



FRACTURE TIBIA FIXATION WITHOUT C-ARM

Orthopedics

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ABSTRACT

Tibia fracture constitutes one of major orthopaedic burden. Among all Tibia fractures closed tibia fractures constitutes more than >50% cases. The study is done to assess the result of treatment of tibia fractures without c-arm radiation exposure. The idea is to overcome the dependency over C-arm.

Methods: The study involves 136 patients with 150 tibia fractures with age group from 18yrs to 60yrs treated between May 2015 to May 2017. The study includes only extra-articular fractures. The study is based on intraoperative reference markers of reduction being Tibia shin, plumb line from tibial tuberosity to 2nd metatarsal and relative position of foot in respect to leg. The postoperative analysis was done in all patients radiologically and functionally.

Results: About 150 cases are being studied with closed interlocking nailing done in 120 cases and biological plating done in 30 cases. Postoperative acceptability in our study include <5degree valgus/varus/rotational deformity. Among 120 cases with nailing done, 114 patients are managed well with 6 cases shown failure of technique with not able to perform locking of nail without use of C-arm due to excessive hammering of nail and subsequent rotation of nail. Among all 114 cases the postoperative results are within the acceptability criteria planned. Among 30 cases with proximal and distal extra-articular fractures biological plating was performed well with no failure seen in any respect and all following the acceptability criteria planned as per study.

Conclusion: The study shows that with the use of reference markers like tibia shin, plumb line from tibial tuberosity to 2nd metatarsal, and relative position of foot in respect to leg. Reduction can be achieved in majority of cases within acceptable range. The technique has much role in centres with nonavailability of C-arm in emergency operation theatres.

KEYWORDS

Introduction :

Tibia fracture treatment is one of the initial operative procedure learned by every orthopaedic surgeon. It is also the most common traumatic lower limb fracture. Treatment of tibia fracture varies from simple POP cast to a complex surgical procedure like Ilizarov for Nonunions. With the availability of intraoperative radiography surgeons are becoming more and more dependent on these appliances, hence getting exposed to radiation more often. The article tells no or minimum use of intraoperative radiography in treating extra-articular tibia fractures. The treatment modality studied here is operative nailing and biological plating involving most of extraarticular tibia diaphyseal fractures. The technique exclusively involves no use of intraoperative radiation for closed tibia fractures nailing, and biological plating for proximal and distal extra-articular fractures. The subcutaneous shin act as most reliable marker and we can also say only deciding factor for achieving accuracy of result. Other factor includes clinical assessment using central plumb line from tibial tuberosity to 2nd metatarsal, position of foot. Among all the markers used, subcutaneous shin solves the purpose of reduction phobia in both nailing and biological plating of diaphyseal tibial fractures. Postoperative acceptability in our study includes <5degree valgus/varus/rotation deformity. The results were excellent when compared with overall parameters including time of surgery.

Material And Methods:

The study includes 136 patients with 150 extra-articular tibial diaphyseal fractures, 14 patients had bilateral tibia fractures, who presented to emergency of Government Medical College Jammu. The treatment modalities include closed interlocking nailing with proximal and distal locking in 112 cases, open reduction with proximal and distal locking in 2 cases and in 6 cases proximal/distal locking was done with the help of C-arm in the next regular OT list where the facility of C-arm is available, biological plating was done in 24 distal 1/4th diaphyseal fractures and 6 proximal diaphyseal fractures. Postoperative radiographs were done in all cases and shows good acceptable results were obtained even in distal fractures which needs good reduction and a very narrow range of acceptability due to fear of varus/valgus angulation deformity of lower limb. Patients were followed up for average of 1yr. All patients performed well with no need of dynamization in any of the patient. Wound related complications seen in about 12 patients who later resolved with debridement and regualae ASD. Deep infections involving implant was

not seen in any patient due to short duration of surgery.

Technique:

Patient routinely investigated and injury fully assessed. As the study mainly focuses closed extraarticular tibial diaphyseal fractures, so preoperative radiographs done, fracture pattern assessed, implant selected. Our Technique based on Natural Markers: Relative percentage of each parameter
Tibia Shin-50%.

Musculotaxis-20%.

Plumb line from T. T to 2nd Metatarsal-10%.

Foot position in respect to Ankle-10%.

Gradual Surgical Experience-10%.

Nailing

Size measured using different clinical techniques. (Colen and Prieskorn, 2000), implant prepared. On table after the pt is anaesthetised, skin incision applied and entry portal made, outflow of marrow content show correct placement of awl into marrow, guide wire inserted, reduction achieved with traction on distal limb and tibial shin used as guide to compare alignment of fragments. Once guide wire is inserted confirmed by marrow sound and length as compared with other guide wire, serial reaming of canal done with strict holding of fracture reduction and later followed by insertion of nail. The study involves strict use of long jig for distal locking after nail insertion. Distal locking is done and if hole is not accurate then using a small k-wire inserted in hole position of nail traced by metallic sounds followed by gentle nail manipulation and kwire entered in distal hole, hole drilled followed by locking screw insertion. Once a screw is locked, rest all achieves alignment itself and if any difficulty encountered same technique used. If AP screw need to be inserted in distal tibial fractures same technique proved to be very beneficial. Strict reduction and correct alignment of both fragments maintained throughout the procedure using shin as guide and plumbline joining tibial tuberosity and 2nd metatarsal.

MIPPO

Fractures involving proximal and distal 1/4th of tibia biological plating proved to be very beneficial. The technique for plating is found to be less difficult than nailing. The procedure starts with about 3-4cm incision centred over medial distal tibial surface, soft tissue dissection

done, bone exposed upto tip of medial malleolus, plate slid along the medial tibia surface submuscularly well above the fracture crepus site and proximal end of plate palpated along shin or level checked by another plate as reference and later exposed by incision over skin. Distal end of plate fixed temporarily with k-wire, with one assistant holding ankle and providing traction, reduction visualized clinically by palpating shin proximal to distally or using straight plumbline technique, proximal end secured with k-wire. Reduction confirmed and screw locked both proximal and distally. Wound closed without any need of drain due to minimal incision technique. Closed musculofascial structures around fracture aids in reduction and preservation of periosteum, fracture hematoma and muscle attachments aids in better and early healing of fracture.

Results:

About 150 cases are being studied with closed interlocking nailing done in 120 case and biological plating with MIPPO in 30 cases. Postoperative acceptability in our study include <5 degree valgus/varus/rotational deformity. Among 120 cases with nailing done, 114 patients are managed well with 6 cases shows failure of technique with not able to perform locking of nail without use of c-arm due to excessive hammering of nail and subsequent rotation of nail. Among all 114 Case the postoperative results are within the acceptability criteria planned. Among 30 cases with proximal and distal extraarticular tibia fracture and Biological plating attempted using MIPPO technique performed well with no failure seen in any respect and all following the acceptability criteria planned as per study. The procedure can be difficult in some instances like posterior migration of nail with difficulty in distal locking, distal 1/4th tibia fractures treated with interlocking nailing with fear having varus/valgus deformity, near subchondral extraarticular tibia fractures with less bone stock and minimal distal screw holding capacity and each screw need to be too precise, proximal 1/3rd tibia fractures planned for nailing. Closed nailing can be done using the above mentioned landmarks with additional precautions of entry portal being more lateral and posterior as compared to usual landmark. The study involves less cases with proximal 1/3rd tibia fractures treated by MIPPO.

Discussion:

The study shows that with the use of reference markers like Tibia Shin, plumb line from tibial tuberosity to 2nd metatarsal, and relative position of foot in respect to leg. Reduction can be achieved in majority of cases within acceptable range. The technique has much role in centres with limited facilities of intraoperative radiography as the study is being also conducted in place where there is non-availability of c-arm on emergency basis. Postoperative results shows excellent outcome in terms of functional results. In the present era of globalization everyone is becoming dependent on machines and forgetting the natural markers the nature has provided. In the present study with the use of only 2 markers we can achieve acceptable results but a pseudo fear of reduction making us weaker day by day. With due experience the surgeon become adapted to both nailing and plating without any use of fluoroscopy. It also shortens the duration of surgery as time needed for adjusting fluoroscopy machine is saved. Radiation hazard can be decreased to both surgeon and assisting staff. (Radhi *et al.*, 2006; Muller *et al.*, 1998; Mehlman and DiPasquale, 1997) Technique proved to be much simpler for plating and even less time consuming. The MIPPO without the use of fluoroscopy shows much better results as not expected. The principle even holds good for comminuted fractures of tibia. In the present study of 136 patients with 150 cases with closed extraarticular tibia diaphyseal fractures, only 6 patients needed use of fluoroscopy that too at end of procedure for locking screw fixation. As we know we are in the era of globalization where technology is advancing day by day. It doesn't mean that we become so dependent that without it we became nothing. The study only concentrates on fact that closed extraarticular tibia diaphyseal fractures can be well managed surgically with both nailing and biological plating with no or minimal use of fluoroscopy that we are using beyond the expectations. We are not restricted to use it but we should be restricted not to overuse it.

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