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Comparative study between locking compression plate and dyanamic compression plate for closed upper end tibial fractures

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Abstract
Aim: To compare Dynamic compression plate and locking compression plate for proximal tibial fracture and compare my result with International literature
Material and method: Spinal or epidural anaesthesia was used. Patients are positioned supine on a radiolucent table. A tourniquet is applied to the proximal thigh and the limb prepared and draped in the standard sterile fashion. Surgical approach either medial or lateral, taken depending upon the fracture geometry and bilateral or unilateral plating. The knee joint is not opened or further exposed unless depressed fracture. Alternatively, two different exposures can be used to directly visualize the lateral joint. In one of them, the deep dissection is brought posteriorly along the tibial margin of the joint line, incising the coronary ligament to create a submeniscal arthrotomy. With a long enough inframeniscal incision, the meniscus can be retracted proximally to expose the tibial side of the lateral joint beneath the meniscus. Cross-joint distraction facilitates visualizing the joint through this submeniscal arthrotomy. This approach has been credited to the AO group.
Result: 30 cases of proximal tibial fractures were included which are treated either by D.C.P or L.C.P. This was a prospective study. In our series maximum age 65 years and minimum 21 years. Majority of the cases were seen in age group of 21- 30, 31-40, 41-50 years age group. For these data X^2 (p value) is 4.087 (0.394) which was not statistically significant.
Conclusion: The terms of successful outcome include a good understanding of fractures biomechanics, proper patient selection, good preoperative planning, accurate instrumentation, good image intensifier and exactly performed osteosynthesis.

Keywords: Dynamic compression plate, locking compression plate, proximal tibial fracture

Introduction

The knee joint is one of three major weight bearing joints in the lower extremity. Fractures that involve the proximal tibia affect the knee function and stability. Comminuted intra articular fractures, such as bicondylar or unicondylar tibial plateau are highly unstable [1, 2]. This type of fracture produces varus or valgus deformity. The surgical treatment of proximal tibia fractures with or without intraarticular involvement is associated with well described patterns of failure and significant complication rates. The surgical management of tibial plateau fracture isa difficult and challenging task [2, 3]. Achieving adequate stability for fracture healing is difficult in presence of metaphyseal or metaphyseal-diaphyseal comminution.

Dynamic compression plate is used for internal fixation since many years. Dynamic compression plate provide absolute fixation. Dynamic compression is a phenomenon by which a plate can transfer or modify functional physiological forces into compressive forces at the fracture site. They resist axial, torsional, and bending loads. They encourage primary bone healing by rigid fixation, more stability and lesser movement at the fracture site [4].

Locking Plate is designed to preserve biological integrity to enhance fracture healing. It is construct where a screw with threaded head is locked in plate (actsas external fixator) and forces are transferred from the bone to fixator across the screw. There is relative space between the plate and bone and not affect the periosteal blood supply [5].

Plate and screws systems where the screw can be locked in the plate, so called locked internal fixator. The plate and screws form one stable system and the stability of the fracture is dependent on the stiffness of the construct. No compression of the plate on to the bone is required, which reduces the risk of primary loss reduction and preserve the bone blood supply. Locking the screw into the plate to ensure angular as well as axial stability eliminates the possibility for the screw to toggle, slide, or be dislodged and thereby strongly reduces the risk of post-operative loss of reduction [6-8].

This study helps to compare Dynamic compression plate and locking compression plate for proximal tibial fracture and compare my result with International literature.

Material and Method

Between from May 2009 to May 2011, 30 patients with closed fractures of proximal tibial plateau, admitted in Krishna Hospital. Present study is a prospective analysis of the data thus obtained. Fractures were classified according to SCHATZKER Classification. After the patients with proximal tibia fracture was admitted to hospital, all the necessary clinical details were record for this study. After the completion of the hospital treatment patients were discharged and called for follow up at outpatient level at regular intervals for serial clinical and radiological evaluation.

All patients with suspected proximal tibial fractures on clinical examination were screened through a series of investigations to determine fracture geometry. Also investigations were targeted to determine overall medical status. Spinal or epidural anaesthesia was used. Patients are positioned supine on a radiolucent table. A tourniquet is applied to the proximal thigh and the limb prepared and draped in the standard sterile fashion. Surgical approach either medial or lateral, taken depending upon the fracture geometry and bilateral or unilateral plating.

The knee joint is not opened or further exposed unless depressed fracture. Alternatively, two different exposures can be used to directly visualize the lateral joint. In one of them, the deep dissection is brought posteriorly along the tibial margin of the joint line, incising the coronary ligament to create a submeniscal arthrotomy. With a long enough inframeniscal incision, the meniscus can be retracted proximally to expose the tibial side of the lateral joint beneath the meniscus. Cross-joint distraction facilitates visualizing the joint through this submeniscal arthrotomy. This approach has been credited to the AO group [9, 10].

The second approach extends the skin incision proximally and an anterolateral joint arthrotomy is created. In this approach, exposure of the joint is from above the meniscus. The ability to visualize the tibial fragments is increased by incising the anterior portion of the coronary ligament and the intermeniscal ligament detaching the anterior horn of the lateral meniscus that can then be retracted laterally with the split fragment opening the joint through the fracture. These are repaired with sutures at the end of the procedure.

If the fracture is intra-articular, first reconstructed and stabilized the whole joint. Use lag screws to achieve compression between the articular fragments. Cannulated screws have proven to be very convenient for this. Take care to ensure that these additional screws do not collide with the locking screws inserted through the insertion guide. The figure shows the possible zone for lateral lag screws in the condyle. The red hatched area indicates the possible zone for lags crews.

Observation and Disscusion

In present study, 30 cases of proximal tibial fractures were included which are treated either by D.C.P or L.C.P. This was a prospective study. In our series maximum age 65 years and minimum 21 years. Majority of the cases were seen in age group of 21- 30, 31-40,41-50 years age group. For these data X^2 (p value) is 4.087 (0.394) which was not statistically significant. In our study males are predominant contributing than females. For these data X^2 (p value) is 0.833 (0.361) which was not statistically significant. In this study Schatzker type VI of fractures are more common. For these data X^2 (p value) is 0.144 (0.705) which was not statistically significant. We had operate 15 cases for L.C.P and 15 cases for D.C.P. 13 cases were operated with single D.C.P. 2 cases were operated with Dual plating.

We were advised for weight bearing walking according to radiological finding and fracture type. Patient treated with L.C.P with good articular congruity showed excellent results. Out of 15 patients, 9 had 60 -90 ROM on discharge and other 6 had 30-60 ROM. cases treated by D.C.P, 6 cases had 0-30, 8 cases 30 -60, only one case had 60-90 ROM on discharge. In present series, all patient treated by locking compression plate united except two cases. One case had loosening screw and infection. One case lost to follow up. Patients those who were treated by D.C.P also united except three cases. One case who affected with infection and loosening of screw. Second case had affected with implant failure. Third case lost to follow up.

As per the above table, for these data X^2 (p value) is 10.800 (0.013) which was statistically significant. Our study is restricted to compare only union, time for weight bearing and implant failure for LCP and DCP. In our series of 30 cases there were 15 cases including 11 male and 4 female, 5 cases of Schatzker type V and 10 cases of Schatzker type VI operated for L.C.P and other 15 cases including 13 male and 2 female, 6 cases of Schatzker type V and 9 cases of Schatzker type VI operated for D.C.P.

In our study, average time of union for DCP is 5.3 months and for LCP is 4.2 months which is comparable to 5.9 months as per Ryan’s study in 2009.[10-12]In our study, average time for weight bearing for DCP is 3.2 months and for LCP is 2.4 months, but there is no data available for comparison in Ryan’s study in 2009.In our study, no cases of implant breakage are seen, but there is no data available for comparison in Ryan’s study in 2009.In our study, 3 cases out of 15 treated with DCP developed varus deformity and no cases of varus deformity are seen in LCP, but there is no data available for comparison in Ryan’s study in 2009.In our study 15 cases operated with L.C.P and 15 cases operated with D.C.P. Our study is restricted to compare only union, time for weight bearing and implant failure for LCP and DCP.

For average union time for LCP is less than average union time required for DCP [13]. Similarly average time for weight bearing for LCP is less than DCP, in our study, no cases of implant breakage are seen for both LCP and DCP and implant failure for DCP are higher than LCP.

Knee score for L.C.P is average 85.33 and for D.C.P is average 73. From the above findings, we consider that LCP is an excellent implant for the treatment of proximal tibia fractures. The terms of successful outcome include a good understanding of fractures biomechanics, proper patient selection, good preoperative planning, accurate instrumentation, good image intensifier and exactly performed osteosynthesis.

Conclusion

The conclusion that current answewr to the fixation of complex intraarticular & metaphyeal region fractures of proximal tibia is the locking compression plate till date. The terms of successful outcome include a good understanding of fractures biomechanics, proper patient selection, good preoperative planning, accurate instrumentation, good image intensifier and exactly performed osteosynthesis.

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