Research Paper

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"LOCKING PLATE Vs. BUTTRESS PLATING IN MANAGEMENT OF FRACTURE UPPER END OF TIBIA: A PROSPECTIVE STUDY of 30 CASES"

Medical Science

KEYWORDS : Proximal tibia fracture, locking plate, butters plate and bone grafting

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ABSTRACT

Fractures of knee joint are serious injuries that frequently result in functional impairment. The surgeon must try to maintain joint congruity, preserve the normal mechanical axis, ensure joint stability and restore a full range of motion. The aim of surgical treatment of the proximal tibia fractures is to restore and preserve normal knee function. The goal of treatment of this fracture is to achieve a stable, painless joint which has normal range of motion and function. The study is a comparison of results of tibial buttress plate and locking plate of tibia fractures in adults.

Introduction:

High velocity traffic in this modern age has resulted in broken bones in different patterns. By its very location, the tibia is exposed to frequent injury, it is the most commonly fractured long bone. Because most of the tibial surface is subcutaneous throughout its length, open fractures are more common in the tibia than in any other major long bones. Furthermore, the blood supply to the tibia is more precarious than that of bones enclosed by heavy muscles.1 Higher-speed injuries in younger patients from sports or similar mechanism can cause split fractures or rim avulsion fractures associated with knee ligament injuries. Motor vehicle accidents and falls from heights and pedestrian struck injuries often produce more severe patterns, which may involve both condyles and have a high risk for associated neurovascular injuries, compartment syndrome, and communicating open wounds.2, 3

Fractures of the proximal tibia involve a major weight-bearing joint i.e. knee joint and are serious injuries that frequently result in functional impairment. To preserve normal knee function, the surgeon must try to maintain joint congruity, preserve the normal mechanical axis, ensure joint stability and restore a full range of motion. There are two categories of proximal tibial fractures, articular and non- articular. Articular fractures, termed tibial plateau or tibial condylar fractures, affect knee alignment, stability and movement. Non- articular fractures affect knee alignment, stability and strength4.

Aims and Objectives:

We studied the comparison of results of tibial buttress plate and locking plate in upper end tibial fractures in adult in 30 cases, with the following aims and objectives:

To compare stability of internal fixation.

To compare union rate and ability for weight bearing

To compare the complication rate, if any.

To compare the relief of pain, joint function and functional limb movement between two procedures.

Material and Method:

We have analysed the management of 30 cases of upper end tibia fractures with open reduction and internal fixation with buttress and locking plate and bone grafting wherever needed. 30 cases were randomly divided into two groups of 15 patients each. One group was treated by traditional buttress plating while another group was treated using lateral locking plate. Displaced fractures, non infected and non-union of fracture upper end tibia and gustillo Anderson grade ≤ III were included. We used anterolateral, posteromedial approach for buttress plating. Lateral locking plating was done by anterolateral, posteromedial approach and MIPO technique.

Patient of both group were examined every month for six months and results were evaluated as per Savoie et al (1987) criteria.5

Figure 2

Results:

- Majority of cases in both groups were male in age group of 30-60 yrs
- RSA was the main cause(85%) in both groups
- Most of patients were AO type A and C
- In intra-articular fracture Schatzker type 5 and 6 was the commonest types.
- Associated injuries were present in 33.33% in locking group and 40% in buttress group.
- Average injury/surgery interval in buttress group was 8.2 days(1-20 days) and 5.4 days in locking group (1-17 days)
- Mean duration of surgery for locking group was 66.13 min (range 42-85 min) and for Buttress plate was 80 min (range 45-90 min).
- Average amount of blood loss was 215.33 ml (Range 180-270ml) in locking group and 304.66 ml (Range 220-390ml) in buttress group.
- Early postoperative complication like superficial infection, deep infection, hardware pain and skin slough more in buttress plate group (13.33% in with locking plate whereas 33.33% with buttress plate)
- Late complications like malunion, knee stiffness and even non union (1 case) was more in buttress group as compared to locking group.
- The mean union time was 16 weeks for locking plate group and 17.4 weeks (excluding 1 case of non-union) for buttress plate group.
- Range of motion >1000 was seen 93.33% cases in locking plate group whereas 80% cases in buttress plate group.
- Full weight bearing started early in locking plate group. The mean was 18.13 weeks for locking plate group and 20.57 weeks for buttress plate group.
- As per Savoie et al (1987) criteria in our series 93.33% patients had excellent to good results in locking plate group and 80% in buttress plate group.

Discussion:

The best treatment for these fractures remains controversial. Various studies are being conducted and literature published to compare the locking plate and buttress plate in the treatment of these fractures but controversy still exists.

The Locking plate system consists of a pre-contoured, anatomically shaped plate that can be inserted with a minimally invasive technique and of screws that can be locked within the plate. Biomechanical testing has shown that these plates demonstrate elastic deformation equal to that of conventional plates (lateral buttress and medial antiglide constructions).6 These plates can also simultaneously achieve fixation of an associated metaphyseal/diaphyseal component of the fracture with a minimal approach.

In the present study the age of patients with upper end tibial fractures ranged between 18 years to 70 years with an average age was 41.06 years. These findings are similar to study conducted by Lee at al7 which shows mean age 42 years. These findings clearly show that these fractures mostly affect adult males in the prime of their productive life and hence significance of early and complete functional recovery in such cases.

Males were affected much more commonly than females. 27 out of 30 cases with upper end tibial fracture were male. Burri (1979)8 reported 33% female patients of upper end tibial fractures. Males were involved more commonly than females because men are more commonly involved in outdoor activities and also most of the motor vehicles are driven by males.

In our study 93.33% upper end tibial fracture was due to road traffic accident i.e. 28 out of 30 cases were due to road traffic accident and only 2 cases resulted from assault.Burri (1979)8 reported 55% of cases of upper end tibial fracture due to road traffic accidents. This difference in the incidence may be due to increase in vehicular traffic worldwide.

Most of the cases in our series were of A-3 type according to AO classification and next common type was C-3 type. According to Schatzker classification most of the intra-articular fractures were type VIprobably due to high velocity nature of trauma. These findings are consistent with study conducted by Marsh2 et al (1995). All the fractures were treated by open reduction and internal fixation with buttress plate or locking plate. Quadriceps exercise was encouraged from the first postoperative day.

Mean duration of surgery for locking plate group was 56.13 min (range 42-85 min) and for Buttress plate was 69.4 min (range 45-90 min). The difference is not statistically significant but comparable (p value is 0.99 by unpaired t test).

Average amount of blood loss was 215.33 ml (Range 180-270ml) in cases treated with locking plate and 304.66 ml (Range 220-390ml)for cases treated with buttress plate .The difference is notstatistically significant but comparable (p value is 0.08 by unpaired t test). Lee et al7 reported mean amount of blood loss 250 ml with locking plate.Yong Zhang et al9 reported mean amount of blood loss 381.7 ml with buttress plating.

Early postoperative complication like superficial infection, deep infection, hardware pain and skin slough more in buttress plate group (13.33% in with locking plate whereas 33.33% with buttress plate) probably due to extensive soft tissue dissection and medial placement of plate directly beneath skin (p value is 0.76 by unpaired t test). Various studies done by Lee et al7, Moore et al10 and Gosling et al11, all have substantiated these facts.

Full weight bearing was started in all cases only after radiological union. Full weight bearing started early in locking plate group. The mean was 18.13 weeks for locking plate group and 20.57 weeks for buttress plate group. Radiological union was seen between 13 to 22 weeks. Radiological union occurred earlier in patients of fractures treated with locking plate. The mean was 16 weeks for locking plate group and 17.4 weeks (excluding 1 case of non-union) for buttress plate group. The difference is statistically not significant (p value is 0.94). Egol KA, Su

E, Tejwani NC, et al (2004)12 showed similar average union time 16 weeks with using locking plate system. Less time for union in locking group was because less tissue dissection needed and due to indirect reduction technique fracture biology maintained.

2 patients (13.33%) in buttress plate group had loss of reduction while none was reported with locking plate group. Mal-union was also higher in buttress plate group (13.33% in buttress plate group and 6.66% in locking plate group) while 100% union was achieved with locking plate technique. 6.66% non-union (1 case) was seen in buttress plate group. The mean non-union rate 6 months after Lockingplate was ranged from 0–8% according to Gösling et al11 and Stannard et al13. Haidukewych et al(2007)14 reported less complications with lateral locking plate in these fractures. Complication rate was less (p value .85) in locking plate group.

Range of motion >1000 was seen 93.33% cases in locking plate group whereas 80% cases in buttress plate group. Mean flexion with locking plate was 1180and with buttress plate was 1130. The difference is not significant (p value .89 by unpaired t test). According to Yong Zhang et al9 mean flexion at knee in locking plate was 1210 and in buttress plate was 1190. Incidence of knee stiffness was higher in buttress plate group probably due to delayed start of postoperative rehabilitation due to longer incision and more soft tissue dissection, a fact well confirmed by study done at Medical University, Austria. In addition early postoperative rehabilitation can started in locking plate group.

3 case of locking plate (i.e. 20.00%) had persistent knee pain at 6 month and 6 cases of buttress plate (i.e. 40.00%) had persistent knee pain at 6 month after surgery. The difference is not significant (p value .23 by unpaired t test) but comparable. This was due to knee stiffness, loss of reduction at articular surface and axial mal-alignment. In stability at knee was in 2 cases in buttress plate group.

As far as results are concerned, 93.33% patients had excellent to good results in locking plate group and 80% in buttress plate group. The difference was statistically not significant but comparable (p value 0.89 by chi square test). Blokker et al15 good to excellent result in buttress plate group.

Conclusion:

We conclude that proximal tibia fractures can be better and more effectively treated with lateral locking plate. Early rehabilitation, fewer complications, early weight bearing and better and near complete functional recovery is seen with locking plate.

Because of a stable and strong construct, a simple locking plate is sufficient in majority of cases while dual plating may be required in many comminuted proximal tibial fractures treated by buttress plating.

Although this study concluded that locking plate is better implant than buttress plates in management of proximal tibia fractures; but we had less sample size. So it recommends that more sample size of the patients is needed for better comparison.

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