

## ARTHROSCOPIC ASSISTED MANAGEMENT OF TIBIAL PLATEAU FRACTURES; A NOVEL TECHNIQUE

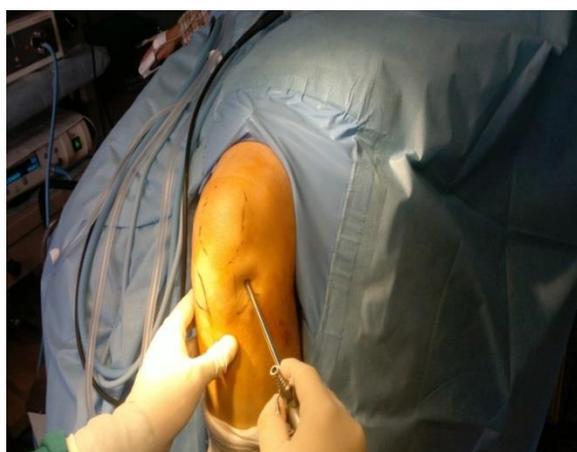
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### ABSTRACT:

*Minimally invasive surgery techniques such as indirect arthroscopic assisted reduction of Periarticular fractures have gained popularity over the recent years and produced good results. The ultimate goal of the intra-articular fracture treatment should be the precise restoration of the joint surface and rigid fixation to allow immediate postoperative non-weight-bearing exercises. The treatment of tibial plateau fractures with arthroscopic assisted osteosynthesis is a novel method that is associated with lower morbidity, less extensive surgical dissection. Arthroscopic assisted reduction and fixation is reliable, safe, attractive and excellent option in the treatment of properly selected tibial plateau fractures.*

Tibial plateau fractures have always been a challenge for orthopaedic surgeon. Like other intra-articular fractures, regaining pre-injury functional status in the tibial plateau fracture is challenging for orthopaedic surgeons because of its severity of trauma, associated soft tissue injuries and postoperative stiffness.<sup>1</sup> Traditional surgical methods achieve satisfactory results in 70–80% of cases however, these methods have a high incidence of complications including loss of reduction, infection, and septic arthritis.<sup>1</sup> The goals of treatment are restoration of normal alignment, joint congruity, joint stabilization and, ultimately, the prevention of degenerative osteoarthritis.<sup>2,3,4,5</sup> This is further facilitated if soft tissue damage can be kept to a minimum degree. Open reduction and internal fixation have a high incidence of soft tissue problems, while plaster cast immobilization produces higher joint stiffness and deep vein thrombosis rate.



**Arthroscopic Guided Reduction of Fracture**



**Initial Haemarthrosis Drainage**

There have been many options for the treatment of tibial plateau fractures in orthopaedic literature including conservative treatment, external fixation, open reduction-internal fixation (ORIF) and *arthroscopic assisted osteosynthesis*.<sup>6</sup> The ultimate goal of the intra-articular fracture treatment should be the precise restoration of the joint surface and rigid fixation to allow immediate postoperative non-weight-bearing exercises.<sup>3,6</sup> The difficulty in achieving precise reduction using conservative methods and the higher morbidity associated with traditional surgical methods have led to the development of semi-invasive techniques.<sup>3,7</sup> The treatment of tibial plateau fractures with *arthroscopic assisted osteosynthesis* is one method that is associated with lower morbidity, less extensive surgical dissection.<sup>3,8,9</sup> Furthermore, arthroscopy allows the surgeon to diagnose and treat concomitant intra-articular injuries.<sup>3,10,11</sup>

Minimally invasive surgery techniques such as indirect *arthroscopic assisted* reduction have gained popularity over the recent years and have been associated with good results. Fowble (1993)<sup>12</sup> compared arthroscopic treatment to open reduction and internal fixation. He reported better results in terms of hospital stay, time to full weight bearing and anatomical reduction of the joint surface in patients

who underwent arthroscopic treatment. With the assistance of arthroscopy the articular surface can be seen better without meniscal detachment and intra-articular lesions can be diagnosed and eventually treated. As demonstrated by walker and Erkman (1975)<sup>1</sup> both menisci are crucial for the maintenance of a normal joint function. For this reason the treatment of associated lesions of the meniscus is important and should be repaired or partially removed if indicated.

Other important concern with open reduction and internal fixation are the additional major surgical damage of the soft tissues and high rate of superficial and deep wound infections. In open reduction, arthrotomy with extensive soft tissue release is needed and this may lead to joint stiffness, increased pain and potential wound complications. Arthroscopy allows minimal soft tissue dissection with a lower rate of the complications.

The advantages of arthroscopic assisted management of tibial plateau fractures are<sup>(1,3,6,11,13,5,7,14,9,15)</sup>:

- 1) Direct visualization of chondral surface reduction
- 2) Accurate fracture reduction
- 3) Anatomical restoration of joint surface
- 4) Reduced morbidity in comparison with arthrotomy
- 5) Diagnosis and treatment of associated meniscal and ligamentous injuries
- 6) Thorough joint lavage
- 7) Removal of loose fragments
- 8) Early post op recovery.

Association of other intra-articular injuries in tibial plateau fractures.<sup>(16, 6, 17,9, 18)</sup>

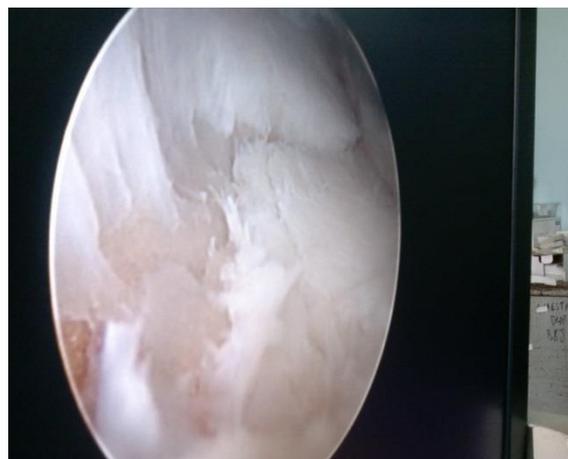
- 1) Meniscal tears occur in 57% of cases
- 2) ACL in 25% of cases
- 3) LCL in 3% of cases
- 4) MCL in 3% of cases.

Gardner (2006)<sup>19</sup> et al found that soft tissue injury could be predicted based on plain radiographic findings. Articular depression of more than 6 mm and widening of more than 5 mm were associated with lateral meniscal tear in 83% (vs 50% for less displacement) and more than 8 mm was associated with increased risk of medial meniscal tear (53% - 78%).

Review of the literature suggests *arthroscopic assisted osteosynthesis* to be equal to or better than open reduction internal fixation (ORIF) in achieving anatomical reduction. In the study of Bernfeld (1996) et al<sup>20</sup> of a small series of 9 fractures, all reductions remained anatomic at a mean follow-up of 10 months. Fowble et al (1993)<sup>12</sup> found all of their 12 *arthroscopic assisted osteosynthesis* patients remained anatomic versus only 6 of 11 for

the ORIF group. In the study of H. Kiefer et al (2001)<sup>21</sup> of a series of 31 fractures, 25 showed anatomical reduction at a mean of 25 months. F. Van Glabbeek and van Riet (2002)<sup>11</sup> were unable to arthroscopically reduce only 1 of 20 split/depression fractures. T. Ohdera and Tokunaga (2003)<sup>22</sup> reported 16 of 19 type II and III fractures were able to be anatomically reduced via ARIF. T. Gill and Moezzi<sup>14</sup> were able to correct articular depression from an average of 7.7 to 0.8 mm in 25 patients.

Arthroscopy holds advantages in patient cosmetically and, more importantly, soft tissue handling. Less iatrogenic soft tissue injury may reduce intra-articular scarring, thus improving recovery of range of motion. Wound healing and risk of infection may be improved for higher energy fractures, and postoperative pain may be less. Some of these factors have been examined in the literature. Even as early as 1985, Jennings<sup>23</sup> noted more rapid recovery, with earlier return of knee motion and reduced pain in 21 patients. T. Ohdera and Tokunaga (2003)<sup>22</sup> found easier and faster rehabilitation, with time to recovery of 120 degrees of knee flexion 4.6 versus 9.1 weeks for ORIF.



**Fracture before Reduction**



**Fracture after Reduction**

## CONCLUSION

Arthroscopic assisted reduction and fixation is reliable safe, attractive and excellent option in the treatment of properly selected cases of tibial plateau fractures because of

- Diagnosis and treatment of associated intra-articular soft tissue injuries.
- Visualization of chondral surface reduction.
- Thorough joint irrigation. Removal of loose fragments
- Accurate fracture reduction with limited soft tissue dissection
- Decreased risk of knee stiffness and more rapid recovery

## REFERENCES:

1. Walker PS, Erkman MJ. The role of menisci in force transmission across the knee. *Clin-Orthop* 1975;109:184-92.
2. Fred J. Mcglynn, Richard B Caspari, Terry L. Whipple: the role of arthroscopy in the treatment of tibial plateau fractures: (The Iowa Orthopaedic Journal;1985vol-6:107).
3. Francesco Pogliacomi et al: combined arthroscopic and radioscopic management of tibial plateau fractures: report of 18 clinical cases. *Acta Biomed* 2005; 76; 107-114).
4. Gregory M. Buchko and Donald H. Johnson: arthroscopy assisted operative management of tibial plateau fractures. *Clinical Orthopaedics and Related Research*1996; pp 29-36.
5. James H.Lubowitz, Wylie S.Elson et al: Arthroscopic management of tibial plateau fractures. *The Journal Of Arthroscopic And Related Surgery*.2004 ;20 pp: 1063-1070.
6. Cemil Kayali et al: Arthroscopic assisted percutaneous osteosynthesis of lateral tibial plateau fractures. *Can J surg*, vol.51, No.5, october2008.
7. Yi-Sheng Chan et al: Arthroscopy assisted surgery for tibial plateau fractures. *Chang Gung Med j* 2011;34:239-47.
8. Andre Weimann et al: Minimally invasive reconstruction of lateral tibial plateau fractures using the Jail technique, a biomechanical study. *BMC musculoskeletal disorders* 2013;14:120.
9. N. Lindsay Harris, Mark L, Purnell and Tomas Pevny: Arthroscopic management of tibial plateau fractures. *Techniques In Knee Surgery* 2007;6:9-16).
10. Cemil Kayali et al: Arthroscopic assisted percutaneous osteosynthesis of lateral tibial plateau fractures. *Can J surg*, vol.51, No.5, october2008.
11. F.Van Glabbeek et al: arthroscopically assisted reduction and internal fixation of tibial plateau fractures: report of twenty cases. *Acta Orthopedic Belgica*; Vol. 68-3- 2002).
12. Fowble CD, Zimmer JW et al: The role of arthroscopy in the assessment and treatment of tibial plateau fractures. *Arthroscopy* 1993;9:584-90.
13. Ali Al-Mukaimi et al: Arthroscopically assisted reduction and treatment of tibial plateau fractures. *Kuwait Medical Journal* 2005; 37(4): 263-266.
14. Thomas J. Gill, Darius M.Moezzi, Kenneth M: Arthroscopic reduction and internal fixation of tibial plateau fractures in skiing. *Clinical Orthopaedics* 2001; 383, pp 243-249.
15. Mehmet Asik, Ozgur Cetik, Ufuk Talu, Yunus V. Sozen. Arthroscopy-assisted operative management of tibial plateau fractures. *Knee Surg, Sports Traumatol, Arthrosc*(2002) 10 :364–370.
16. Andrew Furey et al: Treatment of tibial fractures. *Current opinion in orthopedics* 2007; 18:49-53.
17. C.Thomas Vangness Jr et al: Arthroscopy of meniscal injuries with tibial plateau fractures. *Bone And Joint Surg*1994;76:488-90.
18. Rockwood and Green's Fractures in adults 7<sup>th</sup> edition; vol. 2: 1780-1831.
19. Garden MJ, et al. Prediction of soft tissue injuries in schatzker II tibial plateau fractures based on measurements of plain radiographs. *J trauma* 2006;60:319-323.
20. Bernfeld M et al: Arthroscopic management for unselected tibial plateau fractures. *Arthroscopy* 1996; 12:598-602.
21. H.Kiefer, N.Zivaljevic, J.E.Imbriglia. Arthroscopic reduction and internal fixation of lateral tibial plateau fractures. *Knee Surg, Sports Traumatol Arthrosc*(2001)9:167-172).
22. T.Ohdera, M.Tokunaga, S.Hiroshima, E.Yoshimoto: Arthroscopic management of tibial plateau fractures; comparison with open reduction method. *Arch Orthop Trauma Surg* (2003)123 :489-493.
23. Jennings JE. Arthroscopic management of tibial plateau fractures. *Arthroscopy* 1985;1:160-8.