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Study of Various Modalities of Treatment of Internal Fixation of Tibial Condylar Fractures

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ABSTRACT

OBJECTIVE- Study the different types of fractures of tibial condyles and various modalities of treatment to evaluate the anatomical and functional results.

MATERIALS AND METHODS- 30 cases were studied in a period of may 2013 to april 2015 were treated surgically with different modalities and Lansinger's criteria was used for evaluation of the results.

CONCLUSION- The surgical anatomy of tibial plateau fractures is challenging. Excellent anatomical reduction and rigid fixation to restore articular congruity, early knee mobilization, and decrease post traumatic osteoarthritis and thus achieving optimal knee function.

KEYWORDS Tibial plateau fracture , internal fixation , schatzker classification

INTRODUCTION

Knee is one of the complex joint of the body and commonly injured. To give good functional outcome there is a dilemma how to treat these fractures. Fractures of proximal tibia extending into the knee joint are termed as tibial plateau/ condylar fractures. Apart from bony injury ligament and meniscal injury and should be assessed for functional outcome[1]. Apley G[2] showed good results of union treated with skeletol traction in tibial condyle fractures. Percutaneous fixation is good for isolated undisplaced condylar fractures[3]. Schatzkar[4] treated fractures by open reduction and internal fixation with buttress plate and bone grafting and achieved acceptable results. Post traumatic Osteoarthritis was directly proportional to amount of displacement[5]. Illizarov fixator is an ideal method of treatment for fractures where extensive dissection and internal fixation is contraindicated[6]. Arthroscopic assisted internal fixation and bone grafting showed good results[7]. Open reduction and internal fixation is indicated when lateral tilt or valgus malalignment>50, articular step off >3mm or condylar widening >3mm[8]. MIPPO is a biological fixation made a big difference in treating tibial condylar fractures at less infection rate , minimal soft tissue damage, early union[9] .At Chicago ortho society.in 1956, MaronNohl had rigidly mentioned that these fractures are tough and that is what they are. In the last two decades, with improvement in surgical techniques and implants, there has been an unmistakable trend towards surgical management of these injuries. Nevertheless, tibial condylar fractures remain challenging because of their number , variety and complexity. These fractures are increasing day by day because of increase in automobile accidents and involve young productive men. Hence we undertook the study on the management of these fractures. The mobility and stability of lower limbs entirely depends in the integrity of knee joint. With an aim of achieving a stable, well aligned, mobile joint with minimum articular irregularities we started my study.

MATERIALS AND METHODS

Total 30 cases were included in this study,which comprised of 12 cases(21-30 yrs), 7(31-40yrs), 5(41-50yrs), 6(51-60yrs) from may 2013 to april 2015 to study the surgical management of tibial condylar fractures to obtain stable, pain free, mobile joint to prevent osteoarthritis and to correlate radiological findings with type of fracture and functional end result. Out of 30 patients(21 Males, 9 females) treated surgically 8 cases were with cannulatedcancellous screw, 2 cases with cannulatedcancellous screw with bone grafting, 15 with plate and 5 with plating and bone graft. Whenever rigid internal fixation was achieved, the patient was mobilized after 48 hrs after removal of the drains, for 2-5 days the range of motion allowed was $0\text{-}20^0$. From the 5^{th} day the range of motion gradually increased to 90^0 or more. After the suture removal, full range of motion was allowed .whenever there was doubt about the rigidity of fixation, external fixation in the form of plaster of paris slab was given for support. Range of motion exercises were done daily uner careful supervision and splint applied. All the patients were taught and advised to do static quadriceps exercises and dynamic exercises with a quadriceps board as much as possible and throughout the day. Partial weight bearing was delayed until 6-8 weeks and full weight bearing allowed after 12-16 weeks. The best time for open reduction and internal fixation was within 4 hours of injury or 1 week after the injury, when the swelling and inflammatory reactions have subsided. Out of 30 fractures studied, 66.66% of them were right sided.

SCHATZKER'S CLASSIFICATION AND PERCENTAGE OF CASES

TYPE OF FRACTURE	CASES	%
Pure cleavage	8	26.66
Cleavage with depression	6	20
Central depression	2	6.66
Medial condyle fracture	4	13.33
Bicondylar fracture	6	20
Metaphysio-diaphyseal fracture	4	13.33

PERIOD OF IMMOBILIZATION

PERIOD OF IMMOBILIZATION	CASES
Less than 10 days	22
Upto 3 weeks	5
Upto 6 weeks	3

OPERATIVE PROCEDURE-

IMPLANTS-6.5 mm cancellous screw with 8 mm spherical head and 3.5 mm hexagonal recess, thread length 16 mm and 32 mm in partially threaded screws with 4.5 mm shaft, 3 mm core 3.2 mm drill bit and 6.5 mm tap.4.5 mm cortical bone screw, with 4.5 mm shaft, 3 mm core, 3,2 mm drill bit and 4.5 mm tap. 4 mm cancellous screw, with 6mm head, 2.5 mm hexagonal recess, core diameter 1.9 mm, 1,7 mm pitch, 2.5 mm drill bit and 4 mm tap.k wires. Buttress plates-T plate. L buttress plate with right and left offset. Hockey plates with right and left offset.

PREOPERATIVE X-RAY

POSTOPERATIVE XRAY

PREOPERATIVE X-RAY

POSTOPERATIVE X RAY

LANSINGER'S CRITERIA FOR EVALUATION OF RESULTS[10].

1-Pain-No pain-6; occasional pain-5; stabbing pain in certain position, moderate pain-4; severe pain, consistent pain around knee joint after activity-2; nifgt pain at rest-0.

2-Walking capacity.Normal walking capacity in relation to age-6; walking capacity out doors for at least one hour-4;walking capacity outdoors >15 mins-2; walking indoors only-1; wheel chair bound/bed ridden-0.

3-Extention of leg-Normal extention-6; lack of extension 0 to 10 degree-6; lack of extension >10 degeree-2.

4-Range of motion.At least 135 degree-6; at least 120 degree-5; at least 60 degree-2; at least 30 degree-1; 0 degree-0.

5-Stability. Normal extension and 20^0 flexion-6; abnormal in 20^0 flexion-5; unstable in extension $<10^0$-4; unstable in extension $>10^0$-2.

CLINICAL EVALUATION.

Out of 30 cases treated with surgical procedure, 10 cases gave excellent results, 14 cases came out with good results, fair in 4 cases and 2 cases of poor result, mainly due to severity of the injury and infections. Retrospectively, it was found that high velocity injuries(type 4-5) have poorer outcome than low velocity injuries (type 1-3)[2].

DISCUSSION

The majority of the fractures occur between the age of 20-60 years with maximum incidence being involving the productive age group 21-30 yrs(40%). Boune in 1981 also found that the majority of the patients are aged between 15-55 years with an average of 38.5 yrs , correlates well with this study. Seppo also showed age incidence 20-60 yrs with an average of 39.8 yrs which correlates with the present study. In this series we studied 30 cases of simple tibial plateau fractures only treated with surgical methods. Different authors use different criteria for the surgical management of these fractures. Seppo conducted 130 tibial plateau fractures taking into consideration of condylar widening of >5 mm, lateral condyle step off >3 mm and all medial condylar fractures for surgical management. In our series indication of surgery was 3 mm depression. Schatzker type 1 and 2 were treated with percutaneous cancellous screw fixation. The split fracture of >3mm depression were treated with ORIF. Bone grafting was included along with ORIF with buttress plate and screws in type 2,3,4 and 5 wherever necessary. The benefits of early knee motion include reduced knee stiffness and improved cartilage healing. Schatzker, Robert McBroom in 1978, Magonhobi, Steven and Gauscwitz in 1984 stated the prognosis is given by the degree of displacement, type of fracture , method of treatment and quality of postoperative care. The results of this study are comparable with other documented studies. Rambold 1992 93% acceptable; Seppo 1993 86% satisfactory; Joseph Schatzker 1986 86% satisfactory; Our study 2013 80% satisfactory. Recent trend is to do minimally invasive surgery. Many centres have shown good results with arthroscopic assisted internal fixation, hybrid external fixator, minimal internal fixation supplemented with external fixator, Illizarov ring fixator and most recently Minimally invasive percutaneous plate osteosynthesis. We have not employed any of these techniques though had satisfactory results with the standard conventional methods.

Probably, if we were less invasive at surgery, still more rigid in fixation and further aggressive in physiotherapy, we would not even have these complications and at the same time achieving these goals much earlier.

CONCLUSION

The surgical management of tibial plateau fractures is challenging and excellent anatomical reduction and rigid fixation to restore articular congruity, facilitate early knee motion by reducing post traumatic osteoarthritis and thus achieving optimal knee function. In the background, it reminds us to remember the remarks given by Hohl at the president guest lecture at the Chicago orthopaedic society 1997 "***these fractures are tough"***

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