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OUTCOME OF CALCANEAL FRACTURE TREATED CONSERVATIVELY, PERCUTANEOUS SCREW FIXATION AND WITH PLATING & BONE GRAFTING

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Abstract

Background: 75% of calcaneal fractures are intra articular. Treating calcaneal fractures is a challenge for orthopaedic surgeon due to the complex fracture pathology. A wide range of treatment options varying from non operative to operative methods are available. The purpose of this study is to assess the functional outcome of conservatively treated and operatively managed intra articular calcaneal fractures.

Methods: 20 intra articular fractures have been classified as per Computerized Tomography based Sanders system.7 fractures were treated conservatively.11 fractures were treated with open reduction and internal fixation with bone grafting and plating. 2 fractures were treated with percutaneous screw fixation. Functional outcome was assessed using Modified Rowe score after following the cases over mean period of 12 months.

Results: In conservatively managed 7 fractures, average functional outcome score was excellent in 2 Sanders Type-I fractures, average functional outcome score was good in 3 Sanders Type –II fractures and was poor in 2 Type-III Sanders fractures. In percutaneously fixed 2 cases of Sanders Type –II intra articular fractures by screws, average functional outcome score was good. In fractures fixed with open reduction and internal fixation with bone grafting and plating, average functional outcome score was excellent in 6 Sanders Type-II fractures and good in 5 Sanders Type-III fractures.

Conclusion: Sanders Type-I fractures can be treated conservatively with excellent functional outcome. Managing Sanders Type II and III conservatively results in good to poor outcome. Hence for Sanders Type-II and Type-III, Open reduction and internal fixation with plating and bone grafting has to be considered for achieving excellent functional outcome. Percutaneous screw fixation can also be considered which yields good functional outcome and less post operative complications.

Key words: Calcaneum, conservative treatment , plating, percutaneous screws, Sanders classification, Modified Rowe scale

1. Introduction

Calcaneum fractures account for 2% of all fractures, 60% of tarsal bone fractures.10% of fractures are bilateral and 75% are intra articular1.10% of fractures are associated with vertebrae fractures. Mechanism of injury in majority of patients is axial loading i.e. fall from height. Other mechanisms are brake pedal injuries and high velocity trauma. Current development in imaging technology has allowed better understanding of this complex fracture pathology. Sanders classification of intra articular Calcaneum fractures is widely used now a days because of its proven correlation with management and prognosis. Treating Calcaneum fractures is a challenge for orthopaedic surgeon. Treatment options ranges from non operative to operative methods. This study has been carried out with the aim to assess the functional outcome of conservatively and operatively managed intra articular calcaneal fractures.

2. Materials And Methods

There were 20 intra articular calcaneal fractures in 20 patients between March 2016 to December 2016. Immediate below knee slab, anti-edema drugs and elevation followed by hot water bath after 2nd admission day given.Pre-op antibiotics was given of 1 gm Ceftriaxone and pre-anaesthetic check-up was done. Patients were evaluated clinically and radiologically, lateral (Fig.1), axial(Fig.1) radiographs of Calcaneum were taken. A routine pre operative Computerized Tomography (Fig.2) was taken. Sanders system was used for classifying intra articular fractures.7 intra articular fractures(35%) which had poor local condition, medically unfit patients, peripheral vascular disease and patients who are unwilling for surgery have been treated conservatively with limb elevation and immobilization in plaster for 12 weeks. 11 intra articular fractures(55%) were fixed internally under fluoroscopic guidance on an average in 7 days of injury once wrinkle sign is positive. The aim of treatment was to achieve articular surface reconstruction, to restore height, width of axis of heel by performing primary osteosynthesis. In surgically treated fractures, percutaneous screw fixation was done for 2 intra articular fractures (10%). Extensile lateral approach (Fig.3) with ipsilateral iliac crest graft was used to fill the defect after elevating the depressed posterior articular facet in all cases which were internally fixed with plating. Axial and Broden views were assessed under fluoroscopy intra operatively. Satisfactory reduction was achieved in all cases . Post operatively limb elevation was maintained for 2-3 days. Compressive bandage was applied over sterile dressing. Complete suture removal was done at an average of 18 days. All operated patients were kept on absolute non weight bearing for 6 weeks followed by touchdown weight bearing with active and passive movements of ankle and sub talar joints. Full weight bearing was allowed from 12 weeks. Regular clinical follow up examination was performed monthly in all cases and functional outcome was assessed by using Modified Rowe scale after following the cases over a mean period of 12 months.

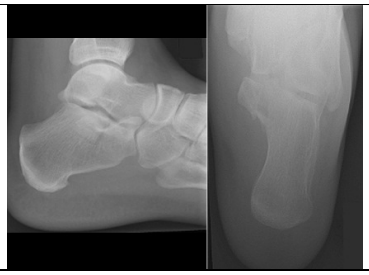

Fig.1 Pre-op Lateral & axial view

Fig.2 3d CT scan

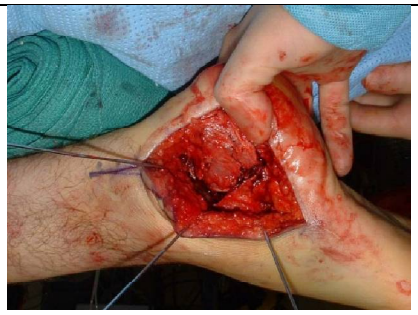

Fig.3 Intra-op image

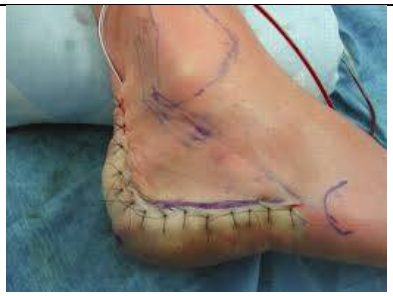

Fig.4 Post-op after closure

3. Results

There were 20 intra articular fractures in 20 patients which were operated between March 2016 to December 2016. 7 intra articular fractures (35%) were treated conservatively. 13 intra articular fractures (65%) were surgically managed. Percutaneous screw fixation was done for 2 intra articular fractures (10%) and open reduction and internal fixation with locking plates with bone grafting was done in 11 intra articular fractures (55%). Mean patient age was 32 years.18 patients were male (90%) and 2 were females (10%). Right Calcaneum was involved in 12 cases (60%), 8 cases (40%) had left Calcaneum fracture. As per Sanders classification Type-I fractures were 2(10%), Type-II were 11(55%), Type-III were 7(35%).Out of 2 Sanders type-I fractures, all (100%) were treated conservatively. Out of 11 Sanders Type-II fractures 3(27.27%) were treated conservatively, 2(18.18%) with percutaneous screw fixation, 6(54.54%) with open reduction and internal fixation with plating and bone grafting. Out of 7 Sanders type-III fractures, 2(28.6%) were treated conservatively and remaining 5(71.4%) were operated with open reduction and internal fixation with plating and bone grafting.In conservatively managed 7 fractures-average functional outcome score was excellent in 2 Sanders Type-I fractures, average functional outcome score was good in 3 Sanders Type –II fractures and was poor in 2 Type-III Sanders fractures. In percutaneously fixed 2 Sanders Type –II intra articular fractures by screws, average functional outcome score was good. Average functional outcome score was excellent in 6 Sanders Type-II fractures and good in 5 Sanders Type-III fractures fixed with open reduction and internal fixation with bone grafting and plating. In patients treated with open reduction and internal fixation with plating and bone grafting wound dehiscence was seen in 1 patient (5%) which was healed with clean compressive dressings and intravenous antibiotics. No other complications were observed.

Modified Rowe score: Excellent >85

Good 70-85

Satisfactory 55-70

Poor <55

		Conservative Management		Operative Management (percutaneous screw fixation)		Operative Management (ORIF with plating and bone grafting)	
	Total no. of patients	7		2		11	
Sanders Type	Total no. of patients	No. of patients	Average Modified Rowe Score	No. of patients	Average Modified Rowe Score	No. of patients	Average Modified Rowe Score
I	2	2	86	0	-	0	-
II	11	3	80	2	75	6	87
III	7	2	50	0	-	5	80
IV	0	0	-	0	-	0	-

4. Discussion

Intra-articular fractures account for approximately 75% of calcaneal fractures and are commonly associated with other axial load injuries giving rise to lumbar vertebral fractures. Mechanism of injury of the Calcaneum fracture causes a major soft tissue injury that includes heel pad, skin and other soft tissues. Lateral, axial and Broden view radiographs are used to examine calcaneal fractures. CT diagnostic provided improved understanding of calcaneal fractures and led to a clinically relevant classification of these injuries CT evaluation of calcaneal fractures has allowed classification systems to offer prognostic significance. The treatment goals are: (1) restoration of congruency of the posterior facet of subtalar joint,(2) restoration of the calcaneal height and width,(3) decompression of the sub fibular space available for the peroneal tendons, (4) realignment of the tuberosity in a valgus position, and (5) reduction of the calcaneocuboid joint. To correct calcaneal anatomy, open reduction should be advised to patients. We used the lateral extensile approach15 because it provides wide exposure of the subtalar joint and allows more accurate exposure of the facet fragments and calcaneocuboid joint, easier decompression of the lateral wall, and sufficient area laterally for plate fixation. Bone grafting is essential to prevent collapse and maintain the height of Calcaneum and to add mechanical support and to probably stimulate earlier fracture healing. Use of percutaneously screw fixation18 with minimum soft tissue dissection can be opted which also results in less post operative swelling and considerably yields good functional outcome. The functional outcome in our study was assessed by using Modified Rowe scale.

5. Conclusion

Sanders Type-I fractures can be treated conservatively with excellent functional outcome. Managing Sanders Type II and III conservatively results in satisfactory to poor outcome. Hence for Sanders Type-II and Type-III, Open reduction and internal fixation with plating and bone grafting has to be considered for achieving excellent functional outcome.Percutaneous screw fixation can also be considered which yields good functional outcome and less post operative complications.

6.References

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