Original Article

Functional Outcome Of Proximal Humerus Plating In Displaced Proximal Humerus Fractures

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DOI: 10.47750/pnr.2022.13.S04.262

Abstract

Background:
The purpose of this study was to examine a group of patients who had fracture of the proximal part of the humerus, representative of the individuals who commonly sustain this fracture, treated by rigid internal fixation after anear anatomic reduction, emphasizing on the functional results, range of motion, strength, and complications.

Methods:
This is a prospective study , of 22 patients conducted at Meenakshi Medical College & Hospital, kanchipuram in Department of Orthopaedics on those who were admitted with displaced fracture of Proximal Humerus from July 2021 to August 2022.

Results:
The functional results after rigid fixation of fractures using a plate were shown to be better than conservative treatment or semi-rigid fixation without anatomical reduction of the head fragment. Shoulder function continued to improve as the strength and function of the muscles increased.

Conclusion:
Early fixation, exact anatomical repositioning of the fracture fragments and rigid internal fixation was associated with a significantly better functional results.

INTRODUCTION:

Proximal humerus fractures constitute 4-5% of all fractures and theyaccount for 45% of all humeral fractures. When considering adults over the age of 40 years, this increases to 76% [(1).] ABOUT 15% to 20% of displaced proximal humerus fractures that may benefit from surgery, no single approach is considered to be the standard of care. However, Various methods of internal fixation [(5)] using k wires and screws, blade plates, external fixators, T-plates, intramedullary devices, locking compression plates and shoulder arthroplasty have been reported but none of these methods has been consistently successful. This studyenlightens the functional outcome of management of the fracture of humerus involving the proximal part with PHILOS plate.

MATERIALS & METHODS:

MATERIALS:

This is a prospective study , conducted at Meenakshi Medical College & Hospital, kanchipuram in Department of Orthopaedics on those who were admitted with displaced fracture of Proximal Humerus from July 2021 to August 2022. Before including them in this study, informed consent was obtained from them in the language in which they were well versed , and ethical committee clearance was obtained for the same.

METHODS:

Twenty two patients were admitted with displaced fracture of Proximal Humerus in the department of orthopedics at Meenakshi medical college ,kanchipuram ,involved in this study prospectively based on the following criteria.

Inclusion criteria:

1. Patients with displaced proximal humerus fracture, on basisof Neer's classification.
2. Open and closed fractures of proximal humerus.
3. Failure of conservative treatment.
4. Associated dislocation of shoulder.
5. Patients undergoing revision surgery for failure of otherimplants.
6. Patients who have given consent to this study.

Exclusion criteria

1. Metastatic & pathological fractures
2. Children (0-14 yrs)
3. Undisplaced fractures
4. Those who not will for surgery

ASSESSMENT:

Age, profession and sex of the patient, mode of injury, severity ofthe injury, associated injuries, time since injury and their function demands were noted down. Confirmed with radiographic evaluation including standard & special view. Intra-articular extent of fracture geometry were assessed with thin slice of CT scan in doubtful cases.

RESULTS & ANALYSIS:

Fracture was classified using NEER'S Classification and planned pre-operatively according to it. Patient was treated with analgesics , U- slab till surgery. Co-morbidities were treated accordingly.Intra-operative events, difficulties and complications, post operative radiological evaluations and bony union were noted. Patients were followed up at 2 weeks, 6 weeks, 3, 6 and 12 months with Radiological evaluation ,clinical examination & outcome.
Here are the results of our study below:

Table 1 : Sex Incidence

	Male	**Female**
Number	**16**	**6**
Percentage (%)	**73**	**27**

	Male	**Female**
18-30 yrs	**3**	**-**
31-40 yrs	**2**	**-**
41-50 yrs	**6**	**2**
51-60 yrs	**4**	**3**
61-70 yrs	**1**	**1**
Total	**16**	**6**

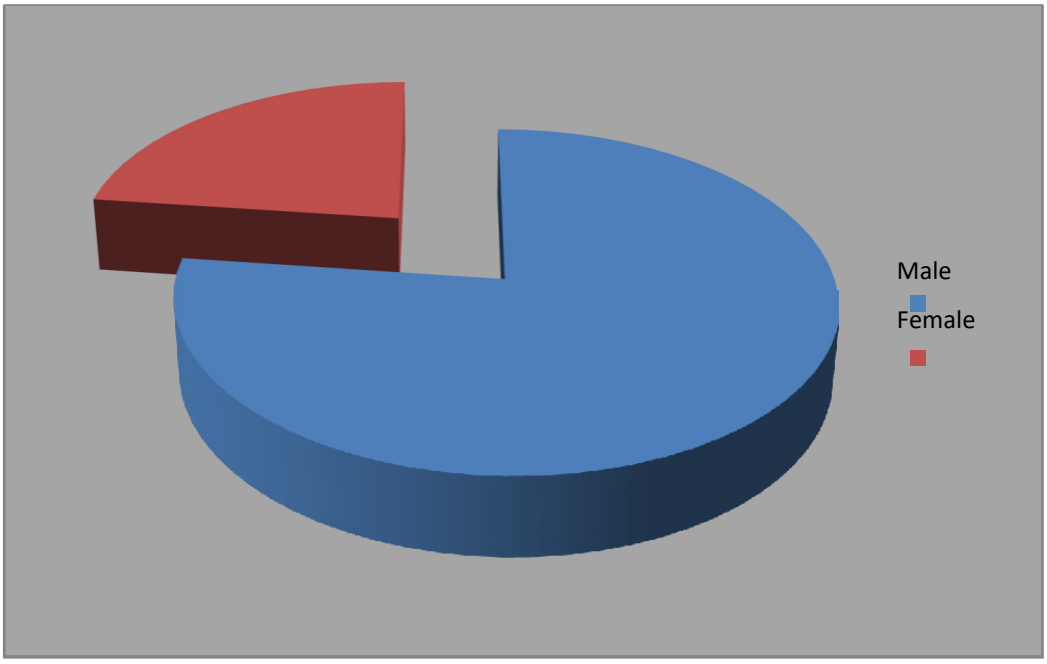
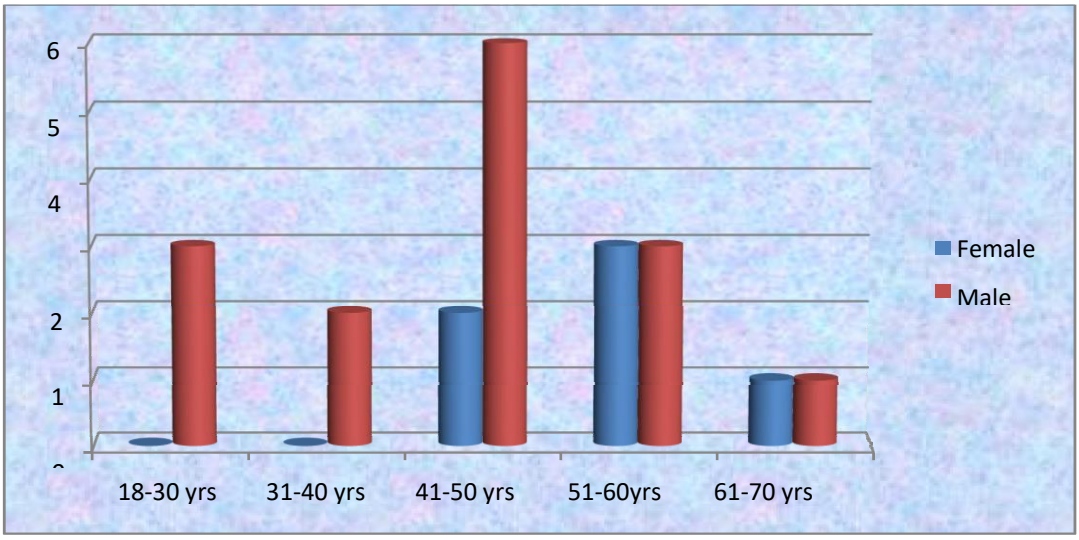
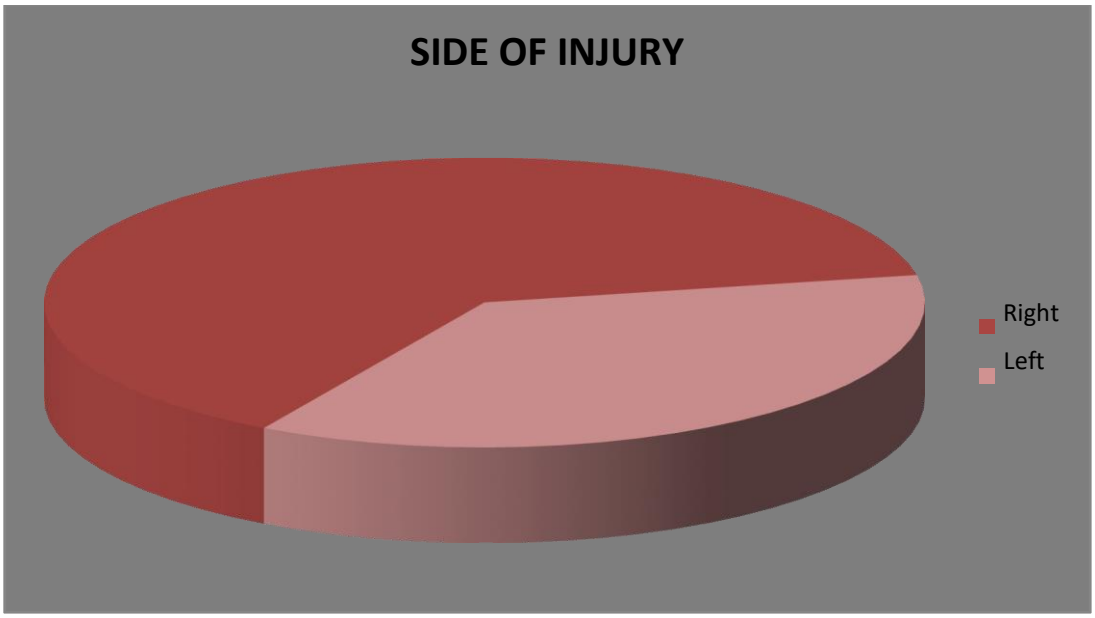
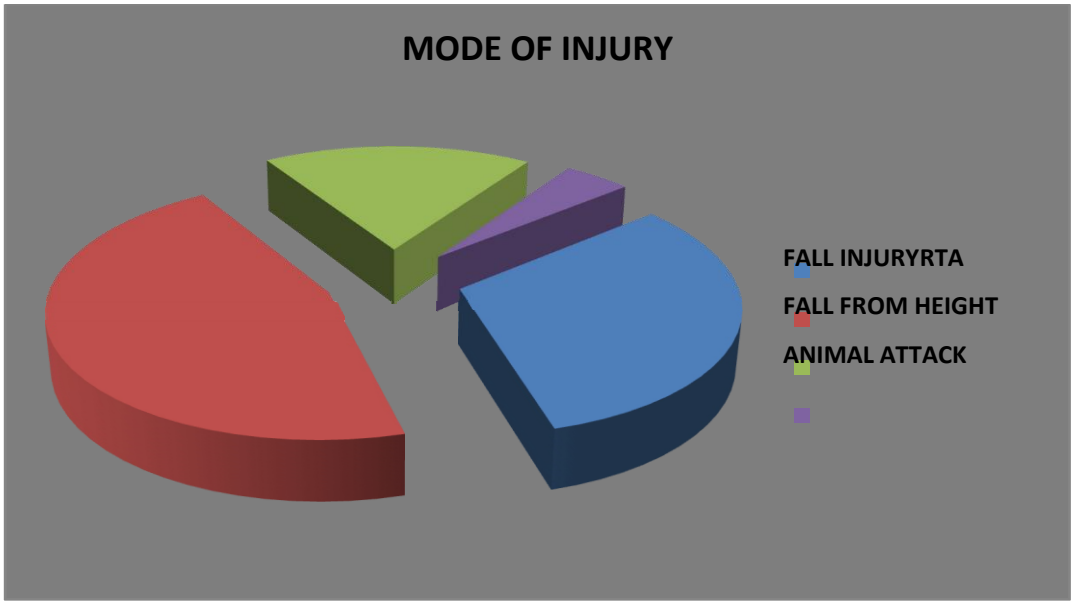


Table 2 : Age Distribution




SIDE OF INJURY
Right
Left

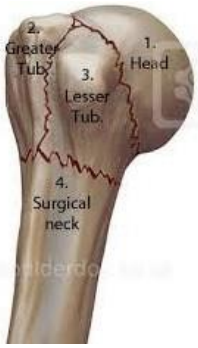

MODE OF INJURY
FALL INJURYRTA
FALL FROM HEIGHT
ANIMAL ATTACK

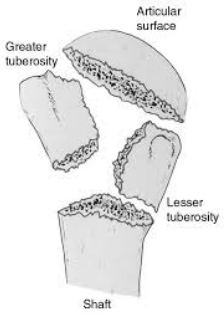
METHODS:

After hemodynamic stabilization, detailed clinical history and clinical examination is undertaken from the patient who have been admitted in department of Orthopaedics & Traumatology, Kanchipuram medical college & hospital.Patients were treated with appropriate analgesic & antibiotics(if necessary) . Then splinted with U-slab and cuff & collar was given. AP, lateral and axillary view radiographs were taken preoperatively. These were reviewed by to determine the Neer's classification of the fracture. In selected cases CT scan / special views were taken in order to know theextent of articular surface involved & processed for surgery(PHILOS platting)

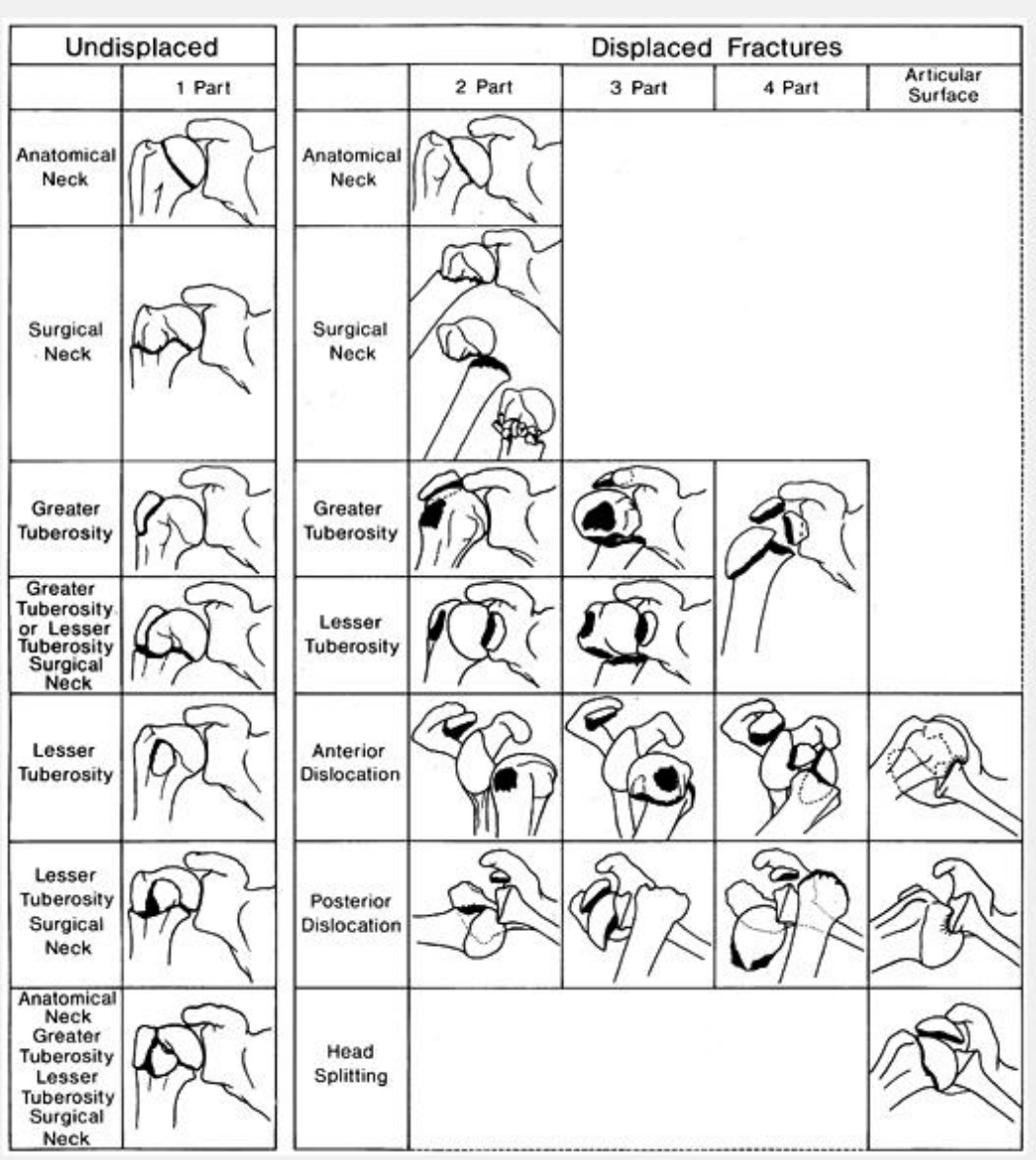
FRACTURE CLASSIFICATION:

The Neer classification system is based on displacement criteria of1 cm or fragment angulation of 45°. The type of fracture then is divided into segments. Four segments are possible, including the articular segment, the lesser tuberosity, the greater tuberosity, and the surgical neck.These four parts are separated by epiphyseal lines (bone growth plates) during the early developmental years. When the proximal humerus is broken, the fracture line predictably occurs along one or more of these planes.More recently, displacement of greater tuberosity more than 5 mm is an indication of fixation.





NEER CLASSIFICATION



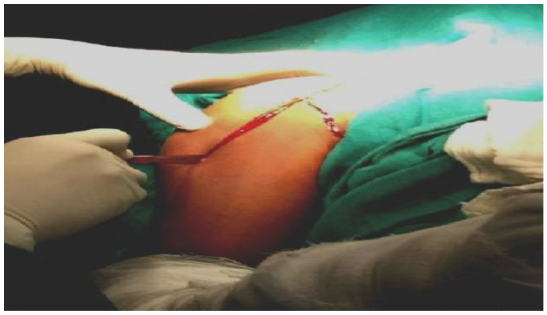
The fracture of all 22 patients were classified using NEER'S Classification. Out of 22 patients, 10 were had Neer's 4 part fracture(one - non union) , 8 were had Neer's 3 part fracture and 4 had Neer's 2 part fracture(3- surgical neck & 1 - greater tuberosity fracture).

Table 3 : Type of Fracture

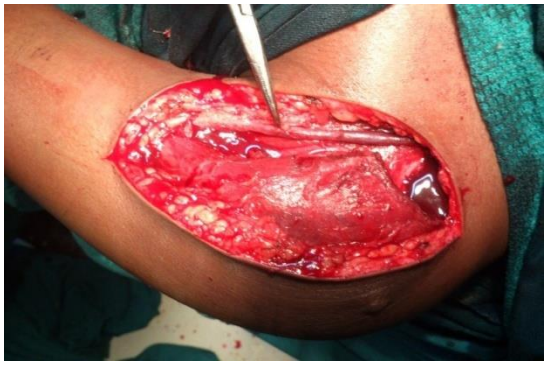
Type of Fracture	Number of Patients
Two part - surgical neck	3

Two part - greater tuberosity	1
Three Part Fracture	8
Four Part Fracture	10

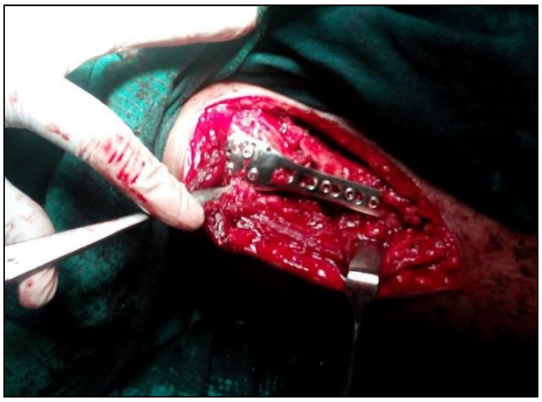
Skin incision for Deltopectoral Approach



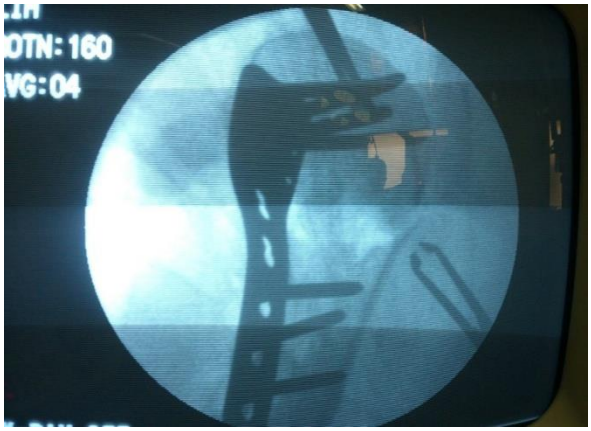
Cephalic vein in deltopectoral groove



Fixed with screws proximally and distally



Final construct with PHILOS plate for proximal humerus fracture



DISCUSSION:

The treatment of complex humeral 3- or 4-part fractures representsa challenge. The surgeon must obtain an exact anatomical reduction and stable fixation, and at the same time minimise the iatrogenic risk of screw penetration and avascular necrosis of humeral head by maximal protection of the periarticular soft tissues.

Poor results in these complex fractures are due to following causes:

1. Inadequate fracture reduction especially medial cortex
2. Unstable fixation
3. Incorrect positioning of the fixation devices .
4. There is consensus in the literature that, regardless of the procedure and the implant chosen, a good functional final result depends mainly on anatomical reduction of the fracture combined with a stable fixation with PHILOS plate and early initiation of functional rehabilitation of the shoulder. But in this study, age of the patient, minimal part of fractures and early fixation of fracture , directly increase the functional outcome.In recent decade, rigid internal fixation of fracture have been increasingly used in the operative care of proximal humeral fractures.Inspite of an early and secure functional postoperative therapy, it was believed that these implant would reduce the risk of secondary reduction loss in osteoporotic patients.In the

very old age group with osteoporosis, functional outcome after conventional plate osteosynthesis was poor.[44] In order to obtain better and reproducible results, the AO/ASIF has developed a special locking compression plate (Philos) for fractures of the proximal humerus.Patients with good bone quality have previously been treated successfully with the conventional plate osteosynthesis.[46]In this study, most of the patients (i.e;14 out of 22) lie in the groupof 41- 60 years , a group highly prone for osteoporosis.In normal conventional plates, the chance of backing out or cuttingout of screws is more.It is difficult to hold the bony fragments as they are highly fragile due to osteoporosis, thereby affecting proper reduction. The normal screws are highly prone for soft tissue dissection, and all these accounts for the high rate of failure in procedures usingconventional plates in an osteoporotic bone.With advent of locking plates, the fraction of backing out or cutting out of screws are reduced due to the locking head and fixed anglepresent in fixed angle screws.Due to multidirectional nature of screws in the locking plate, which spans through sphericity of head and not the centre alone, reduces the failure in fixation and collapse of head of humerus.Suturing of tendons with eyelets of plate is possible in locking plates which reduces the risk in fixation of small fragments of osteoporotic bone which was otherwise hard, and also reduces the possibility of collapse.Soft tissue dissection rates are similar in both conventional and interlocking plates, but with the skills of surgeon and meticulous surgicalprocedures this negativity can be overcome.In bone plate interface, the reduced compression effect of locking plates when compared to conventional plates, play a high role in reducing avascularityof the bony fragments and head of humerus.The average clinical result obtained in our study, with a mean Constant-Murley score of 67.28 points is satisfactory.Comparable studies of internal fixation of Proximal humerus fractures demonstrate similar short term results. Although the follow-up period of our series was short, studies have shown that early function is comparable to final long term outcome. The outcome seems to correlate with fracture severity, anatomic reduction, etiology, bone quality, lengthof time elapsed from injury to surgery, concomitant injuries and the exact positioning and fixation of the implant.[47]

CONCLUSION:

Although our study was relatively short and it was not a randomized controlled study, the results are comparable with other published journals.Accurate anatomical reduction gains and early fracture fixation aremore important than the implant used, to get a good final functional outcome, and this factor is independent from the implant design and procedure selected.The options as to the surgical approach or the type of implant useddepend on the pattern of the fracture, the quality of the bone encountered,the patient's goals and the surgeon's familiarity with the techniques. The learning curve with the implants chosen certainly also plays a role. An adequate surgical technique will minimise complications and an aggressive rehabilitation regime will ensure the best possible result.There is no much difference among 2,3 & 4 parts of fracture with PHILOS plate. All are nearly more or less with good function outcome.In general, 2- and 3-part fractures can be treated with open reduction and internal fixation (a plate with screws is the choice). Four-part fractures in the younger, active patient also can be treated successfully with open reduction and internal fixation.