Orginal Article

Functional Outcome of Distal Radius Fractures in Elderly Treated By Close Reduction and Cast Application under Hematoma Block

Arjun Prasad Dumre[1], Rajram Maharjan[2], Ganesh Bahadur Gurung[2]

[1] Departmant of Orthopedic, Nepal Police Hospital, Kathmandu, Nepal.
[2] National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal.

Article History
Recived: 3 December, 2023
Accepted: 14 January, 2024
Published: 31 January, 2024

Funding Sources: None

Conflict of Interest: None

Online Access

DOI:
https://doi.org/10.61122/jkistmc282

Correspondence
Arjun Prasad Dumre
Department of Orthopedics
Nepal Police Hospital, Kathmandu, Nepal.
Email: arjunahbm@gmail.com

Citation: Dumre AP, Maharjan R, Gurung GB. Functional Outcome of Distal Radius Fractures in Elderly Treated By Close Reduction and Cast Application under Hematoma Block. J. KIST Med. Col. 6(11):1-4.

Abstract

Introduction: Distal radius fractures are common in elderly population. Various options of treatment are available. Very good clinical outcomes have been reported in elderly patients with distal radius fractures treated by close reduction and cast application. The purpose of this study was to assess functional outcome of distal radius fractures in elderly treated by close reduction and cast application under hematoma block.

Methods: Sixty two patients (19 males, 42 females; mean age 67.7± 5.7 years) aged >60 years with distal radius fractures Frykman I to IV were treated with close reduction and cast application under hematoma block. Pain level was assessed using VAS score. Anatomical and functional results were assessed with radiological parameters, range of motion and DASH score at 2,6,12,24 and 52 weeks follow up.

Results: Union was achieved in all fractures with mean time of 6.1±0.4 weeks. At final follow up, mean radial height, radial inclination and radial tilt were 6.39 mm, 18.4° and 4.2° respectively. Mean VAS score and DASH score were 0.76 and 10.1 respectively. Complications were seen in 5 (6 %) patients.

Conclusion: Distal radius fractures in elderly treated by close reduction under hematoma block and cast application has good functional outcome.

Keywords: *Close reduction, distal radius fracture, functional outcome, hematoma block*

Introduction

Distal radius fracture is a common problem in elderly population. In 1814, Colle's described distal radius fractures[1]. They are said to be the most common osteoporotic fracture[2]. The increase in incidence in elderly females has been linked to estrogen with drawl in postmenopausal women and reduced bone mineral density[3]. The risk of woman sustaining distal radius fracture increases from 6% by the age of eighty years to 9% by the age of ninety years[4].

Most common mechanism of injury is low energy trauma like fall on an outstretched hand. These fractures are usually closed with typical deformity described as "dinner fork deformity" The aim of treatment is pain relief and maintenance of the patient's functional status. There is still a controversy regarding management of distal radius fractures in elderly population. Some authors have recommended that restoration of displaced distal radius

fractures as the best way to achieve good results.[5,6,7,8,9] Cast immobilization is indicated in (1) stable fractures in which the expected radiographic outcome achieves the goals of treatment outlined above, and (2) low demand elderly patients in whom future functional impairment is less of a priority than immediate health concerns and/or operative risk[10].

In his original article, Colles noted that "one consolation remains, that the limb at some remote period will again enjoy perfect freedom in all its motions and be completely exempt from pain".[1] Though mal- alignment may occur due to redisplacement, it has been demonstrated that mal-alignment does not necessarily correlate with the functional outcome in elderly patients.[11]

The direct infiltration of local anaesthesia technique is quicker to perform[12]. The injection of local anaesthetic into the site of the fracture has been suggested to be an acceptable alternative for the manipulation of wrist fractures[13,14].

Methods

Sixty two (19 male , 43 female average age 67.6±5.7 years) patients with distal radius fracture Frykman type I to IV treated with close reduction and cast application under hematoma block in Bir Hospital between October 2012 to September 2013 were included. Inclusion criteria were a) elderly patients > 60 years of age, b) distal radius fracture Frykman type I to IV. Patients with open fracture, polytrauma, additional fracture on same extremity and associated neurological injury were excluded from the study. Close reduction was conducted to all the patients after taking informed consent. Hematoma block was used for close reduction and below elbow cast was applied after reduction. Wrist position was flexion of 20 degree and ulnar deviation of 20 degree. Post reduction x-ray of wrist AP and lateral view was taken. Oral analgesics were prescribed for 2 days and patient was followed up next day for any cast complications. Follow up was done at 2 weeks, 6 weeks, 3 month, 6 month and 12 month. Physiotherapy was started after cast removal. Radiological parameters (radial height, radial inclination, radial tilt) were assessed in each visit. Pain was assessed by VAS score and functional status after cast removal by DASH questionnaire.

Statistical data analysis was done using SPSS (Statistical Programme for Social Studies) version 20 software. Various statistical tools were used wherever applicable. Values of $p < 0.05$ were considered significant with confidence interval 95% throughout the study. Ethical clearance was taken from Institutional Review Board (IRB) of National Academy of Medical Sciences.

Results

Patients were followed up for 1 year. Most common mechanism of injury was fall on out stretched-hand (79%) and non-dominant side was involved in 58% of cases. Most common was Frykman type II (35%) and least common was Frykman type I (12.9%). Fifty two (83.8%) patients reported within 24 hours of injury. Mean post reduction VAS Score was 4.2±1.1 which decreased to a mean of 0.7±0.9 at last follow up. Mean DASH Score was 34.06±1.9 at 3 months, 17.9±2.0 at 6 months and 10.0±1.3 at 12 months follow up. All fractures united with 57(91.9 %) fractures united by 6 weeks. Mean pre reduction radial height was 4.29±1.4mm, immediate post reduction it was 9.16±1.0 whereas at the end of 1 year follow up, it was 6.39±0.5 mm. Mean pre reduction radial inclination was 14.0±1.8°, immediate post reduction it was 19.7±1.1° whereas at the end of 1 year follow up, it was 18.4±1.23°. Mean pre reduction radial tilt was -10.3±4.4°, immediate post reduction it was 7.1±3.8° where as at the end of 1 year follow up, it was 4.2±3.3°. (Table 1)

Table 1: Radiological parameters

Time Period	Radial Height (mm)	Radial Inclination (degree)	Radial Tilt (degree)
Pre reduction	4.29 ± 1.4	14.0 ± 1.8	-10.3 ± 4.4
Post reduction	9.16 ± 1.0	19.7 ± 1.1	7.1 ± 3.8
2 weeks	7.35 ± 0.8	18.7 ± 1.1	5.6 ± 3.6
6 weeks	6.53 ± 0.6	18.6 ± 1.1	4.8 ± 3.5
3 months	6.39 ± 0.5	18.5 ± 1.1	4.4 ± 3.3
6 months	6.39 ± 0.5	18.4 ± 1.1	4.2 ± 3.3
12 months	6.39 ± 0.5	18.4 ± 1.2	4.2 ± 3.3

At the end of one year follow up, mean dorsiflexion was 77.6 ± 2.1° and mean palmar flexion was 62.6 ± 2.1°. Mean radial and ulnar deviation were 18.5 ± 0.9° and 27.8 ± 1.3° respectively. Supination and pronation at last follow up were 79.7 ± 1.7° and 79.4 ± 2.0° respectively (Table 2)

Table 2: Range of Movement at Follow up.

Time duration	Dorsiflexion	Palmar flexion	Radial Dev	Ulnar Dev	Supination	Pronation
3 months	38.9 ± 4.4	37.9 ± 2.2	13.1 ± 1.1	14.3 ± 1.4	55.3 ± 3.0	63.4 ± 2.0
6 months	59.5 ± 4.5	49.8 ± 2.7	15.7 ± 0.8	22.5 ± 1.6	68.6 ± 2.2	71.1 ± 2.1
12 months	77.6 ± 2.1	62.6 ± 2.1	18.5 ± 0.9	27.8 ± 1.3	79.7 ± 1.7	79.4 ± 2.0

Complex Regional Pain Syndrome I was observed in 3 (4.8%) patients.

Discussion

Distal radius fractures are more common in elderly population. Females are affected more than male[15,16,17,18]. The functional outcome of distal radius fracture in elderly treated by close reduction and cast application in our study is similar to most of the studies done by other authors. The functional outcome is good in most of the cases regardless of the radiological parameters at each follow up.

Despite all the developments in therapy, there is still a lack of an established treatment algorithm for distal radius fractures in elderly[19,20]. Non dominant hand is commonly involved than dominant hand[18,19]. Most of the fracture unite by 6 weeks time[21]. Acceptable reduction can be achieved using hematoma block for close reduction of fractures. Immobilization can be done with below elbow cast application. Loss of reduction in the early stage is the most frequently seen problem associated with treatment of distal radius fractures conservatively [22,23]. VAS Score subsequently improves after the procedure[19,21]. It was also observed that functional limitations occurred after fracture have been improving through the course of follow up[22,24]. Complex Regional Pain Syndrome 1 is also seen as a complication of conservatively treated distal radius fracture[25].

The most significant limitations of our study was small sample size and lack of control group. In consideration to low level of expectations of elderly individuals risks associated with anesthesia and treatment costs, non- surgical therapies are still a valid option[26,27]

Conclusion

Distal radius fracture is common fracture in elderly population with female predominance. Close reduction and cast application under hematoma block is safe, out patient procedure for elderly patients with distal radius fracture. Functional outcome is good after treatment.

References

1. Colles A. On the fracture of the carpal extremity of the radius. Edin Med Surg J 1814;10:182
DOI:10.1056/NEJM181410010030410

2. Court-Brown CM, Caesar B. Epidemiology of adult fractures: a review. Injury 2006; 37:691-697.
DOI: 10.1016/j.injury.2006.04.130
PMID:16814787

3. Masud T, Jordan D, Hosking DJ. Distal forearm fracture history in an older community dwelling population: the Nottingham Community Osteoporosis (NOCOS) study. Age Ageing 2001;30:255-258.
DOI: 10.1093/ageing/30.3.255
PMID: 11443028

4. Barrett JA, Baron JA, Karagas MR, Beach ML. Fracture risk in the U.S. Medicare population.J Clin Epidemiol. 1999;52:243-9.
DOI:10.1016/S0895-4356(98)00167-X
PMID: 10210242

5. McBirnie J, Court-Brown CM, McQueen MM. Early open reduction and bone grafting for unstable fractures of the distal radius. J Bone Joint Surg Br. 1995;77:571-5.
DOI: 10.1302/0301-620X.77B4.7615600
PMID: 7615600

6. Porter M, Stockley I. Fractures of the distal radius. Intermediate and end results in relation to radiologic parameters. ClinOrthopRelat Res. 1987;220:241-52.
DOI:10.1097/00003086-198707000-00034

7. Trumble TE, Schmitt SR, Vedder NB. Factors affecting functional outcome of displaced intra-articular distal radius fractures. J Hand Surg Am. 1994;19:325-40.
DOI: 10.1016/0363-5023(94)90028-0
PMID: 8201203

8. Ruch DS, Weiland AJ, Wolfe SW, Geissler WB, Cohen MS, Jupiter JB. Current concepts in the treatment of distal radial fractures. Instr Course Lect. 2004;53:389-401.

9. Kreder HJ, Agel J, McKee MD, Schemitsch EH, Stephen D, Hanel DP. A randomized controlled trial of distal radius fractures with metaphyseal displacement but without joint incongruity: closed reduction and casting versus closed reduction, spanning external fixation, and optional percutaneous K-wires. J Orthop Trauma. 2006;20:115-21.
DOI: 10.1097/01.bot.0000199121.84100.fb
PMID:16462564

10. Beumer A, McQueen MM. Fractures of the distal radius in low demand elderly patients: closed reduction is of value in 53 of 60 wrists. Acta Orthop Scand 2003; 74:98-100
DOI:10.1080/00016470310013743
PMID: 12635802

11. McQueen M. Management of distal radial fractures. J R CollSurg Edinb.1989;34:161.

12. Wardrope J, Flowers M , Wilson DH. Comparison of local anaesthetic techniques in the reduction of Colles' fracture. Archives of Emergency Medicine 1985; 2: 67-72
DOI: 10.1136/emj.2.2.67
PMID: 3893460 PMCID:PMC1285259

13. Case RD. Hematoma bock-a safe method of reducing Colles fracture. Injury 1985;16:469-70
DOI: 10.1016/0020-1383(85)90168-8
PMID: 4030071

14. Dinley RJ, Michelinakis E. Local anaesthesia in reduction of Colle's fracture. Injury 1973;4:345-46
DOI: 10.1016/0020-1383(73)90012-0
PMID: 4710930

15. Kilic A, Ozkaya U, Kabukcuogly Y, Sokucu S, Basilgan S. The results of non-surgical treatment of unstable distal radius fractures in elderly. Acta OrthopTraumatolol. 2009 May-Jul;43(3):229-34.
DOI: 10.3944/AOTT.2009.229
PMID: 19717940

16. Young BT, Rayan GM. Outcome following nonoperative treatment of displaced distal radius fractures in low-demand patients older than 60 years. J Hand Surg [Am] 2000;25:19-28.
DOI:10.1053/jhsu.2000.jhsu025a0019
PMID: 10642469

17. J.L. Jaremko,R.G.W.Lambert, B.H. Rowe, J.A. Johnson, S.R. Majumdar Clinical Radiology (2007)62,65-72
DOI: 10.1016/j.crad.2006.08.013
PMID: 17145266

18. Anzarut A, Johnson JA, Rowe BH, Lambert RG, Blitz S, Majumdar SR.Radiologic and patient-reported functional outcomes in an elderly cohort with conservatively treated distal radius fractures. J Hand Surg Am. 2004;29:1121-7.
DOI: 10.1016/j.jhsa.2004.07.002
PMID: 15576226

19. Azzopardi T, Ehrendorfer S, Coulton T, Abela M. Unstable extra-articular fractures of the distal radius: a prospective, randomised study of immobilisation in a cast versus supplementary percutaneous pinning. J Bone Joint Surg [Br] 2005;87:837-40.
DOI: 10.1302/0301-620X.87B6.15608
PMID:15911669

20. Chen NC, Jupiter JB. Management of distal radial fractures.J Bone Joint Surg [Am] 2007;89:2051-62
DOI:10.2106/JBJS.G.00020
DOI: 10.2106/00004623-200709000-00025

21. Arora R, Gabl M, Gschwentner M, Deml C, Krappinger D, Lutz M. A Comparative Study of Clinical and Radiologic Outcomes of Unstable Colles Type Distal Radius Fractures in Patients Older Than 70 Years: Nonoperative Treatment Versus Volar Locking Plating. J OrthopTrauma 2009;23:237-42
DOI: 10.1097/BOT.0b013e31819b24e9
PMID: 19318865

22. Gehrmann SV, Windolf J, Kaufmann RA. Distal radius fracture management in elderly patients: a literature review. J Hand Surg [Am] 2008;33:421-9
DOI: 10.1016/j.jhsa.2007.12.016
PMID: 18343302

23. Mackenney PJ, McQueen MM, Elton R. Prediction of instability in distal radial fractures. J Bone Joint Surg [Am] 2006;88:1944-51
DOI:10.2106/00004623-200609000-00006
DOI:10.2106/JBJS.D.02520
PMID: 16951109

24. Egol KA, Walsh M, Romo-Cor
DOI: 10.2106/JBJS.I.00968
PMID: 20686059

25. Wong TC, Chiu Y, Tsang WL, Leung WY, Yam SK, Yeung SH. Casting versus percutaneous pinning for extra-articular fractures of the distal radius in an elderly Chinese population: a prospective randomised controlled trial. J Hand Surg Eur Vol. 2010;35:202-8
DOI: 10.1177/1753193409339941
PMID: 19620184

26. McQueen M, Caspers J. Colles fracture: does the anatomical result affect the final function? J Bone Joint Surg [Br]1988;70:649-51
DOI:10.1302/0301-620X.70B4.3403617
PMID: 3403617

27. Handoll HH, Madhok R. Surgical interventions for treating distal radial fractures in adults. Cochrane Database Syst Rev 2003;(3):CD003209
DOI:10.1002/14651858.CD003209