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A STUDY OF POST TRAUMATIC ARTHRITIS IN PATIENTS WITH CALCANEAL FRACTURES IN RELATION TO BOHLER'S ANGLE

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ABSTRACT **INTRODUCTION:**Calcaneal fractures account 3% of all fractures and for 65% of tarsal injuries. Most of them are Intra articular. **AIM:**To assess the relation between change in bohler's angle and severity of post traumatic arthritis (subtalar or calcaneo cuboid) **OBJECTIVES :**To correlate between change in Bohler's angle initially and at the time of follow up and post traumatic arthritis if developed and grading the severity of arthritis by KGLS system **MATERIALS AND METHODS:**The study was conducted in Gandhi hospital from 2019 to 2021. All the patients with closed displaced and undisplaced Calcaneal fractures were evaluated with x-ray of calcaneum , AP, lateral views and few of them with CT scans. Bohler's angle was measured by using stratovanprosurgical 3d software as to minimise errors. **RESULTS:** In majority of the cases (63.33%), mechanism of injury was due to fall from height. 63.33% were manages surgically and 36.66% were manages conservatively. Patients with surgery had better outcome than that of those with conservative management. **CONCLUSION:**Bohler's angle is an important indicator in the outcome of calcaneal fractures managed conservatively and by surgical methods. Surgical correction was better than conservative treatment.

KEYWORDS : Calcaneal fractures, Bohlers angle, arthritis.

INTRODUCTION:

Calcaneal fractures account for 65% of tarsal injuries. Calcaneum is the repeatedly fractured tarsal bone. Calcaneal fractures account for about 3% of all fractures. Most of them are Intra articular. Fall from height especially in male construction workers is the most common cause. Most of them are sole earning members of their family, so it leads to more financial burden apart from morbidity. They are often associated with Thoraco lumbar fractures.

The definitive management of calcaneal fractures is unsettled. Tracing the method of treatment of these fractures is by aggressive surgical fixation of these fractures and later resorting to closed treatment methods. Between 1990 and 2000 there was a noteworthy development in management of calcaneal fractures and decrease in complication rates.[1]

AIM:

1) To assess the relation between change in bohler's angle and severity of post traumatic arthritis (subtalar or calcaneo cuboid) developed in relation to that change.

OBJECTIVES

1) To analyse the radiological changes in calcaneal Fractures immediately after trauma and after follow up.
2) To determine the correlation between change in Bohler's angle initially and at the time of follow up and post traumatic arthritis if developed.
3) Grading the severity of arthritis by KGLS system

MATERIALS AND METHODS

The study was conducted in Gandhi hospital from 2019 to 2021. Patients with closed displaced and undisplaced Calcaneal fractures were selected and treated accordingly. Most of the cases resulted from fall from height. Few cases from Road traffic accidents. All of them came to hospital with chief complaint of pain, swelling and inability to walk. All the patients were evaluated with x-ray of calcaneum, AP, lateral views and few of them with CT scans. Bohler's angle was measured by using stratovanprosurgical 3d software as to minimise errors. The patients for whom open reduction and internal fixation was planned were treated by limb elevation, ice application and below knee slab to reduce swelling.

OBSERVATIONS AND RESULTS:

Table 1 Age and Gender Distribution

Parameter	Frequency	Percentage (%)
Age in years		
20-29	8	26.66
30-39	9	30
40-49	10	33.33
50-59	3	10
Gender		
Male	22	73.33
Female	8	16.66

Table 2 Injury related characteristic features

Parameter	Frequency	Percentage (%)
Mode of injury		
RTA	11	36.66
Fall from height	19	63.33
Management		
Conservative	11	36.66
Surgical	19	63.33
Bohler's angle after injury (in degrees)		
10	3	10
12	2	6.66
13	5	16.66
14	6	20
15	2	6.66
16	7	23.33
17	1	3.33
18	4	13.33

Table 3 Follow up related characteristic features

Parameter	Frequency	Percentage (%)
Period of follow up in months		
8	12	40
9	8	26.66
10	4	13.33
12	2	6.66

13	1	3.33
14	1	3.33
18	2	6.66
Bohler's angle after followup (in degrees)		
11	1	3.33
15	1	3.33
16	1	3.33
17	1	3.33
18	6	20
19	2	6.66
21	2	6.66
23	5	16.66
24	5	16.66
25	4	13.33
30	4	13.33

Table 4 Kellgren Lawrence grading system of arthritis:

KGLS	Conservative management	Surgical management	Grand total	Percentage	P value
0	0	4	4	13.3	0.004 (Highly significant)
1	1	9	10	33.3	
2	5	6	11	36.6	
3	4	0	4	13.3	
4	1	0	1	3.3	
Grand Total	11	19	30	100	

In the present study, patients with surgery had better outcome than that of those with conservative management. Arthritic changes are of less grade than those managed conservatively.

Figure 1:X-ray immediately after trauma

Figure 2:X-ray after 12 months follow up

Figure 3:X-ray immediately after trauma

Figure 4: Post operative period X-ray

Figure 5: X-ray during 8 month follow up

DISCUSSION

Fractures of the calcaneum are the most common tarsal bone fractures with overall incidence of 2% of all fractures with displaced intra articular Fractures comprising 60-75% of the cases. Intra articular fractures occur after eccentric axial loading of the talus on the calcanuem.

The first widely accepted classification was proposed by Essex Lopresti. In 1952 based on involvement of sub-talar joint. Soeur and Remy devised a classification system for Intra-articular fractures in 1975 based on mechanism of injury and taking sustentacular fragment as the key to surgery. With the advent of CT scan, a new classification system was developed by Crosby and Fiotzgibbns based on posterior facet.

Sanders et.al proposed a classification system based on coronal view of CT scan, in which 3 fractures lines A,B,C. Separate the posterior facet of the calcaneum into 4 potential pieces. The literature review says it is the most widely accepted classification as it is considers both fracture pattern and also guides further treatment course.

Out of 30 patients , 19 were treated by surgery and 11 patients are managed conservatively .Pre operative and post Operative xrays are taken and Bohler's angle was measured.

Various outcomes by various studies are as follows:

In a randomised control study by **Ibrahim et.al in 2007,**No correlation was found between Bohler's angle and functional outcome for both conservative and operative group.[2]

O'Farrell et.al reported superior results with operative treatment in terms of walking distance, sub talar motion, shoe size and return to work.[3]

Leung et.al in a retrospective study found that open reduction and internal fixation was superior to conservative management.[4]

Mulcahy et.al in their study in 2015, on calcaneal fractures and characteristics of subtalar joint stated that the congruity of posterior facet predisposes the development of sub talar arthritis. They also mentioned that even with the anatomical reduction the arthritis may develop secondary to cartilage necrosis caused by initial traumatic insult.[5]

Buckley et.al found significantly better results in patients treated surgically and who had joint reduction within 2 mm and higher individual Bohler's angle.[6]

Michael Swords et.al in 2020, conducted a study in operative compared with non-operative treatment in intra articular calcaneal fractures found that the functional results after non operative were equivalent to those of operative care. Outcomes are significantly better in some groups of surgically treated patients.[7]

In the present study ,the outcomes were better in surgically managed patients than that of those managed conservatively. Patients in whom the bohler's angle was increased showed better outcome than that of patients with decreased bohler's angle. Even, with the surgical management there was arthritis in few patients but most of them didn't complain pain and arthritic changes was incidental finding on radiograph. Most of the patients with grade 1 KGLS score did not complain of pain and the changes were seen in follow up radiographs.

CONCLUSION

With the short term follow up of the study, we conclude that displaced intra articular fractures fixed surgically to correct the Bohler's angle had better outcome than that of those treated conservatively. Bohler's angle is an important indicator in the outcome of calcaneal fractures managed conservatively and by surgical methods.

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REFERENCES:

1) Cotton, F.J., Wilson, L.T.: Fractures of the os calcis. Boston Med. Surg.J. 159 (18):559–565, 1908.
2) Ibrahim T, Rowsell M, Rennie W, Brown AR, Taylor GJ, Gregg PJ. Displaced intra-articular calcaneal fractures: 15-year follow-up of a randomised controlled trial of conservative versus operative treatment Injury. 2007 Jul;38(7): 848-55. doi: 10.1016/j.injury.2007.01.003. Epub 2007 Apr 18. PMID: 17445815.
3) O'Farrell DA, O'Byrne JM, McCabe JP, Stephens MM. Fractures of the os calcis: improved results with internal fixation.Injury. 1993 ; 24(4):263-265
4) Leung KS, Yuen KM, and Chan WS The Journal of Bone and Joint Surgery. British volume. 1993; 75-B:2, 196-201
5) Mulcahy DM, McCormack DM, Stephens MM. Intra-articular calcaneal fractures:

effect of open reduction and internal fixation on the contact characteristics of the subtalar joint. Foot Ankle Int. 1998 Dec;19(12):842-8.

6) Buckley R, Tough S, McCormack R, Pate G, Leighton R, Petrie D, Galpin R. Operative compared with nonoperative treatment of displaced intra-articular calcaneal fractures: a prospective, randomized, controlled multicenter trial. J Bone Joint Surg Am. 2002 Oct;84(10):1733-44.

7) Swords, Michael DO, Shank, John MD, Fraticelli, Nicole DO, Benirschke, Stephen MD, Late Treatment of Displaced Intra-Articular Calcaneus Fractures: Successful Management With Anatomic Reduction, Journal of Orthopaedic Trauma: 2020 Feb; 34: (S21-S25)