Percutaneous K-Wires Fixation of Displaced Intra-Articular Calcaneal Fractures (A Novel Technique)

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Disclosure

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✓ My Disclosure is in the final AOFAS mobile App.

✓ No potential conflicts with this presentation.
Background

- Management of calcaneal fractures continue to be among the most challenging problems.
- Operative treatment of calcaneal fractures has been a controversial topic.
- Open reduction and internal fixation is associated with a high incidence of postoperative soft tissue complications.
- Closed reduction and percutaneous fixation provides less damage to the soft tissue.

In 1908, Cotton and Wilson suggested that open reduction of a calcaneal fracture was contra-indicated.

22 displaced intra-articular calcaneal fractures in 20 patients were treated by closed reduction and percutaneous K-wires fixation.

- 11 males, 9 females.
- Average 36 years old, range 18-54.
- According to Sander’s Classification, 11 fractures were type II, 9 were type III and 2 were type IV.

Preoperative lateral and axial X-rays and assessment of Bohler’s and Gissane’s angles.

Preoperative CT scan for classification and preoperative planning.

**Inclusion Criteria**
- Sander’s type II, III and IV fractures.
- Closed fractures.
- Recent fractures.
- Non-pathologic origin.

**Exclusion Criteria**
- Sander’s Type I fractures.
- Neglected fractures.
- Severe comminution.
- Infected blisters.
Methods

- Surgical Technique:
  - Bimanual compression to reduce the calcaneal width.
  - A Schanz screw is inserted into the calcaneal tuberosity and pushed downwards to elevate the depressed fragment.
  - 1-2 cm long transverse incision just below the tip of the lateral malleolus and a small tipped periosteal elevator is inserted to elevate the depressed fragment.
  - Two parallel K-wires are placed from the posteroinferior corner of the calcaneus across the posterior facet into the talar body.
  - The reduction of the articular surface is then maintained by two crossing subchondral K-wires.
Methods

- Follow Up:
  - 14 days post-operatively:
    - ✓ Sutures removal and a below knee cast.
  - 6 weeks post-operatively:
    - ✓ A follow up X-ray.
    - ✓ Cast and K-wires removal.
    - ✓ Full range of motion exercises of ankle and subtalar joints.
  - 12 weeks post-operatively:
    - ✓ Partial weight bearing.
    - ✓ Physiotherapy.

Clinical evaluation based on Maryland Foot Score.
Results

- The mean follow-up period was 7.68 months.
- The final results were satisfactory in 81.8% of patients, and unsatisfactory in 18.2% of patients.
- The mean operative time was 42 (range 35 – 60) minutes.
- The mean postoperative hospital stay period was 1.5 (range 1 – 3) days.
- The mean time of complete radiological union was 11.86 (range 10 – 14) weeks.
- Only one patient (4.5%) had pin tract infection and a good healing was obtained with treatment and continuous dressing.
- Only one patient developed heel widening (4.5%).
Results

Preoperative X-rays

Immediate postoperative X-rays

Six weeks postoperative X-rays

3 months postoperative X-rays

A) Dorsiflexion
B) Planter flexion
Intra-articular fractures of the calcaneus have been associated with a high degree of morbidity.

Conservative management and ORIF have been associated with a relatively high rate of complications.

The minimally invasive technique of closed reduction and percutaneous K-wires fixation minimizes the soft tissue complications.

The mini approach for elevation of the depressed posterior facet restores joint congruity and decreases late subtalar arthritis.

K-wires are removed later after 6 weeks compared with extensive dissection and retained hardware in the ORIF groups.

Shorter surgery time and hospital stay decrease the patient stress and is recognized as an advantage of this technique.
Conclusions

- The lesser the time between the injury and operation, the better is the outcome.
- The presence of associated injuries worsens the outcome.
- Satisfactory results can be expected in Sanders type II and III fractures.
- Restoration of Bohler’s angle and angle of Gissane to the normal range to be attempted to achieve better functional results.
- A strong knowledge of the principles and strict careful application of the technique is mandatory to obtain satisfactory results.
- Closed reduction and percutaneous K-wires fixation of intra-articular calcaneal fractures provides less damage to the soft tissue which improves the functional outcome.
References


