafting done.

CULNICAL FEATURES

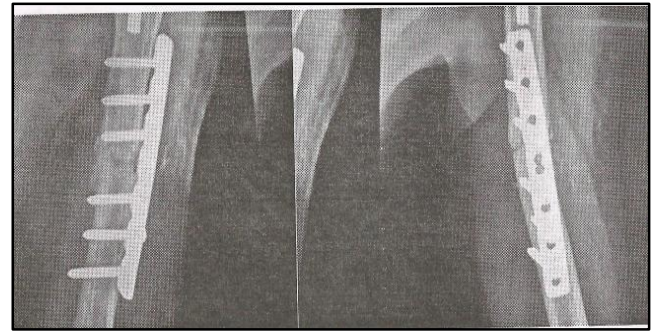
- SYMPTOMS:
- Deformity of left arm.
- Unable to lift left arm.
- SIGNS:
- Abnormal mobility present at midshaft humerus.
- Temperature-normal
- No tenderness

INVESTIGATIONS: X-Ray left humerus-AP and Lateral view showed pseudoarthrosis at mid shaft Humerus with broken nail at two sites, one at the upper third region and second at the non-union site. (Fig. 1 & 2)

- HB-10.9 g/dl
- Serum Electrolytes-normal
- Blood sugar-normal

MANAGEMENT: Interlocking nail was removed through incision at supracondylar region. Then anterolateral approach was taken and the broken nail was removed. Pseudoarthrosis site was exposed and freshening of fracture ends was done. Reaming of proximal and distal fragments was done. All fibrous tissue was excised. Seven hold locking compression plate was applied and bone grafting was done. Incision was closed over negative suction drain. Sutures were removed on 12th post-op day.

Shoulder immobilizer was given for 3 weeks. (Fig. 3 & 4)



Post-operative X-RAY 8 weeks healing at non-union site is seen

DISCUSSION: "Non-union is a state in which all the healing process has come to a halt as judged by clinical and radiological evidence beyond the stipulated period of healing for a particular bone, due to mechanical and biological failure, with a gap being filled with fibrous or dense fibro-cartilaginous tissue, requiring a change in treatment."

According to FDA, non-union is established when a minimum of 9 months has elapsed since injury and the fracture shows no visible progressive signs of healing for 3 months.

CAUSES OF NON UNION ARE:

- Open fractures
- Unstable fixations
- Segmental fractures
- Comminuted fractures
- Distraction by either traction, plate or screws
- Soft tissue injury- lack of blood supply
- General factors-old age, poor nutrition

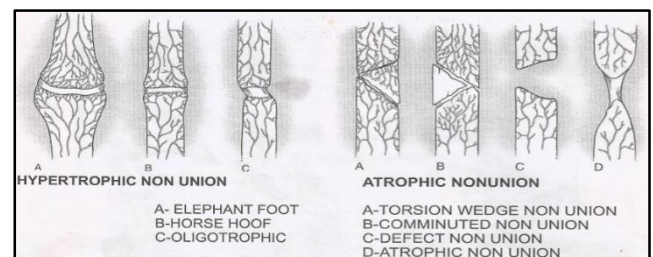
CAUSES ARE DIVIDED INTO 2 TYPES

1. MECHANICAL FAILURE

Due to inadequate immobilization Inadequate internal fixation leads to hypertrophic non-union. Once stability is restored, fracture heals quickly.

2. BIOLOGICAL FAILURE

- Due to loss of blood supply to fracture site and infection.
- Here in addition to stability, bone grafting or electrical stimulation is necessary.
- Bone ends are atrophic, therefore no callus is seen on X-ray and there is mobility.



- Marti¹ et al. reported a 98% union rate in their 51 patients with nonunion of the humeral shaft with the use of this technique. Healy WL² and Jupiter³ suggested that the use of a fibular allograft in the medullary canal may improve stability and enhance union. Fattah HA⁴ suggested excision of the fibrous tissue with freshening of the bone ends usually improves results. Intramedullary nailing of humeral non-union also has proved successful; however, exchange nailing of shaft fractures that were originally fixed with a nail have not proved to be as successful in the humerus as in the femur.
- Neel⁵ suggested using multiple methods simultaneously to provide the best chance for healing of a non-union of the humeral shaft. He advocated the use of a broad dynamic compression plate with an implantable electrical bone stimulator and a bone graft substitute consisting of calcium sulphate, crushed cancellous bone chips, and demineralized bone (allomatrix; Wright medical, Arlington, Tenn).
- Van Houwelingen⁶ and McKee⁷ reported healing of humeral shaft non-unions in six osteoporotic patients after lateral compression plating with allograft cortical strut grafting medially (to obtain screw purchase for the plate) and the use of iliac crest bone grafting or a bone substitute (rhbmp-7).
- Healy WL² suggested that Gap nonunion of the humeral shaft usually are more easily grafted than nonunion of any other long bone because considerable shortening is compatible with function; the ends of the fragments can be freshened and opposed, and the non-union can be treated with one of the routine grafting procedures. When preserving the length of the humerus is desirable, the defect can be bridged with a compression plate and the defect filled with cancellous and cortical cancellous grafts.
- Bridging a defect is less often necessary in the humerus than in other long bones because, when a defect occurs, the fragments can be apposed and grafted even when 4 to 5 cm of shortening is necessary; such a shortening causes little disability, and the cosmetic result is of little consequence compared with the difficulties of bridging a defect.



CONCLUSION: Pseudoarthrosis is a condition where union at fracture site is very difficult to obtain. But sticking to the very basic principles of management of non-union – that is freshening at fracture site, removal of sclerotic bone, reaming of medullary canal, rigid fixation and abundant bone grafting-helps in achieving the goal. In the above case, all the steps were carried out and the fracture has healed two months postoperatively.

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