



COMPARISON ON OUTCOME OF TIBIAL PLAFOND FRACTURES MANAGED BY ANKLE SPANNING UNIAXIAL EXTERNAL FIXATOR ALONE VERSUS TWO-STAGE MANAGEMENT WITH FINAL PLATING

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ABSTRACT

Tibial plafond fractures are associated with massive swelling of ankle & foot as well as with open wounds. Soft tissue is the determinant for surgical indication & type of implant. This study compares soft tissue healing, infection rate & union times in plafond fracture managed by ankle spanning uniaxial external fixation alone versus those managed by two staged procedure with final plate fixation.

Key words:

Plafond Fracture, Uniaxial Ankle Spanning
External Fixation, Two Stage Plate Fixation,
Fracture Healing.

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INTRODUCTION

The terms Distal tibial explosion fracture, Tibial plafond fracture, Pilon fracture all have been used to describe intra articular fractures of distal tibia. It is caused by High energy Axial compression force and low energy rotation forces⁽²⁷⁾. Two types of classification of these fractures are mostly used the AO/OTA and REUDI AND ALLGOWER classification.⁽⁴⁰⁾

Fractured limb X-rays are of routine use, X-ray of contralateral limb may be of benefit as a template for articular reconstruction.⁽²⁷⁾ C.T scans are extremely useful in determining the size, direction, comminution and displacement of articular fragments.⁽¹⁹⁾ Intra articular fractures of distal tibia are treated by various methods including traction, lag screw fixation, P.O.P, ORIF with plate and screws, MIPPO with plate and screws, External fixation with minimal internal fixation of tibia, external fixation of tibia with ORIF of fibula, only external fixation of tibia alone.⁽³⁹⁾

The present study would look at the outcome of tibial plafond fractures stabilised with ankle spanning uniaxial external fixation alone versus two stage management with final plate fixation.

MATERIALS AND METHODOLGY

A prospective study was conducted, the data for this study was collected from the patient admitted to Rajah Muthiah Medical College and Hospital, Annamalai University, Chidambaram, diagnosed to have intra articular fractures of distal tibia, 11 patients were treated surgically using uniaxial external fixators alone and 9 patients had been managed with a two staged protocol with final plate fixation during the period JUNE 2015 to JUNE 2016. The clinical and radiological outcomes were assessed and recorded. The ethical committee clearance was obtained from the institution.

Inclusion Criteria was 1] Patients with intra articular fracture of distal tibia aged 18 years and above, 2] All unilateral and bilateral cases, 3] compound and closed types of plafond fractures, 4] plafond fractures with diaphyseal extension, 5] any plafond fracture regardless of comminution. 6] patients with gross soft tissue injuries, impending compartment, severe closed soft tissue injuries.

Exclusion Criteria is paediatric closed plafond fracture.

Principle

The uniaxial external fixator that spans the ankle, offers mechanical stability to the fracture there by healing the

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overlying soft tissues. The fracture is reduced by distraction and ligament taxis.

All parts of the EXTERNAL FIXATOR are made up of a stainless steel. The system consists of A.O rods, A.O clamps, Schanz screw of size 4.5mm, Tube to tube clamps, 10-11 spanners and T-handle.

ANKLE SPANNING UNIAXIAL EX-FIX –group1.

Surgical treatment was performed by experts. 11/20 patients underwent thorough wound debridement in compound fractures, attempted closed reduction, or reduction through the compound wound of the fracture using traction and manipulation in a supine position on a table. When fracture is reduced ligamentotaxis and limb length was achieved by ankle spanning uniaxial external fixator. Thus fracture reduction and maintaining the limb length is the mainstep in the external fixation. If the fracture was found to be unstable, additional A.O rods were used,⁽¹⁸⁾ or lateral pillar is stabilised using fibula fixation with k-wires or 1/3 tubular plate.⁽³⁵⁾ Knee mobilisation started immediately postoperatively. The fracture reduction and limb length were obtained intraoperatively in both AP & lateral views. Post-operatively early, non weight bearing mobilization was begun within limits of pain tolerance. Active, assisted and active range of motion exercises of knee joint proved to be valuable adjuvant for achieving a supple knee joint. Pin tract and soft tissue infection was taken care with regular betadine dressing and I.V antibiotics for 7-10 days. All patients were advised partial weight bearing with a walker for a period of twelve to fourteen weeks. Patients were allowed full weight bearing after radiological evidence of fracture union. Radiographs were taken at regular intervals and evaluated for fracture healing, alignment. Clinical union was defined as a painless fracture site during full weight bearing. Radiographic union was defined as bridging trabeculations across the fracture line on two orthogonal views. External fixators were removed after a period of twelve to fourteen weeks and limb was maintained with Ptb cast with full weight bearing for 4 weeks.

Two Stage Procedure With Final Plate Fixation –group2

9/20 underwent ORIF/MIPPO with plate and screws, after a period of two to three weeks of external fixation, when 1, the soft tissue has healed well, 2, skin wrinkle has appeared, 3, skin pinchability has been achieved, 4, no pin site infection, 5, when fracture is unstable, 6, when fracture pattern is suitable for definitive fixation.

Immediate knee and ankle mobilisation exercises are started. Patients are allowed full weight bearing after clinical consolidation and radiological evidence of healing had occurred. Post operative radiographs and surgical site were evaluated at regular follow up.

RESULTS

During the period of study a total of 20 cases of intra articular fractures of distal tibia were taken up of which 11 cases were united well with ankle spanning uniaxial external fixator and rest 9 cases went for ORIF with plate and screws, after a period of two to three weeks of external

fixation. Case followed up at two weeks, three months, six months and twelve months intervals.

Average age of patients was 53.5 (range 35 to 72) years. There were sixteen male patients, four were females. The youngest patient in our series was thirty five years old and the oldest was seventy two years old. Fourteen fractures involved right side. Six fractures were left sided. The fracture types are given in table 1. Trauma to surgery interval was 6 hours to 1 day. The average surgical time was 75 minutes (range 60 to 90 min). Average blood loss was 150 ml (range 100 to 300ml). Average hospital stay was 15 days (range 13 to 18 days), in case of uniaxial ankle spanning external fixator. Average time from external fixation and ORIF was fifteen days (range 14-16 days) and when the patient was taken for second surgery the average stay was 25 days (range 20 to 30 days). Average blood loss was 300 ml (range 150-450ml). Post op complications were 9.1% in group 1 and 11.1% in group 2. Mean union time in weeks were 22.90 +/- S.D of 3.2 in group 1 and 23.50 +/- S.D of 2.9 in group 2. Mean IOWA SCORE were 92.54 in group 1 and 94.00 in group 2. Full weight bearing was started from third month (range 3 to 4 months) in first surgery. Full weight bearing was achieved after 6 months (5 to 7) month. IOWA SCORING was done for all cases. Of eleven patients, 10 reported excellent, 1 good, in whom plafond fractures treated with ankle spanning uniaxial external fixator alone as definitive procedure. Rest nine patients in whom two staged surgery was performed, 7 reported excellent, 1 good, 1 fair. The p-value of IOWA scoring is <0.001. In our series most of the complications were minor and resolved with minimal interventions without causing any lasting morbidity. Only one patient in group 2 had deep infection and skin necrosis which was treated with I.V antibiotics and SSG cover.

Table 1 Fracture Pattern

Type of fracture	No. of patients
43 A1	6
43A2	0
43A3	4
43B1	0
43B2	0
43B3	2
43C1	1
43C2	6
43C3	1

DISCUSSION

Tibial plafond fracture though easy to treat surgically, the most dreadful complications are skin necrosis and arthritis of ankle joint.^(16,34) Uniaxial Ankle Spanning external fixator brings solution to the above problems. The main finding in our study shows that the management with uniaxial ankle spanning external fixator alone, as definitive procedure involves a slight faster union than a two stage procedure with final plate fixation. In our study we maintain the following protocols, regular post operative dressing, plastic surgery opinion for skin condition, physiotherapy to keep neighbouring joint supple, i.v antibiotics for 5 days, regular check for skin wrinkles to appear and skin to become pinchable, radiological assessment of the fracture site.

Case 1 Pre Op X-Ray & Clinical Picture



C-Arm and Clinical Picture- Immediate



Immediate Post Op X-Ray



4 Months Follow Up X-RAY & Clinical Picture



Case 2 Pre Op Clinical Picture & X - Ray



Intra Operative & Immediate Post OP X-Ray



Second Post Operative Clinical Picture



Second Post Operative X-RAY



Table 2 Iowa Scoring System

Score	No of Patients
Excellent (more than 90)	18[10 in group 1, 7 in group 2]
Good (81-90)	2[1 each in group 1 & 2]
Fair (71-80)	1 in group 2.

Table 3 Complications

Post-operative Infection	1
Pin site infection	1
Skin necrosis	1
Non union	0

Finally decision is made either to continue external fixator as permanent treatment or to go for second surgery (ORIF), as permanent treatment.^(7,37) In some of our cases certain factors made us necessary to revise ex.fix, they are, soft tissue condition, need for second debridement, pin site infection and loosening, mechanically unstable external fixation, bone loss, neurovascular injury.⁽³⁵⁾ Advantages of ankle spanning uniaxial external fixation in plafond fractures are as follows, 1) less soft tissue damage, 2) no large implants in subcutaneous plane, 3) less rates of infection, 4) maintains limb length, 5) maintains alignment, 6) good soft tissue healing, 7) as a definitive procedure for fracture healing, 8) an ease for second procedure [ORIF], 9) decreased articular impaction prevents ankle joint arthrosis⁽³⁰⁾.

Disadvantages of ankle spanning uniaxial external fixator is, 1) insufficient reduction, 2) loss of alignment, 3) pin tract infection, 4) stiff ankle in few cases.⁽³⁰⁾ Thus ankle spanning uniaxial external fixator in plafond fractures has advantage of percutaneous application and modifiable biomechanical characteristics.⁽²⁹⁾ It can be used in both emergency⁽³⁴⁾ and elective procedures⁽³⁶⁾ as safe and reliable method.⁽³⁴⁾

CONCLUSION

Even though the differences between the two groups were not statistically significant. In our study we believe that lesser aggression to the soft tissues involved in group 1 treatment, could suppose a determinant factor in the biomechanics of the union process. Ankle spanning uniaxial external fixator in plafond fracture is a SAFE and RELIABLE method in achieving temporary or permanent stability in pilon fractures. It is a versatile tool and has advantage of percutaneous application and modifiable biomechanical characteristics. Used as a device for temporary management in plafond fractures for patients undergoing two staged procedure with final plate fixation, or as a definitive management in patients who can rehabilitate comfortably and stimulate fracture healing through protected weight bearing.

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