ORIGINAL ARTICLE

Comparison of closed intramedullary nailing and percutaneous plating in distal tibia metaphyseal fracture

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Introduction: Our aim is to compare outcome of closed intramedullary nailing with locking compression plate in distal tibia metaphyseal fracture through minimal plate osteosynthesis for time to union, hard ware irritation and AOFAS (American Orthopedic Foot and Ankle surgery score) for functional evaluation.

Method: Retrospective review of prospective collected study. It was conducted between January 2013 to June 2014. Total 30 patients were included in study. Randomly 15 patients were treated with closed intramedullary nailing and 15 patients were treated with locking compression plate through minimally plate osteosynthesis. They were observed for time to union, hard ware pain and AOFAS (American Orthopedic Foot and Ankle surgery score) for functional evaluation.

Results: Mean union time was 3.2 months (2.5- 4.0) months in all patients, 3.0 months for intramedullary nail group and 3.4 months for plate fixation group their was no significant difference between the groups (p=0.856).Ankle arthritis was evaluated by AOFAS scoring system. The mean AOFAS score was 86.8 (range 55-100). It was 87.8 (range 75-98) in intramedullary nailing group and 82.8 (range 71-97) in MIPO group. There was no significant difference between the groups according to AOFAS scoring system. (p= 0.754). Thirteen patients complaining for hard ware pain in plating group as compare to seven in tibia nail population.

Conclusion: Percutaneous plating is usuallypreferred over nailing for treating 43-A type of fracture as distal fragment size is small. But in our observation intramedullary nailing is the better option as it has shorter time to union and good functional results as compare to MIPO LCP but technically, it is demanding.

Keywords: closed intramedullary nail, distal tibia metaphyseal fracture, percutaneous plating

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Introduction:

Tibia is vulnerable to injury due to its location as it is subcutaneous long bone. So, most commonly it got fracture during trauma.[1] It is challenging to treat distal tibia fracture due to minimum surrounding soft tissue, poor vascularity and subcutaneous location.[2]

Ideal method for the treatment for distal tibia fracture is debatable.[3] With the passage of time operative indications get redefined.[4] Conservative methods reserved for low energy, minimally displaced, stable closed fractures.[5] Surgical management reserves for high energy, displaced, comminuted, unstable fractures. It gives appropriate alignment, rotational stability and proper environment for tissue healing.[2]

Many surgical methods have been used including external fixators, intramedullary nailing and plate osteosynthesis. External fixator indicated in open fractures but it may result in improper reduction and higher incidence of malunion (5% -25%), non union (2% -17.6%) pin tract infection (10% -100%).[7]

Intramedullary nail and minimally invasive percutaneous plate osteosynthesis (MIPO) are the two common practicing optionsas both methods are closed and minimally violate soft tissues[2]. Currently, locked intramedullary nailing is one of the most common method usually

preferred for most diaphyseal tibial fracture as it gives closed reduction without trauma. It usually does not disturb fracture vascularity, preserve surrounding soft tissue sleeves and early joint range of motion is possible. But intra-medullary nailing for distal tibia fracture is usually challenging due to hour glass shape of medullary canal. So tight endosteal fit is not possible and result in torsional and angular instability of distal tibia so, malignant rate is high. But intra-medullary nailing with interlocking screws is indicated for distal tibia fracture with 96% overall union rate. Most patients complain for anterior knee pain after intramedullary nailing. 56% complain for chronic knee pain and most complain for difficult kneeling. Even in experienced hand open reduction and internal fixation require extensive surrounding soft tissue dissection and periosteum stripping. It results in higher incidence of infection (8.3% - 23%), delayed union and non union (8.3% - 35%). So, most surgeons preferred recently introduced minimally plate osteosynthesis (MIPO) to lower the incidence of delayed union, non union, wound complications as it is less invasive indirect method of reduction and maintain surrounding environment for fracture healing but technically it is challenging. Despite of it, complications like hard ware failure (0% 10%), angular deformity (7.1% - 35%) and non union (0% - 10%) have been published.

Therefore our aim is to compare outcome of closed intramedullary nailing with percutaneous locking compression plate through minimal plate osteo-synthesis in terms of time to union, hardware pain and AOFAS (American Orthopedic Foot and Ankle surgery score) for functional evaluation.

Methods:

Retrospectively we analyzed 30 patients (19 male and 11 female) who came with extra articular distal tibia closed fracture between January 2013 to June 2014 at Liaquat National Hospital. Randomly 15 (50%) patients were treated with closed intramedullary nailing and 15(50%) patients were treated with locking compression plate through minimally plate osteosynthesis. The mean follow up period was 13 months (range, 12 – 18 months). According to AO classification 43- A fractures were included. Patients with other associated fracture, fracture extending to joint, knee and ankle ligaments injury, open fracture, fracture with vascular injury and pathological fractures were excluded.

Intramedullary nailing done through transpatellar tendon approach. After reaming nail of appropriate length and diameter were used. Open reduction was not attempted during fixations.Distally two parallel distal locking 4.5mm screws were inserted through medial site, single 4.5mm anterioposterior screw was placed and single proximal 4.5mm screw was used.

Through medial distal tibia approach plate is introduced from distal to proximal, through a space between periosteum and intact overlying soft tissue. 3.5 mm distal medial tibial LCP were used. Through stab incision proximal and distal screws were placed under C-Arm visualizing both anterioposterior and laterally after indirect reduction through ligamento-taxsis.

Prophylactically 2nd generation intravenous cephalosporin was used pre-operatively and two days post-operatively and then oral for five days.

Patients were discharged on 2nd post-operative day after change of dressing with advised for-non- weight bear mobilization and follow ups after two weeks for change of dressing and four weekly for six months and than 8 weekly for 18 months.

Non weight bearing (NWB) was allowed on 1st post operative day partial weight bearing after (10-14 weeks) and gradually full weight bearing was allowed after (16-20 weeks) in both groups.

Fractures were considered as united after clinical examination and radiographicstudy. If union was not appreciated at the end of nine month it was accepted as non union.

Ankle joint results were evaluated with "The American Orthopedic Foot and Ankle Society (AOFAS) foot and ankle scoring system".

Data was entered and analyzed in SPSS 17.0 statistical package. Continuous variables age will be analyzed as mean ± SD. Categorical variables i.e. sex, time to union, hardware pain, was analyzed as proportions and percentages. P-value of <0.05 was taken as significant.

Results:

Thirty patients were evaluated, who presented with distal tibia fractures (43- A) and treated randomly. 15 patients (50%) with intramedullary nailing and 15 patients (50%) with minimally plate osteo-synthesis over the period of eighteen months. Mean age was 41 years (range 18 – 62 years). According to OTA classification 18 (60 %) included in 43- A1, 6 (20 %) 43-A2 and 6 (20%) were 43- A3. Patients group were homogenous in regard to age, gender, and fracture classification.

Mean time to surgery was 2 days (range 1- 3 days) in intramedullary nailing group, and 1.3 days (range 1- 5) in MIPO group and their were no significant difference between the groups (p= 0.782). Mean union time was 3.2 months (2.5-4.0) months in all patients, 3.0 months for intramedullary nail group and 3.4 months for plate fixation group their was no significant difference between the groups (p=0.856).

Ankle arthritis was evaluated by AOFAS scoring system. The mean AOFAS score was 86.8 (range 55-100). It was 87.8 (range 75-98) in intramedullary nailing group and 82.8 (range 71-97) in MIPO group no significant difference between the groups. 15 patients had fibula fracture 10 were fixed three in intramedullary nailing group and seven in MIPO group. There was no significant difference between the groups in AOFAS scoring system. (p= 0.872).

Thirteen patients complaining for hard-ware pain in plating group as compare to seven in tibia nail population.

Discussion:

Tibia fracture occurred frequently and different surgical methods give acceptable results. But distal tibia fracture is challenging as overlying soft tissue gradually become thinner and has diminished vascularization. These conditions can lead tonon union and implant irritations. So, MIPO technique with introduction of LCP for treating such fractures gain its popularity. Plate is introduced through small incision between muscle and periosteum along medial aspect of tibia and fixed with locking screws. Another less invasive technique is IMN which preserve surrounding soft tissue minimally disrupts surrounding blood supply. More frequently these patients complain for knee and ankle pain. So, our purpose of study is to compare tibia nail and plating in distal tibia fracture.

Table 1:

	IMN Group	LCP Group	P - value
Time to Union	3.0 months	3.4 months	0.865
AOFAS score	87.8	82.8	0.872
Hardware irritation	7 patients	13 patients	

Because there were no nonunion cases reported in our study which indicates that it is preferred to use closed nailing and MIPO technique with LCP for treating distal tibia fracture as it preserved fracture hematoma and minimally disrupts surrounding soft tissue. But slightly shorter time to union in IMN population as compares MIPO LCP.

AOFAS score indicates good functional results in operated patients but slightly better in IMN population. This is comparable to previous studies that shows mean AOFAS score between 91.0 and 87.3 points following union.

During this study we noted that pain due implant impingement was common but it is difficult to explain that it needs removal of implant. But it is comparatively more common after MIPO LCP.

Limitation of our study is small sample size and short duration of follow ups.

Conclusion:

Percutaneous plating is usually preferred over

nailing for treating 43-A type of fracture as distal fragment size is small. But in our observation intramedullary nailing is the better option as it has shorter time to union and good functional results as compare to MIPO LCP but technically, it is demanding.

Conflict of Interest: None**References:**

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