Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2016/548

Original Article

Analysis of Functional Outcome of Complex Tibial Plateau Fractures (Schatzker Type 5 and Type 6) Treated with Hybrid External Fixators

A Sureshkumar[1], G Samynathan[1], Heber Anandan[2]

[1]Professor, Department of Orthopedics, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, [2]Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Healthcare Limited, Tamil Nadu, India

Abstract

Introduction: Despite many advances in the case of intra-articular fractures, a survey of literature indicates that many authors report only slightly better than 50% satisfactory results, closed or operative methods of treatment. For over 3 decades, various modalities of treatment starting from traction, knee-spanning external fixator to total knee arthroplasty for tibial plateau fractures. Minimal intervention and hybrid external fixator can provide a fair outcome with fewer complications.

Aim: To evaluate functional outcome of tibial plateau fractures (Schatzker Type 5 and Type 6) treated with hybrid external fixator.

Materials and Methods: This is a prospective study of 20 cases of tibial plateau fractures (Schatzker Type 5 and Type 6) surgically fixed with hybrid external fixator system.

Results: All fractures united by 6-10 weeks. Compound fractures showed 15 Neer's rating score and closed fracture showed 17 score; in our study, 5 patients had pin site infections, 3 had wound infection, 4 had knee stiffness, 1 had varus malunion, and 1 with 0.5 cm shortening.

Conclusion: The choice of treatment with hybrid external fixator system can be considered for high-energy tibial plateau fractures, especially in compound fractures the advantage being early mobilization preserving fracture hematoma, avoids soft tissue disruption.

Key words: Compound fracture, Hybrid external fixator, Schatzker Type 5 and Type 6

INTRODUCTION

Despite many advances in the care of intra-articular fractures, tibial plateau fractures continue to be a difficult surgical problem. A survey of the literature indicates that many authors report only slightly better than 50% satisfactory results with either closed or operative methods of treatment.[1,2] The failures of treatment are usually due to residual pain, stiffness, instability deformity, recurrent effusions, and giving way. Review of over 140 of these fractures treated by both closed and operative methods has shed considerable light on the reason for the failures.[3,4]

For over three decades, various modalities of treatment starting from (traction, knee-spanning external fixator to total knee arthroplasty) used for tibial plateau fractures. Traction and closed reduction followed by the pop application will not restore the articular surface and lead on to articular surface collapse and knee stiffness. Ordinary external fixators are not suitable for tibial condyle fractures because if it is applied we should span the knee joint lead on to stiffness of knee joint. Open reduction and fixation with plating even though will lead to good reduction of articular surface, it will not protect already damaged soft tissue will lead on to wound necrosis and complications. ORIF with dual plating has been an attractive treatment method for these types of injuries.[5] Since the early 1990s, to reduce the incidence of devastating complications such as joint stiffness, malunion, skin loss, osteomyelitis, amputation,

Access this article online

www.ijss-sn.com

Month of Submission : 08-2016
Month of Peer Review : 08-2016
Month of Acceptance : 09-2016
Month of Publishing : 10-2016

Corresponding Author: Heber Anandan, No.10, South By-pass Road, Vannarpettai, Tirunelveli - 627 003, Tamil Nadu, India. Phone: +91-9894067910. E-mail: clinicalresearch@dragarwal.com

and even death can occur.[6] Hybrid external fixator for high-energy tibial plateau fractures usually protect soft tissue envelope. It also allows access to soft tissue cover during the fracture treatment. If we add additionally cannulated screws and K-wires for articular surface reduction, it will give additional stability lead on to earl knee mobilization and also avoids knee stiffness.[4,7] Minimal interventions and hybrid external fixation can provide a fair outcome with fewer complications compared to open reduction internal fixation with plating or other methods.

Aim

To evaluate functional outcome of tibial plateau fractures (Schatzker Type 5 and Type 6) treated with hybrid external fixator.

MATERIALS AND METHODS

This is a prospective study conducted in the Department of Orthopedics, Tirunelveli Medical College Hospital. The Institutional Ethics Committee approval and informed consent from the patients were obtained. After surgery, the patient symptom was subsided. The patient walked with walker with touch toe. After 2 weeks, the patient was started on partial weight bearing walking with walker and 6 weeks full weight bearing with walker support. After 6 weeks, the fracture was united radiographically. Fixator was removed and patella tendon bearing (PTB) cast applied with patient allowed to full weight bearing walking. After 2 weeks, the PTB cast was removed. And start to walk with walker and gradually discarded the walker.

Inclusion Criteria

1. Age above 20 years
2. Closed tibial plateau fractures (Schatzker Type 5 and Type 6)
3. Compound tibial plateau fractures (Grade I to Grade III B)

Exclusion Criteria

1. Age <20 years
2. Patients with co-morbid medical condition
3. Closed tibial plateau fractures (Schatzker Types 1-4)
4. Compound tibial plateau Grade III C fractures
5. Associated fractures such as floating knee and pilon fractures.

RESULTS

The analysis was done using Neer's rating system for knee, and the following results were obtained.

According to Neer's score rating system for knee, the 40% patients had excellent and 40% patients had good outcome. 13% of patients had fair outcome and only 5% had poor outcome (Table 1).

Out of 20 cases, 8 cases were Type 5 and 12 cases were Type 6 Schatzker, and the average Neer's scoring for them was 17.25 and 14, respectively (Table 2).

Out of 20 cases, our study had 7 cases of closed fracture and 13 cases of compound fracture which were treated by hybrid fixator showed average Neer's score of 17.28 and 14.78, respectively (Table 3).

Road traffic accident predominates assault in mode of injury perhaps fall injury stood last (Figure 1).

Among the high-energy fractures of tibial condyle, Type 6 showed more frequency. Type 5 almost equals the frequency (Figure 2).

Most common complication is pin site infection, overcame by regular dressing. Knee stiffness found in 20% of patients, managed by physiotherapy (Table 4).

Table 1: Distribution of study patients in grade

Grading	Number of cases (%)
Excellent	8 (40)
Good	8 (40)
Fair	3 (13)
Failure	1 (5)

Table 2: Results according to Schatzker's type

Schatzker's type	Number of cases	Average Neer's rating score
Type 5	8	17.25
Type 6	12	14

Table 3: Results based on type of fracture (closed/open)

Fracture	Number of cases	Average Neer's rating score
Closed fracture	7	17.28
Compound	13	14.78

Table 4: Complications

Complications	Number of cases (%)
Pin site infection	5 (25)
Knee stiffness	4 (20)
Malunion	1 (5)
Shortening	2 (10)
Wound infection	3 (15)

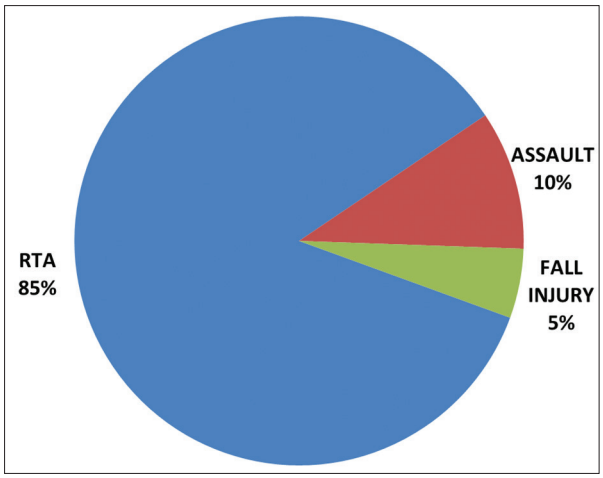

Figure 1: Mode of injury

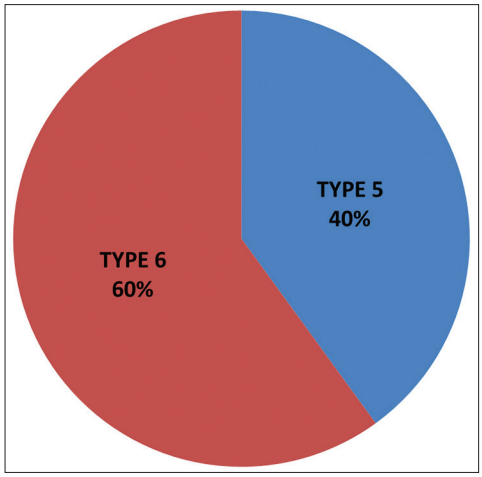

Figure 2: Classification of fractures

DISCUSSION

The average time for fracture healing was 8 weeks (ranging from 6 to 10 weeks). Fracture pattern, type of fracture (closed/open), and presence of infection significantly affected the fracture healing. Anatomical reduction and relatively stable fixation had early rehabilitation and reduced complications.[8,9]

In recent years, use of hybrid fixator for tibial condoles fractures, especially for compound fractures has increased because of easy applicability, less blood loss compared to ORIF with plating. Preservation of the fracture hematoma aids in good healing potential and early union. Avoids skin necrosis which was potential problem in proximal tibia fractures and also allows room for skin/flap cover in cases of compound fractures with skin loss/bone exposed.[5,10]

Pin site infection is the most common complication of our study. Even though it looks high, it was managed properly with early intervention by proper dressing and appropriate antibiotics. If not diagnosed early, it will cause spread of infection into the joint through pins in the 5/8th ring lead to septic arthritis which is most dreaded complication.

Knee stiffness was another notorious complication for proximal tibia fractures. In our study, it was 20% even though it looks high-study period was too short to commit these results.[11,12] After a couple of years, the range of movements in these patients may improve and functional outcome may go up.

CONCLUSION

In general, hybrid external fixator is a promising alternative treatment for high-energy tibial plateau fractures. It allows anatomical reconstruction of the articular surface, stable fixation of fracture fragments, early rehabilitation of the joint, and care of associated soft tissue injuries, without a high rate of complications.

REFERENCES

1. Sirkin MS, Bono CM, Reilly MC, Behrens FF. Percutaneous methods of tibial plateau fixation. Clin Orthop Relat Res 2000;375:60-8.
2. Schatzker J, Sanderson R, Murnaghan JP. The holding power of orthopedic screws *in vivo*. Clin Orthop Relat Res 1975;108:115-26.
3. Steink H, Mosheiff R, Frigg R, Perren SK, Cordey J. Tthe hybrid external fixator: A biomechanical study. Clin Biomech 1997;12:259-66.
4. Thakur AJ. Elements of Fracture Fixation. 1st ed. Ch. 8. Philadelphia, PA: W.B. Saunders; 1997. p. 147-76.
5. Weiner LS, Kelley M, Yang E, Steuer J, Watnick N, Evans M, *et al.* The use of combination internal fixation and hybrid external fixation in severe proximal tibia fractures. J Orthop Trauma 1995;9:244-50.
6. Bianchi-Maiocchi A, Aronson J. Operative Principles of Ilizarov. Baltimore: Williams & Wilkins; 1991.
7. Watson JT. High-energy fractures of the tibial plateau. Orthop Clin North Am 1994;25:723-52.
8. Karunakar MA, Bose MJ. Rockwood and Greens Fracture in Adults. 5th ed. Ch. 231-245. Philadelphia, PA: Lippincott Williams & Wilkins; 2001.
9. Farrar M, Yang L, Saleh M. The Sheffield hybrid fixator – A clinical and biomechanical review. Injury 2001;32 Suppl 4:SD8-13.
10. Yilmaz E, Belhan O, Karakurt L, Arslan N, Serin E. Mechanical performance of hybrid Ilizarov external fixator in comparison with Ilizarov circular external fixator. Clin Biomech (Bristol, Avon) 2003;18:518-22.
11. Roberts CS, Antoci V, Antoci V Jr, Voor MJ. The accuracy of fine wire tensioners: A comparison of five tensioners used in hybrid and ring external fixation. J Orthop Trauma 2004;18:158-62.
12. Robern CS, Dodds JC, Pery K, Berk D, Selingson D, Voor MJ. Hybrid external fixator of proximal tibia: Strategies to improve frame stability. J Orthop Trauma 2004;18:57.

How to cite this article: Sureshkumar A, Samynathan G, Anandan H. Analysis of Functional Outcome of Complex Tibial Plateau Fractures (Schatzker Type 5 and Type 6) Treated with Hybrid External Fixators. Int J Sci Stud 2016;4(7):156-158.

Source of Support: Nil, **Conflict of Interest:** None declared.