



## EVALUATION OF RESULTS OF TREATMENT OF POTTS FRACTURE BY OPEN REDUCTION AND INTERNAL FIXATION

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**ABSTRACT** **Aim & Objective:** The difficulties and associated fracture complications and to assess the functional results obtained in treating by open reduction and internal fixation. Fracture complications occurring in Potts fractures by ORIF with technical errors and without technical error are recorded and the seriousness of the technical error estimated. Functional results in terms of pain, gait, range of movements of time taken to return pre injury functional status are assessed of results evaluated.

**KEYWORDS :** Ankle joint, Potts Fracture, open reduction, internal fixation.

### INTRODUCTION:

Ankle injuries comprise a major group of lower limb trauma. The pattern of injury depends on many factors- age of the patient, the quality of bone, the portion of the foot at the time of injury, the direction, magnitude, and rate of the loading faces. The common deforming forces are adduction and abduction (external and vertical loading) resulting an rotation of talus around its long axis, while internal rotation and external rotation are rotational movements around the ventral axis of the tibia.

Pott's fracture dislocation is described by Percivall Pott in 1668, Since then the group as a whole is being referred to as "Potts Fracture" with reference in particular to fracture involving both malleoli with or without subluxation/dislocation. The original description was to Potts Fracture fibula 2 to 3 inches above the distal tip, with an associated rupture of medial ligaments and lateral subluxation of the talus.

The importance of ankle joint lies in the fact that the entire body weight is transmitted through it into the foot and locomotion essentially depends upon its stability. Most of these injuries are mixed bony and ligamentous failure due to a deforming force. Though majority of these injuries are satisfactorily treated by manipulation reduction and conservative management, however all types of developed ankle fractures of closed nature are treated by early open reduction and internal fixation which gives better anatomical union and early mobilization thus avoiding all the complications of prolonged immobilization.

### MATERIAL AND METHODS

The present study is a prospective time bound hospital based randomized controlled comparative study comprises of 30 cases of Pott's fractures admitted and treated in the department of Orthopedics, KMC, GGH, Kurnool.

History of patient was taken with particular enquiry into the mode of injury and associated injured as well as other systemic diseases. Preoperative x-ray (AP, lateral) were taken and fracture classified based on Lauge-Hansen's classification and Weber's classification. Patients were treated by 'ORIF' with malleolar screws/plates and screws/rush nails.

Through local examination was done noticing deformity, site of swelling, condition of the slum and distal neurovascular status. Preoperative investigations included by, urine for albumin, sugar, blood for sugar, urea, serum creatinine, blood group, chest x-ray and ECG.

All surgical procedures were done in the OT under strict aseptic precautions and under suitable anaesthesia. Minimum follow up after treatment up to 6 months was ensured for all patients included in the study. They were followed up and assessed at every 2,6,8,10 and 12 and 14 weeks for fracture union, status of implant, toes and ankle movements and complications. Final assessment of functional outcome was done at 6 months. They were evaluated clinically and the outcome was used for comparison.

### Inclusive criteria:

1. Patient with bimalleolar fracture (Lauge-Hansen's classification and Weber's classification)
2. Skeletally mature age group between 16-70 years
3. Patients of both genders
4. Closed fractures
5. Patients willing to give written informed consent for participation in the study.

### Exclusive criteria:

- Skeletally immature patients
- Pathological (open fractures)
- Fractures with neurovascular compromise/injury
- Patients not willing to give written informed consent

### Treatment options:

The goals of Rx are to obtain anatomical reduction, maintain this reduction until the Potts fracture heals although majority of cases are treatment by OR and IF, same indications do exist for CR.

### Indication for Closed Reduction:

1. Undisplaced or stable Potts fracture
2. Displaced Potts fracture when an anatomical reduction is obtained and maintained without repeated manipulation
3. When operative treatment is contraindicated because of poor general condition of the patient.
4. When operative treatment is planned but delayed.

### Techniques of Closed Reduction:

Closed Reduction is confirmed by good quality post reduction x-ray and the radiographic parameter that assess the stability and reduction.

Avulsion Potts fracture of lateral malleolus (supination-adduction or Weber's type-A) are usually stable and minimally displaced which is reduced by everting the foot. An associated medial malleolar Potts Fracture may be reduced by pronation and abduction, but it is an unstable pattern and will require operative treatment.

External rotation Pott's fracture at the level of syndesmosis (supination-External Rotation Weber's type B) are reduced by gentle traction, internal and varus stress. If the medial malleolus Potts is proximal, CR often fails and should be treated operatively Potts fracture associated with syndesmosis disruption (pronation –external rotation and abduction – external rotation or Weber's type c) usually unstable and require operative stabilization.

Isolated fracture of medial malleolus are treated by CR if they are undisplaced, but if the distal portion of malleoli is involved they should be reduced by manipulation.

### Maintenance of Closed Reduction:

The initial method of immobilization is by soft, bulky Jones type dressing with supplementary plaster splints. A long leg cast is used for Potts fracture that are unstable in rotation, usually maintenance for 4 to 6 weeks and then a short leg cast or Potts brace is used. Radiographic follow up of frequent interval is necessary to detect and correct loss of

reduction before fracture healing.

**Operative treatment:** The operative planning depends on both the patient and good X-ray of the ankle. Ankle swelling may peak in 1 to 7 days, and operative treatment is best done before the period of maximum swelling or after the initial swelling has subsided.

#### Indications for Operative Treatment:

1. Failed CR
2. CR require forced anatomical positioning of the foot-faced plantar flexion and inversion.
3. Displaced or unstable Potts of either or both malleoli that result in displacement of the talus or widening of the mortise > 1 to 2 mm.
4. Open Potts fracture current trend is towards recommending OR for any displaced Potts that involved the articular surface.

#### Procedure:

With the patient in supine position, tourniquet is applied ipsilateral buttock raised on a sand bag or the table rotated for exposure of lateral side. An antibiotic is given before inflation of tourniquet and continued for 7-10 days after surgery.

Adequate incisions are given directly over bony prominence and undermining of skin avoided. Incision extended directly to the periosteum resulting in full thickness slum flaps. Meticulous care taken to avoid damage to the slum. Articular surfaces of the fracture site are inspected for articular damage. The joint is irrigated and any loose fragments are removed. A direct or indirect incision is done and held temporarily with a clamp or 'k' wires and provisionally stabilised before proceeding to definite fixation.

#### Surgical approach for internal fixation:

There are many approaches for internal fixation of fractures around ankle joint.

##### a. Medial approaches:

1. Koenig and Schaefer: Though not a popular method but is useful for fracture dislocation of talus, other trauma bone lesions of the ankle joint and osteochondritis dissecans of the talus.

##### 2. Broomhead Technique:

The line of approach is midway between the posterior border of tibia and the medial border of tendocalcaneus and permits exposure of both medial and posterior malleoli.

##### 3. Colonna and Ralston modification:

Incision begun at a joint about 10 cm proximal and 2.5 cm posterior to the medial malleolus and curved anteriorly and inferiorly across the centre of medial malleolus and then inferiorly and posteriorly 4 cm towards the head.

##### B. Posterolateral approach:

It permits exposure of the distal fibular shaft and the lateral malleolus and extending towards to give access to the anterior aspect of the inferior tibiofibular syndesmosis and posteriorly to reach the posterolateral quadrant of distal tibia. It is exposure of choice for the fixation of fractured of distal fibula especially in an associated posterior lip fracture of the tibia.

##### C. Gatellies and chasting approach:

This is a transmalleolar posterolateral approach and permits open reduction and internal fixation of fracture of ankle in which the fragment of the posterior tibial lip is large and laterally situated.

##### d. Anterolateral approach:

It gives excellent access to the ankle joint, the talus and most other tarsal bones and to many reconstructive operative and other procedures.

#### 10. Management :

The primary goal of internal fixation is to permit early mobilization of the involved joint, to restore fracture and to prevent fracture dislocation.

Following surgery the ankle is immobilized in a posterior splint with the ankle in neutral position and elevated. If the bone quality is good and fixation is stable splint is removed in 2-4 days followed by the slab application and POP casting after the wound healed and sutures removed. Check X-rays were taken at the time of discharge.

Instructions were given to the patient not to bear weight for 6 weeks, to perform active movements of toes, knees and intrinsic foot muscle exercises.

**1<sup>st</sup> follow up:** the patients were then asked a to report after 2 weeks for the first follow up and the plaster changed if necessary.

**2<sup>nd</sup> follow up:** Usually after 6 weeks when check x-rays taken to know the fracture dislocation patient is advised partial weight bearing after 6 weeks if the fracture is healing well.

**3<sup>rd</sup> follow up:** was around 12 weeks when plaster of Paris (POP) is removed and clinical and radiological union of the fracture evaluated (Rockwood and green). Patient advised full weight bearing after 12 weeks. The period of immobilization depend up on the severity of injury and rigidity of fixation.

If the fracture is not secured due to skin condition, bone quality or other factors the fracture is stabilized with a long leg cast converted to short leg cast in 4 to 6 weeks. The patient is not allowed to bear weight until fracture healing has progressed well (8-12 weeks).

#### Complications:

The complications that are seen with ankle fractures can be divided into early and late.

**Early:** Soft tissue injury, haematomas, skin slough and necrosis of soft tissue bandages and flaps.

**Late:** Osteoarthritis, delayed union, malunion, non union, post traumatic arthritis, residual pain, infection, implant exposed.

Non union rate have declined with emphasis on soft tissue management, malunion are result of non anatomical fracture reduction or loss of the medial malleolus with inadequate buttressing techniques. They are dealt with corrective osteotomies at a later date. Post traumatic arthritis occurs when significant articular damage is present every effort is made towards anatomical articular reconstructions. Arthrodesis is the treatment alternative to this problem.

#### RESULTS:

As shown in figure, majority of the patients were males (24/30 with 80%) with peak incidence between 31-40 years (33.33%)

#### Age incidence:

Age in years	No. of cases	Percentage
10-20	6	20.00%
21-30	4	13.33%
31-40	10	33.33%
41-50	5	16.67%
51-60	3	10.00%
61-70	2	6.67%

Sex	No. of cases	Percentage
Male	24	80.00%
Female	6	20.00%

Based on Ao classification majority are Type B-B<sub>2</sub> followed by type C-C<sub>2</sub> (26.67%). In majority of the cause a mode of injury is by road traffic accidents (56.67%) followed by domestic accidents (20.00%) seen mostly in agricultural and other labourers (56.67%). In most of the cases the surgical implants used are malleolar screws (53.33%) inspite of complexity of these fractures we were able to achieve 73.33% good results with our method of fixation. In addition we had 20% fair and 6.67% poor results. The functional evaluation was done as per the criteria and this outcome may have been due to early appropriate treatment taking care of soft tissue status and early mobilization and physiotherapy. The results are comparable with other documented standard studies conducted by P. Kumar, J.C. Sukla, a. Mehrola, N. Srivastava on 28 patients where the results were good in 21 cases (25%) fair 4 patients (14.3%) and poor results 3 (10.7%)

#### DISCUSSION:

Pott's fractures (Bimalleolar Pott's fractures) of the ankle form a moderate number of fractures seen in our hospital. They are common injuries covering disability and loss of man power if not treated properly. In general they are unstable and some of them specially medial malleolus may go for non union due to soft tissue interposition

requiring a 2<sup>nd</sup> surgical procedure.

It is noted by many authors, when discussing the relationship between the reduction and clinical outcome. Adequacy of reduction alone does not determine the final result. Other factors like type of fracture, amount of displacement of talus like type of fracture, amount of displacement of talus, tear of deltoid ligament etc should also be considered.

#### Age:

The youngest patient in this study was 12 years in the oldest was 65 years. most cases were between 31-40 years followed by 2<sup>nd</sup> decade.

**Sex:** In the current study 24(80%) were made and 6 were female (20%).

#### Mode of injury:

In our study 17 patient (56.67%) had a high velocity trauma mostly by road traffic accidents, majority of them being labourers. 13 had low velocity trauma by fall from height, spare, Domestic accidents.

#### Type of fracture:

All the fractures in this study were classified according to Lauge-Hansen's system and classification of them 9 had pronation-external injury, 8 had supination – external rotation injury, 7 had supination-adduction injury, 5 had pronation-dorsiflexion injury, 1 had pronation-dorsiflexion injury.

Based on Ao classification 16 had type B-B2 (53.33%, 8 had (type C-C2 (26.67%) 6 had type A-A2 (20%) injury choice of implants - initially B/K POP, followed by ORIF.

#### Type of procedure:

In our study, 16 patients (53.33%) were operated with malleolar screws, in 8 patients (26.67%) plating, and 6 patients (20%) rush nails were used.

#### SUMMARY:

We conducted a prospective time bound hospital bound randomized controlled, comparative study in a group of 30 patients presenting to the orthopaedic department of KMC and hospital during the study period of Jan 2009 to Dec 2010. The main purpose of this is to find out the incidence of Pott's fracture (closed) with reference to various factors like age, sex, occupation, co-morbidities, mechanism of injury, mode of injury, type of fracture, time interval between injury and surgery, change of implants the role or effectiveness of surgical management of Pott's fracture in attaining the structure of ankle mortise. In our study majority of patients had good results ( M= 22,73..33%), 6 had fair outcome, 2 had poor outcome.

#### CONCLUSION:

1. Pott's fracture are falling common fractures seen especially in male (80%) with active age group 31-40 years (33.33%).
2. Road traffic accidents (high velocity trauma) from the commonest mode of injury (56.67%).
3. All patients are to be thoroughly evaluated to rule out any co-morbidities and if any treated accordingly.
4. Each patients fracture type and soft tissue status should be analyzed appropriately before surgery.
5. Achieving a congruous joint surface and convert alignment by closed reduction or open reduction and stable internal fixation should be the goal to facilitated early mobilization and consequent good functional results.
6. Accurate reduction and surgical fixation of the Pott's fracture is emphasized because even the slightest in congruity leads to stiffness, osteoarthritis and instability of ankle mortise affecting the weight bearing and locomotion of the patient.
7. Interposed soft tissue should be complexity excised before fixing the fracture. Every attempt should be made to restore the articular congruity to prevent arthritis, postoperative disability.
8. Attention paid to tensionless suturing techniques and careful handling of skin resulted in excellent wound healing.
9. Postoperative rigid immobilization and protected weight bearing for 12 weeks and minimal to achieve good union followed by physiotherapy to restore the maximum range of movements.
10. The post operative functional outcome indicated that surgical management is a fracture treatment option for bimalleolar fractures.

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