Surgical Treatment of Proximal Humeral Fractures in Late Adolescence and Young Adults

EHAB NEGM, M.D.; NASER OSMAN, M.D. and ADEL EL ADAWY, M.D.

The Department of Orthopedic Surgery,
Faculties of Medicine, Cairo and Banha Universities.
Surgical Treatment of Proximal Humeral Fractures in Late Adolescence and Young Adults

EHAB NEGM, M.D.; NASER OSMAN, M.D. and ADEL EL ADAWY, M.D.

The Department of Orthopedic Surgery, Faculties of Medicine, Cairo and Benha Universities.

Abstract

Open reduction and internal fixation for 30 cases of displaced proximal humeral fractures and fracture dislocation was done from the period of 1991 to 1994. Two cases were lost for follow up and 28 cases were included in the study. We chose certain age group which is late adolescence and young adults because we felt that this is the most active age in which the person needs free mobility and power from his shoulder. Most of the cases were displaced surgical neck fractures (26 cases). An AO T buttress plate was used in (25 cases) the mean follow up period is one year (range from 6 months & 2 years). The results were evaluated subjectively using the scoring system of Neer [6]. Overall results were excellent or satisfactory in 83% of cases. The complications encountered was malunion in one case (3.6%), deep infection one case (3.6%), bicipital tendinitis, two cases (7.1%), pain and limitation of movements in various degrees in 20 cases (71.4%) which were included in the satisfactory and the unsatisfactory group. There were no cases of non-union or avascular necrosis.

Introduction

IN the majority of cases with proximal humeral fractures (PHF), satisfactory function can be expected following non-operative management [1,2,3,4].

About 20 percent of (P.H.F.) are classified as displaced [5] according to Neer [6] and the treatment of these is still disputed.

Closed methods were advocated by some [4,7,8], while others prefer open reduction and internal fixation.

There is no consensus to treat these complicated fractures of the proximal humerus. Various methods of internal fixation using wires and screws [6], plates [9], blade plates [10], external fixators [11], T plates [12] and flexible intramdullary pins [13]. Percutaneous pinning [14,15,16], were advocated. However most surgeons agree that for full functional recovery, anatomical reduction, stable fixation and early mobilization are required.

Classifications:

Neer [6], proposed a four parts classification for proximal humeral fractures. His classification is based on the number of displaced (over 1 cm displacement or angulated more than 45 degrees) segments rather than the number of fracture lines. He observed that upper humeral fractures oc-
curred between one or all of the four major segments: (1) The articular segment or the anatomic neck (2) the greater tuberosity (3) the lesser tuberosity (4) the shaft or surgical neck. Fractures without displacement regardless of the number of fracture lines or the anatomic structures involved are essentially one part fractures and can be treated with sling support and gradual exercises.

The AO group have a slightly different classification:

Type A: Extra-articular fractures with one fragment (tubercle or metaphyseal).

Type B: Extra-articular fractures with two or three fragments (both tubercles and metaphyseal).

Type C: Intra-articular fractures involving the anatomical neck (Fig. 2) [17].

Material and Methods

Thirty patients with displaced proximal humeral fractures were treated in Cairo University Hospital and Banha University Hospital from the period of 1991 to 1994. Two cases were lost for follow up and 28 cases were included in the study.

Two-part fractures and fractures dislocations involving only the greater tuberosity were not included in this study since they were managed differently by a tension band technique.

Twenty cases were males (71.4%) and eight cases were females (28.6%). Left and right arms were almost equally involved.

The mean age is 30 years (range from 16 to 40 years)

The cause of injury in 60% was road traffic accidents and 40% was due to fall from a height on outstretched hand.

The fractures were classified according to Neer's classification [6] (Table 1)

<table>
<thead>
<tr>
<th>No. of cases</th>
<th>Type of fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Two parts fracture, displaced surgical neck</td>
</tr>
<tr>
<td>1</td>
<td>Three parts fracture, greater tuberosity and surgical neck</td>
</tr>
<tr>
<td>1</td>
<td>Three parts fracture dislocation, lesser tuberosity &amp; surgical neck</td>
</tr>
</tbody>
</table>

Table (1)

Our indications of surgery were:

(1) Unstable displaced two parts or three parts fractures and fracture dislocations with inability to obtain or maintain an acceptable closed reduction.

(2) Open fractures (3) Fractures associated with vascular injury (4) Multiple trauma patients-Twenty six fractures (92.9%) were closed and two cases (7.1%) were compound from within. The mean delay between injury and operation is 1.5 days (range from 6 hours and 4 days).

The approach used in all the cases is deltopectoral or anteromedial approach to the shoulder which may be extended by detaching the deltoid muscle from the clavicle and the acromion [18].

The obstacle to closed reduction in some of the cases was button holing of the shaft fragment through the anterior capsule and the fibres of subscapularis and in other cases it was the long hand of biceps impinging between the two fragments that prevent closed reduction.

In most of our cases of displaced two parts and three parts fractures and fracture dislocations an AO T plate was used (Twenty six cases 92.9%) and in one case
Proximal Humeral Fractures Treatment

(1) any were:
aced two parts or
part fracture disloca-
ted and maintain

in all the cases is
ed reduction in
s fracture disloca-

of displaced two
tures and fracture
plate was used
and in one case

of displaced two parts surgical neck frac-
ture where two interfragmentary screws in
a coronal fashion fracture in a late adoles-
cent 18 years male was considered enough
and stable fixation. And in another case of
16 years old with a low surgical neck frac-
ture, a small 5 holes DCP plate was used for
fixation.

In all the cases in which AOT plate was
used, it was applied lateral to the tendon of
long head of biceps and special care was
taken to ensure that the upper end of the
plate did not impinge on the humerus when
the arm was abducted.

AO 6.5 mm cancellous screws were
used in the cancellous bone proximally and
4.5 mm cortical screws for fixation of
more distal fragments. An interfragmentary
lag screw was inserted through the plate
whenever possible to improve fixation.

In every case intraoperative examina-
tion of the rotator cuff was done and any
tear was meticulously repaired.

The wound was closed over suction
drain and postoperatively the arm was
wrapped in a Velpeau bandage. Exercises
of the shoulder were started few days after
the operation and gradually increased.

Results

The mean follow up period is one year
(range from 6 months to two years).

All the cases were evaluated clinically
and radiologically.

The results were evaluated subjectively
using the scoring system of Neer [6], which
employs a maximum of 100 units distribut-
ed as follows: pain 35, function 30, range
of motion 25 and anatomy 10. An excellent
score is 90% or more, satisfactory 80%,
unsatisfactory 70-79 and failure score less
than 70 units (Fig. 3). An analysis of our
results is shown in Table (2). Overall re-

Table (2)

<table>
<thead>
<tr>
<th>Results</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>8 cases (28.6%)</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>16 cases (57.1%)</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>4 cases (14.3%)</td>
</tr>
<tr>
<td>Failure</td>
<td>-</td>
</tr>
</tbody>
</table>

All our cases with excellent results
were young active adults with displaced
two parts fractures of the surgical neck. At
the end of follow up period they regained
full function with no pain or limitation of
motion.

Cases in the satisfactory group lost
more score because of the presence of
slight or mild pain on activity or some
limitation of movements especially abduction
and external rotation.

Cases in the unsatisfactory group lost
more score because of moderate pain or
limitation of movements or mal reduction.
The details of these cases were as follows:

One case was a lady with a bad reduc-
tion from the start which healed with varus
deforomity and resulted in limitation of ab-
duction and external rotation at the end of
follow up period with mild pain on exer-
tion.

Two cases of 3 part fractures one in-
volving the lesser tuberosity and the surgic-
ical neck were still had some limitation of
movements in all direction at the end of
follow up period.

One case of open fracture which devel-
oped deep infection and required drainage
20 days after the operation was still suffer-