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Research Paper

Short Term Outcome of Patients With Proximal Tibial Fractures (Bicondylar) Operated by Double Plate Fixation with Single Anterior Incision". (A Prospective Parallel Non Randomized Open Label Study Of 30 Cases)

Medical Science

KEYWORDS : Proximal Tibial Fractures; Types V & VI of Schautzker Classification; Double Plate Fixation; Single Anterior Incision

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ABSTRACT

AIMS AND OBJECTIVES: To evaluate the results of proximal tibia (bicondylar) fracture fixed with dual plate via single anterior midline incision by radiological criteria and clinical rating with knee society score.

MATERIALS AND METHODS: After institutional review board approval and informed written consent from patients, this prospective case controlled clinical study was carried out in 30 patients, with ASA physical status I and II and scheduled for elective general surgery. All patients had anterior-posterior (AP) and lateral radiographs. The patients were assessed preoperative and postoperatively in form of range of movements, pain, stability, reduction of fracture and early mobilisation. All patients were operated with dual platting for proximal tibia via anterior midline incision and were assessed postoperatively for range of movements, stability and graded according to the knee society score.

RESULTS:-Among 30 patients; according to knee society score results are Excellent in 80%, good in 3.33%, fair in 13.33% and poor in 3.33% patients. Average trauma surgery interval was 4 days with mean operative time of around 135 minutes. Mean hospital stay was approximately of 13 days. Radiological evaluation showed that none of our cases had non union. Union was seen radiologically at around 11 weeks. 90% of cases had no angular deformity and among them 60% were pain free at the end of 6 months follow up. Clinically 84% patients achieved 120 degree range of flexion movement and full muscle power.

CONCLUSION: The double plate fixation with single anterior incision is a good, effective and simple procedure in treatment of complex proximal tibial fractures (Types V and VI of Schautzker classification) with lower risk for deep infection, complications providing stable and rigid anatomical reduction and fixation to facilitate early mobilization.

INTRODUCTION :-

The knee joint is complex joint and is the commonly injured joint now days because of increased vehicular trauma and sports related injuries. Being superficial joint and more exposed to external forces, this joint easily gets injured. Fractures of the proximal tibia are big challenge in traumatology. Patient of all age groups are affected, but the group in the 3rd and 4th decades of life is most commonly affected. Complex proximal tibial fractures (Types V & VI of Schautzker classification) are the major problems in orthopedic surgery and associated with high complication rates. These fractures include bicondylar injuries with significant articular depression; multiple, displaced condylar fracture lines; metadiaphyseal fracture extension and comminution injuries. Intra-articular fractures of proximal tibia are difficult to treat. Age, skin conditions, osteoporosis further increase the obstacles in the healing process. Both the complexity and the soft-tissue disruption of this subgroup of fractures contribute to the high rate of unsatisfactory results which follow both nonsurgical and surgical management. The goals of operative treatment of these fractures include anatomic reduction for restoration of articular congruity and alignment, and stable fixation to allow early mobilization.

Dual plating is preferred to other techniques in the setting of a significantly displaced fracture of the articular surface, especially in cases with significantly depressed fragments. The two most common complications of double plating with two or single incision are; the compromised skin and soft tissue envelope, which invites a high rate of complications following attempted open reduction and internal fixation, and poor bone quality and comminuted fracture patterns creating difficulty in achieving stable fixation.

The purpose of this study is to evaluate the results of double plating with single anterior midline incision in complex proximal tibial fractures (Types V & VI of Schautzker classification). In this study, we evaluated the postoperative functional and radiological outcomes of 30 patients with high-energy tibial plateau fractures (Schautzker type V or type VI) treated with the double-buttress plate fixation through a single anterior midline incision.

AIMS AND OBJECTIVES:-

To evaluate the results of proximal tibia (bicondylar) fracture fixed with dual plate via single midline incision by radiological criteria and knee society score (clinical rating system).

Assessment of knee function and functional abilities of patient in follow up studies

MATERIAL AND METHODS:-

After institutional review board approval and informed written consent from parents, this prospective case controlled clinical study was carried out in 30 patients, with ASA physical status I and II, were scheduled for elective general surgery were included in the study. All patients had anterior-posterior (AP) and lateral radiographs as well as CT scans to identify each of the bicondylar fractures.

The patients were assessed preoperative and postoperatively in form of range of movements, pain, stability, reduction of fracture and early mobilisation with/without walking aids.

After thorough pre anaesthetic evaluation and required investigations, following group of patients were included in the study,

INCLUSION CRITERIA:-

- Consent of patient for participation in the study.
- ASA physical status 1 and II
- history of trauma with X-Ray suggesting proximal tibial fracture(bicondylar) Following group of patients were excluded from the study,

EXCLUSION CRITERIA:-

- ASA physical status > 2
- General contraindications of surgery and anaesthesia.
- Presence of other systemic disorder URTI, high blood pressure, uncontrolled diabetes, poor respiration.
- Patient refusal.
- Patient having allergy for polyethylene and metallic mate-

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rial
- Patient having associated other knee pathology like Osteoarthritis, skin infection and synovitis.
- Open fracture grade II and more.
- Associated ligament injury around knee.

Patient were assessed post-operative with criteria of knee society score and calculate individual score depends on severity of signs and symptoms and compare it with post-operatively obtained knee society score. Patients were also evaluated according to following variable:

- Fracture reduction
- Severity of pain
- Deformity of knee (Degree of varus / valgus)
- Posterior proximal tibial angle
- Medial proximal tibial angle
- Flexion contractures.

RANDOMIZATION:-As this was prospective case controlled study and we assessed improvement of signs and symptoms of individual patient postoperatively and compared it in form of knee society score which we calculated before and after operation. So, we did not need any randomization and each patient was control for his own study.

STATISTICAL ANALYSIS: The study contained total sample size of 30 patients .Each variable were recorded and analyzed using Jindal Sigma Statistical Software ver.2.0. Detailed analyses were carried out with the required mean of the respected variables. The association between variables were analyzed with independent student's T test and paired T test for quantitative variables and by chi square test for qualitative variables.

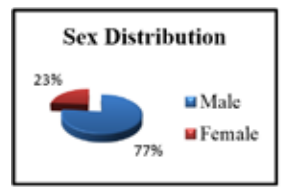
The significant association were considered only when p value is < 0.05.

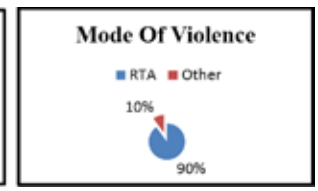
SURGICAL TECHNIQUE: A mid line incision technique was used for reduction of both the condyles. Arthotomy was done for inspection of ligament injury or meniscal injury. Menisectomy done if indicated. Depending upon comminution fixation is done by L, T or hockey stick plate or locked plates and cancellous screws. Dual plating was done for better stability to allow early mobilization and weight bearing and to prevent collapse of fracture.

POST OPERATIVE CARE
- In all the surgeries wounds were closed over suction drains. The drains were removed after 48 hrs
- Above knee slab or removable knee brace with leg elevation given to decrease the pain and edema
- Injectable antibiotics given for 3 to 5 days
- Static quadriceps exercises and ankle pump exercise started on second day
- The patients with stable fixation were allowed intermittent knee mobilization once the wound pain subsided, early in type I, II and III in 5 to 10 days and late in type V and VI in 14 days or later depending upon comminution of fracture.
- Stitches are removed on ten to twelve days and progressive muscle strengthing exercises along with passive exercises instituted.
- Knee immobilisation with brace or above knee cast was used in cases with ligamentous injuries for 4 to 6 weeks.
- Weight bearing is deferred until evidence of union is seen on x-rays (usual by 8 -14 weeks)

The patient was followed up every 4 weeks for a period of 6 months. Partial weight bearing was started from 04- 08 weeks depending upon the fracture configuration and correlation with the x-ray. Full range of motion is expected at 8-10 weeks after discharge. The results were evaluated using the functional grading of knee society score.

OBSERVATIONS & RESULTS:- Majority of the patients were in the 3rd and 4th decade of life. The average age is 40years and Standard deviation is 1.21.





Schautzker Classification	No. of patients	percentage
V	20	66.7%
VI	10	33.3%

	No Of Patients	Percentage
Non Union	0	0
Mal Union	3	10
Delayed Union	1	3.3

Mean Operative time	Intraoperative Blood loss	Post Operative Drainage
135 minutes (range 90-180)	300 ml (200-450 ml)	100 ml (90-200 ml)

Complications	Patients	%
Infection (Local)		
Superficial wound infection	03	10 %
Residual Pain		
Mild	6	20%
Moderate	5	16.7%
Severe	1	3.3%
No pain	18	
Angular Deformity		
No Deformity	27	90%
10 or > 10º Valgus.	3	10%
Loss of Extension		
No Loss	25	83.3%
< 10º	4	13.3%
10º or > 10º	1	3.3%
Muscle Power		
VI	5	16.7%
V	25	83.3%

Range of Movement	No. of patients	Percentage
120	25	83.3
130	2	6.7
140	3	10

	No. of patients	percentage
Associated injury		
None	26	86.7%
Other minor fractures	4	13.3%
Associated medical illness		
Diabetes	1	3.3%
Hypertension	2	6.7%
COPD	1	3.3%

Partial Weight Bearing Started On	No. of patients	Percentage (%)	Complete Weight Bearing Started On	No. of patients	Percentage (%)
Days	23	76.7%	80 – 90 Days	24	80%
41 – 60 Days	06	20%	91 - 120 Days	04	13.3%
More than 60	01	3.3%	More than 120	02	6.7%

Callus Formation

Weeks	No of patients	percentage
8	4	13.3
10	8	26.7
12	13	43.3
14	2	6.7
16	2	6.7
18	1	3.3

The Mean trauma surgery interval in our study is 4.5 days and standard deviation is 1.99 (range 3-8 days). The mean hospital stay was 13 (range, 10-28)

days and standard deviation is 3.45days

DISCUSSION:- The most common difficulties faced by the surgeon while dealing with intra-articular proximal tibial fractures are the compromised skin and soft tissue envelope, which invites a high rate of complications following attempted open reduction and internal fixation, and poor bone quality and comminuted fracture patterns creating difficulty in achieving stable fixation. At the outset in 1958, the AO formulated four treatment principles, which were expected to improve the results of fracture treatment in general and of internal fixation in particular (Muller et al, 1982). Some forty years later, it appears timely to evaluate the extent to which these four principles have stood the test of time.

These are:-

1. Anatomic or good reduction.
2. Stable internal fixation: designed to fulfill the local biomechanical demands.
3. Preservation of blood supply: to the bone fragments and the soft tissue by means of atraumatic surgical technique.
4. Early active pain free mobilization of muscle and joint: adjacent to the fractures,

preventing the developments of fracture disease.

Open double plate fixation has been reported to be associated with the complication of wound dehiscence and infection[38].

Hybrid fixation systems have not good functional and bony results, and give increased risk of pin tract infection and prolonged courses of treatment.[40]

Some studies have reported that open lateral plating and medial fixator in complex bicondylar fractures of the tibia give good functional results minimizing soft tissue complications.[40]

Anatomical knee joint reduction, the relative stability and alignment of the proximal tibia allowing the earliest knee mobilization, while keeping complications to a minimum rate, are the major goals in the treatment of complex proximal tibial fracture. In order to obtain stability of bicondylar and complex proximal tibial fractures, reduction and fixation of both medial and lateral columns is necessary. That is why dual platting is preferred over single lateral plate. Dual plating successfully gives a good stability by buttressing both columns; but high rate of complications associated with this open technique is reported .To reduce this high rate of infection we have approached proximal tibia via single midline incision as compared to dual incision.In this research we evaluated the results of double plating with single anterior incision in bicondylar proximal tibial fractures as compared to dual platting via two different medial and lateral incisions

Benefits of dual plate in proximal tibia via single midline incision:

1. It provides better union of fracture
2. Early mobilization
3. Better fixation
4. It prevents valgus deformity
5. It provides good clinical exposure for dual platting.
6. Less soft tissue damage.
7. Better skin coverage to hardware.
8. Single incision for cosmetic purpose.

Postoperative early mobility and good single scar mark sounds better in young patients...

It's about doing the right thing, doing the thing right, doing thing via right approach and doing it at the right time.

In this study total 30 cases were studied. After proper consent and proper AP and Lateral X-rays of proximal tibia all patients were planned for operative procedure...CT scan was also carried out in patients for better operative planning...

All patients were given pre operative antibiotics on the night before operation and just before induction also. All patients were given proper beta scrub wash followed by painting and draping. Average trauma-surgery interval was found to be 4 days ranging from3-8days.

Using anterior approach all patients were operated and no intraoperative complication was found. Mean operative time was around 135 mins ranging from 90-180 minutes. Because of anterior approach better visibility of operative area was achieved resulting in better and rigid fixation of fracture resulting in excellent radiological parameters. None of 30 patients went into non union. After 4 clean postoperative dressing patients were discharged with advice to follow up in OPD after 10 days for suture removal.

In follow up in our study superficial infection was observed in 3 cases and no soft tissue breakdown was noted. We also had good functional and bony results. Among all patients 60% of them were pain free at the end of 6 months follow up.

Only 01 patient had severe residual pain otherwise 37% of them had only mild to moderate residual pain. After proper physiotherapy around 84% of patients regained full muscle power. In 90% of cases no angular deformity was seen and around 84% of patients were having no loss of extension.

In this study, our results demonstrate a lower risk for deep infection and soft tissue complications, good functional and bony results in complex proximal tibial fractures when compared to earlier reports about other techniques[39].

CONCLUSION:-The double plate fixation with single anterior incision is the best, effective and simple procedure in treatment of complex proximal tibial fractures (Types V and VI of Schautzker classification) with lower risk for deep infection and good results when compared to other reported techniques.

It provides stable and rigid anatomical reduction and fixation to facilitate early mobilization.

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