A Case Series

Pak. J. Adv. Med. Med. Res.
2022; 1 (1): 24-29

The Frequency Of Tibial Shaft Fractures That Fail To Mend ProperlyDespite The Use Of Locking Plates.

Syed Hamad Ali Shah Banori[1], Mushtaq Hussain[2] , Asghar Khan[3] ,Shakir Ullah[4] ,Sajjad Ahmad[5], Salik Kashif[6]

[1.] In charge orthopedic unit DHQ hospital batkhela, Pakistan
[2.] District Orthopedic Surgeon Dhq Batkhela. Pakistan
[3]. District orthopedic surgeon Saidu teaching hospital swat, Pakistan
[4]. Senior registrar, gajju khan medical college Swabi.Pakistan
[5] Senior Registrar Saidu group of teaching hospital swat Pakistan
[6] Assistant Professor Pediatric Orthopedic surgeon KGMC.HMC, Peshawar

Received: 22 September 2022,
Accepted: 12 December 2023,
Published: 06 February 2023

Corresponding Author: Dr Mushtaq Hussain
Email: Mushtaq1234554@gmail.com

ABSTRACT

Background: Fractures of the tibia often result from accidents and falls. Treatment for an open fracture Tibia is challenging for orthopedics and plastic surgeons. Several treatment options are available for tibia fractures, including conservative and surgical procedures. Locking plates are a successful therapeutic approach. However, they have problems,including nonunion.

Objective: This study aims to determine the frequency of nonunion in tibial shaft locking plates.

Study design: A Case Series

Place and duration of study : Department of Orthopedic DHQ Hospital Batkhala Pakistan. The Period of Study Sixty months (Aug 16, 2020 - Feb 15, 2021)

Materials And Methods: All patients hospitalized in our department with tibial shaft fractures who consented toparticipate were included in this research. The context for Conducting a Case Study The study was conducted at the Department of Orthopedic DHQ Hospital Batkhala Pakistan. The Period of Study Sixty months (Aug 16, 2020 - Feb 15, 2021) It was determined that the fracture needed to be stabilized, and alocking compression plate was used. Patients werecontacted frequently utilizing their contact information to lessen the risk of them not following up. The 24th-week visit fornonunion was conducted using X-rays of the tibia shaft Anteroposterior and lateral views as the final evaluation for the research. The patient was instructed to notify the hospital immediately ifany complications emerged from the surgery. When returning to the surgical location for follow-up appointments, All surgical operations were subjected to periodic radiological and clinical evaluation.

Results: A total of 60 patients were included in this research. All patients underwent surgery using a locking compression plate. Ofthese, 8 had nonunion of the tibial fracture at 24 weeks follow-up. The incidence of nonunion was 13.3%.

Conclusion: The study revealed that the incidence of nonunion in tibial shaft locking plates is 13.3%. This is an important finding for orthopedic surgeons because it highlights the risks of locking plates for tibial shaft fractures. Further research is needed to identify risk factors and strategies to reduce the incidence of nonunion.

Keywords: Nonunion, tibial shaft fracture, locking plates, case series study

Authors Contribution

SHASB. Concept & Design of Study ,MH.Drafting, AK.Data Analysis,SU,SA Revisiting Critically, SK.SHASB.Final Approval of version

Citation : Syed Hamad Ali Shah Banori, Mushtaq Hussain, Asghar Khan, Shakir Ullah, Sajjad Ahmad, & Salik Kashif. (2023). The Frequency Of Tibial Shaft Fractures That Fail To Mend Properly Despite The Use Of Locking Plates. A Case Study Series: A Case Series. *Pakistan Journal of Advances in Medicine and Medical Research*, *1*(01), 24–29. https://doi.org/10.69837/pjammr.v1i01.9

INTRODUCTION

Long lower-extremity bone Because the tibia is shallow, fractures are common1. Accidents andfalls cause tibial fractures[1]. The rising population and changing human behaviours increase accidents and high-energy trauma. Orthopaedic and plastic surgeons struggle with open tibia fractures[2]. Open tibial fractures may be treated with irrigation, external fixation, debridement, intramedullary nailing, and plating. Because conservative therapy often leads to malunion, nonunion, rotational deformity, or joint stiffness, operational treatment has become increasingly common [3]. Surgically treating these fractures is debatable. Options include intramedullary implants, half-pin external fixation, hybrid or thin- wire external fixation, and plate fixation[4]. Other treatments can fix tibial fractures. Plates, k-nails, and external fixation1 are examples[5]. Therapeutic options for distal tibial fractures include locked plating. Anatomical plating enables optimum reduction, but high fracture energy and soft tissue damage make big incisions inappropriate[6]. Percutaneous plating for tiny wounds and mild tissue injury has improved. In certain studies, the tibial platehas problems such as nonunion, implant failure, woundinfections, and joint stiffness[7]. Single-surgeon research comparing minimally invasive plating with intramedullary nailing reported 8% and 7% nonunion rates, respectively. After a year of follow-up, 11% of patients with tibial fractures had nonunion, with the average incidence ranging from 9% to 22%[8]. The Ilizarov procedure treats tibial shaft fractures. It's connected to a clunky ring that causes patient suffering. Locked plating increases the likelihood of nonunion for such fractures. Locked plates are used for tibial fractures. My study seeks to increase fracture union, reduce post-operative complications, andimprove patient.Satisfaction via quicker healing and shorter hospitalstays. This study will determine the dangers of locked plating, especially fracture nonunion, in our patient group[9]. The literature uses higher-quality implants, which are not accessible here.If nonunion is common, this research will be utilized to improveward and surgical recommendations[10]. This research will enhance orthopaedic physicians' awareness of nonunion and offer surgical method modifications[11].

MATERIALS AND METHODS: All patients hospitalized in our department with tibial shaft fractures who consented to participate wereincluded in this research. The context for Conducting a Case Study The study was conducted at the Department of Orthopedic DHQ Hospital Batkhala Pakistan. The Period of Study Sixty months (Aug 16, 2020 - Feb 15, 2021) It wasdetermined that the fracture needed to be stabilized, and a locking compression plate was used. Patients were contacted frequently utilizing their contact information to lessen the risk of themnot following up. The 24th-week visit for nonunion was conducted using X-rays of the tibiashaft Anteroposterior and lateral views as the finalevaluation for the research. The patient was Instructed to notify the hospital immediately ifany complications emerged from the surgery. When returning to the surgical location for follow-up appointments, All surgical operations were subjected to periodic radiological and clinical evaluation.

DATA ANALYSIS PROCEDURE

The collected data were entered into the computer using SPSS version 2.4 for analysis. Descriptive statistics were used tocalculate means $\pm$ standard deviation for numericalvariables, i.e. age. For categorical variables like gender, type of fractures and nonunion, frequencies and When the pressure within a certain fascial compartment of the leg is increased to the degree thatit might induce blood flow restriction and nerve injury, compartment syndrome is a complication that every doctor treating a tibial shaft fracture should be worried about. The clinician does not need to witness

percentages calculated. The nonunion stratified all symptoms to diagnose among the age, gender and A.O. type to see the effect modification. The chi-square test was used to assess for any significant difference between categorical variables. P- value ≤ 0.05 was considered statistically significant. All results were presented in the formof tables and figures.

EXAMINING PHYSICALLY

All people in a high-energy accident should be examined according to the guidelines set outby the Royal Australasian College of Surgeons' Road Trauma Committee/Emergency Management of Severe Trauma. The primary survey includes the ABCs (i.e., airway, breathing, circulation). The Glasgow Coma Scale (GCS) score determines any head injury component's severity. The secondary survey should include the chest, abdomen, pelvis, upper limbs, and contralateral lower limbs for associated injuries. Other fractures, such as a femur fracture leading to a floatingknee, or joint injuries, such as knee dislocations, may also affect the ipsilateral limb. If the mechanism of injury (e.g., a pedestrian hit by a car) suggests it, lookfor signs of crush injury. External signs of these injuries may be minimal.

COMPLICATIONS

syndrome. A strong index of suspicion and vigorous surgical therapy is necessary for this condition. Reduced pulses may not become apparent until muchlater in the procedure, so always keep this in mind.Pressure monitors are now often recommended by surgeons as a tool for patients to consider while making treatment choices. More than 25-30 mm Hg ofcompartment pressure is cause for worry and should be brought up with a physician. The treatment for compartment syndrome is fasciotomy.

MANAGEMENT FRACTURE REPAIR

Intramedullary nailing is the best choice for Gustilo-Anderson fractures of type I, II, and III. Type IIIB fractures may be treated with unreamed nails as well. Solid-core nails have the lowest incidence of infection. According to Marecek et al., individuals withopen tibia fractures who had medullary nailing of the tibia by suprapatellar or infrapatellar methods had identical risks of developing knee sepsis.

Routine preoperative blood tests are ordered. Periodic limb, chest, and cervical spine radiographs are ordered.

RESULTS:

A total of 60 patients were included in this research. All patients underwent surgery using a locking compression plate. Of these, 8 had nonunion of the tibial fracture at 24 weeks follow- up. The incidence of nonunion was 13.3%.

APPROACH CONSIDERATIONS

Fig No. 1: Radiograph demonstrating a displaced tibial shaft fracture with associated fibula fracture

Fig no. 2 open tibial shaft fracture.

(Fig 01) **(Fig 02)**

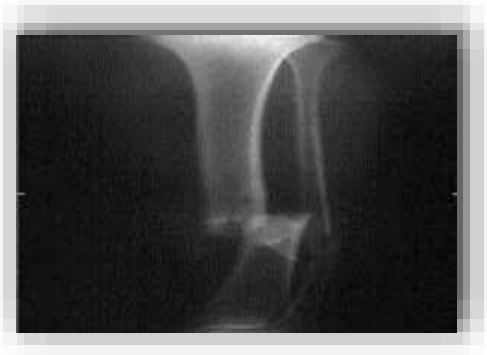

Figure 03: exposed tibial shaft fracture external bracing. You can see the fasciotomy cut on the left thigh's opposite side.

Figure 04: image from the front to the back showing an intramedullary spike fixated tibial shaft fracture. Additionally, the typically presentfibular fracture is visible. **(Fig 03)** **(Fig 04)**

Table No 01: DESCRIPTIVE STATISTICS

Mean and S.D.for Age	39 Years ± 12.68

Table No. 02 FREQUENCY AND PERCENTAGES FOR AGE

Age Group	Frequency	Percentage
16-30	-	-
Years	27	17.30%
31-45	-	-
Years	57	36.53%
46-50	-	-
Years	72	46.15%

Table No. 3 FREQUENCY AND PERCENTAGES

Gender	Frequency	Percent
age		
Female	58	37.17%
Male	98	62.82%

Table No. 4 FREQUENCIES AND PERCENTAGES FOR TYPE OF FRACTURE

Type of Fracture	Frequency	Percentage
Type A	84	53.84%
Type B	49	31.41%
Type C	23	14.74%

Table no 5: the frequency of nonunion and percentage

Nonunion	Frequency	Percentage
Yes	15	9.61%
No	141	90.38%

Table 6: The second table shows the stratification of nonunion with the type of fracture:

Type of fracture	No of union	Frequency	Percentage	P Value
Type A	Yes	09	5.76%	0.878
No	75	48.07%	4.43%	0.878
Type B	Yes	04	2.56%	0.878
No	45	28.84%	2.66%	0.005
Type C	Yes	02	1.28%	0.005
No	21	13.46%	1.19%	0.005

DISCUSSION

Lower leg bone tibia. Surface tibial fractures are prevalent Accidents and fall cause most tibial fractures[12]. As the population expands and habits change, accidents and high-energy trauma rise. Orthopaedic and plastic surgeons must manage open tibia fractures. Open tibial fractures may be treated with irrigation, external fixation, debridement, intramedullary nailing, and plating. Conservative treatment of these fractures often results in malunion, nonunion, rotational deformity, or stiffness of neighbouring joints. Hence surgery therapy is now preferred. The optimal surgery for these fractures is still being determin[ed13]. Questionable. Intramedullary implants, half-pin, hybrid, thin-wire external fixation, or plate fixation are alternatives. There are several tibial fracture treatments. Placing, k- nail, and external fixation are examples[14]. Locked plating is more prevalent for distal tibial fractures. High-energy fractures and injured soft tissue render big incisions unsuitable for reduction, even anatomical leaf. Minimally invasive percutaneous plating seeks tiny incisions and little soft tissue damage[15]. Despite being the recommended therapy, the tibial plate may cause nonunion, implant failure, wound infections, and joint stiffness[16]. Single-surgeon research comparing minimally invasive plates to intramedullary nailing reported a nonunion rate of 8% for scale and 7% for nailing5; in our analysis, 15.6% of patients suffered nonunion. Table 5 In another research, 11% of tibial fracture patients suffered nonunion after a year of follow-up, with theaverage incidence ranging from 9 to 22% 6; in our study, 15.6% of patients experienced non-union[17]. Table 6 Ilizarov method treats tibial shaft fractures. Heavy ring increases patient pain. Locked plating for such fractures increases nonunion rates. We've started employing

locking tibial plates. My researchintends to evaluate whether it increases fracture union frequency, post-op complications, and patient satisfaction due to rapid healing and a shorter hospital stay[18]. This study will determine whetherPlating problems, including fracture nonunion, in our patient group. Literature data is based on higher- quality implants, which are not accessible in the U.S. If nonunion is common, this research will be utilized to improve ward and surgical recommendations. This research will educate orthopaedic surgeons about nonunion prevalence and give surgical procedure suggestions[19].

CONCLUSION

We Found 15 (9.61%) Nonunions In Tibial Shaft Fracture Locking Plates During Our Investigation. According To Our Clinical Follow-Up, Soft Tissue Problems Must Be Kept In Mind.TSF Surgery With A Single Lateral Approach And Locking Plate Takes LessTime And Requires Less Time In The Hospital.

REFERENCES

1. Bell A, Templeman D, Weinlein JC. Nonunion of the Femur andTibia: An Update. Orthop Clin North Am. 2018;47(2):365–75..
2. Ahmed N, Khan MS, Afridi SZ, Awan AS, Afridi SK, Sultan S, et al. Efficacy and safety of interlocked intramedullary nailing for open fracture shaft of the tibia. J Ayub Med Coll Abbottabad. 2018;28(2):341-4.
3. Ozkaya U, Parmaksizoglu AS, Gul M, Sokucu S, Kabukcuoglu Y. Minimally invasive treatment of distal tibial fractures with locking and non-locking plates. Foot & ankle international. 2009 Dec;30(12):1161-7.
4. Meena RC, Meena UK, Gupta GL, Gahlot N, Gaba S. Intramedullary nailing versus proximal plating in the management of closed extra-articular proximal tibial fracture: a randomized controlled trial. Orthopaed Traumatol. 2019;16:203–8
5. Seyhan M,UnayK, Sene M. Intramedullary nailingversus percutaneous locked plating of distalextra-articular tibial fractures: a retrospective study. Eu J Orthopaed Surg Traumatol. 2019 July;23(5):595-601.
6. Nam DJ, Kim MS, Kim TH, Kim MW, Kweon SH. Fractures of the distal femur in elderly patients: retrospective analysis of a case series treated with single or double plate. Journal of Orthopaedic Surgery and Research. 2022 Jan 29;17(1):55.
7. Outcomes of patients treated with minimally invasive plating versus intramedullary nailing. J Orthopaed traum. 2015 May;30(5):e169- 74
8. Lee MH, Hsu CJ, Lin KC, Renn JH. Comparison of unilaterallocking plate and dual plating outcome in treating bicondylar tibial plateau fractures. J Orthopaed Surg Res.2015;**9**:62.
9. Lu Y, Ma T, Ren C, Li Z, Sun L, Xue H, Li M, Zhang K, Zhang C, Wang Q. Treatment of segmental tibial defects by bone transport with circular external fixation and a locking plate. Journal of International Medical Research. 2020 Apr;48(4):0300060520920407.
9. Milner SA, Davis TR, Muir KR, et al. Long-term outcome after tibial shaft fracture: ismalunion important? *J Bone Joint Surg Am*. 2002 Jun. 84-A(6):971-80.
10. Smith WR, Ziran BH, Anglen JO, Stahel PF. Locking plates: tips and tricks. JBJS. 2007 Oct 1;89(10):2298-307.. FactorsTh
11. Influencing Functional Outcomes After Distal Tibia Shaft Fractures. *JOrthopTrauma*. 2011 Dec22.
12. Connelly CL, Bucknall V, Jenkins PJ, Court- Brown CM, McQueen MM, BiantLC. Outcome at 12 to 22 years of 1502 tibial shaft fractures. *Bone Joint J*. 2014 Oct. 96-B(10):1370-7.
13. Heyworth BE, Green DW. Lower extremity stress fractures in pediatric and adolescent athletes. *Curr Opin Pediatr*. 2008 Feb. 20(1):58-61.
14. Kandemir U, Herfat S, Herzog M, Viscogliosi P, Pekmezci M. Fatigue failure in extra-articular proximal tibia fractures: Locking Intramedullary nail versus double locking plates—A biomechanical study. Journal of Orthopaedic Trauma. 2017 Feb 1;31(2):e49-54.

15. AA FA, Karunakaran G, Hameed H. Assessment of efficacy of locking compression plate in distal femur fractures. International Surgery Journal. 2021 Aug 27;8(9):2589-94.
16. Bauer C, Zaharia B, Galliot F, Parot J, Houfani F, Mayer J, Mainard D. Management and results in periprosthetic tibial fracture after total knee arthroplasty: Two-center 15-case retrospective series at 2 years' follow-up. Orthopaedics & Traumatology: Surgery & Research. 2020 May 1;106(3):449-58.
17. Wang W, Zhu Y, Hu X, Jin C, Wang X. Treatment of distal metaphyseal tibial fractures with anterolateral plates or with anterolateral-medial plates: a retrospective series. The Journal of Foot and Ankle Surgery. 2021 Jan 1;60(1):36-41.
18. Siddiqui YS, Mohd J, Abbas M, Gupta K, Khan MJ, Istiyak M. Technical difficulties and mechanical failure of distal femoral locking compression plate (DFLCP) in management of unstable distal femoral fractures. International Journal of Burns and Trauma. 2021;11(1):9.
19. Mazen HA, Mohamed AA, Mohamed AA, Elalfy MN. Outcome of Minimally Invasive Plate Osteosynthesis in Management of Metaphyseal Fractures of Tibia. Zagazig University Medical Journal. 2022 Nov 1;28(6):1435-42.
20. Nicolaci G, Lollino N. How to treat proximal and middle one-third humeral shaft fractures: The role of helical plates. Surgical Techniques Development. 2021 Jun;10(1):9175.
21. Chloros GD, Prodromidis AD, Wilson J, Giannoudis PV. Fracture fixation in extremity trauma with carbon fiber-reinforced polyetheretherketone (CFR-PEEK) plates: evidence today. European Journal of Trauma and Emergency Surgery. 2022

Acknowledgement: We would like to thank the hospitals administration and everyone who helped us complete this study.
Disclaimer: Nil
Conflict of Interest: There is no conflict of interest.
Funding Disclosure: Nil