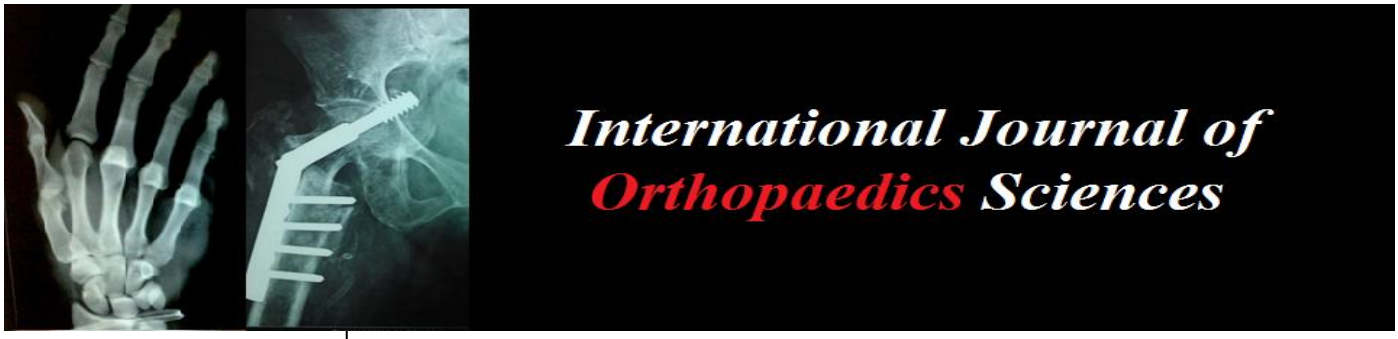

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Recent perspectives in the management of distal radius fractures

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Abstract
Introduction: The distal radial fractures accounts of about 15 to 20% of the total fractures. Many studies were done with relevance associating with various management modalities of distal radius fractures and their functional outcomes. The latest trend focuses on surgical intervention.
Methods: The reviewed literature was regarding recent perspectives in the management of distal radius fractures. The suitable articles were identified on the basis of inclusion and exclusion criteria. The data were collected from PubMed, MEDLINE, Web of Knowledge and EMBASE.
Results: Basis on inclusion and exclusion criteria 870 important citations have been identified and scrutinized. The evidence level was scored by the Jadad quality score. The volar plate group had better results of DASH scores. The use of a volar locking plate predictably leads to better functional outcomes.
Conclusion: After analyzing the parameters, the time taken and cost of postoperative rehabilitatiwasere not taken into account in the majority of studies and a combined analysis was unworkable. Better outcomes in terms of achieving good reduction, maintenance of fixation during healing. The grasping power, pronation and supination were found to be comparatively better in the fragment-specific procedure.

Keywords: Distal radius fractures, randomized controlled trial, recent perspectives

Introduction

The distal radial fractures accounts of about 15 to 20% [1] of the total fractures [2]. Many studies were done with relevance associating with various management modalities of distal radius fractures and its functional outcomes [3-7]. The latest trend focuses on surgical intervention.

Distal radial fractures was first acknowledge by Hippocrates (461–370 BC) and mentioned in his treatise as carpal dislocations. A French surgeon Jean-Louis Petit (1703) mentioned carpal dislocation as a gap in the continuity of the bone. Another French surgeon Pouteau-Colles (1784), documented the fracture as dorsally displacement of the distal radius. An Irish surgeon Abraham Colles (1814), in his publication described detail about the fracture and was named as Colles fracture. With the help of a splint the original anatomic position were achieved and till date, it is recommended management [5, 8-10]. Abraham Colles quotes (1814), "the limb will at some distant period again appreciate perfect freedom in all its movements, and be entirely exempted from pain" [11]. According to Epidemiology and Burden of the problems, mentions fracture of the distal radius to be the commonest of all fractures. The occurrence in adults itself makes up about one-fifth of all the fractures in any orthopaedic causality units [12].

The management entire depends on the age groups [13] 1) in children/adolescents group, the commonest fracture is in the distal forearm (23-25%) [14], 2) In young adults group 74% fractures are caused by high-energy strain with which more than 50% of these fractures are initially displaced [15] and 3) In elderly group mainly due to osteoporosis which also claimed to be a predictor of future hip fracture [16].The mortality rate increases with age and with a decrease bone mineral density (BMD) [17]. After the age of 50 years, women are four to five times at risk of sustaining a fracture of the distal radius [18-22]. The management and techniques of dorsal radial fractures have been modified periodically. However, the complications profile following the management of unbalanced radial fractures has undergone little change over the years.

The present study aim to analysis the review literature of current evidence in the management of distal radius fractures.

Methods

Search strategy

We did a literature search without language restrictions and conducted-usage of phrases "Colles fracture" or "barton fracture" with these limits "randomized controlled trial" PubMed (1950–2019), Ovid's MEDLINE (1949–2019), MEDLINE In the Processs & Other Non-Indexed Citations (updated to February 2019), Web of, Knowledge and EMBASE (1968-2019). More lookups with similar keywords and limitations have not provided many extra references. We have also done a lookup of the Cochrane Central Register (CENTRAL). In addition, reference lists of all primary articles and previous systematic additions of papers and eligible materials were added. Duplicates were removed. Information was carefully extracted from all eligible publications independently by 2 reviewers disagreements were solved by modes of spoken communication between them. The suitable articles were then decided based on the following

Inclusion criteria

1. Only the randomized controlled papers on the patients with distal end radius fractures
2. Papers which compared the Integral Fixation with External Fixation with such fractures
3. At least minimum time periods of 12 months of follow-up for the patients were done.

Exclusion criteria

1. Non-randomized trials
2. Period of follow up which is lower than 12 months
3. Papers with the inclusion of children in their study population.
4. The scale used to assess the quality of the Randomized Control Trials -Jadad, where a score of < 3 showed lower the quality [23].

Analysis

We have made use of the (Disability of the arm, shoulder, and hand) - the DASH score [24], for the primary outcome and other outcomes of the range of motion at the forearm, the radiographic also the complication findings. For those papers that have not reported range of motion as a percentage at the unaffected wrists. Where the researchers have provided ranges as an alternative of standard deviations for means [25], the standard deviations are estimated by the rule-of-thumb range divided by four. For the range of movements, damage and percentages were calculated according to Wei *et al.* (2012) [26]. Radiographic measurements taken from eligible papers were organized by calculating the absolute values or calculated from normal values for the unaffected wrist.

The below mentioned normal values are taken into account:

Radial inclination-22° volar tilt-10° radial height-11 mm

Complications are taken as minor or major, as explained by Rozental *et al.* (2009) [27].

Minor complications

- Transient extensor tendon irritation
- Occurrence of superficial infections
- Stiffness of fingers

Major complications

- Inability to reduce the fracture
- Malunion of the fracture
- Nonunion of the fracture
- Deep infection
- Neuropathy at the site
- Tendon rupture

Results

Selected papers containing 870 important citations have been identified and scrutinized, out of which 10 were published randomized control trials fulfilling the inclusion criteria was selected for this narrative review [25, 26, 28-35]. One of the randomized control trials was not included in our analysis because the period of follow up was 6 months after fracture correction [36].

The evidence level in every other article have been given scores of 1 to 4 using the Jadad quality score [23]. 716 patients with 773 distal end radius fractures were taken into account in the analysis. Allocation discretion was reported in 4 trials and wasn't clear in the other trials. Since there is the obvious nature of the intercession. The combined results of the initial outcome measure and the DASH scores, presented a momentous deviation, affirmative that, internal fixation over external fixation at 12 months period of follow up after surgery, not at 3 months and 6 month. An independent analysis of randomized papers comparing IF using volar locking plates with external fixation showed that at 3 and 6 months, the volar plate group had better results of DASH scores, but the difference reduced over a period of time; at 12 months, the scores were not statistically significant different and showed a trend in relation with the effects of internal fixation and external fixation on a range of motion of wrist and forearm and that use of a volar locking plate predictably leads to better functional results in the first 3 months after fixation.

Discussion

The reasons for unbalanced radial fractures could be older age of the study subject, severe initial displacement, degree of Metaphysal-comminution, intra-articular involvement, increased angulation or severe axial compression [37-41]. The case could provide only limited stability due to the bones nature [39]. The fractures managed with the cast in proper anatomical alignment (lesser than10 degree and lesser than 5 mm radial shortening), only 49% will continue to be in an satisfactory location at one week and not greater than 29% at 5 weeks [42]. Another study showed with the agreeable place (lesser than10 degree dorsal tilt, lesser than 20 degree volar tilt, greater than 10 degree radial tilt, lesser than 2 mm ulnar alteration and lesser than 2 mm intra-articular step off), 30% of fractures in the satisfactory arrangement between 10 and 14 days and nearly half that is 54% of the fractures would have moved or displaced at the follow-up after 3 months [41]. The normal anatomical alignment could be re-established with surgical procedure however the surgical methods vary depending on the ability to preserve the corrected fracture position during the process of healing. Even with closed or limited open correction with the insertion of a pin a good reduction can be attained, but again the misalignment to the anatomical position may occur [43]. External fixators with or without pinning has proven to achieve a good stability by indirect fixation. The reduced portion has a better upheld when compared to that in open fixation and internal fixation [44].

A

study has shown proper anatomical positioning and preservation, which was attained with open reduction and plate fixation especially in patients with bad bone quality [45]. An author has stated there could be a worsening of the illness particular complications arise from the open nature of the surgery [46]. New theories, advance new technologies, improvised implants for steady long-lasting anatomical fixation with the least adverse effect from the open nature of the surgery [47].There were not much of evidences to prove that these improvised techniques and implants provides a least adverse outcome. Nearly at the same time two implants grounded on the three-column model originated to clinical practice [47, 48]. The difficulties of separated fragments in a comminuted fracture were minimized by the use of these implants. Pins, wire-forms and small plates were used to stick on to the fragments placed distally which were attached proximal to the radius. The specialized implants were designed especially for volar, dorsal lip fragments and radial styloid, which facilitate open surgical procedure and also for the shattered comminuted fracture. Closed reduction and the process of external fixation with or without pinning were the methods previously used for this condition.

Conclusion

After analyzing the parameters, the time taken and cost of postoperative rehabilitation were not taken into account in majority of studies and a combined analysis was unworkable. Better outcomes in terms of achieving good reduction, maintenance of fixation during healing. The grasping power, pronation and supination was found to be comparatively better in the fragment-specific procedure.

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