

A Case Of Communitated Proximal Humerus Fracture With Osteoporotic Degeneration Treated By Reverse Shoulder Arthroplasty

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Abstract

Following a ground-level fall on an extended arm, proximal humerus fractures are typical fractures often found in elderly individuals with osteoporotic bone.^{1,2} Managing fractures in the proximal part of humerus might be difficult if the fracture associated with it is complex.³ While many patients benefit from surgery, others, particularly older individuals with valgus affected proximal humerus fractures, are effectively handled non-surgically. Age-related complicated fractures in the proximal part of humerus which might be 3 part or 4 parts are increasingly being treated with reverse shoulder arthroplasty.^{4,5,6} 76 yr Old aged postmenopausal women allegedly fall down from her bike and was brought to our hospital. A fractured proximal humerus was discovered on radiology.⁸ The indications for the usage of new technique reverse shoulder arthroplasty have been in the increasing trends over few decades which include deficiency at the rotator cuff muscle, major nonrecoverable tears at the rotator cuff muscles, fractures less than 3 weeks, native treatment which may lead to recurrent dislocations, non-union and most common complication malunion and for revision arthroplasty, and for any lifesaving salvage conditions.^{7,8,9} The patient had reverse shoulder arthroplasty, and all of his or her functions were fully recovered. The majority of patients report pain reduction and better function, and patient satisfaction with RTSA may be high.^{10,11,12} The long-term effects remain unclear, despite the fact that the implant survival rate seems to be satisfactory in the short term. Contrary to expectations, Reverse Shoulder Arthroplasty is linked to a greater rate and wider range of problems. To make this therapy as effective as possible for numerous shoulder disorders, improvements in prosthesis design, surgeon expertise, and clinical outcomes are required.^{13,14}

Keywords: Reverse shoulder arthroplasty, Rotator cuff tear, Valgus affected proximal humerus fractures, Malunion, chronic dislocations, Non- union, Revision Arthroplasty.

INTRODUCTION:

Nearly 5% of all fractures are fractures associated with proximal part of humerus, the second most frequent type of fracture, and their incidence is rising as the population ages.^{15,16} While only 4% of fractures associated with proximal part of humerus are three- or four- part fractures or fracture dislocations, older individuals are more likely than younger groups to have complicated fracture patterns. As a result of their frequent severe comminution, displacement, and poor bone quality, nature and pattern of the fractures of the proximal humerus are challenging to repair with plating by open reduction techniques.^{17,18,19} Penetration of fixed screws into the head of humerus, improper fixation of the fractures and decreased blood supply to the head of humerus which is called as osteonecrosis are the issues associated with plate osteosynthesis.^{20,21,22} The Neer-introduced hemi-arthroplasty for fracture gives a favourable treatment option for irreparable fractures, effectively relieving pain; nevertheless, outcomes might also include great functional improvement. The healing of the tuberosities is the primary factor in determining hemiarthroplasty results, which are often bimodal and separated into good and bad outcomes. Those patients have improved range of movements and associated great clinical improvement with appropriate tuberosity healing.²³ However, insufficient functional outcomes are often seen in cases of tuberosity resorption, nonunion, or malunion.



Fig 1: NEER Classification- Proximal Humerus fracture

Reverse shoulder arthroplasty (RSA), which often produces more consistent and predictable outcomes, has been recommended for complicated fractures because to the uncertainty in the outcome of hemiarthroplasty. Greater tuberosity healing improves clinical results in both hemiarthroplasty and Reverse; however, tuberosity healing is not necessary for a positive outcome following reverse shoulder arthroplasty.²⁴

To treat arthropathy associated with rotator cuff, new technique reverse shoulder arthroplasty was developed but over the past few years, its indications for use have grown include deficiency at the rotator cuff muscle, major nonrecoverable tears at the rotator cuff muscles, fractures less than 3 weeks, native treatment which may lead to recurrent dislocations, non-union and most common complication malunion and for revision arthroplasty, and for any lifesaving salvage conditions^{25,26}

Universal salvaging technique for a wide variety of severe humerus injuries and other shoulder traumatic conditions in the old aged patients is Reverse Shoulder Arthroplasty because to its nonanatomic design principles. The reverse prosthesis works according to the established Grammont principles, which call for the construction of a fulcrum which is fixed along with the prosthesis which is semi constraint in nature that allows the muscle deltoid to raise the upper limb in case of decreased rotator cuff muscle function. It is possible to extend the deltoid and increase its moment arm by medializing the centre of rotation.²⁷ These biomechanical adjustments lessen the power needed for the movement of abduction of the arm, which enhances mobility when the rotator cuff isn't working properly. To lessen scapular notching and enhance external rotation, material of glenosphere which is lateralized created. Glenosphere which is made lateralization enhanced the stability of shoulder joint, which has no effect on the movements such as external rotation, collectively increased the muscle deltoid force needed for the movement like abduction, according to bio-mechanical research.^{28,29}

CASE PRESENTATION:

78 yr aged post-menopausal female patient presented with a pain over the left shoulder and inability to move the left shoulder. Patient gives alleged history slip and fall from the bike. Patient was taken to the nearby hospital for the initial treatment and referred to higher center for further management. Xray Left shoulder was taken to diagnose any fracture due to the fall from bike.



Figure 2 shows Xray Left Shoulder indicating the Proximal Humerus Fracture

Xray shows proximal humerus fracture. To further diagnose how part of fracture associated with the injury, CT Left Humerus along with the shoulder was taken and CT findings were found to be the following in this osteoporotic patient.

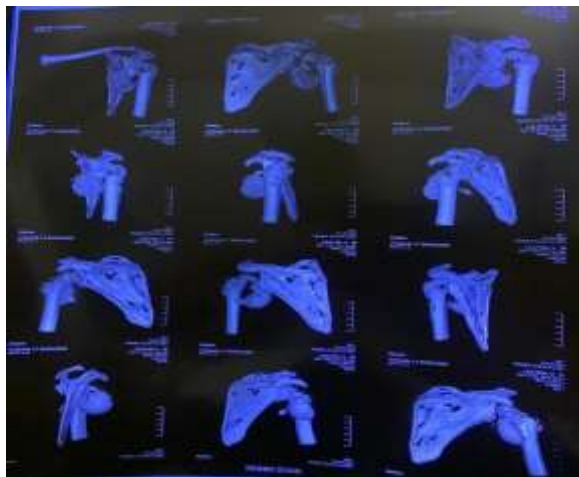


Figure 3 shows CT of the Humerus (3-part fracture of Proximal Humerus)

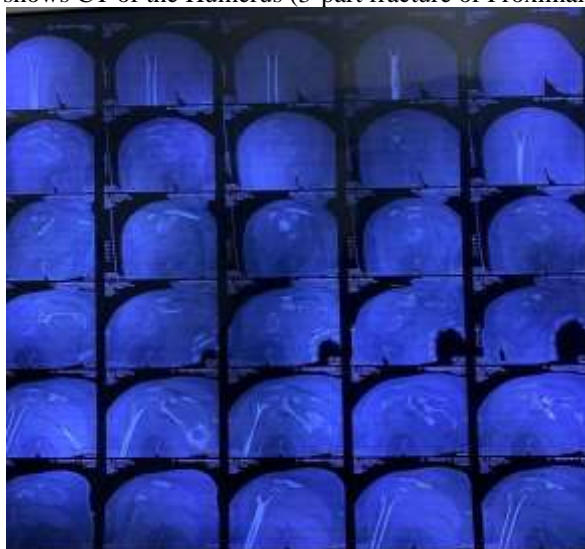


Figure 4 Shows the Saggital View of left CT Shoulder

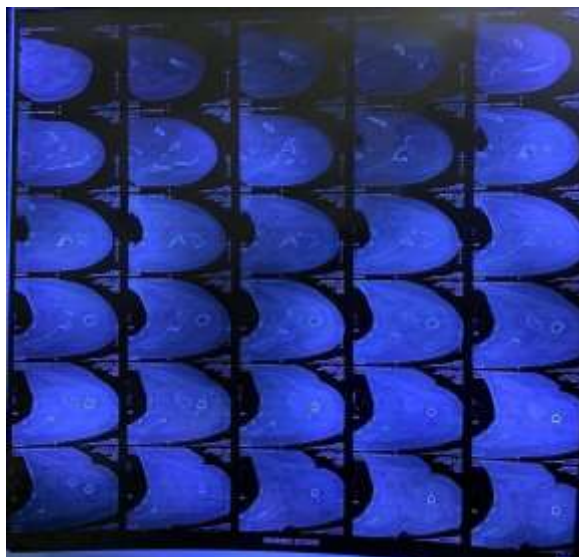


Figure 5 Shows the Axial View of left CT Shoulder

This process should be carried out after careful preparation since it is not urgent. In order to accurately assess the tuberosities such as greater tuberosity and lesser tuberosity and the displacements related to the tuberosity and conditions associated with the tuberosity as well as nature of the glenoid part of the humerus that is like version of the glenoid, bone density, proper workup consists of imaging studies like Xrays- two views standard lateral view and anteroposterior view.^{31,32} Details on trophicity of rotator cuff preoperatively and degeneration of the soft tissue associated with it is provided through soft tissue windows. Care should be taken while assessing metaphyseal bone loss, and preoperative

planning for the restoration of humeral height is crucial. A Xray of the opposite side complete humerus should be taken in the case of significant loss of metaphyseal bone in order to precisely determine height of implant.

SURGICAL INTERVENTION:

To decrease the post operative pain, the surgery is carried out either block along the interscalene region or without the block, along with the general anaesthesia.

The Operative patient is perched along the edge of the table in a beach chair posture, angled between 30 and 60 degrees. Movements of anterior shoulder and the posterior shoulder, along with the retropulsion of humerus head, should be possible in this position. The arm is resting on rest pads.

You can use the supero-lateral or approach through deltopectoral region. Using the delto-pectoral approach, tuberosities such as greater tuberosity is difficult to find and get it operated and the glenoid is less easily accessible. However, this method should be preferred in patients who have fracture-dislocation injuries or fracture lines that extend into the metaphysis. Additionally, it theoretically protects the anterior deltoid and prevents exposure of the axillary nerve.³³

In order to provide the most direct access to the glenoid, the delto- pectoral approach is a lateralized 8 to 10 cm approach that begins at the acromio-clavicular joint and extends to the tip of the deltoid V. For the muscle to be mobilised from the back, the deep surface of the deltoid must be completely released.³⁴ The coraco-acromial and coraco-humeral ligaments are cut flush with the coracoid process, and the clavi-pectoral fascia is opened at the lateral edge of the conjoined tendon. The acromio-clavicular joint to 38 mm under the lateral edge of the acromion's anterior edge are incised.

In order to protect the axillary nerve, the supero-lateral approach involves making an incision along the anterior edge of the acromion that does not extend past 38 mm under the lateral edge of the acromion.³⁵

This limit is crucial because continuing the penetration past this point increases the risk of axillary nerve damage. The middle and anterior deltoid's fibres are divided. To protect the axillary nerve, a suture can be inserted at the distal end of the gap between the two deltoid bundles. The coraco-acromial ligament and anterior deltoid are separated from the acromion together, sub-periosteally. The procedure of acromioplasty can increase exposure.

Excised is the hemorrhagic sub-acromial bursa. The bicipital groove is opened after identifying the long head of the biceps tendon. The biceps tendon is frequently tenotomized. Although no effect of this procedure has been proven, tenodesis at the distal end of the groove is an option. Usually, the fracture lies directly across from the groove. The fracture line is where the tuberosities are divided. The glenoid is reached after identifying and opening the rotator interval. Up to the glenoid, the supra-spinatus tendon is excised. Although this tendon can be saved, after the reduction it might put too much pressure on the greater tuberosity. In order to preserve the periosteal attachments as much as possible, the greater tuberosity is located and mobilised.. To reveal the medial side of the smaller tuberosity, the humeral head is freed from its capsular adhesions and removed. As a source for grafts during reconstruction, it is preserve



Fig 6 shows Intra operative picture of Reverse Shoulder Arthroplasty



Fig 7 shows Intra Operative picture of the Reverse Shoulder Arthroplasty

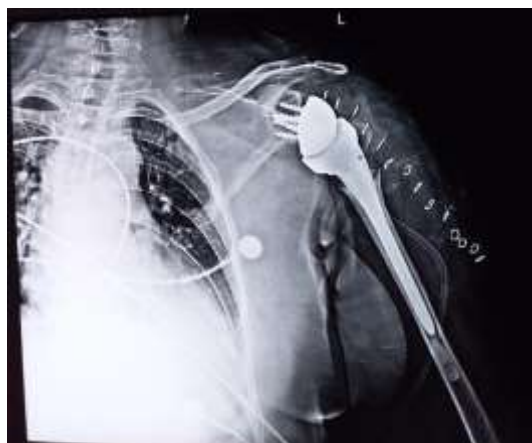


Fig 8 shows POST OPERATIVE pic of reverse shoulder arthroplasty for the 3rd part proximal humerus fracture

DISCUSSION:

The choice to do Reverse Shoulder Arthroplasty in recent proximal humerus fractures is made based on the patient's age, comorbidities, and fracture characteristics, such as tuberosity displacement and comminution, cuff and calcar health, the degree of displacement, and the risk of avascular necrosis.³⁶

Patients over the age of 70 who have a three- or four-part displaced fracture with a high risk of avulsion necrosis of the humeral head, poor-quality comminuted tuberosities, and/or a pre-existing rotator cuff rupture might choose Reverse Shoulder Arthroplasty. When treating youthful, energetic people, RSA shouldn't be the primary option.³⁷ Axillary nerve injuries that are present or present simultaneously, scapular spine or acromion fractures that may be displaced by increased deltoid muscle tension, or concurrent glenoid fractures that may prevent the implantation of a glenoid baseplate are all contraindications to Reverse Shoulder Arthroplasty.^{38,39}

RESULTS:

Reverse Shoulder Arthroplasty is becoming a popular choice for treating complicated proximal humerus fractures in older patients mostly osteoporotic patients. Reverse Shoulder Arthroplasty has the benefit of offering consistent results as opposed to the erratic outcomes of hemiarthroplasty. Careful pre-operative planning and attention to technical issues may provide satisfactory outcomes. However, unlike hemiarthroplasty, the healing of the tuberosity is not necessary for a successful clinical result. A pillar in the treatment strategy for difficult proximal humerus fractures, RSA for fracture has encouraging short- and mid-term outcomes and a reduced complication profile compared to hemiarthroplasty. Prior to recommending the broad usage of Reverse Shoulder Arthroplasty, longer-term follow-up is necessary.⁴⁰

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AUTHOR CONTRIBUTIONS:

Dr. Ruthira Kumar contributed towards treatment protocol and follow up. Dr. Vignesh A.R contributed in preparing the case series and collecting clinical and radiological images. Dr. Satish RG contributed editing, drifting case report.

Informed consent:

Written and oral informed consent were obtained from the participant in the study.

Ethical committee approval:

Proper ethical committee approval was taken for the study.

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Conflict of interest:

Conflict of interest declared none.

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