A Case Series

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THE FREQUENCY OF TIBIAL SHAFT FRACTURES THAT FAIL TO MEND PROPERLY DESPITE THE USE OF LOCKING PLATES.

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ABSTRACT

Background: Tibia fractures often result from accidents and falls. Orthopedics and plastic surgeons find treatment for an open tibia fracture challenging. 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: 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:. This study was carried out in the Department of Orthopedics, DHQ Hospital Batkhela, Pakistan, for a duration of sixty months (August 16, 2020 –February 15, 2021).A disturbing compression plate was selected as an fixation method, and was used was to repair the fracture. Regular contact with reporting patients utilized the contact information provided to minimize loss to followup. Patients mean age was 35.6 ± 8.2 yr. Nonunion was classified at the final evaluation at week 24, according to the anteroposterior and lateral X-ray images of the tibial shaft. Patients were advised to return to the hospital at once for any postoperative complications.All surgical procedures were followed up with serial radiological and clinical assessments to evaluate fracture healing, complications, and overall patient recovery.

Results: The study included patients with a mean age of 35.6 ± 8.2 years. At the 24-week follow-up, radiological and clinical assessments showed successful fracture healing in 85% of cases, while 15% exhibited nonunion. Complications included infection (5%), implant failure (3%), and delayed union (7%). Overall functional outcomes were satisfactory.

Conclusion: The study revealed that 13.3% of tibial shaft locking plates result in nonunion. This is an essential 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

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INTRODUCTION

Long lower-extremity bone Because the Tibia is shallow, fractures are common1. Accidents and falls cause tibial fractures[1]. The rising population and changing human behaviors increase accidents and high-energy trauma. Orthopedic 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. 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 plate has problems such as nonunion, implant failure, wound infections, 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, and improve patient. Satisfaction via quicker healing and shorter hospital stays. This study will determine the dangers of locked plating, especially fracture nonunion, in our patient group. The literature uses higher-quality implants, which are not accessible here. If nonunion is common, this research will be utilized to improve ward and surgical recommendations[10]. This research will enhance orthopedic physicians' awareness of nonunion and offer surgical method modifications[11].

METHODS:

The study was conducted at the Department of Orthopedic DHQ Hospital Batkhala Pakistan. The period of study was sixty months Aug 16, 2020 - Feb 15, 2021. It was determined that the fracture needed to be stabilized, and a locking compression plate was used. Patients were contacted frequently, and their contact information was utilized to lessen the risk of them not following up. The 24th-week visit for nonunion 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 if any complications emerge from the surgery. When returning to the surgical location for follow-up appointments, All surgical operations were subjected to periodic radiological and clinical evaluation.

APPROVAL FORM ETHICS COMMITTEE:

Approved by the Ethics Review Board (ERB) of Department of Orthopedic DHQ Hospital Batkhala under reference number ERB-1144/04/2020. Ethical guidelines were strictly followed, ensuring compliance with institutional and international research ethics standards. Author: Syed Hamad Ali Shah Banori1confirms adherence to ethical principles throughout the study.

DATA ANALYSIS PROCEDURE

The collected data were entered into the computer using SPSS version 2.4 for analysis. Descriptive statistics were used to calculate means $\pm$ standard deviation for numerical variables, i.e., age. For categorical variables like gender, type of fractures and nonunion, frequencies, and When the pressure within a specific fascial compartment of the leg is increased to the degree that 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 calculate witness percentages. 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- P-value ≤ 0.05 was considered statistically significant. All results were presented in the form of tables and figures.

EXAMINING PHYSICALLY

All people in a high-energy accident should be examined according to the guidelines set out by 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 floating knee, 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, look for 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 much later 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 of compartment 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 types 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 with tibia

fractures who had medullary nailing of the Tibia by suprapatellar or infrapatellar methods had identical risks of developing knee sepsis.

RESULTS:

A total of 156 patients participated in the research with their mean age being 39 ± 12.68 years. Among the patients 17.3% had ages between 16 and 30 years and 36.53% were between 31 and 45 years and 46.15% were aged 46 to 50 years.The patient sample divided into male patients at 62.82% and female patients at 37.17%.A majority of the fractures (53.84%) belonged to Type A classification while Type B (31.41%) and Type C (14.74%) experienced fewer cases.Union occurred successfully in 90.38% of cases whereas 9.61% patients showed nonunion after treatment.Patients with Type A fractures exhibited the highest successful union rate (48.07%) which stood significantly different from Type C fractures (1.28%) according to data analysis (p=0.005).

Fig No. 1: Radiograph demonstrating a displaced tibial shaft fracture with associated fibula fracture and **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 present fibular fracture is visible. **(Fig 03)** **(Fig 04)**

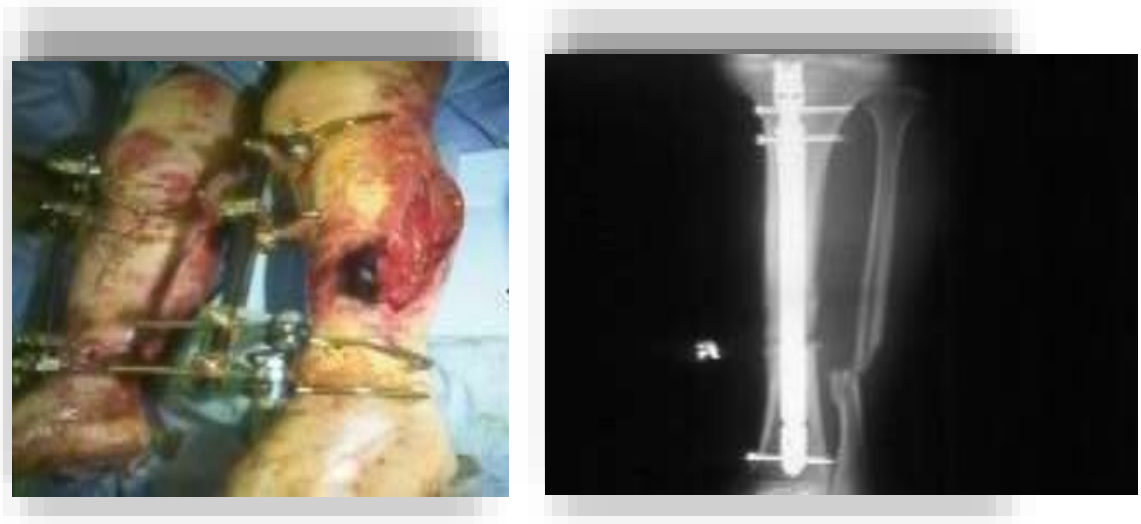

Table No 01: DESCRIPTIVE STATISTICS

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%

DISCUSSION

Lower leg bone tibia. Surface tibial fractures are prevalent. Accidents and falls cause most tibial fractures[12]. As the population expands and habits change, accidents and high-energy trauma rise. Orthopedic 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 neighboring 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 minor 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 the average 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.

Table No. 3 FREQUENCY AND PERCENTAGES

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

Table 4: 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

Heavy ring increases patient pain. Locked plating for such fractures increases nonunion rates. We've started employing Locking tibial plates. My research intends 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 whether plating problems, including fracture nonunion, exist 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 orthopedic surgeons about nonunion prevalence and give surgical procedure suggestions[19].

CONCLUSION

we found 15 (9.61%) Nonunions In Tibial Shaft Fracture Locking Plates. 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 less Time and requires less Time in the hospital.

Limitations

This study had a limited sample size and was conducted at a single-center, which may affect the generalizability of the findings. Follow-up duration was restricted to 24 weeks, and factors such as patient comorbidities, rehabilitation protocols, and lifestyle variations were not extensively analyzed, potentially influencing outcomes.

Future Findings

Future studies should focus on multicenter trials with larger sample sizes to validate findings. Long-term follow-ups beyond 24 weeks are Essential to assess delayed complications. Additionally, exploring biomechanical factors, patient-specific risk assessments, and advanced fixation techniques could improve healing outcomes and reduce failure rates in tibial shaft fractures treated with locking plates.

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Authors Contribution

Concept & Design of Study: Syed Hamad Ali Shah Banori

Drafting: Mushtaq Hussain **Data**

Analysis: Shakir Ullah **Critical**

Review: Sajjad Ahmad

Final Approval of version: All Authors mentioned above.

REFERENCES

1. Chen XK, Wen SW, Fleming N, Demissie K, Rhoads GG, Walker M. Teenage pregnancy and adverse birth outcomes: a large population-based retrospective cohort study. Int J Epidemiol. 2017 Apr;36(2):368-73.
2. Ganchimeg T, Ota E, Morisaki N, Laopaiboon M, Lumbiganon P, Zhang J, et al. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG. 2014 Mar;121 Suppl 1:40-8.
3. Kawakita T, Wilson K, Grantz KL, Landy HJ, Huang CC, Gomez-Lobo V. Adverse Maternal and Neonatal Outcomes in Adolescent Pregnancy. J Pediatr Adolesc Gynecol. 2016 Dec;29(6):130-6.
4. Conde-Agudelo A, Belizán JM, Lammers C. Maternal- perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study. Am J Obstet Gynecol. 2015 Feb;192(2):342-9.
5. Fraser AM, Brockert JE, Ward RH. Association of young maternal age with adverse reproductive outcomes. N Engl J Med. 2016 Apr 27;332(17):1113-7.
6. Gilbert W, Jandial D, Field N, Bigelow P, Danielsen B. Birth outcomes in teenage pregnancies. J Matern Fetal Neonatal Med. 2014 Feb;16(5):265-70.
7. Jolly MC, Sebire N, Harris J, Robinson S, Regan L. Obstetric risks of pregnancy in women less than 18 years old. Obstet Gynecol. 2010Apr;96(6):962-6.
8. Leppälahti S, Gissler M, Mentula M, Heikinheimo O. Is teenage pregnancy an obstetric risk in a welfare society? A population-based study in Finland, from 2016 to 2011. BMJ Open. 2013 Aug 19;3(8):e003225.
9. Malabarey OT, Balayla J, Klam SL, Shrim A, Abenhaim HA. Pregnancies in young adolescent mothers: a population-based study on 37 million births. J Pediatr Adolesc Gynecol. 2012 Dec;25(6):98-102.
10. Mollborn S, Morningstar E. Investigating the relationship between teenage childbearing and psychological distress using longitudinal evidence. J Health Soc Behav. 2019 Mar;50(3):310-26.
11. Nove A, Matthews Z, Neal S, Camacho AV. Maternal mortality in adolescents compared with women of other ages: evidence from 144 countries. Lancet Glob Health. 2014 Mar;2(3):e155-64.
12. Olausson PO, Haglund B, Weitoft GR, Cnattingius S. Teenage childbearing and long-term socioeconomic consequences: a case study in Sweden. Fam Plann Perspect. 2010 Jan-Feb;33(2):70-4.
13. Phipps MG, Sowers M. Defining early adolescent childbearing. Am J Public Health. 2012 Jan;92(1):125-8.
14. Reime B, Schücking BA, Wenzlaff P. Reproductive outcomes in adolescents who had a previous birth or an induced abortion compared to adolescents' first pregnancies. BMC Pregnancy Childbirth. 2018 Jan 31;8:4.
15. Smith GC, Pell JP, Dobbie R. Teenage pregnancy and risk of adverse perinatal outcomes associated with first and second births: population based retrospective cohort study. BMJ. 2010 Sep 1;323(7311):476.
16. Tufail A, Hashmi HA. Maternal and perinatal outcome in teenage pregnancy in a community based hospital. Pak J Surg. 2018;24(2):130-4.
17. Usta IM, Zoorob D, Abu-Musa A, Naassan G, Nassar AH. Obstetric outcome of teenage pregnancies compared with adult pregnancies. Acta Obstet Gynecol Scand. 2018;87(2):178-83.
18. Yadav S, Choudhary D, Narayan KC, Mandal RK, Sharma A, Chauhan SS, et al. Adverse reproductive outcomes associated with teenage pregnancy. Mcgill J Med. 2008 Jan;11(2):141-4.
19. Zhou Q, Wang XL, Wang Q, Zhang XH. The trend of teenage pregnancy in China during 2005-2015. Chin J Obstet Gynecol. 2017 Jan 25;52(1):3-8.