

Study of functional outcome of 42 cases of Type V and VI Tibial plateau fractures treated with Fine wire fixator as a definitive procedure.

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Abstract:

Background:

MECHANISM:

Fractures of the tibia plateau occur as a result of strong valgus or varus forces during axial loading of the respective femoral condyle producing both a shearing and a compressive force on the underlying tibial plateau. Both the collateral ligament act like a hinge as valgus or varus forces drive the lateral and medial femoral condyle into the tibial plateau.

The articular surface of the medial condyle is prolonged anteriorly, and as the knee comes into fully extended position, the femur internally rotates until the remaining articular surface on the medial condyle is in contact. The posterior portion of the lateral condyle rotates forward laterally, thus providing a screwing home movement, locking the knee in the fully extended position. When flexion is initiated unscrewing of the joint occurs by external rotation of the femur on the tibia. It is called the screw-home movement.

Materials & methods:

we have studied 42 patients with 47 knees during a period from September 2013 to August 2016 in the tertiary care center of Osmania Medical College/ Govt.General and Chest Hospital, Hyderabad, Telangana. The Type V and VI of Schatzker were include in this study.

Results:

The results in this study were assessed by the criteria of soft tissue healing, bony union of the Tibial plateau fractures and the range of movements of the knee joint. Bony union is Excellent in 38, Good in 5, Bad in 4. The Range of movements 100-110 degrees in 39, 80-100 degrees in 5, Less than 80 degrees in 3.

Conclusions:

The Fine wire Ring fixator provides a definitive treatment to treat the Fracture disease associated with the Tibial Plateau fractures, better range of movement of the joint and faster bony union of the Tibial Plateau.

Keywords: Fine wire Ring fixator, Ilizarov, SCHATZKER'S, Tibial plateau.

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I. Introduction:

Tibial plateau fractures are one of the commonest intra-articular fractures. They result from indirect coronal or direct axial compressive forces. These make up about 1% of all fractures and 8% of fractures in the elderly. Most injuries affect the lateral tibial condyle (55 to 70%) and isolated medial condyle fractures occur in 10 to 23%, whereas Type V and VI of Schatzker's fractures are seen in 10 to 30% of the reported series. Apart from tibial plateau bony injury, meniscal tears and ligament injuries should also be assessed. High velocity injuries sustained in automobile accidents are creating an ever-growing problem. Since travelling at high speeds in the sitting position with the loading edge composed of flexed hind limbs, when the machine in which the subject is travelling stops suddenly, most of the impact is taken at first on the patella, then the tibia and femur in varying proportions and at various positions. The stationary lower limb may be struck by a moving object from lateral side. This is the common pedestrian injury, the so called "BUMPER or FENDER FRACTURE" since the bumper of most vehicles being placed roughly at knee height. Graham Apley studied 60 cases-valgus stress. Wilson & Jacobs (1952) suggested abduction combined with compression forces are the cause. Associated with ligamentous injuries Meniscal injuries with osseous depression of articular surface and translational displacement of the fracture fragments.

Because of the disparity between the lengths of the articular surfaces of the femoral condyles and the tibial condyles, two types of motion during flexion and extension are produced.

- 1) Ginglymus (hinge).
- 2) Trochoid (pivot joint) articulation.

The joint permits flexion and extension in the sagittal plane and some degree of internal and external rotation when the knee is flexed. The complex flexion and extension motion is a combination of rocking and gliding. The rocking motion is demonstrable in the first 20° of flexion, after which the motion becomes predominantly of the gliding type. The natural deflection outward of the tibia on the femur, at the knee joint produces greater weight bearing stresses on the lateral femoral condyle than the medial. But because the medial condyle of the femur is prolonged further forwards than the lateral condyle, the vertical axis of rotation falls in a plane near the medial condyle. Flexion and extension range from 0°-140°. Rotation ranges from 5°-25° with individual variation. 5-10° of Hyperextension is also possible. Medial meniscus is more prone for injury because the anchorage of the medial meniscus permits less mobility.

Anatomical consideration:

Expanded overhang of the condyles on the shaft with inadequately supported by the cortical bone. Trabecular pattern of the medial condyle is dense allowing axial weight bearing thrust. The trabecular pattern of lateral condyle is less dense, hence fractures are common.

II. Materials And Methods

we have prospectively studied 42 patients with 47 knees during a period from September 2013 to August 2016 in tertiary care of Osmania Medical College/ Govt. General and Chest Hospital, Hyderabad, Telangana. The Type V and VI of Schatzker (Fig: 1) were include in this study. There were 40 males and 2 females. The age group was from 21yrs to 54yrs. There were 30 right sided ,7 left sided and 5 bilateral injuries. There were 32 patients who developed Fracture Disease. All the cases sustained road traffic accidents with direct injures to the knee joints. Three patients sustained injuries on both sides due to a fall heavy metal objects on both knees.

Inclusion criteria:

1. Schatzker's type V Tibial Plateau fractures
2. Schatzker's type VI Tibial Plateau fractures
3. Compound fractures of Tibial Plateau.
4. Associated Tibial shaft fractures.
5. Fracture disease with Schatzker's Type V and VI.

Exclusion criteria:

1. Schatzker's types I, II, III

Procedure:

Pre-Operative evaluation:

All the patients were admitted in the ER. The patients reached the ER within 12 hrs. to 72 hrs. following the trauma. 32 patients developed fracture disease with serous and hematogenous blisters within 12 to 24 hrs after the trauma and were evaluated radiographically. The CT scans were done to assess the amount of articular incongruity. The diagnosis of Schatzker's Type V and VI (Fig: 1) was confirmed. The soft tissue components were assessed to rule out any physiological degloving of the skin. All the patients underwent routine surgical profile and PAC also. All the cases were operated within the 24 to 32hrs after the admission to the hospital.

Surgical procedure:

All the surgeries were done under regional anaesthesia. When the joint congruity was minimal fracture table was used otherwise normal radiolucent table was used. A pneumatic tourniquet was used in all cases. A pre-assembled three Ilizarov fine wire ring frame was used. Under the C arm control the condyles were manipulated with 2.5mm K wires as Joy sticks and were temporarily stabilized with K wires. The proximal condylar fragments were fixed with 3 K wires using Alive wires and also percutaneous cannulated Screws to compress the condyles (Fig: 2) to get near normal joint congruity and normal width of the condyles in relation to the Femoral condyles. The metaphyseal fracture was stabilized with 2 fine wires in the second ring. The distal metaphysis of the Tibia was fixed to the third ring with two fine wires. The reduction of the fracture was confirmed in both AP & Lateral views under C arm. Aseptic dressings were done around the fine wires only. The compound wounds were closed in layers after repeat debrima.

Fig: 1a & b

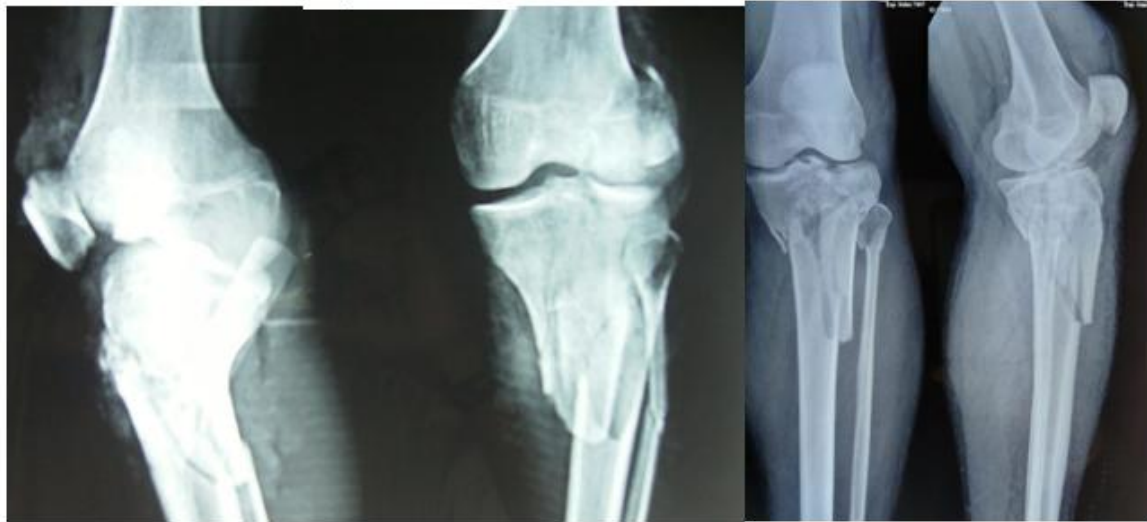
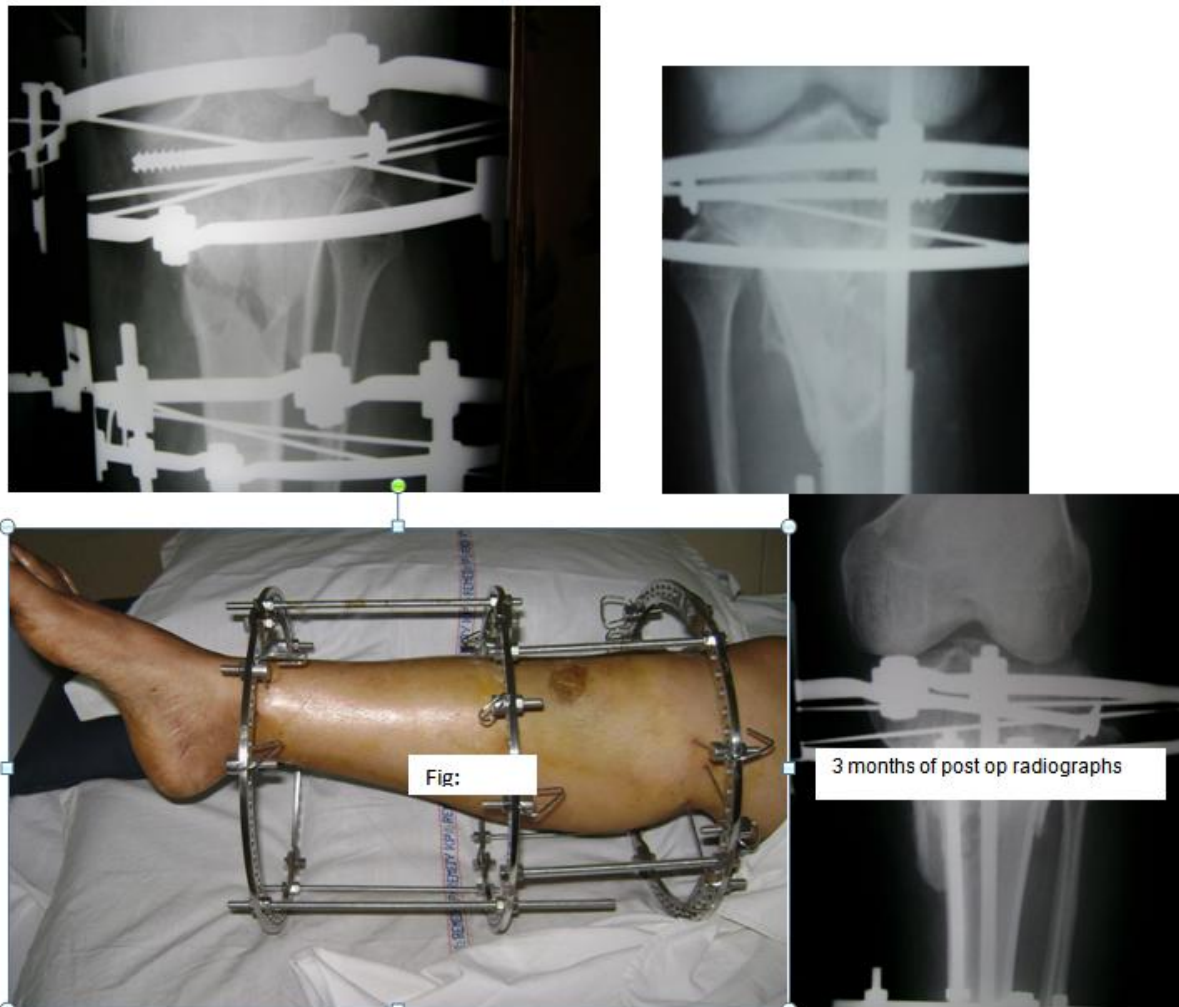
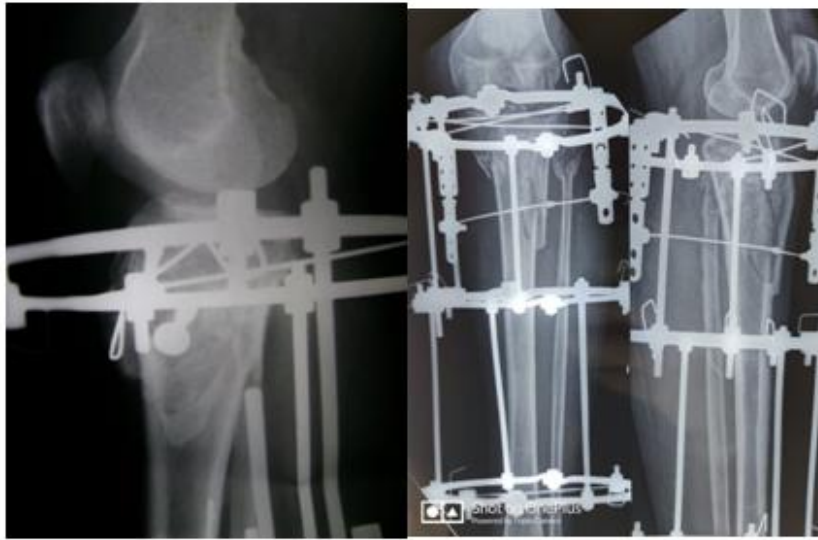


Fig:2a & b



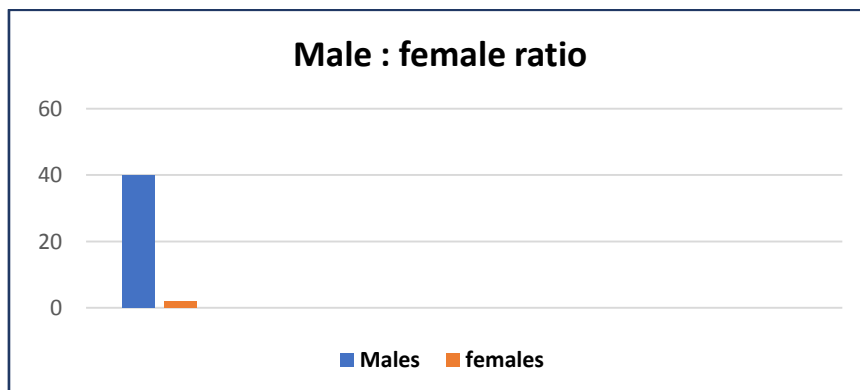


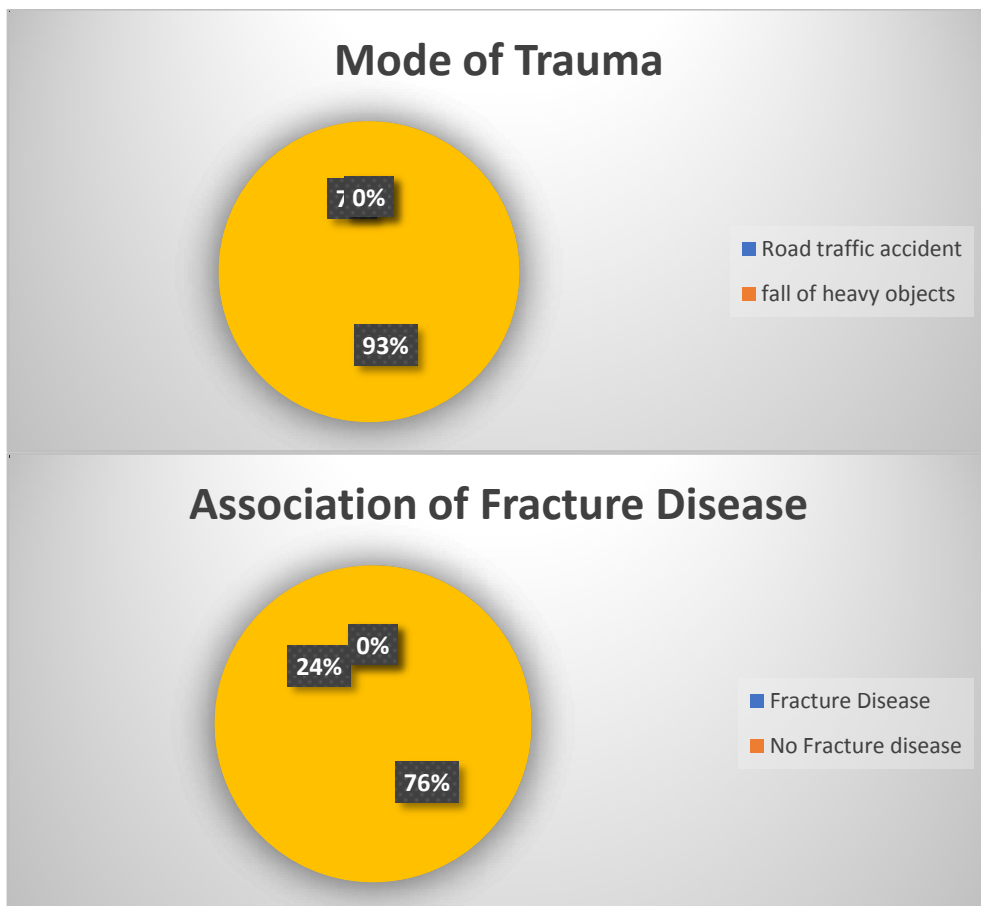
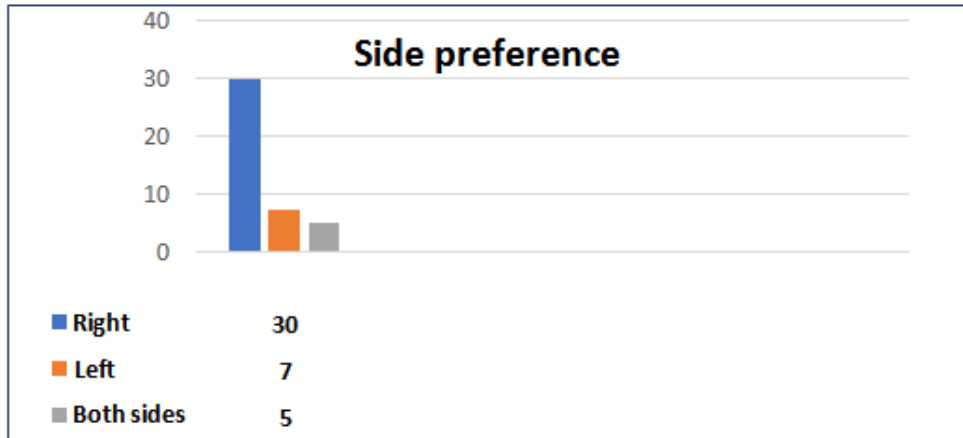
Follow up radiographs after frame removal

Post-operative management:

The patients were allowed partial weight bearing as tolerated from 3rd post op period. Routine antibiotic and analgesic protocol were followed in all cases. The ROM of the knee was allowed. The patients were followed at 3 weeks ,8 weeks three months and 6months intervals till there was clinico radiological union.

Statistics:



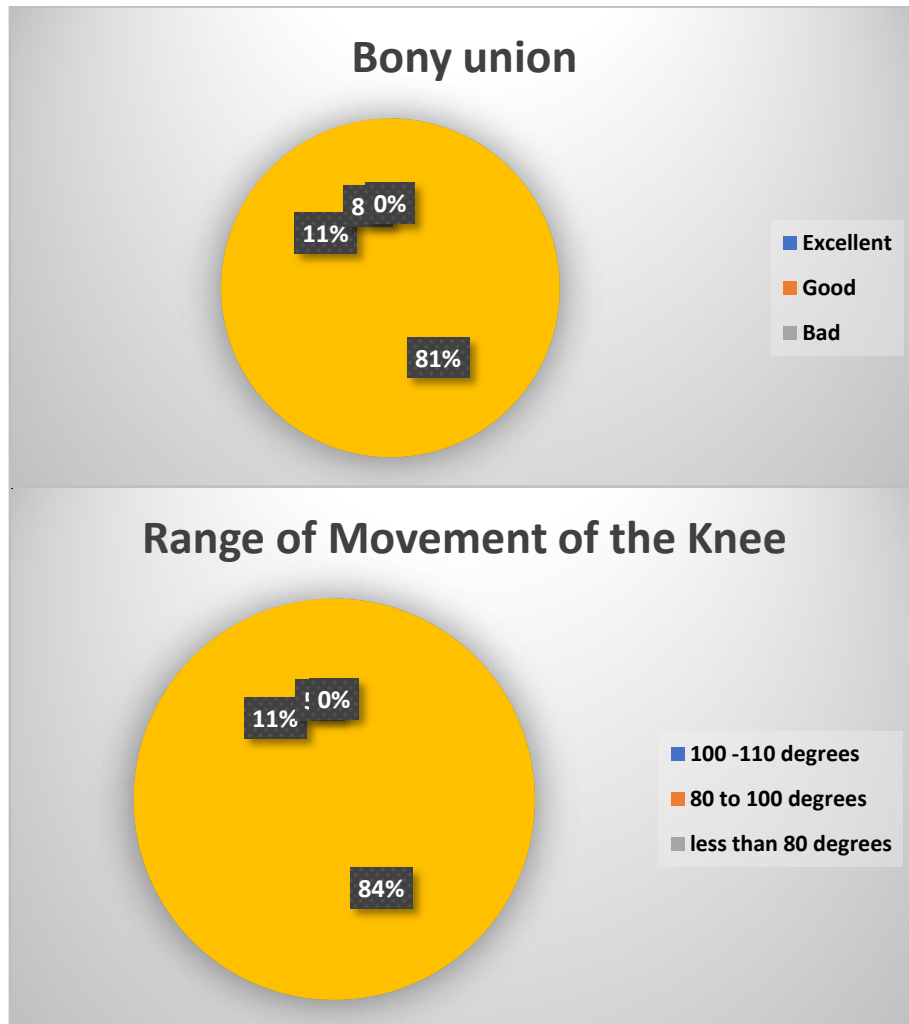


III. Results:

In this study of 42 patients with 47 knee joints,

1. 38 knees have got excellent union with 100 to 110 degrees of flexion of the knee joint.
2. Five knees have good union with 95 to 100 degrees of flexion of the knee joint.
3. Two knees had early secondary OA changes even though there were good union with limitation flexion upto 80 degrees only.
4. Two knees have developed gross stiffness of the knees and developed varus deformities even though there was union of the fractures.

Among the gross stiffness knees group one patient had a delayed healing of the compound wound by secondary infection due to infection. The average time for the union was 4 months. All the patients were ambulatory with partial weight bearing from day 3 post op period.



IV. Discussion:

The aim of the prospective study is to assess the functional outcome in 42 patients with 47 knees of Schatzker's Type V and VI operated primarily with Fine wire Ring fixator as a definitive procedure. The advantages of FineRing wire fixator are,

1. Easy reproducibility
2. Early weight bearing
3. Better ROM of the knee joint
4. Better soft tissue healing
5. Faster bony union due to controlled axial compression

We analyzed the results in terms of age of the patient, sex distribution, mode of injury, side of the fracture, complications and the functional outcome.

V. Conclusions:

In this study of 42 cases with 47 knees we observed 32 cases with fracture disease. The Fine wire Ring fixator provides a definitive treatment to treat the Fracture disease associated with these types of fractures, better range of movement of the joint and faster bony union of the Tibial Plateau. We had noticed two cases with gross restriction of the ROM of the Knee joints.

Conflict of interest: NIL

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