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

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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 intramduillary 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 surgi-
cal neck. Fractures without displacement
regardless of the number of fracture lines
or the anatomic structures involved are es-
entially one part-fractures and can be
treated with sling support and gradual exer-
cises.

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 involv-
ing 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 dislo-
cations involving only the greater tuberosi-
ty were not included in this study since
they were managed differently by a tension
hand 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>
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<tbody>
<tr>
<td>26</td>
<td>92.8 Two parts fracture, displaced surgical neck</td>
</tr>
</tbody>
</table>
| 1            | 3.6 Three parts fracture, greater tuberosity and surgi-
               cal neck                                         |
| 1            | 3.6 Three parts fracture dislocation, lesser tuberosity & surgical neck |

Table (1)

Our indications of surgery were:

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

(2) Open fractures (3) Fractures asso-
ciated 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 de-
lay 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 de-
taching the deltoid muscle from the clavic-
le 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 end of biceps im-
pinged between the two fragments that pre-
vent 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
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of displaced two parts surgical neck fracture where two interfragmentary screws in a coronal fashion fracture in a late adolescent 18 years male was considered enough and stable fixation. And in another case of 16 years old with a low surgical neck fracture, 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 examination 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 distributed 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 results were excellent or satisfactory in 85% of cases.

<table>
<thead>
<tr>
<th>Results</th>
<th>No. of cases</th>
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<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>
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</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 reduction from the start which healed with varus deformity and resulted in limitation of abduction and external rotation at the end of follow up period with mild pain on exertion.

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

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