

Fixation of two part fracture of radial head by pre-bend K-wire: An alternative means of fixation

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ABSTRACT: The study was aimed to see the functional status of elbow after fixation with pre bend K- wire in Mason type II Radial head fractures. We have studied eight patients (3 females and 5 males) with Mason type II isolated radial head fractures aged between 15 and 65 years (average 39 years) who underwent open reduction and internal fixation with the pre bend K-wires. This method is cost effective and takes lesser time. Even surgeons with minimal experience can perform this procedure.

KEY WORDS: Radial head; Fracture; Pre- Bend K-wire

INTRODUCTION

Fractures of the head of the radius were first described by **Thomas** in 1905. As with many orthopedic conditions, the management of the various types of radial head fractures is controversial. The fracture of Radial head of Mason type I is often treated by conservative treatment. However, the treatment of the more severe injuries, Mason type II and III, is one which creates a good deal of debate. In contrast, the outcome of treatment following displaced and comminuted fractures shows a high proportion of unfavorable results in some studies^{1,2} and predominantly favorable results in other studies^{3,4,5}. As a result of the uncertainty regarding the long-term results, open reduction and internal fixation of the radial head has received more interest during the last decade especially for the treatment of displaced two-fragment fractures.⁶ The outcome does not seem inferior to the outcome described in the literature after open reduction and internal fixation. We did open reduction and internal fixation of Mason type II displaced fractures with two pre bend K-wire followed by early mobilization. We wish to report our experience in 8 Mason Type II fractures managed in this way.

METHODOLOGY

Eight patients (3 females and 5 males) with Mason type II isolated radial head fractures (**Figure 1**) aged between 15 and 65 years (average 39 years) underwent open reduction and internal fixation with the pre bend K-wires within 3-5 days of injury. There was mechanical block to rotation and a large articular step (Displacement more than 5mm). All operations were performed through a lateral (modified Kocher) approach, preserving soft tissue attachments of fragments and the lateral collateral ligament, where possible. The annular ligament was preserved; but occasionally it was partially divided to allow access and subsequently repaired. Any associated damage to the capitellum was noted before internal fixation. We measured the length of radial head on radiograph on contralateral side and again reconfirmed during the fixation.

After reduction, we fixed the fragments with K-wire perpendicular to the fracture line and drilled the bone with just bigger diameter K-wire adjacent to the fixed K-wire. After that, the wire was cut just bigger in length, and the bend the outer edge of K-wire was bent in U-shape and inserted in pre drilled hole (**Figure 2**).

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Figure 1: Showing Mason type II fracture of radial head

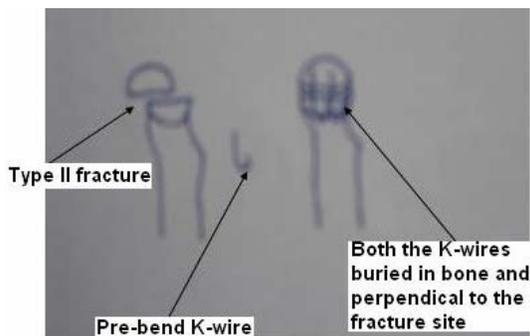


Figure 2: Showing diagrammatic representation of type II fracture, Pre bend K-wire and K-wire perpendicular to the fracture site and buried into the bone

All elbows were screened (**Figure 3**) on the table by an image intensifier to confirm reduction and length of K-wire.



Figure 3: Showing fixation of radial head by K-wire

After that, we tried to embed the outer end (U-shape) of K-wire into the bone. No casts were applied, the arm being supported in a standard triangular sling until postoperative pain had settled and early movement could begin. Mobilization was supervised by a physiotherapist initially employing passive/assisted exercises. As the pain decreased, this progressed to active movement. We removed the K-wire 6-8 week of operation with or without radiological assessment of union in which there is limitation of pronation and supination. The patients were followed up to one year. The functional status of elbow was assessed by *Morrey Elbow Scoring System*. The result could then be expressed in terms of excellent, good, fair or poor depending on the number of points scored.

RESULT

There were five patients of right radial head fractures and three of left radial head fractures. Six patients out of eight were having history of fall on outstretched arms with extended elbow. Two patients stated that they had sustained a farm related injury. All patients were returned to his/her previous occupation. Six patients were farmer and two were students. The K-wire was removed in six patients at 6-8 weeks with or without any evidence of radiological union because of the limitation of pronation and supination as the wire was fixed anteroposteriorly (sagittal plane fracture). The full range of pronation and supination was regained in further follow-up (**Figure 4a and 4b**).

The K-wire was not removed in two patients because of no limitation of pronation and supination in these patients. Using the *Morrey Elbow Assessment Score*, six patients out of eight had excellent functional results. The two patients came out with good results as they were having moderate pain with activity in which the K-wire was removed at interval. No patients reported wrist pain. All eight patients were noted to have some mild loss of elbow extension (10°-15°) (**Figure 5**). On reviewing the x-rays, all fractures were found to be healed with no evidence of avascular necrosis, myositis or degenerative changes.



Fig-4a Showing pronation of forearm



Fig - 4b Showing supination of forearm



Fig-5 Showing some limitation of movement of elbow

DISCUSSION

Most of the surgeons agreed with conservative treatment of type I radial head fracture but they did not agree on conservative treatment of type II radial head fractures. Before fixation of radial head fracture, the surgeon should know the anatomy around the elbow joint especially the relationship of radial head with other soft tissues and bones. The surgeon should not rely on expensive and sophisticated implants.

The head of the radius works together with other bones, ligaments, and tendons in and around the elbow joint to stabilize the articulation. The radial head may be considered as a multifunctional conjoint stabilizer of the elbow because it serves to check instability in three planes: the *coronal plane* as it works with the medial collateral ligament to prevent valgus instability; the *sagittal plane* as it works mainly with the posterolateral ligamentous structures, the coronoid process and the medial ligaments to

prevent posterior dislocation; and in the *axial plane* as it works with the interosseous membrane to prevent the shaft of the radius riding up. Proximal translation of the radius would adversely affect the inferior radio-ulnar joint.

Mason observed that a good result was possible in his series of 100 cases only with a perfect reduction.² Some studies showed good results following early excision of the radial head in type II fractures.^{7,8,9} However, other investigators have shown significant long-term complications especially proximal migration of the radius with associated wrist pain.^{10,11,12} Excision with replacement either early or delayed is also associated with problems, particularly when silastic implants are used.^{13,14,15} Knight has advised the use of a metal prosthesis to avoid the problems of silastic synovitis.¹⁶

According to **Akesson et al**¹⁷, the nonoperative treatment of two-fragment fractures of the radial head with 2 to 5 mm displacement is associated with a predominantly good or excellent long-term outcome, especially if a delayed radial head excision is performed for the few patients who have an unsatisfactory primary outcome.

The fixation of radial head and attained good results are a continuing challenge. In the light of our experience, we would recommend the use of a pre-bend K-wire is alternative to Herbert screw because it takes lesser time to operate, cost effective and even moderately experience surgeon able to fixed without any complication in the management of type II fractures as it allows rigid fixation and as a consequence early mobilization but there is disadvantage of reoperation in which the plane of fracture is sagittal in which the pre bend end is not completely embedded in bone. The surgeon can expect a return to good level of function in the majority of patients

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