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Original Research Article

Observational study for the functional outcome of humerus shaft fractures treated with plating versus nailing

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ABSTRACT

Background: Fractures of the humerus diaphysis comprise approximately 3% of all fractures. It's treatment has mainly been conservative in the past but is not well tolerated by the patient now a days. Also, all humerus shaft fractures are not amenable to conservative methods. Operative interventions like dynamic compression plating and intramedullary nailing are associated with better functional outcome. There has been a lot of debate on which of the above two surgical methods is better for management of humeral shaft fractures to ensure better functional outcome and lesser complication rate. Objective were to compare the results of the plating and nailing in the treatment of humerus shaft with reference to A) functional outcome and B) complications and their management.
Methods: All patients with fracture of humeral shaft presenting to the department of orthopaedics, MMIMSR, during the study period and that met our criteria were included in the study. Out of total 30 patients, 15 were randomly selected for intramedullary nailing and 15 for plating. Postoperatively, these patients were followed up for 6 months and relevant data was collected. Time taken for union, post operative complications rate and final functional outcome were then compared in the two groups. Study design was observational study.
Results: It was observed that most of the patient that sustained humeral shaft fractures were 18-40 years of age. Post-operatively, fractures treated by plating united earlier, had lesser complications and significantly better functional outcome compared to nailing.
Conclusions: We concluded that plating is a better method and more acceptable to patients as compare to intramedullary nailing for the treatment of fractures shaft humerus, as it is associated with better functional outcome, earlier union of fracture and lesser complication rate.

Keywords: Diaphysis, Dynamic compression plating, Intramedullary nailing, Complications

INTRODUCTION

Humeral shaft fractures are around 1-3% of all fractures.[1,2] They are treated both operatively and non-operatively. Humerus shaft fractures can occur due to fall from height, direct trauma to arm or shoulder etc. with increase in road side accidents, there is an increase in number of humerus shaft fractures can be treated non-operatively.

Non operative treatment is by the use of hanging cast, functional brace, velpeau dressing, coaptation splint and abduction cast. It requires a long period of immobilisation, which causes shoulder joint stiffness and inconvenience to patients. If there are complications, then surgical treatment is required.

Stabilisation of fractures of humerus by placing a rod in intramedullary canal was introduced by Kuntscher in 1940, Rush in 1950 and Hackethal in 1961.[3]

Kuntscher proposed the slotted elastic nail with classical self-fitting technique. He uses both the proximal and the distal entry to the medullary canal.[6] Rush proposed two elastic rods with three point fixation. He preferred the proximal entrance.[7] Hackethal, used bundle of elastic rods and proffered the proximal approach.[8] But the operative treatment of humeral fractures has been dominated by the plating technique after AO group of Muller, Allgower, Schneider and Willenegger in 1977.[9] The humeral locking nail was propped by Seidel in 1985.[10]

METHODS

This observational study was done on 30 patients admitted under department of orthopaedics of MMIMSR with fracture of the shaft of humerus, from January 2017 to February 2018, treated surgically by plating or intramedullary interlocking nailing. Patients were selected as per inclusion and exclusion criteria. After obtaining a detailed history, a complete systemic and local examination of the patients was done and they were subjected to relevant investigations. Written and informed consent was taken from every patient and their legal guardian before surgical procedures. Patients were randomly divided into two groups consisting of 15 patients in each group. Patients were operated using either intramedullary interlocking nail or plating for fracture stabilisation.

The 15 patients underwent dynamic compression plating and 15 patients underwent interlocking nailing.

Patient selection

The study subjects were selected based on the following inclusion and exclusion criteria.

Inclusion criteria

Humerus shaft fractures which require operative intervention and can be treated with IMN/DCP/LCP. Patients age should be18 years or more. The fractures were of diaphyseal of the humerus. They were fresh fractures included in the study.

Exclusion criteria

If patients age less than 18 years and if the fractures are pathological fractures, if patients can be treated conservatively, if their are fractures of upper and lower end of humerus, If the fractures are open/ compound fractures, if upper fractures with mal-union, non-union or delayed union, if their is serious illness, if the patient is not willing to give consent, if there is polytrauma, if there are segmental fractures were excluded from the study.

Investigations

After proper patient selection according to inclusion and exclusion criteria, investigations were done including X-rays, routine blood investigations for pre anaesthetic check-up and clearance for surgery.

Preoperative preparation

Preoperative preparation was done after relevant investigations and obtaining written and informed consent.

Patients were immunised against tetanus. Local preparation of the part was done by shaving and appropriate broad-spectrum antibiotics was given preoperatively and postoperatively.

Intraoperative considerations

Choice of nails: universal humeral nail available in diameters ranging from 6 to 8 mm were used. Six mm nail is usually solid while 7- and 8-mm nails are cannulated. These have double proximal locking hole in medio-lateral plane and two distal locking holes in antero-posterior plane. All are made up of 316L stainless steel).

Operative technique: intramedullary nailing

Patients position and preparation

With the patient supine, the head was turned to the collateral side to increase the exposure of shoulder and a sand bag placed below the scapula to raise the shoulder off the table. Proper cleaning and draping were done.

Approach and entry portal

A longitudinal incision was made from the most lateral part of acromion and extended distally, cantered over tip of greater tube Rosita. The fascia of deltoid was then incised in the line of skin incision. Care was taken not to extend the incision more than 4-5 cm in deltoid muscle to avoid injury to extend the incision more than 4-5 cm in deltoid muscle to avoid injury to the axillary nerve. Using a small Kuntscher diamond shaped awl, entry portal was established just medial to the tip of greater tuberosity and was confirmed with the image intensifier. The awl was gently advances into the medullary canal by gentle hammering.

Guide wire insertion

The awl removed and a guide wire inserted through the entry portal up to the distal end of proximal fracture fragment. Reduction was then bony by closed means under C-arm guidance and guide wire was advanced into the distal fracture fragment up to the distal humeral shaft. Position of the guide wire was checked under C-arm in

both AP/Lat planes. Next, reaming of the canal was done by cannulated reamers starting from 6 mm reamer and advancing gradually by 0.5 mm.

Nail insertion

Appropriately sized nail was determined by measuring with another guide wire of same length and the nail diameter was 1 mm smaller to the last reamer used. It was attached to the jig with the conical bolt in such a way that bend of the nail pointed medially. The nail was then inserted into entry portal and gently hammered up to the fracture site and then up to 1 to 2 cm proximal to the olecranon fossa to avoid supracondylar fracture. The alignment and rotation of the fracture site was checked under C-arm. The nail was hammered into the head so that proximal end of the nail was beneath the bone to avoid subacromial impingement.

Proximal and distal interlocking

For proximal interlocking proximal aiming device was used. For distal interlocking we used free hand technique using C-arm. The wound was irrigated with adequate amount of normal saline and closed layer by layer. A bulky dressing with cuff and collar was given to the patient for initial 2 to 3 days.

Operative technique: DCP / LCP with combi holes

Patient positioning and preparation

With the patient supine, the arm was placed on the arm board rest, abducted 45-60 degrees. Proper cleaning and draping was done.

Approach

In my study, all the patients who were treated with open reduction and internal fixation with plates and screws, the fracture was opened through anterolateral and posterior approach, depending upon the fracture.

Anterolateral approach

Skin incision was given in line with the anterior border of deltoid from a point midway between its origin and insertion, distally to the level of its insertion and proceeded in line with the lateral border of the biceps muscle to within 7.5 cm of the elbow joint.

Superficial and deep fasciae were divided. In proximal part of the wound, deltoid was retreated laterally and the biceps medially to expose the shaft of humerus. Distal to the insertion of the deltoid, brachialis muscle was exposed, split longitudinally to the bone and then retreated subperiosteally, the lateral half to the lateral side and medial half to the medial. The lateral half of the brachialis muscle protects the radial nerve as it winds around the shaft of the humerus.

Posterior approach

Patient was put in a decubitus position. Skin incision off around 15-18 cm length over the posterior aspect of the arm was given. Incision was then extended distally to a point midway between the lateral epicondyle of the humerus and the tip of olecranon, 4cm distal to the elbow joint. The proximal portion of the incision was located 4 cm posterior to the lateral intermuscular septum.

Triceps fascia was excised longitudinally a few millimetres posterior to the inter muscular septum. Triceps muscle was then separated followed by incision of fascia along the lateral edge of the anconeus and extended 4cm distal to the lateral epicondyle. Anconeous muscle and fascia were retracted. Posterior antebrachial cutaneous nerve was identified and protected and radial nerve was retracted anteriorly, followed by retroaction of the triceps muscle medially to expose the posterior humeral shaft.

Once the bone was exposed, reduction at fracture site was done. LCP with combi holes plate was placed over fracture site and screws were placed. Due to large rotational forces placed on humerus, LCP with combi holes was used. Broad plate allows better rotational stability and 8 cortices allows more rotational stability than 6. Selection of the plate size was done according to the fracture type.

Implant choice

The most commonly used plate for fixation of humeral shaft was the broad, 4.5 mm, limited contact dynamic compression plate. Occasionally, a narrow, 4.4 mm, limited contact DCP was also used for smaller bones.

Postoperative planning

All the cases were given I/V broad spectrum antibiotics and were continued for 5 days postoperatively after which patient was switched to oral antibiotics. Analgesics if required were also given.

Operated limb were protected with a sling. Physiotherapy was started after 1 Post operative day. But resistance and rotational forces were allowed after 2 weeks from the date of surgery.

Follow up

Follow was scheduled at interval of 2 weeks, 1 month, 3 months and 6 months.

X-rays were done assessed clinically and radiologically. By the presence of bridging callus on both radio graphic views-AP/ lateral views as well as the fracture was said to be united.

Table 1: Functional outcome was evaluated under Rodriguez-Merchan criteria.

Rating	Elbow range of motion	Shoulder range of motion	Pain	Disability
Excellent	Extension in 5 degrees Flexion in 130 degrees	Full range of motion	None	None
Good	Extension in 15 degrees Flexion in 120 degrees	<10% loss of total range of motion	Occasional	Medium
Fair	Extension in 30 degrees Flexion in 110 degrees	10-30% degree loss of total range of motion	With activity	Moderate
Poor	Extension in 40 degrees Flexion in 90 degrees	>30% loss of total range of motion	Variable	Severe

RESULTS

A total of 30 patients were included and studied according to the previously stated method and following observations were made.

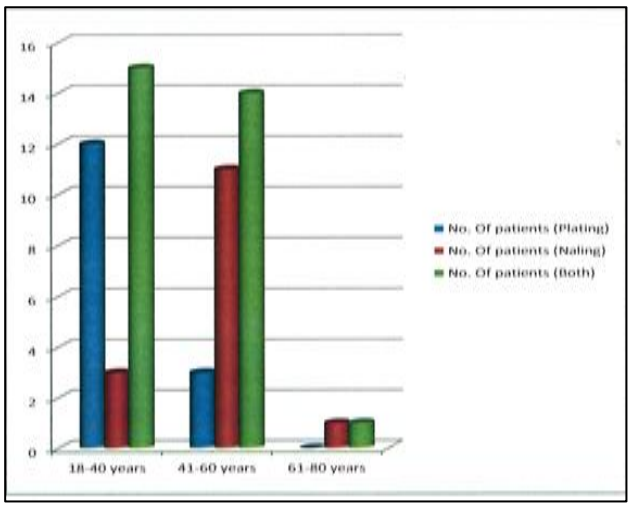

Figure 1: Age-wise distribution of patients.

Inference was that patients treated with both intramedullary nailing and plating was either maximum or equal.

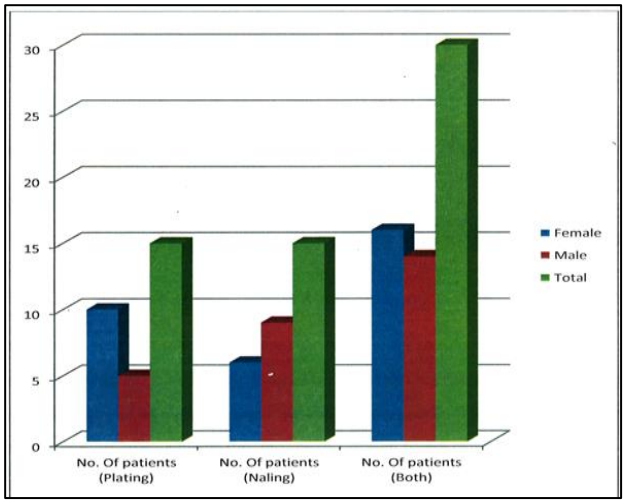

Figure 2: Gender wise distribution of patients.

The inference was that in plating, the number of female patients was more. In nailing, the number of female patients was less. In both nailing and plating, the number of female patients was more.

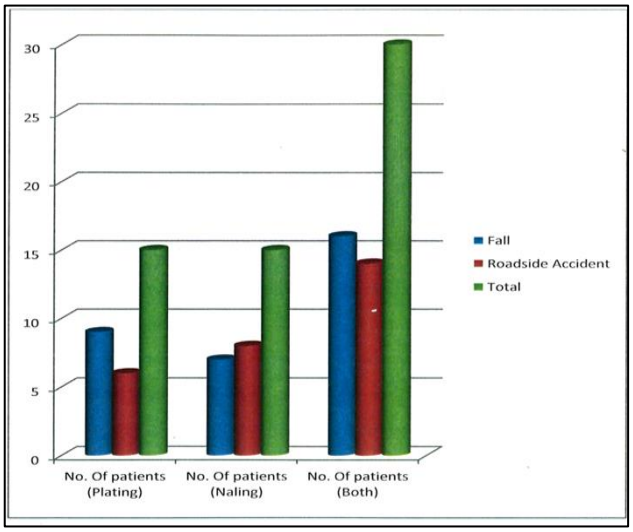

Figure 3: Distribution of mode of injury in patients.

The inference was that in patients with fall from height the plating was more successful. In patients with roadside side accidents nailing was more successful. In fall from height number of patients treated with plating was more.

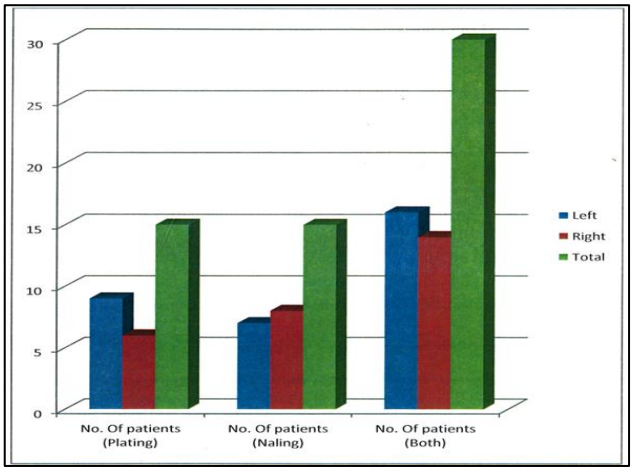

Figure 4: Distribution of side of the limb involved.

The inference was that number of patients treated with plating was more on the left side. The number of patients treated with nailing was more on the right side. The number of patients treated with both nailing and plating was more on left side.

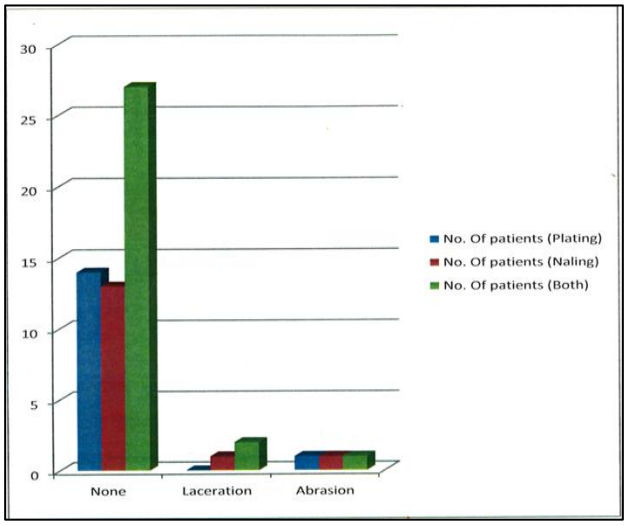

Figure 5: Distribution of associated injuries among patients.

Inference was that the number of patients with no laceration or abrasion was treated more with plating. The number of patients with laceration was more treated with nailing. The number of patients with abrasion were treated equally with plating and nailing.

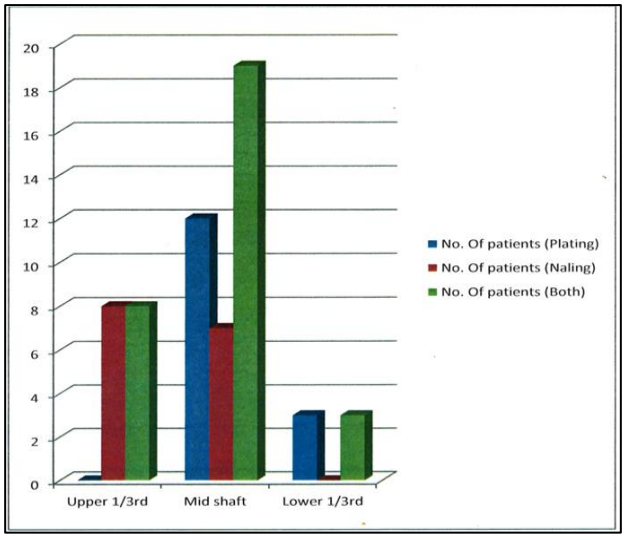

Figure 6: Distribution of patients according to the level of fracture.

Inference was that the number of patients with upper 1/3rd of humerus Fracture was treated more with nailing. The number of patients with mid shaft of humerus fracture was treated more with plating. The number of patients with lower 1/3rd of humerus Fracture was treated more with plating.

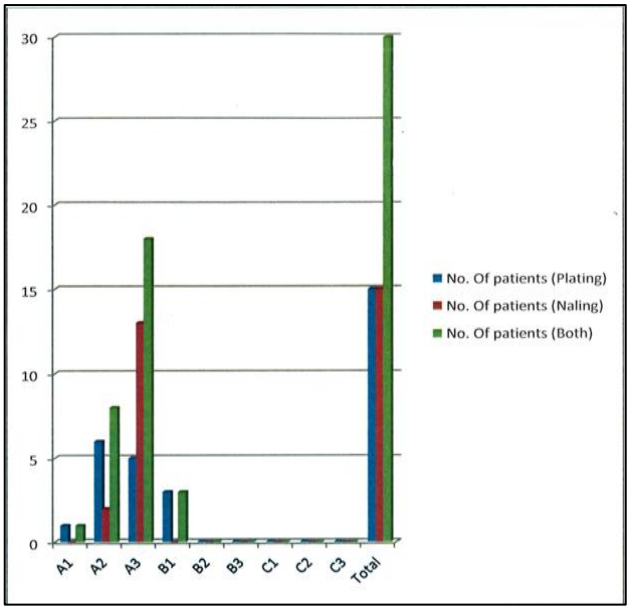

Figure 7: Incidence of the fractures according to the AO classification.

Inference was that the patients with extra articular Fracture were treated more with plating. The patients with partial articular Fracture were treated more with plating. The patients with complete articular Fracture were treated equally with plating and nailing.

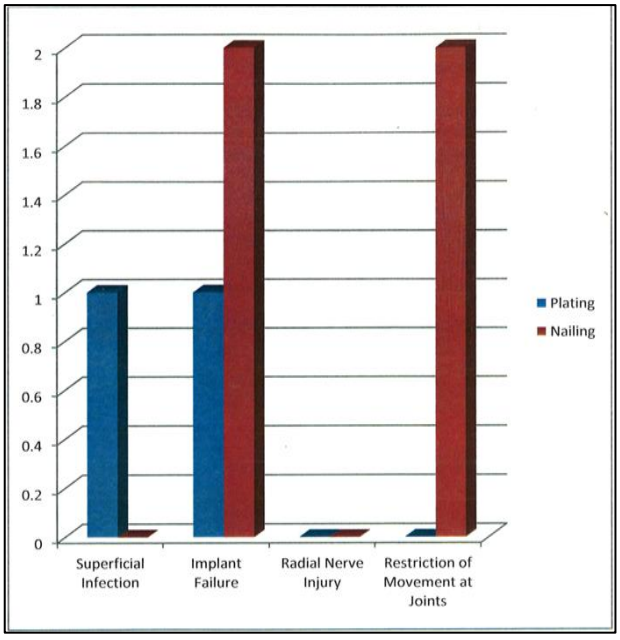

Figure 8: Incidence of post-operative complications-plating vs. nailing.

Inference was that superficial infection was more in patient treated with plating. Implant failure was more in patients treated with nailing. Radial nerve injury either was not present or equal in both plating and nailing. Restrictions of movement at joint were more in patients treated with nailing.

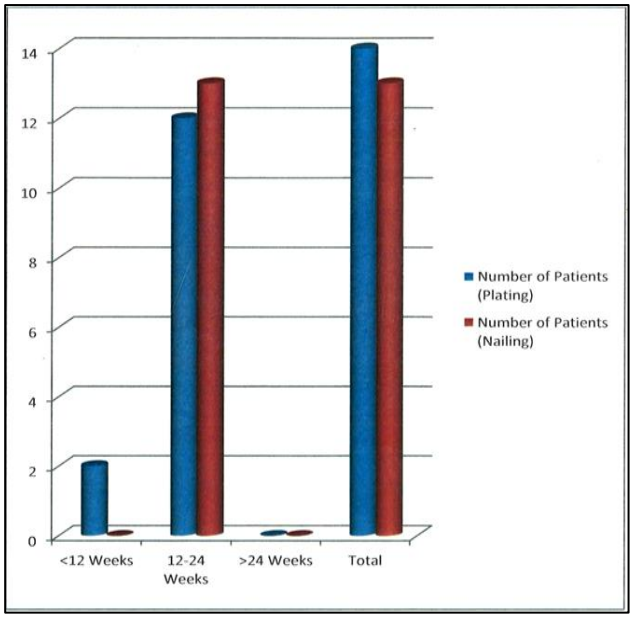

Figure 9: Distribution of patients according to time taken for union radiologically.

Inference was that up to 12 weeks' time taken for union radiologically, number of patients treated with plating were more. Between 12-24 weeks taken for union radiologically, number of patients treated with nailing were more. Time taken for union radiologically, number of patients treated with plating nailing same up to 24 weeks.

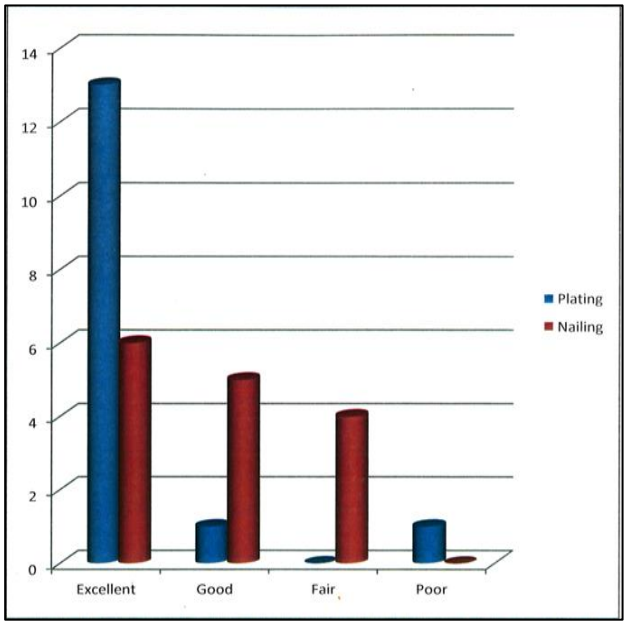

Figure 10: Comparison of final functional outcome-plating vs. nailing.

DISCUSSION

Fractures of the humerus shaft are common and result in significant burden to society.[8] In cases of fracture shaft humerus, although good healing is usually achieved with conservative treatment, surgical treatment attains better functional result. Conservative treatment for humeral shaft fractures can lead to serious complications.[9] It is associated with significant morbidity and complications have included non-union, as high as 20% in some studies, mal-union and persistent radial nerve deficits.[10-13] Operative treatment may also be considered to avoid complications like shoulder stiffness, elbow stiffness, rotational deformity, delayed union, mal-union, non-union and long hospital stay. Therefore, surgical treatment plays an important role.

Because the gleno-humeral joint has an exceptional range of motion in many planes, deformity is well tolerated after union. Acceptable fracture alignment, which is the guide to continued conservative management, includes 20 degrees of anterior bowing, 30 degrees of varus angulation, 15 degrees of mal-rotation, and 3 cm of shortening or bayonet apposition.[15]

Surgeon experience and newer studies assessing functional outcomes in non-operative patients have challenged the belief that humeral shaft fractures uniformly do well without surgery. Studies have noted permanent loss of motion and elevated rates of non-union with non-surgical management.[14]

In the past, humeral plating has been the predominant mode of fixation due to its various advantages over nailing mentioned below. Also, there is substantial variability in plating that allows the surgeon to modify the construct to the personality of the patient and fracture. Simple fractures are best treated with compression plates, comminuted fractures are often bridge plated, and osteopenic or torsionally unstable fractures are candidates for locked or hybrid plate fixation.[26]

Intramedullary nailing has a long and interesting history that dates back, at least, to the 16th century. Modern intramedullary techniques were developed by Kuntscher in Germany during the 1940s and were originally met with much skepticism. Despite these early doubters, intramedullary nailing has become the standard of care for the treatment of humeral shaft fractures that require operative stabilization.[18]

Fixation of humerus shaft fracture can be achieved surgically by compression plate and screws, by interlocking intramedullary nail.

The advantages of plating are reliability of union rate, lower re-operation rate, avoidance of adjacent joint discomfort, excellent reduction and fixation, there is possibility of substantial variability in the procedure.

Disadvantages of plating are there is increased risk of non-union because of periosteal stripping or inadequate fixation, there is requirement of wide dissection, violation of fracture hematoma takes places, high incidence of

iatrogenic radial nerve palsy, there are higher chances of infection, adjacent joint discomfort.

Intramedullary nailing is presently the preferred mode of treatment for certain special situations like pathological fractures, diaphyseal segmental fractures, associated soft tissue injury and injury in an osteopenic bone. Antegrade Nailing is done with rigid interlocking nail inserted through the rotator cuff. Retrograde Nailing with an interlocking nail is suitable for middle third fractures of shaft humerus.

The advantages of nailing are it requires minimal dissection, smaller incision is made, there are less chances of infection, there is no damage of soft tissue around fracture, there is no drainage of hematoma which promotes healing of fracture.

The disadvantages of nailing are, there are higher rate of non-union and re-operation, adjacent joint stiffness and adjacent joint pain occur, it can distract the fracture which inhibits union, it can cause rotator cuff problems.

Accepted indications for surgical management of humerus shaft fractures are: If there are segmental fracture, if there are pathological fracture, if there are fracture associated with major vascular injuries, if there are unsatisfactory alignment or reduction by non-operative methods, if there are associated injuries in the extremity requiring early mobilization, if there are polytrauma, if there are humeral fractures with radial nerve palsy viii. floating elbow.

A meta-analysis that previously favored plating over nailing was recently updated and noted equivalent outcomes in rates of nonunion, infection, nerve palsy, reoperation, and total complications between humeral plating and nailing.[27] Lately, it has been accepted that implant selection should ultimately be based on patient factors, fracture personality, associated injuries, and surgeon preference.[21] Patients should be counselled about iatrogenic radial nerve palsy with plates and rotational mal-alignment and adjacent joint pain with intramedullary nails.[28,29]

On the basis of observations previously made, we are discussing our results and comparing them with previous similar studies.

Age

Age of patients included in our study ranged from 23-68 years. Majority (50%) of the patients were in the age group of 18-40 years. This group represents the earning section of the society who spend more time outdoors and are involved with more physical activity, or are active in household work. The mean age of patients that underwent plating was 33.73+6.78 years and of patients that underwent nailing was 46.60+8.59 years. Plating was done mostly (80%) in younger patients (18-40 years), as compared to nailing, which was done mostly (73.33%) in slightly older age group (41-60 years). Hence, the plating group in our study was significantly younger than the nailing group.

Motwani et al conducted a comparative study of humerus shaft fractures treated with plating vs nailing. In their study, mean age of the patients in the two groups was not significantly different.[13]

Choudhary et al performed an analytical study of different modalities of treatment in humeral shaft fractures. They found significant difference in the mean age of two groups. It was 29.64+2.4 years in the nailing group and 42.26+6.8 years in the plating group. As opposed to our study, they observed that plating group was significantly older than the nailing group.[11]

In a similar study conducted by Kumar et al more than 60% of the patients were 21-50 years of age, with 22% of them being between 21-30 years.[14]

Wali et al did a similar study and reported no significant difference in the mean age of the two groups.[12]

Tsai et al reported the peak incidence of humeral shaft fractures in the third decade.[16]

In another similar study done by Benegas et al the age of patients in nailing group ranged from 19-75 years, and in plating group, from 19-71 years. The averages for age did not show any significant differences.[8]

Gender

In our study, females accounted for 53.33% of all patients of fracture shaft humerus. Female:male ratio in the plating group was 2:1 and in the nailing group, it was 2:3.

In a similar study by Singisetti et al males accounted for 77% of all patients.[10]

In a study conducted by Wali et al nailing group comprised of 21 male and 4 female patients and plating group comprised of 20 males and 5 female patients.[12]

Choudhary et al found that nailing was applied mostly in male patients (82.6%) and but not so in plating (46.4%).[11]

Hence, in most studies, mostly male patients suffered from Humerus shaft fractures as a result of more outdoor activities, hence, more chances of roadside accidents and more work-related injuries. However, in our study, the ratio of females was slightly higher than males.

Females mostly have the risk of injury due to fall while doing domestic work or fall from stairs. The other major cause that contributes towards humerus fractures is osteoporosis in females.

Mode of injury

Overall, more than half of the patients in our study sustained injury due to fall (53.33%). Plating was done in most of the cases of fall, whereas, nailing was done in most of the roadside accident cases.

Road traffic accidents accounted for about 85% of the fractures followed by other causes in the study conducted by Singisetti et al.[10]

Similarly, road traffic accident was the most common mode of injury in majority of patients in both groups as reported by Wali et al and by Kumar.[12,14]

Higher number of patients sustaining injury due to fall in our study as compared to other similar studies may be accounted for by higher number of female patients in our study as they are less commonly involved in road traffic accidents are more commonly suffer injury by fall, due to domestic nature of their work.

Laterality

In our study, left upper limb (53.33%) was involved in slightly more number of cases as compared to right upper limb (46.66%).

No obvious side predilection was noted by the Singisetti et al.[10]

Out of the 30 patients included by Choudhary et al 18 patients had right humerus fracture whereas, 12 patients had left humerus fractures.[11]

Associated injuries

We found that 90% of the patients had no associated injury in our study. Incidence of associated injuries in our study was 10%, laceration in two patients and abrasion in one patient.

The 11.11% of the total cases of fracture shaft humerus included in the study by Singisetti et al had associated injury, mainly preoperative radial nerve palsy.[10]

In another study by Moradiya et al associated radial nerve palsy was present in 13.33% of the patients after the injury.[15]

The 16% patients had associated injuries in the nailing group as well as the plating group in a study conducted by Khan et al. [9]

The incidence of associated radial nerve injury was 26.7% as observed by Ricci et al in their study of fracture shaft humerus and showed to be slightly higher than the values previously described in the literature (11% to 18%).[27]

Unlike other studies, we had lesser incidence of associated injuries as we excluded the cases of polytrauma and open fractures while selecting study patients.

Level of fracture

Majority of the patients (63.33%) in our study suffered fractures in the mid shaft of the humerus, followed by upper 1/3rd of the humerus (26.67%).

The 64% of the cases in the study conducted by Singisetti et al involved the middle third of humeral shaft. [10]

Wali et al reported that majority of the fractures in both the groups, i.e., nailing as well as plating, were in the middle third of the shaft of humerus. The next commonly involved level in plating group was distal third (24%) of shaft, compared with nailing group, where next commonly involved level was proximal third (24%) of shaft. [12]

In a comparative study by Motwani et al the distribution of fractures at various levels in the two groups, nailing vs plating, were not statistically significant.[13]

Incidence of the fractures according to the AO classification

The 60% of the total number of patients in our study were in A3 category, whereas, 26.66% were in A2 category and 10% were in B1 category. Majority (86.67%) of the patients treated by nailing belonged to A3 category.

In a study conducted by Singisetti et al, all of the fractures could be grouped as A3 and B2 of AO classification.[10]

In the nailing group of a study done by Wali et al 64% patients had AO type A fracture, 24 % had AO type B and 12% patients had AO type C fracture. The pattern was similar in plating group with 68% patients having type A, 24 % patients had type B and 8% patients had type C fracture.[12]

Post-operative complications

Incidence of postoperative complications in our study was 20%. Among the two groups, the number of post-operative complications in nailing cases (26.66%) was double that of plating (13.33%). Two cases of nailing (13.33%) developed shoulder stiffness and two cases (13.33%) had migration of screw. Superficial infection was seen in one case and breakage of plate was seen in one case of plating.

In the study conducted by Singisetti et al post-operative radial nerve palsy was not seen in the nailing group but was present in one case in the plating group (6.25%). There was one case of deep infection each in the plating

(6.25%) and the nailing groups (5%) The nailing patient with infection was left with severe adhesive capsulitis and an overall poor result. [10]

In a similar study by Wali et al three patients in nailing group and two in plating group had delayed union and united between 4 and 6 months. Two patients in nailing group (8 %) and two patients (8 %) in the plating group did not show signs of union till 6 months. One patient in nailing group had iatrogenic comminution at the fracture site with distraction at the fracture site. [12]

Choudhary et al showed no obvious complication except one patient (3.33%) in the plating group with wound leakage in 2nd week. [11]

Post operative complications in the study conducted by Motwani et al included two wound infections in the plating group but no wound infection in the nailing group. One patient of plating developed postoperative radial nerve palsy.[13]

The major complication that was observed by Kumar in the plating group was shoulder stiffness which was observed in 16.3% of the cases while in the nailing group, it was only 4.7%. An infection contributed to 11.6% of the complications on the plating group but was only 4.7% in the nailing group. [14]

Breakage of plate in one case in our study was managed by removal of plate followed by intramedullary interlocking nailing. One case of superficial infection in the plating group was managed by regular dressing and intravenous antibiotics. It recovered within eight days of starting treatment. Physiotherapy and NSAIDs were started in two cases of shoulder stiffness in the nailing group which led to gradual improvement in range of movements. Screw migration in two cases in the nailing group was managed by removal of screw and nail followed by plating with bone graft.

Time taken for union (Radiologically)

The 76.66% of the fractures included in our study united between 12-24 weeks following surgical intervention. 14.29% of the patients in the plating group had union in less than 12 weeks. 85.71% of the patients in plating group and all of the patients in the nailing group had union between 12-24 weeks. Union did not occur in three patients out of which one patient is of breakage of plate and rest two had screw migration. These patients were managed as stated in the paragraph above.

In the study done by Singisetti et al 50% of nailing patients and 75% of plating patients showed evidence of union on or before 16 weeks (31). There was no significant difference in bone union time starting between plating and nailing procedures in the study of Choudhary et al.[11]

Motwani et al did not find any significant difference between radiological evidence of union at 6, 12 and 18 weeks, but plating group showed better radiological evidence of union at 24 weeks. There was implant failure in one patient.[13]

The union of bones in study of Kumar et al took on an average 12.2 weeks by plating and 9.9 week by nailing.[14]

Final functional outcome

The 80% of the plating patients had excellent functional outcome as compared to 46.66% of the nailing patients i.e., the incidence of excellent functional outcome is almost double in cases of plating as compared to nailing.

The functional outcome was significantly better in the plating group as compared to the nailing group, as observed by Singisetti et al.[10]

There was no statistically significant difference in post-operative results in the study of Choudhary et al.[11]

Motwani et al reported significantly better functional outcome in the nailing group as compared to plating group.[13]

Limitations

Complications associated with plating are superficial infections and delayed wound healing. Another problem associated with plating with direct or indirect reduction was implant irritation, which usually prompted removal of the instrumentation and the need for a secondary procedure.

CONCLUSION

Surgical management of fractures of humeral shaft consist mainly of DCP/LCP and IMN. In our study, we made a comparison of patients of fracture shaft humerus managed by either of the two methods.

We studied 30 patients with fracture shaft of humerus that visited our hospital during the study period and were managed surgically by either nailing or plating, after proper case selection according to inclusion and exclusion criteria and after obtaining informed, written consent. We then studied various characteristics of the two study groups i.e., patients that were managed by nailing and that were managed by plating. Besides demographic details and general characteristics of the fractures, the two groups were then compared in relation to time taken for union after surgery, post-operative complications and functional outcome after surgery.

Most of the patients that sustained fracture shaft humerus were in the age group of 18-40 years. Age group of patients that underwent nailing was significantly more

than patients that underwent plating. There was no significant gender predilection.

As regards to mode of injury, again there was no significant difference between patients that suffered injury due to road traffic accidents and that suffered injury due to fall. Also, there was no preference for side of injury.

The 90% of the patients in our study had no associated injury. Most common level of humerus affected in fracture was mid shaft followed by upper 1/3rd and lastly lower l/3rd. 90% of the total fractures were of AO classification category A with most of them being in subcategory A3. There was no significant difference in the two study groups.

Overall, we had a post-operative complication rate of 20%, out of which 2/3rd were in patients with nailing and 1/3rd were in patients with plating. There was no significant difference in the time taken for union in the two groups, although cases with plating united comparatively earlier as compared to cases with plating.

We observed that the final functional outcome was significantly better in cases with plating as compared to cases with nailing.

To summarise, according to our study, plating is a better surgical intervention for management of uncomplicated, closed fractures of shaft humerus as they are associated with better functional outcome, earlier union of fracture and less rate of complications as compared to nailing.

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