



A Comparative study of results of Volar Barton's fracture treated with Plating or Pinning with external fixator

Orthopaedics

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ABSTRACT

Background: Intra-articular lower end radius particularly Volar Barton's fractures are more common in young adults and associated with significant deformity if not treated effectively. Open reduction with buttress plating or closed reduction with external fixation and percutaneous Kirschner wire fixation are two modalities being used most of the times and both having good results.

Method: Retrospective analysis of 50 cases of volar Barton's fracture treated with plating or external fixator and kirschner wire with at least 12 months of follow-up were studied and results were obtained.

Results: All patient were having good radiological and functional result. 1 major complication and 2 minor complication were there in plating cases while 4 minor complications were there in patient treated with external fixation.

Conclusion: Both the above mentioned surgical techniques give a high success rate.

Despite the fact that each technique has advantages and disadvantages, the results from the plating treatment seem to be superior.

KEYWORDS:

volar Barton's fracture, buttress plate, external fixation, Kirschner wire.

Introduction and Back ground

Volar Barton's fractures are more common in young people and that may occur due to either high or low energy injuries.[1,2] Such fractures are unstable and leads to deformity if not managed properly. Several methods are available for management of this types of fracture including conservative and surgical.[3]

However surgical treatment is mostly favoured because of good anatomical and functional results particularly plating [4]. Various surgical techniques have been reported in the literature. Closed reduction with external fixation & percutaneous Kirschner pinning and open reduction with volar buttress plating are two most common methods of fixation being used recently.[3] In this study results of percutaneous wire with external fixation and open reduction and buttressing plate were obtained retrospectively and compared.

METHODS

50 patients of distal end radius of volar Barton's type i.e. AO type B3.2 and B3.3 admitted from January 2016 to December 2016 & treated with either percutaneous wires with external fixation or open reduction with buttress plating were studied and results were obtained.

All the patient were admitted from emergency department and screened to rule out other possible injuries. After conformation of volar Barton's fracture all of the patients were operated within six to 48 hours (mean injury to operation interval 24 hours) by any one of the above mentioned method either under regional anaesthesia or general anaesthesia based on physical condition of the patients.

Surgical technique

For patients undergoing pinning with external fixation with the use of traction and ligament taxis fracture is reduced and confirmed under image intensifiers. One wire is inserted from radial styloid process from radial to ulnar side and another one is inserted from ulnar side of the radius to radial end. Maximum articular step that is acceptable in comminute fractures are <2mm. Pin ends were bent and kept outside. After rechecking reduction under image intensifier external fixator is put to bridge the wrist that ensures further wrist stability. After six weeks External fixator along with pinning were removed and active wrist mobilization were started.

For patients undergoing plating Modified Henry's approach was used that creates the plane between Flexor Carpi radialis tendon and radial artery [5]. After severing the fibres of pronator quadratus fracture is reduced by using periosteum elevator under direct vision and fixed by using buttress plate put over volar aspect. After that wound is closed with suture and splint was given and wrist mobilization begins after suture removal at 2 weeks post operatively.

After starting active wrist range-of-motion exercises progressive heavy loading of the wrist was permitted. Patients were followed-up at the Outpatient Department after six weeks, three months, and one year and evaluated for radio graphical and functional results.

Functional evaluation of wrist is done with Gartland and Werely score and for anatomical evaluation radiographs were taken. Clinically a fracture union was defined as no pain or tenderness during daily activity with loading, and radio graphically defined when trabeculae had bridged the main fracture fragments.[6] Non-union was defined as a fracture that was still not united after one year of treatment.[7]

RESULTS

Mean age among patient was 38 (with SD +/-10) years .Most common cause of fracture was domestic fall (24) followed by road traffic accident (14) followed by sports injuries (8) and fall from height (4). 47 patients were having closed fracture while 3 patient having gustilo Anderson type 1 fracture [8]. Among the cases 4 patient were having injuries on another limb part as being poly trauma patient. Mean follow-up period was 12 months (SD +/-2).

Out of total 50 cases 28 were treated with plating and 22 were treated with external fixators with pinning.

All fractures healed within three months and the union rate was 100%. There were no perioperative complications in either of cases. However there was 1 case of deep infection at wound that led to wound dehiscence and that was managed with multiple debridement and prolonged antibiotic injection and removal of implant at 2 months and 2 minor complication like stitch line infection and sudeck's dystrophy were there. While in cases treated with pinning and fixation in 4 cases

minor complications like pin site infection and sudeck's dystrophy occurred.

At one year follow up the mean volar inclination in the plating group was plus 5.2 degrees and in the pinning with fixator group was plus 5.4 degrees.

Table 1 results according to gartland and werely classification

Gartland and Werely score	Pinning with fixator group	Plating group
0-2 (excellent)	4	6
3-8(Good)	15	18
9-20(fair)	3	4
>20 (poor)	0	0

There was no case of non-union or mal-union (> 2 mm step-off of the joint surface, > 5 mm of radioulnar variance, > 10 degrees of dorsal inclination, and < 10 degrees of ulnar angulation).

DISCUSSION

Factors that favours fracture healing are anatomic reduction with adequate stabilization with proper supply of blood at fracture site.[9] Cancellous bone at distal end radius is associated with faster healing so cases of non-union at this area are very rare but poor fixation can result in mal union that is very common in this area following fracture. Volar Barton's fractures often produce volar subluxation of the carpus. The principle of treatment is mainly to provide anatomic reduction and stabilization. Malunited Volar Barton Fracture is very difficult to treat and if articular cartilage is damaged regeneration of it is not possible. [10,11]

Therefore, prevention of a malunited volar Barton's fracture is of prime important to avoid having to treat a malunion. In this study, plating or external fixation combined with Kirschner pinning achieved sufficient stability during the fracture healing process and both of them are associated with good results.

Clinically, both techniques have advantages and disadvantages. Plating treatment can reduce fragments more precisely and the fragments can be stabilized more securely. However, it requires opening the fracture site. If local swelling is serious, closure of the incision site may be very difficult, although the incision is usually not large and the infection rate negligible. Additionally, the fracture healing process is not hindered due to the cancellous bone character. The success rate is therefore high.

Pinning treatment avoids opening the fracture site and so there is no need to worry about incision site problems. However, fragment reduction with stabilization may be not so satisfactory. In addition tendon penetration by the external fixation may interfere with thumb and index finger movement. It is also associated with infection at the pinning site.[12,13] Fortunately, the external fixation can usually be removed after six weeks, and wrist and finger range of motion exercises can then be implemented. Despite the fact that external fixation and Kirschner wires are removed within six weeks, some patients still cannot flex their fingers effectively.

Accordingly, external fixation pins must be placed carefully. The success rate will then be raised. Therefore, the functional outcome of the wrist joint is largely satisfactory.

Long-term results mainly depend upon the degree of arthrosis of the wrist as volar Barton's fractures involve the articular surface and the injured articular cartilage normally cannot regenerate. Therefore, the longer the follow-up, the lower the success rate. In the present series, the mean follow-up period was 1 year.

To avoid poor function of the joints, wrist and finger range-of-motion exercises should be implemented as early as possible in both of the cases. This is especially important for Barton's fractures that have intra-articular involvement. Once adhesion in the joint occurs, treatment becomes very complicated. Both intra- and extra-articular release techniques are very difficult.

In the present series, immobilization of the joints lasted no more than six weeks. This may be another factor that influenced the high satisfaction rating.

Conclusion:

Volar Barton's fractures are common in younger age group and

associated with significant displacement. Current surgical techniques can provide a high satisfaction rating. In the present study, both open reduction with buttress plating and closed reduction with pinning and external fixation stabilization can achieve a high success rate. Both techniques have advantages and disadvantages but the results from the plating treatment seem to be superior. (14)

Images:

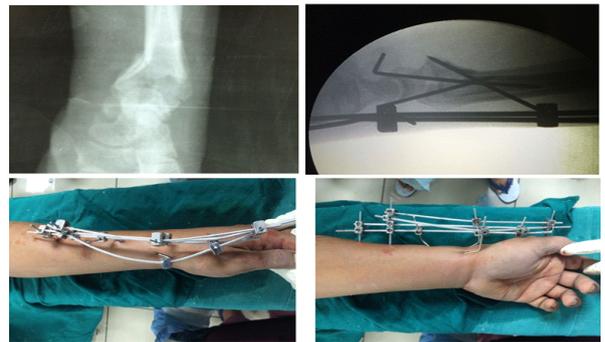


Figure a 35 year male with volar barton fracture: image shows radiographs as well clinical photos



Figure image shows clinical as well radiographic images of volar barton fracture treated with buttress plate

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