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The clinico-radiological outcome of open reduction and internal fixation of displaced scaphoid fractures in the adult age group

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ABSTRACT

Background: Scaphoid fracture is the most common among carpal bone fractures, frequently imperceptible on initial radiographs. Tendency of scaphoid fracture to undergo in non-union makes it an important challenging injury for all orthopaedic surgeons. Displaced scaphoid fracture has high non-union rate in conservative management asserting the need to explore operative treatment

Materials and method: A prospective study was conducted in our institution in thirty patients in 20 to 50 year age group, for displaced scaphoid fracture (<30 days duration). Patient were followed up at every 4 week interval for 6 month and then three monthly for total duration of 18 months. At each follow up clinical and functional outcome was measured by Mayo wrist score and Patient rated wrist evaluation, and radiological outcome was measured in terms of union.

Results: Mayo wrist score showed satisfactory outcome at 8 week, and good and excellent outcome at 12 week and 16 week period. Patient rated wrist score showed improvement in clinical and functional result at three month period.

Conclusions: The use of open reduction and internal fixation by Herbert screw in acute displaced scaphoid fracture has good clinical, functional, and radiological outcome, and associated with early recovery.

1. Introduction

The scaphoid is the most common fractured carpal bone, comprising approximately 51%–62% of all carpal fractures[1] These fractures are most commonly seen in male 15–30 years of age. Scaphoid forms the link between proximal and distal rows of carpal bones and thus more vulnerable to fracture commonly through its weakest part, the waist.[2] Poor treatment or no treatment of this fracture can lead to its non-union, which may cause painful and severely disabled wrist. Therefore fracture of scaphoid is an important injury for all trauma surgeons.

The incidence of fracture of the scaphoid has been on increase in automobile and fast outdoor sports injuries. During such accidents it would be very difficult for the patients to recollect the exact mechanism of injuries due to pre-occupied apprehensive state of mind. But the fracture is common in active young men, many of whom are bread winners for their families. They are significantly disabled if prolonged immobilization is needed to achieve union Acute un-displaced scaphoid fracture can be treated non-operatively by immobilization in a cast, with successful union in 88–95% of patients.[3,4] It is the displaced scaphoid fracture that present problem in management. Displacement is seen in 30% of scaphoid fracture. Displacement of greater than 1 mm is associated with a 55% risk of avascular necrosis of proximal pole of the scaphoid. With >1 mm of displacement, the risk of fracture complications secondary to either ligamentous or vascular injury seems to rise significantly as shown by series of scaphoid fracture reported by Eddeland et al.,[6] in which they found a 19% incidence of pseudoarthrosis in 93 fractures with less than 1 mm of displacement, while 23 of 25 fractures(92%)with greater than 1 mm displacement failed to unite Satisfactory healing of the displaced scaphoid fracture demands an accurate reduction and its maintenance, which is very difficult to obtain without internal fixation. Most literatures suggest poor result in displaced fracture treated non-operatively. The best results of treatment of displaced fracture have utilized a technique of open reduction and internal fixation[5] (Fig. 1).

The aim of our study was to evaluate the clinical and radiological outcome of acute displaced scaphoid fracture treated with open reduction and internal fixation.

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Fig. 1. Oblique view of the right wrist joint showing displaced scaphoid fracture at waist.

2. Material and methods

In this prospective study thirty cases of acute displaced scaphoid fracture were included on the basis of selection criteria as follows:

Inclusion criteria-

a Age group of 20–50yrs.
b Fracture less than 30 days duration.
c Displaced scaphoid fracture. (>1 mm)
d Patients who gave their consent to undergo the procedure.

Patients with comorbid condition preventing surgical intervention, poor condition of local tissue, and any other injury to same extremity, making surgery inadvisable were excluded (Fig. 2).

All the patients were subjected to clinical and radiological examination. Postero-anterior (PA), lateral, and scaphoid view of both wrist are obtained along with 3D CT scan of involved limb. The radiographs were assessed to see the displacement on the basis of one of the following criteria:-

a Minimum gap of 1 mm between fracture fragments.
b Lateral intrascaphoid angle of >45°.
c Antero-posterior intrascaphoid angle of <35°.
d Scapholunate angle of >60°.
e Radiolunate angle of >15°.
f A height to length ratio of the scaphoid of ≥0.65 on lateral radiograph.

All patients with displaced fractures were taken for open reduction and internal fixation with Herbert headless screw performed by senior orthopaedic surgeon. Patients were given preoperative antibiotics, which included a third generation cephalosporin and an amino glycoside 30 min prior to the operation. All the patients were given either general anaesthesia or regional anaesthesia. Before proceeding for the operation adequate anaesthesia of the limb was assured. Patient was then taken up for surgery. Procedure was done in supine position under tourniquet. For scaphoid waist and distal pole fracture volar approach, and for proximal pole dorsal approach was used. 'Postoperatively patient was followed for 6 month at every 4week interval by the operating surgeon and then three monthly for total duration of 18 months. At each follow-up patients were asked to fill the questionnaire of mayo wrist score and PRWE and clinical examination necessary for completion of questionnaire was done, and the radiological outcome is measured in terms of union based on roentenographic grading system (Fig. 3).

3. Observation and results

The mean age of patient in our study was 30 years and range from 22 to 48 years. 53.4% of fractures occurred in 21–30 year age group and 36.7% of fracture occur in 31–40 year age group and 10% fracture occur in more than 40 year age group. Scaphoid fracture was found to be more common in 40 year and below in our study. Majority of patients in our study were male. Injury was most common right side and waist was the most commonly fractured

Fig. 2. Post operative radiograph right wrist at 6 month follow up showing union.

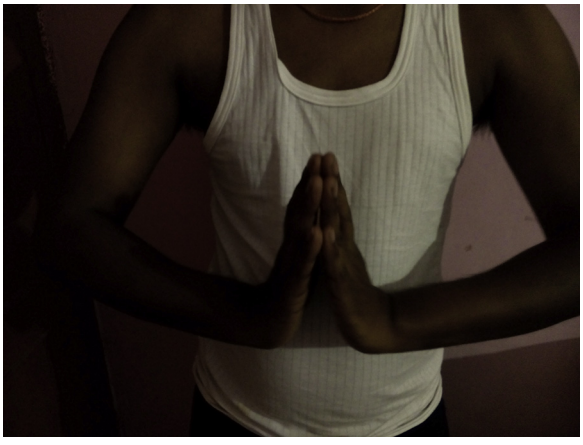

Fig. 3. Clinical photograph of patient showing full dorsiflexion at 3 month period.