

MINIMALLY INVASIVE PLATE OSTEOSYNTHESIS FOR META- DIAPHYSEAL FRACTURE OF PROXIMAL TIBIA (A PROSPECTIVE STUDY)

Original Article Orthopaedics

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Abstract:

Introduction: In our study we have been done minimally invasive LCP fixation for proximal tibia fracture with or without diaphyseal extension which provide all aim to need in proximal tibia fractures.

Biological fixation by long LCP ,achieve indirect reduction and spanning the wide area of fracture without disturbing biology of fracture which provide flexible fixation to induce indirect healing of fracture with minimal complication and good functional as well radiological outcome

Material and method: we have been done this studyA prospectively from Jan 2013 to Aug 2015 in department of orthopaedics and traumatology, J. A. group of hospital associated to Gajara Raja Medical College Gwalior M.P. We had selected total 40 cases in which 30 male and 10 female, patients' age group from 18 to 80 years.

Result: in our prospective study we had been taken 40 patient (M-30,F-10), mode of injuries in our series most of patient by road traffic accident 25,side involved right side in 21 ,16 in left side and both side 3. Type of fracture AO 41A3- 30(M-24,F-6),AO 41C2- 10(M-6,F-4). our study were assessed by the knee society score system ,We have been got result out of 40 patients excellent in 26(65%), good 08(20%), fair 03(7.5%) and poor 03(7.5%). The average time for union of fractures was 18 week, ranging from 16 to 24 weeks.An average of 122° knee joint range of motion was achieved.

Conclusion: We treated all fractures in our study with MIPPO technique and found rapid healing by secondary fracture union and hence achieving strong bone union across the fracture site due to inherent benefits of less tissue damage and minimal disturbance of fracture site biology.In our study most of the patients sustained these fractures belong to physically highly active and productive age group, they need optimal treatment to get back to their previous work capacity and avoid long term complications

Key words: Tibia fracture, LCP, MIPPO

Introduction:

Proximal tibia fractures with or without diaphyseal extension are serious injuries and present difficult challenge to treatment. Most of proximal tibia fractures are due to high energy trauma especially road traffic accident fall from height and were first described as car bumper fractures.^{5,6}, as we all know that entire surface of antero-medial aspect tibia has subcutaneous coverage so it has high chances to infection and non-union, if these fracture associated to poor bone quality and comminuted and compound fracture also present difficult problem to treat fractures. So in this matter we need such technique who minimal soft tissue trauma and balance between mechanical to biological fixation, in our study we have been done minimally invasive LCP fixation for proximal tibia fracture with or without diaphyseal extension which provide all aim to need in proximal tibia fractures.

Biological fixation by long LCP, achieve indirect reduction and spanning the wide area of fracture without disturbing biology of fracture which provide flexible fixation to induce indirect healing of fracture with minimal complication and good functional as well radiological outcome.

Material and method:

We have been done this study A prospectively from Jan 2013 to Aug 2015 in department of orthopaedics and traumatology, J. A. group of hospital associated to Gajara Raja Medical College Gwalior M.P. We had selected total 40 cases in which 30 male and 10 female, patients' age group from 18 to 80 years.

Selection criteria- age between 18 to 80 years, comminuted, intrafragmentary fracture, close and compound fracture GA grade 1 & 2, fracture within 10 days of injury.

Exclusion criteria- age below 18 and above 80 years, comp.GA grade 3 and simple diaphyseal fracture.

A detailed history was taken with a particular reference to the other medical condition, which affect the suitability for the anesthesia/operation. A careful clinical examination of the involved extremity was carried out to look for wounds, associated neurological or vascular complications. A detailed clinical examination of other part of the limb and systems was also carried out to rule out the associated injuries. Radiological evaluation of the affected area was done to evaluate classified according to AO type classification, degree of comminution and displacement of the fragments and condition of the bone. In case of polytrauma roentgenograms of the other region were also done. The extremity initially immobilized in above knee posterior POP slab. All these patients were then subjected to surgery after thorough pre-anesthetic evolution. perioperative antibiotics were used in all cases.

Surgical procedure- after medical and pre-anesthetic fitness and informed consent then patient taken for surgery in emergency at trauma center, most of patient operated under spinal anesthesia. Position of patient over radiolucent OT table operated in supine position. Before doing surgery, we should examine the affected area by c-arm in AP and lateral view then determine size of plate (LCP); usually we had left the hole of plate 1/3rd to less than 50% in total length of plate and 3-4 screw sufficient to proximal and distal fragment of bone. Pillow placed

underneath of knee and proximal leg. We were given 2-3 cm. incision proximal part of tibia, slightly oblique on lateral surface and sometime also given distal incision otherwise distal fragment fixed by close under image, after indirect reduction of fracture in respect of axial, rotational alignment and length restoration, make tunnel for sub muscular insertion of plate then insertion of plate first fix proximal fragment with plate and then fixed distal fragment. If fracture was compound first debride it then fix fracture. After fixation of fractures then close incision.

After fixation of fracture, we were not applied pop slab almost in all cases and first dressing on the 3rd post-operatively and that time allow to patient mobilization of joint (but not allow weight bearing). After 10-14 days of post-op, we were removed the suture.

Follow-up- first in 2 week, second in 1month, third in 2month, then 3 and last 4-6 month. In every follow-up we were assessed as per knee score system and radiologically.

Result:

In our prospective study we had been taken 40 patient age group 18-80yr, in which 10 female and 30 male patient, mode of injuries in our series most of patient by road traffic accident 25, fall 09 and by assault 06, distribution of fractures according to side involved right side in 21, 16 in left side and both side 3. Type of fractures according to A.O classification AO 41A3- 30(M-24,F-6), AO 41C2-10(M-6,F-4) cases had been taken. Distal extension of fracture, distal extension in, 1/3rd of proximal tibia shaft was 05 and middle tibial shaft extension was 03.

Our study were assessed by the

knee society score system as per excellent 80-100, good 70-79, fair 60-69 and poor below 60 points. We have been got result out of 40 patients excellent in 26(65%), good 08(20%), fair 03(7.5%) and poor 03(7.5%). overall excellent to good result was 85% in our study. The average time for union of fractures was 18 weeks in our series ranging from 16 to 24 weeks. An average of 122° knee joint range of motion was achieved. Soft tissue damage, intra articular fracture, severity of fracture and physiotherapy determined knee range of motion, total infections in our study was only in 5 cases in which 3 cases treated by implant removal and two treated by antibiotics as per culture and sensitivity, ultimately after 3-4month, we had been found radiological union and wait for next 4-5 month and then implant removed and after implant removal patient has good ROM. Two patients had extensor foot(dorsiflexion of foot) weakness, it may be due to long plate and maximum detachment of extensor of foot from lateral surface of tibia and treated by physiotherapy.

Discussion:

Purpose of this study to evaluate clinical and radiological outcome of proximal tibial fracture with or without involvement of diaphyseal extension treated by minimally invasive plate osteosynthesis which has excellent to good result in 85% (34 patients), fair in 7.5%(3 patients), poor in 7.5%(3 patients). Jens A. Jöckel, Johannes Erhardt *Int Orthop.* 2013 Apr; 37(4): 701–708. The mean HSS score after 12 months was 87 (27–100) corresponding to a good to excellent functional result in 95 % of the patients . The mean range of motion (flexion/extension) for the affected knee joint was 124° (75–

150°) after 12 months³. The incidence of proximal tibial fractures has not only Increased with increase in RTA but also the complexity of fracture has changed due to high velocity direct impact causing more comminution at fracture site. Any fracture around the weight bearing joint like knee joint is of paramount importance as these would result in significant morbidity and compromised quality of life. Moreover, the management of high energy proximal tibia fractures is a challenging task for the surgeon, as they are often associated with a number of complications.^{4,5-7} Of late with the better understanding of peculiarities in proximal tibial fracture, fracture healing, and complications associated with them, there has been research in better tissue friendly approaches (MIPPO) and development of better technically mature implantsystems (LCP) for fracture fixation, which are showing promising results by early restoration of strength at fracture site and function of knee joint. MIPPO enables indirect fracture reduction and percutaneous sub muscular implant placement⁸. Favourable outcome is not due to MIPPO but due to less extensive dissection of soft-tissue envelope and devitalisation of fracture fragments. The patients with fracture in our study occurred between the age of 20 to 80 years with maximum incidence involving the productive age group of 20-60 years (95%). This was in accordance with a study by P.A Cole et al in 2004 who also found the majority of patients in productive age with an average of 45 years, and with the study of Ricci and Stannard with average of 53 years and 38 years respectively.⁹⁻¹¹ In another Indian study by Sharma et al, similar results were found where RTA was the most common cause of fractures.¹² This is

due to the high probability of injuries occurring in this age group due to RTA. In our series majority of the patients were males 75%, which can be attributed to our Indian setup where the female population largely work indoor and do not travel much. In our study the commonest mode of injury was road traffic accident (63%) the other being assault (22%). There was not much difference in the laterality of the fracture. The right tibia was affected in 53%, left tibia in 40% of cases and bilateral in 7% of cases.

The average time for union of fractures was 18 weeks in our series ranging from 16 to 24 weeks. An average of 122° knee joint range of motion was achieved. Soft tissue damage, intraarticular fracture, severity of fracture and physiotherapy determined knee range of motion. Both Cole et al and Egol et al reported similar range of movement results when using locked plate for these fractures (range 0 to 122° and 0 to 109° respectively).^{9,13} Amongst the complications observed, 5 patient (12%) developed infection within 2 weeks postoperatively, which was comparable to the studies conducted by Egol et al¹³ who reported no infection, Stannard et al¹¹ reported 5.9% rate of infection and Cole et al⁹ with 4% rate of infection. The mal-alignment rate was 5% in our study, as compared to 2.6% in a study by Cole et al and 22% in the study by Phistikul et al¹⁴. our study were assessed by the knee society score system as per excellent 80-100, good 70-79, fair 60-69 and poor below 60 point. We have been got result out of 40 patients excellent in 26(65%), good 08(20%), fair 03(7.5%) and poor 03(7.5%). overall excellent to good result was 85% in our study. Reddy et al reported an excellent result in 86.7% of the cases and 13.3%

had good results, while in a study by Rohra et al, 85.29% of the patients had excellent and 14.71% had good results.¹⁵ Similar results were observed by Yu et al, Prasad et al, Zhang et al, Oh et al.¹⁶⁻¹⁹

Conclusion:

There is an increase in the complexity of proximal tibial fractures with increasing road traffic accident. As most of the patients sustained these fractures belong to physically highly active and productive age group, they need optimal treatment to get back to their previous work capacity and avoid long term complications like osteoarthritis. We treated all fractures in our study with MIPPO technique and found rapid healing by secondary fracture union and hence achieving strong bone union across the fracture site due to inherent benefits of less tissue damage and minimal disturbance of fracture site biology.

Table 01
Distribution of fractures according to age and sex

Age (year)	Male	Female	Total
18-30	06	02	08(20%)
31-40	10	04	14(35%)
41-50	08	04	12(30%)
51-60	04	00	04(10%)
61-70	02	00	02(05%)
71-80	00	00	00(00%)
Total	30(75%)	10(25%)	40(100%)

Table 02

Side	Male	Female	Total
Right	15	06	21 (52.5%)
Left	12	04	16 (40%)
Both	03	00	03 (7.5%)
Total	30	10	40 (100%)

Table 03
Distribution of fractures according to mode of injury

Mode of injury	Male	Female	Total
Fall	06	03	09(22.5%)
RTA	20	05	25(62.5%)
Assault	04	02	06(15%)
Total	30	10	40(100%)

Table 04
Type of fracture according to AO classification

Type	Male	Female	Total
AO 41 –A3	24	06	30(75%)
AO 41 –C2	06	04	10(25%)
	30	10	40(100%)

Table 05
Result of our study according to knee score society score

Type of fracture	AO 41-A3	AO 41-C2	Total
Excellent	20(66.6)	06(60%)	26(65%)
Good	06(20%)	02(20%)	08(20%)
Fair	02(6.66%)	01(10%)	03(7.5%)
Poor	02(6.66%)	01(10%)	03(7.5%)
	30	10	40

PHOTOGRAPHS



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