A COMPARATIVE STUDY OF CONSERVATIVE MANAGEMENT VS. EXTERNAL FIXATION OF COMMINUTED DISTAL RADIUS FRACTURES

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ABSTRACT

BACKGROUND

Fracture of the distal radius ('broken wrist') is a common clinical problem. It can be treated conservatively usually involving wrist immobilisation in a plaster cast or surgically. A key method of surgical fixation is external fixation.

MATERIALS AND METHODS

A prospective study was carried out on 66 patients admitted between June 2014 to May 2016 for evaluation of conservative and surgical management of distal radius fractures.

RESULTS

Excellent, fair or good result was noticed in around 85% of cases managed conservatively and in above 90% of cases managed by external fixator.

CONCLUSION

There is some evidence to support the use of external fixation for dorsally displaced fractures of the distal radius in adults. Though, there is insufficient evidence to confirm a better functional outcome, external fixation reduces redisplacement gives improved anatomical results and most of the excess surgically-related complications are minor.

KEYWORDS

Colles Fracture, Volar Angulation, Radial Length, Radial Shift and Articular Congruity.

HOW TO CITE THIS ARTICLE: Kare SK, Lukalapu PK, Patri S, et al. A comparative study of conservative management vs. external fixation of comminuted distal radius fractures. J. Evid. Based Med. Healthc. 2016; 3(101), 5559-5561. DOI: 10.18410/jebmh/2016/1149

BACKGROUND

Up until a few decades ago, distal radius fractures were often casually regarded as 'Colles' fractures. With better understanding of the various fracture types, classifications such as Frykman,[1] Melone[2] and AO[3] were developed. The need for better outcomes in these fractures has frequently been revisited as newer methods of treatment have been developed. Fracture union is no longer the only goal as the restoration of normal anatomy with early functional recovery as well as resultant full and painless motion of the wrist, take over as the ultimate goals of treatment.

External fixation is one of the key methods for surgical fixation of distal radial fractures. A key question is whether it produces superior results to conservative treatment. The answer to this question is likely to depend particularly on fracture configuration and bone quality. A prospective study was done to evaluate and compare the functional and anatomical results of conservative and surgical (external fixation) management of distal radius fractures.

Financial or Other, Competing Interest: None.
Submission 28-11-2016, Peer Review 04-12-2016,
Acceptance 11-12-2016, Published 16-12-2016.
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DOI: 10.18410/jebmh/2016/1149

MATERIALS AND METHODS

A prospective study was carried out on 66 patients admitted in our institute between June 2014 to May 2016 with distal radius fracture (Frykman's type I, II, III and IV). There was no randomisation of the patients into the Closed Reduction Plaster Cast Fixation (CRPCF) or External Fixation (EF) group. There were 34 patients in the CRPCF group and 32 in the EF group. Fracture configuration and experience of the treating doctor were the main determinants of selection of the mode of management. External fixation was used in unstable fractures that could cause redisplacement of the fracture.

Assessment of the patients was carried out over four levels. Primary survey included assessment of general condition of the patient. Secondary survey included clinical and radiological assessment of the fracture and local wound condition. Based on these two levels of assessment,

treatment option best suited for the patient fracture pattern was selected.

Technique

Closed reduction was performed using haematoma block supplemented with IV sedation/Bier block. Supplementary K-wires originating from the radius styloid across the fracture fragments were used in some patients for dorsal buttressing. Reduction maybe confirmed using sonography, fluoroscopy or with plain radiographs after the manoeuvre. Cast immobilisation should be maintained for a minimum of 6 weeks.

External fixator was applied under general or regional anaesthesia. External fixator frames were wrist bridging and modular type. Proximal threaded pins were placed through a drill sleeve to the radial shaft approximately 5 cm proximal to the fracture with a stab incision. The pins were advanced to the other cortex. Distal smaller pins were placed in the proximal metaphyseal region of the index metacarpal through a drill sleeve with a stab incision. Supplementary K-wires originating from the radius styloid across the fracture fragments, were used in some patients for dorsal buttressing. 21 reduction confirmed under C-arm.

Postoperative Care and Rehabilitation

Limb elevation, Active and passive range of motion exercises of fingers, shoulder and elbow joints were begun on 1st postoperative day. Training in activities of daily living is started based on stability of injury, stability of fixation after subsidence of pain. Pin site dressing was done every day. Sutures were removed on the 7th postoperative day. Clinical and radiological assessment was done to check redisplacement and collapse of fracture fragments at the time of discharge. The external fixation device is left in place for an average of 5-8 weeks till both clinical and radiological evidence of healing are seen. The fixator was removed as outpatient procedure under sedation. After removal of external fixator strengthening exercises were begun for a period of 8-10 weeks, postoperatively.

Majority of cases were followed up to six months. Subjective evaluation was done using Demerit Point System of Gartland and Werley modified by Sarmiento. Evaluation of anatomic results was carried out based on Lidstrom and Frykman criteria modified by Sarmiento. Radiological assessment of volar angulation, radial angulation, radial length, radial shift and articular congruity was performed.

RESULTS

Majority of the patients were in the age group of 41-60 years. 40 (61%) were males and 26 (39%) were females. Most of the patients, i.e. about 44% were manual labourers by occupation and housewives constituted 18% of our patients. In 62% of patients, dominant hand was found to be involved. Most of the fractures occurred following RTA (50%) only to be followed by fractures due to fall on outstretched hand (29%). Most of the patients (94%) were having closed fractures, open fractures were treated by external fixator. Average duration of follow up was 33.37 weeks. At the end of follow up of 12 months, it was noted that the average loss in radial length was less in external fixator group, which is statistically significant. The average radial angle obtained was 19.22° and average palmar tilt obtained was 1.96° in our EF group cases. Radial tilt also being significant value.

The radial tilt in CRPCF group is less than EF group, which signifies that dorsal angulation is corrected in casting methods. The CRPCF group has significant loss in the radial length in the postoperative period, which was more obvious during the initial few weeks of treatment due to inadequate immobilisation or support from the cast. A few patients were converted to external fixation and they were accordingly grouped in the study.

Postoperative complications were more common in the CRPCF group than the EF group. 6 patients had residual wrist pain, which was mild-to-moderate and was treated by analgesics alone. Pin tract infection was not common. Restricted wrist movements and finger stiffness was present in cases of open fractures and in patients who were not compliant for physiotherapy. One case had moderate Sudeck's dystrophy, which responded to aggressive physiotherapy. Discomfort from the cast occurred in 2 patients and was treated with cast modifications. All cast complications occurred in fractures with soft tissue swelling.

DISCUSSION

It must be emphasised that this study is only short-term follow up with average of 33.37 weeks and the discussion that follows is essentially a preliminary assessment. The aim of this study is to evaluate the results of external fixator for comminuted distal end radius fractures and compare with those of closed reduction and casting. The incidence of fractures in this study was more common in males 41/66 (61%), which can be attributed to the risk of injury due to occupational and ambulant life led by them. Another reason for high incidence of cases in males maybe due to higher susceptibility to injury and easy accessibility to health facilities. High incidence of fractures in males was also seen in studies of Nagi ON et al (2004), Yamamoto et al (2003),[4] Mannur et al (2001),[5] Jain BK et al (1998),[6] Leung et al (1989).[7]

It was noted that dominant hand was more commonly involved (62%). This maybe attributed to tendency of stretching the dominant hand as a reflex while RTA/fall so as to avoid injury to face and head. 18.75% of fractures were open fractures; the incidence of open fracture is comparable to that observed in Jain BK et al study (18.1%). Most of the cases had a higher Frykman type with Type VII and VIII constituting 43.75%. The average period of immobilisation in our study was shorter (6.53 weeks) as advised by Nagi ON et al[8] compared to that of Gunaki RB et al[9] wherein it was 7.2 weeks.

We followed the method advocated by Seitz et al (1993)[10] limited open technique to avoid pin-related complication like pin tract infection, pin loosening, eccentric drilling and fractures. The radial shortening due to loss of reduction was measured as the difference between initial

post reduction and final x-ray made for each patient as suggested by Cooney et al (1979). In the EF series, average loss of radial length was 1.90 mm, slightly lower as compared to that of 2.13 mm in Gunaki RB et al (1998). It was also noted that loss of radial length increases with type VII and VIII fractures. Radial length is one of the crucial factors for regaining good wrist function 4 mm - 6 mm shortening compromises DRUJ (Collins 1998). Even small change in palmar tilt leads to radiocarpal dysfunction as suggested by Taleisnik and Watson (1987) and causes midcarpal instabilities due to change in load distribution.

It is evident that average range of wrist movement achieved in present study at final follow up were more than maximum requirements for daily activities (Sarmiento 1975). The lower incidence of pin-related complications (pin tract infection 3 cases, pin loosening 0 cases) can be explained probably due to limited open technique of external fixator application as advocated by Seitz et al. The functional result was poor in cases with open fracture and injury to tendons of wrist and hand.

CONCLUSION

The treatment outcomes of distal radius fractures have all along been evaluated by objective measurements such as grip strength and motion as well as radiographic parameters. Recently, there is an increasing demand to adopt patients' subjective evaluation tools such as DASH and PRWE. How the deformity, objective functional outcome and subjective patient satisfaction affect one another remains a conundrum. The standard practice and general consensus is still highly variable between different countries. The decision for each patient should be based on individual needs weighted against the cost and additional risks of surgery.

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