



## RESEARCH ARTICLE

### HOW TO FIX TIBIA WITHOUT C ARM

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#### ABSTRACT

Tibia fracture constitutes one of major orthopedic burden. Among all tibia fractures closed fractures constitutes more than >50% cases. The study is done to assess the results of treatment of tibia fracture without c-arm radiation exposure. The idea is to overcome the slowly eroding disease of DEPENDENCY ON C-ARM.

**Methods:** The study involves prospective analysis of 136 patients with 150 tibia fractures with age between 18 to 60 treated between May 2016 to may 2017. The study includes only extra-articular and closed type of injury with fracture pattern varying from transverse to comminute in appearance. The study is mainly 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 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 extra-articular 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.

**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 limited facilities of intraoperative radiography as the study is being also conducted in place where there is nonavailability of c-arm on emergency basis.

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## INTRODUCTION

Tibia fracture treatment is one of the initial Step of beginning orthopedic carrier of every surgeon. It is also most common lower limb traumatic fracture. (Howard and Court-Brown, 1997) Advances in treatment of Tibia fractures ranges from conservative POP cast treatment to highly developed Ellizarov device for treating Nonunions. (Hughston *et al.*, 1969; Paley, 1990; Jackson and Macnab, 1959; Anderson and Hutchins, 1966; Anderson *et al.*, 1974; Bone *et al.*, 1997) With the advent of fluoroscopy surgeons become more and more dependent on these appliances due to creating a vicious cycle of radiation atmosphere around them. The phobia is gradually advancing to extent that a day will come when the "Shin "will be palpated radiologically. The article discusses no or rare use of

fluoroscopy in treating extraarticular tibia fractures. The treatment modality studied here is usually operative that include Closed Nailing and MIPPO involving most of extraarticular tibia diaphyseal fractures. (Casstevens *et al.*, 2012; Bono *et al.*, 2001) The technique exclusively involves nonuse of fluoroscopy for closed nailing of tibia diaphyseal fracture, (Hooper *et al.*, 1991; Henley, 1989; Solheim and Bo, 1973; Wiss and Stetson, 1995) and MIPPO involving proximal and distal tibia fractures. (Behrens *et al.*, 1983; Lange *et al.*, 1985) The subcutaneous shin acts as the most reliable factor 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 ankle /foot. Among the all modalities used, subcutaneous shin solves the most purpose in overcoming the REDUCTION PHOBIA in both closed Nailing and biological plating of diaphyseal tibia fractures. Postoperative acceptability in our study include <5 degree valgus/ varus/

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rotational deformity. (Merchant and Dietz, 1989) The results were excellent when compared with overall parameters including time range of surgery to postoperative results.

## MATERIALS AND METHODS

The study includes about 136 patients with 150 extraarticular closed Tibial diaphyseal fractures (14 patients with bilateral tibia fractures) presented to orthopedic department Govt. Medical College Jammu the, only Centre available in Jammu equipped to deal with all orthopedic facilities. The treatment modalities include closed interlocking nailing with 2 proximal and 2 distal locking screws in 112 cases, open reduction with 2 each proximal and distal locking screw in 2 cases, 6 cases needed distal locking under fluoroscopic guidance, MIPPO in 24 distal 1/4th tibia diaphyseal fracture and 6 proximal tibia fractures. Post-operative radiographs were done in all cases and shows good acceptable results even in distal fractures which needs good reduction and has very narrow range of acceptability due to fear of varus/valgus angulation deformity of leg. Patients are followed for average of 1yr. All patients performed well with no need of dynamization in any of patient. Wound related complications seen in about 12 patients who later resolved on secondary debridement and serial dressings. Deep infections involving implant was not seen in any patient due to short duration and minimal exposure adding a benefit to 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 k-wire 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 crepitus 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 extra-articular 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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