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## Study of outcome of calcaneum fractures treated with calcaneum plate or cc screw

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### Abstract

**Background and Aims:** Conservative treatment for displaced intra-articular fracture calcaneum can lead to incongruence of the posterior facet and, incongruence of the calcaneocuboid joint. Therefore surgical treatment is advocated to restore anatomy of calcaneum and reduce complications like subtalar arthritis, malunion and pain while walking. Aim of study is to study functional outcome of fractures treated with calcaneum plate or CC screw.

**Material and Methods:** total 20 cases were studied from June 2021 to July 2022 in SSG hospital of calcaneum fractures treated surgically and monthly follow up were taken. Fracture classified on basis of Sanders classification and treated with plate or screw depending on type. Post-operative BK slab for 6 weeks and partial weight bearing till 3 months till sign of union visible.

**Results:** 75% showed excellent results 20% good and 5% poor results.

**Discussion and Conclusion:** lateral approach to the calcaneum is more widely followed worldwide providing wide exposure of subtalar joint decompression of lateral wall, no risk of any injury to neurovascular structure and wide area for internal fixation. Early mobilization to prevent ankle stiffness. Meticulous surgical techniques, respect for soft tissues, antibiotics are essential to minimize the postoperative infection and skin problems.

**Keywords:** Calcaneum fractures, calcaneum plate, cc screw

### Introduction

The calcaneum or heel bone is a bone of the tarsus of the foot which constitutes the heel. Calcaneum Fracture is also known as Lover's Fracture.

Conservative treatment for displaced intra-articular fracture calcaneum can lead to incongruence of the posterior facet (84%), incongruence of the calcaneocuboid joint (59%), dorsal tilting of the talus, lateral bulging and a relative shortening of the Achilles' tendon.

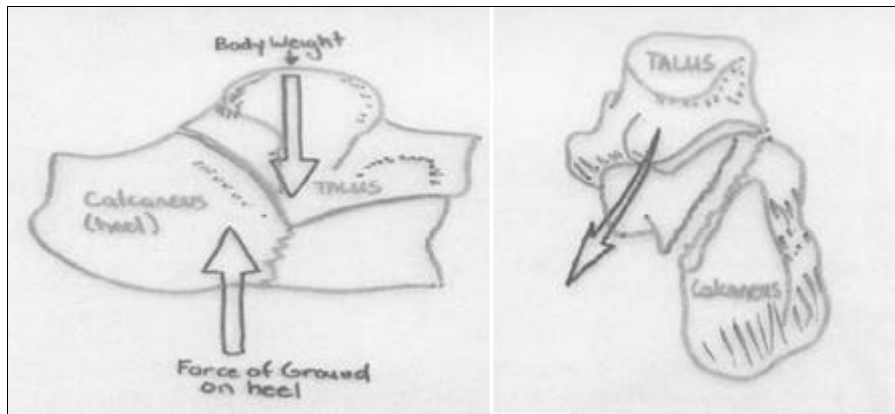
Surgical treatment is technically demanding because fracture is difficult to reduce and the risk of post-operative infection is high due to lack of soft tissue coverage and blood supply, making a surgeon reluctant to perform such interventions.

Problems in the Indian patients are unique because they have a habit of walking bare footed, leading to decreased vascularity and poor skin condition, sitting cross legged, kneeling and squatting.

### Mechanism of Injury

Intra-articular fractures are commonly produced by axial loading: a combination of shearing and compression forces produce both the primary and secondary fracture lines.

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**Fig 1:** Mechanism of injury

**Material and Methods**

- a. **Sample Design:** Prospective cohort study
- b. **Sample Size:** 20
- c. **Duration:** June 2021 to June 2022

**Treatment protocol**

All the patients treated according to protocol which consists of:

1. Standard AP, lateral plain X-ray and calcaneal view(axial)
2. Open wound taken to operation theatre for wound debridement on emergency basis as early as possible.
3. Injection TT, Diclofenac and R.L. pint started in casualty.
4. Poly trauma patients fixed as soon as their general condition allowed for surgery.
5. Ankle range of movement exercises started according to implant used and stability of fixation of fracture, post operatively.
6. Patients discharged with BK slab depending on stability of fixation.
7. Weight lifting and routine work allowed according to union status radiologically and clinically.
8. Patients followed up depending on the clinical examination as well as the x-ray findings.

**Inclusion criteria**

1. Patients with age group >18yrs of either sex.
2. Patients having fresh (Within 3 weeks) calcaneum fracture.
3. Closed fractures
4. Open grade I/II fractures

**Exclusion criteria**

1. Age < 18 years
2. Patient with local site infection
3. Open grade III fractures
4. Not giving consent

5. Medically unfit patient

**Indications**

- Thus, the indications for surgery in our study are:
- Intra articular Fracture Calcaneum
- Unstable fracture
- Fracture in patients with polytrauma

**Contraindications**

1. Pathological fractures.
2. Infected fractures.
3. Poor skin condition.

Poor general medical condition of patient (where patients cannot tolerate surgery).

**Timing of the surgery**

The surgery should be performed when there is less soft tissue edema. The Surgery should be performed within 12-24 hours of Trauma



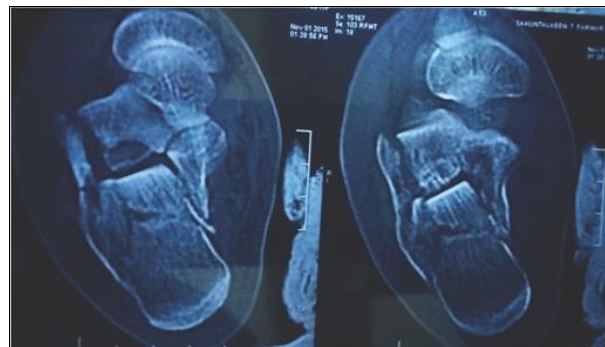
**Fig 2:** calcaneum plating internal fixation



**Fig 3:** different types of Calcaneum plate

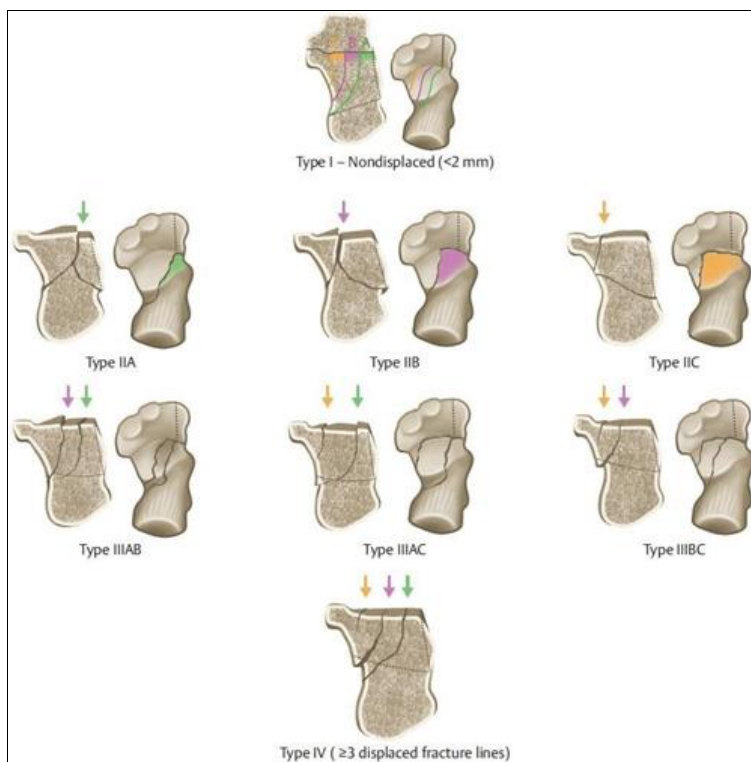


**Fig 4:** calcaneum plate



**Fig 5:** Axial view intra articular Calcaneum fracture

**Classification**



**Fig 6:** Sander classification

**Surgical technique of lateral approach**

The procedure was done in lateral position with affected side up under pneumatic tourniquet control, under anaesthesia (Spinal/ General/ Epidural) depending upon anaesthetic requisites.

**Exposure of skin & soft tissue**

A right-angled lateral incision was kept. The horizontal limb of the incision is at the junction of skin over the dorsum of foot and the thick plantar skin. The vertical limb is extended upwards midway between posterior border of fibula and

tendoachillies. The incision was curved at the junction of 2 limbs to avoid the right-angle skin flaps. This skin flap is the most important aspect of the exposure. We have to strictly avoid the undermining of the skin flap which derives its blood supply from the lateral calcaneal branch of the peroneal artery. The undermining of this flap is a harbinger for flap necrosis and resultant failure in the procedure. The incision was carried down to the periosteum of the lateral wall by cutting the deep fascia and the inferior peroneal retinacula. Care is taken not to cut the peroneal tendon sheath. The peroneal tendon were mobilized



**Fig 7:** Surgical Incision



**Fig 8:** Trolley

**Post-operative management**

- Application of crepe bandage
- BK Slab
- Limb Elevation
- Regular dressing
- NWBC
- Physiotherapy

**Results**

**Table 1:** Post-operative range of movement

Range of motion	No. of patients	Percentage
<15 degree	2	10%
16-30 degree	4	20%
>30 degree	14	70%
Total	20	100%

Normal Inversion is 30 degrees and eversion is 18 degrees. We have calculated range of motion by adding these 2 parameters.

In our study 14(70%) patients were having range of moments>30 degrees, 4(20%) patients were having range of motion 16-30 degrees and 2(10%) patients were having range of motion <15 degrees.

**Table 2:** Immediate post-operative complications

Complications	No. of Patients	Percentage
Infection	2	10%
Skin Necrosis	1	5%
Absent	17	85%
Total	20	100%

Only 15% of patients in the present series had eventful post-operative period of which 2 patients had infection and 1 patient had skin necrosis.

85% of patients had no post-operative complications.

**Table 2:** Age vs result

Result	Age			
	21-30	31-40	41-50	>51
Excellent	5	5	4	0
Good	0	1	1	1
Fair	0	0	1	1
Poor	0	0	0	1
Total -20	5	6	6	3

- In our study 21-30 age group patients have 5(25%) excellent result; 31-40 age group patients have 5(25%) excellent and 1(5%) good result; 41-50 age group patients have 4(20%) excellent,1(5%) good and 1(5%)

fair result; 51-70 age group patients have 1(5%), good 1(5%) fair and 1(5%) poor result.

- More the age poorer the outcome.
- Young age group have excellent result.

**Table 4:** Occupation vs result

result	occupation		
	Labourer	Job	Housewife
Excellent	11	2	1
Good	2	1	1
Fair	1	0	0
Poor	1	0	0
Total	15	3	2

- In our study 3(15%) patients were labourer among them 2 had excellent result and 1(5%) had good result.
- In our study 2(10%) patients were labourer among them 1(5%) had excellent result, and 1(5%) had good result.
- Labourers are associated with poor result due to high demanding work.
- Housewife is associated with excellent result due to low demanding work.

**Discussion**

Calcaneum is an important structure in the skeletal system serving to, Support body weight, Efficient locomotion, Forming posterior part of longitudinal and Lever arm for Tend oachilles.

Fracture calcaneum forms 2% of all fractures in the body of which 70% fractures are intra-articular and 30% are extra-articular. So historically calcaneum fracture was associated with high post-operative morbidity and disability because of incongruence of subtalar joint. Since time immemorial calcaneum fractures were managed conservatively.

Aggressive surgical treatment for intra-articular fracture calcaneum has been on the fore since last 15 years only.

The most common cause for fracture calcaneum is fall from height, axial loading injury (axial compressive injury), other causes being twisting force, or high velocity road traffic accidents. The incidence of fractures is on the high with modernization of the society.

Subtalar joint cannot be accurately assessed by plain radiographs (AP and Lateral views of the foot), requiring special views like Broden's view and calcaneal (axial view). The advent of CT scan has changed the whole perception for diagnosis and classifying calcaneum fractures

Being a cancellous bone with a cortical shell and supporting the talus superiorly, intra- articular fractures are associated with tremendous crushing and collapse of posterior facet.

Perceiving all these factors, lateral approach to the calcaneum is more widely followed worldwide providing wide exposure

of subtalar joint decompression of lateral wall, no risk of any injury to neurovascular structure and wide area for internal fixation.

### Conclusion

Operative procedure should be done as early as possible (when skin condition permits), preferably within 3 weeks of injury.

Meticulous surgical techniques, respect for soft tissues, antibiotics and excellent operating room conditions are essential to minimize the postoperative infection and skin problems.

To preserve the congruity of the articular margins, non-weight bearing is maintained up to the clinico-radiological signs of union.

The indigenously designed low profile calcaneum plate is best suited for the Indian patients. We have used calcaneum plate in most of the patients. Majority of patients presented to us in the first week injury.

We have used bone grafts only in one patient, as the height of the isthmus can be achieved using calcaneum plate as lag screw can be passed through the plate. But this proficiency requires a lot of accurate knowledge of anatomy of fracture calcaneum and experience with the surgical technique.

To prevent the postoperative joint stiffness, we have mobilized the patients in immediate postoperative period using below knee splint.

### Acknowledgement

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### Author's Contribution

Not available

### Conflict of Interest

Not available

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