

Evaluation of Tibial Shaft Fracture in Al- Hussein Teaching Hospital

**Prof. Dr. Ali Taha Hassan Al-azzawi M.B.CH.B.F.I.C.M.S (ortho),
Tabark Saleh Sharif Ammar Jawad**

Al-Muthana University, College of medicine, Department of surgery
drmustafasalah7@gmail.com

DOI: 10.56201/ijmepr.v8.no5.2024.pg41.52

Abstract

This study was conducted on 50 patients with fracture of tibia from 15 October, 2023 to 22 February 2024 at Al-Hussein teaching hospital, Al-Muthanna, Iraq 56% male and 44 % female. All patients sent for imaging such as plain x- ray CT or MRI. We study the age, sex, the cause, severity, type, site, shape of fracture, and the fracture displacement. The aim of this study is to know the associated factors with fracture of tibia, the methods of treatment and outcome of treatment.

Keywords: *Tibial shaft, Tibial shaft fracture, Mechanism of injury, Injury severity, Associated injuries, Mortality*

Introduction

Tibial shaft fractures occur with an incidence of 16.9/100,000/year. They are associated with significant short- and long-term morbidities ranging from acute compartment syndrome to chronic leg and knee pain. Furthermore, tibial shaft fractures in working-age adults have been shown to have a significant financial impact, both in terms of direct medical costs and lost productivity. As with other orthopaedic fractures, several studies showed patients with tibial shaft fractures in terms of age, gender, mechanism of injury (MOI) and fracture type. One such study by Larsen et al. found that men have a higher frequency of fractures while participating in sports activities, while women have a higher frequency because of walking and during daily activities.

Court-Brown and McBirnie found that the majority of tibial shaft fractures were caused by falls from height and road-traffic accidents. However, it is helpful to know the likelihood of associated injuries in order to optimize evaluations and ensure appropriate management, the associated injuries with fracture of tibia are compartment syndrome which is a painful condition that occurs when pressure within the muscles builds to dangerous levels.

This pressure can decrease blood flow, which prevents nourishment and oxygen from reaching nerve and muscle cells. Unless the pressure is relieved quickly, permanent disability may result. This is a surgical emergency. During the procedure, the surgeon makes incisions in the skin and

the muscle coverings to relieve pressure. Other associated injury is Open fractures (compound fractures) which occur due to expose the bone to the outside environment. Even with good surgical cleaning of the bone and muscle, the bone can become infected. Bone infection is difficult to treat and often requires frequent procedures and long-term antibiotics ,the other associated injuries are vascular injury and nerve injury .

Anatomy introduction:

The tibia is one of two bones that comprise the leg. As the weight-bearing bone, it is significantly larger and stronger than its counterpart, the fibula. The tibia forms the knee joint proximally with the femur and forms the ankle joint distally with the fibula and talus. The tibia runs medial to the fibula

from just below the knee joint to the ankle joint and is connected to the fibula by the interosseous membrane.

The proximal portion of the tibia consists of a medial and lateral condyle, which combine to form the inferior portion of the knee joint. Between the two condyles lies the intercondylar area, which is where the anterior collateral ligament, posterior collateral ligament, and menisci all have attachments

The shaft of the tibia is triangular in cross-section with three borders and three surfaces. The three borders are the anterior, medial, and interosseous and the three surfaces are the lateral, medial (anterior), and posterior. The anterior border divides the medial and lateral surface, the medial border divides the medial and posterior surface, and the interosseous border divides the lateral and posterior surface. the medial surface is mostly subcutaneous

Epidemiology:

Tibial fractures are common long-bone injuries, accounting for approximately 2 percent of all adult fractures with an incidence of 16.9/100.000/year ,The presence of significant osteoporosis increases the risk for compound or more complex fractures associated with higher morbidity and mortality , More severe tibia fractures caused by high-energy trauma, most often motor vehicle collisions (MVCs) ,The risk is somewhat higher in males.

Etiology:

Tibial shaft fractures occur in multiple contexts, including high- energy, low-energy, and rotational mechanisms of injury.

Common causes include sports, motor vehicle accidents ,falls

,bullet injury and shell injury The superficial position of the tibia leads to increased risk of fracture due to direct contact, as well as potential for open fracture.

Pathophysiology:

The tibia is the primary load-bearing bone of the lower leg. Typically, higher-energy mechanisms result in more proximal fractures and more complex fracture patterns. Rotational or torsional force more often results in spiral fractures. Significant soft tissue or crush injury increases the risk of compartment syndrome and vascular injury

Classification:

There are several classification systems used for tibial shaft fractures. Whichever classification system is used, it is important to note the location and degree of tibial fracture, associated fibular fracture, magnitude of surrounding soft tissue injury, and any articular extension

The Gustilo classification system is often used for open fractures:

Type I – open fracture, clean wound less than 1 cm •

Type II – open fracture, wound less than 10 cm without • extensive soft tissue damage, flaps, or avulsions

Type IIIA – open fracture from high-energy trauma, with • adequate soft tissue coverage of bone despite laceration or flaps

Type IIIB – open fracture with extensive soft tissue loss, • periosteal stripping, and bone damage

Type IIIC – open fracture associated with arterial injury •
requiring repair

Patient and methods:

This study was conducted on 50 patients with fracture of tibia from 15 October , 2023 to 22 February 2024 at Al-Hussein teaching hospital , Al-Muthanna, Iraq

56% male and 44 % female . All patients sent for imaging such as plain x- ray CT or MRI . We study the age, sex ,the cause , severity , type , site , shape of fracture, and the fracture displacement.

The aim of this study is to know the associated factors with fracture of tibia , the methods of treatment and outcome of treatment.

Results:

Table 1:Gender difference

Gender	male	28 56%
	female	22 44%

Figure 1: Gender difference

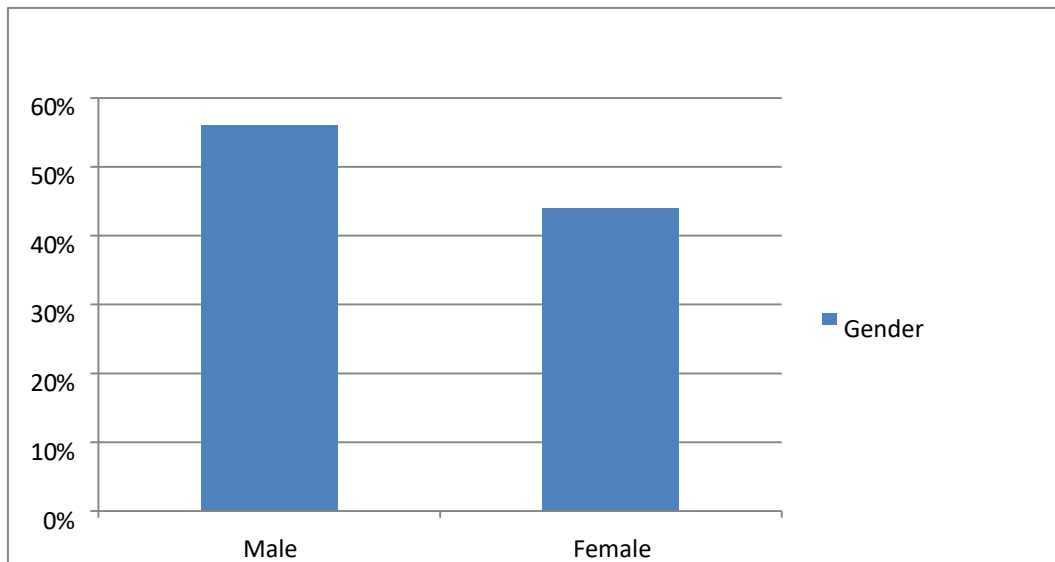


Table 2 : Age difference

Age	18-39	40-64	65+
	93,41%	3,85%	0%

Figure 2: Age difference

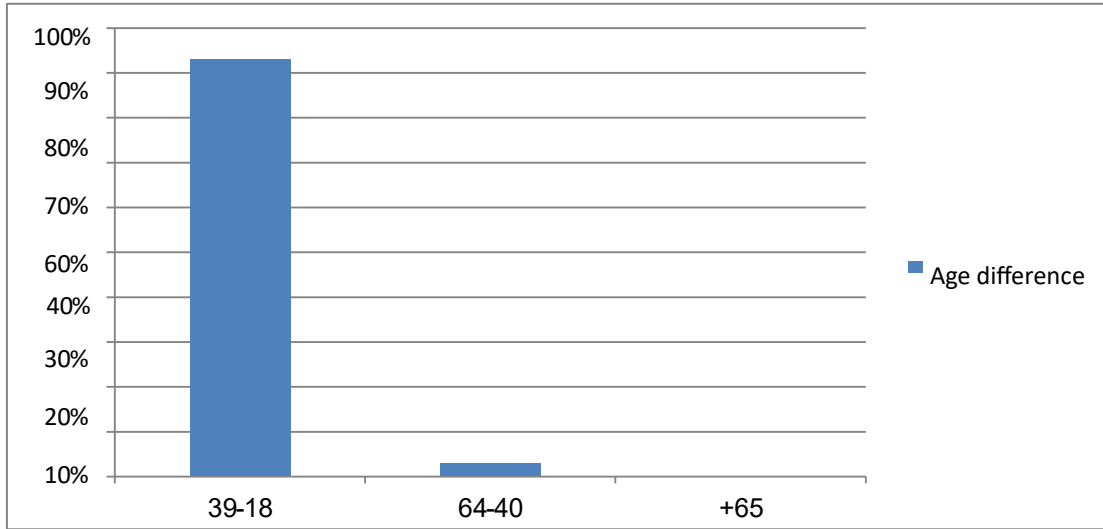


Table 3 : causes of fracture of tibia.

Causes of fracture of tibia	
Falls	7
Transport accidents	40
Open fractures (bullets , shells)	3

Figure 3: causes of fracture of tibia

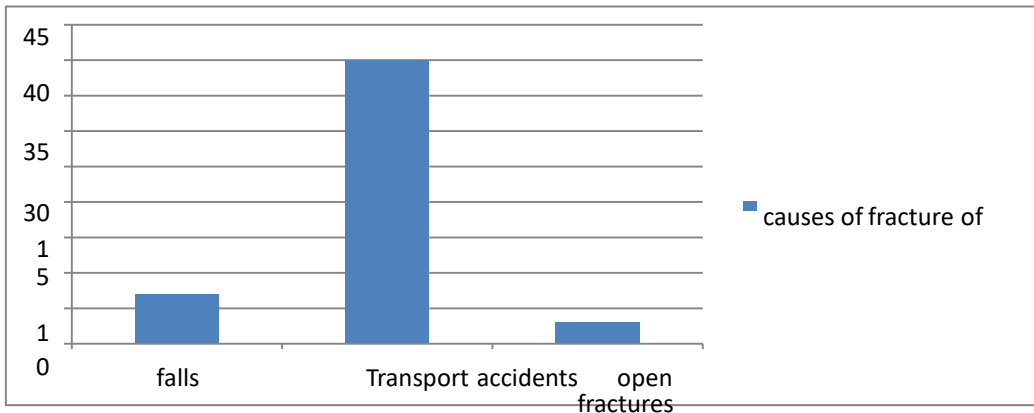


Table 4: types of fracture of tibia

Types of fracture of tibia	Open fracture	34
		68%

	Close fracture	16 32%
--	----------------	-----------

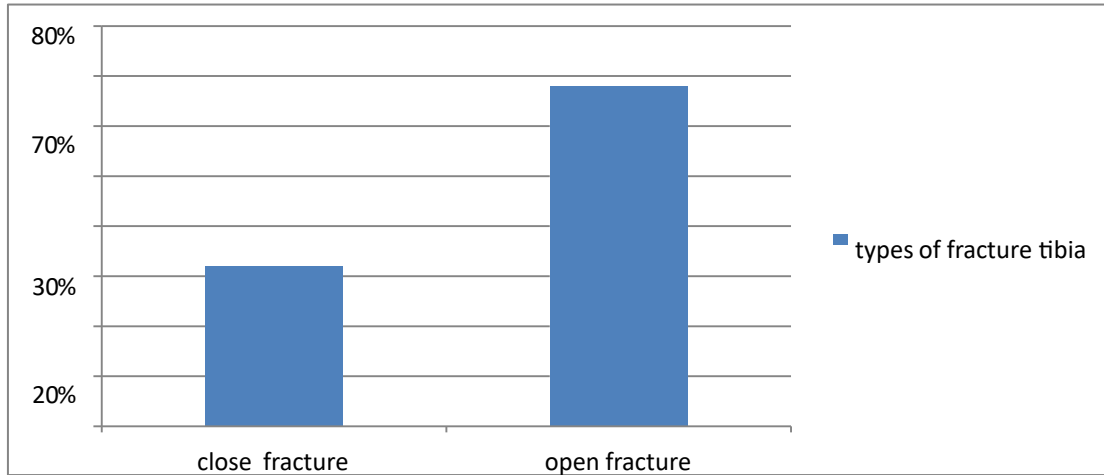


Figure 4 : types of fracture of tibia

Table 5: shapes of fracture of tibia.

Shape of fracture of tibia	Spiral	29 48%
	Transverse	14 28%
	Oblique	7 14%

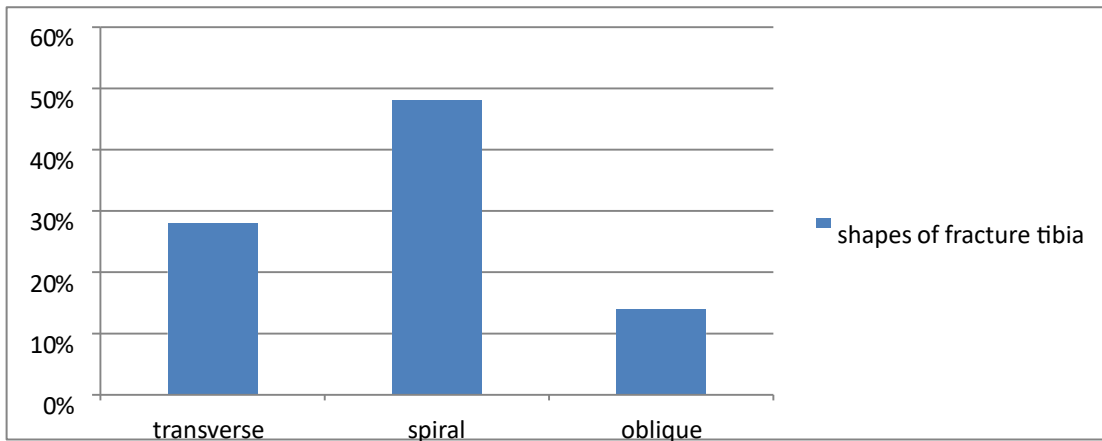


Table 6 :sites of fracture of tibia

Sites of fracture of	Upper third	12
----------------------	-------------	----

tibia		24%
	Middle third	18.36%
	Lower third	20.40%

Figure 6: sites of fracture of tibia

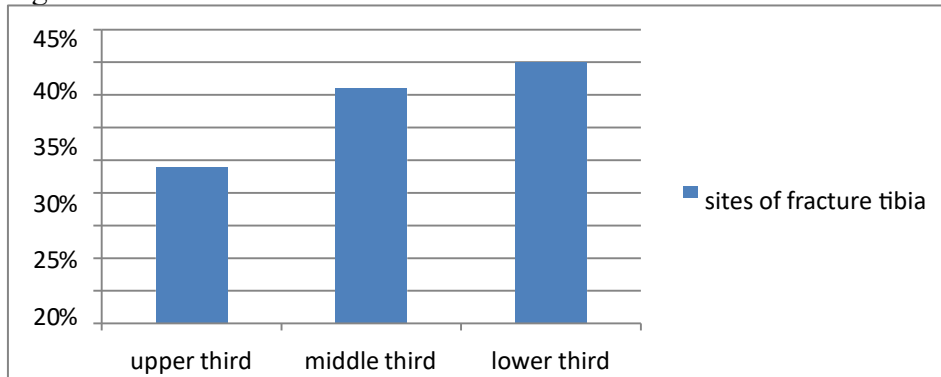


Table 7: Displacement of fracture of tibia

Displacement of fracture tibia	Displaced fracture	33 66%
	Not displaced fracture	17.34%

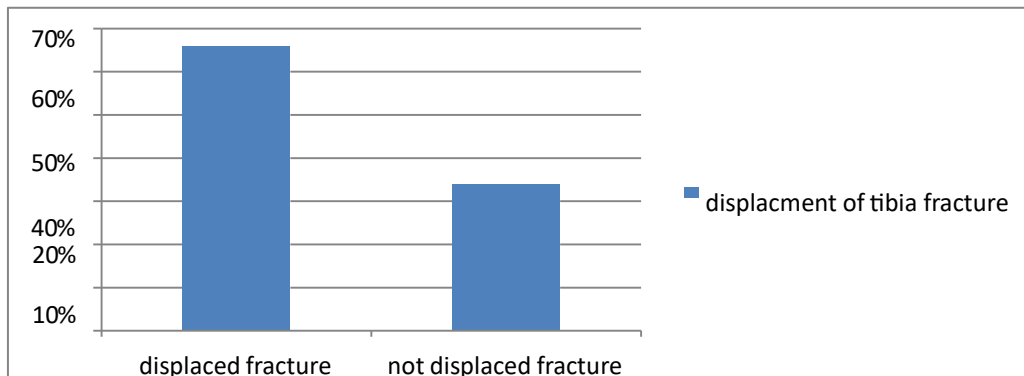


Figure 7: displacement of fracture of tibia Table 8: conservative treatment of tibia fracture

Conservative treatment	cast	36%
	Brace	64%

Figure 8: Percentage of conservative treatment

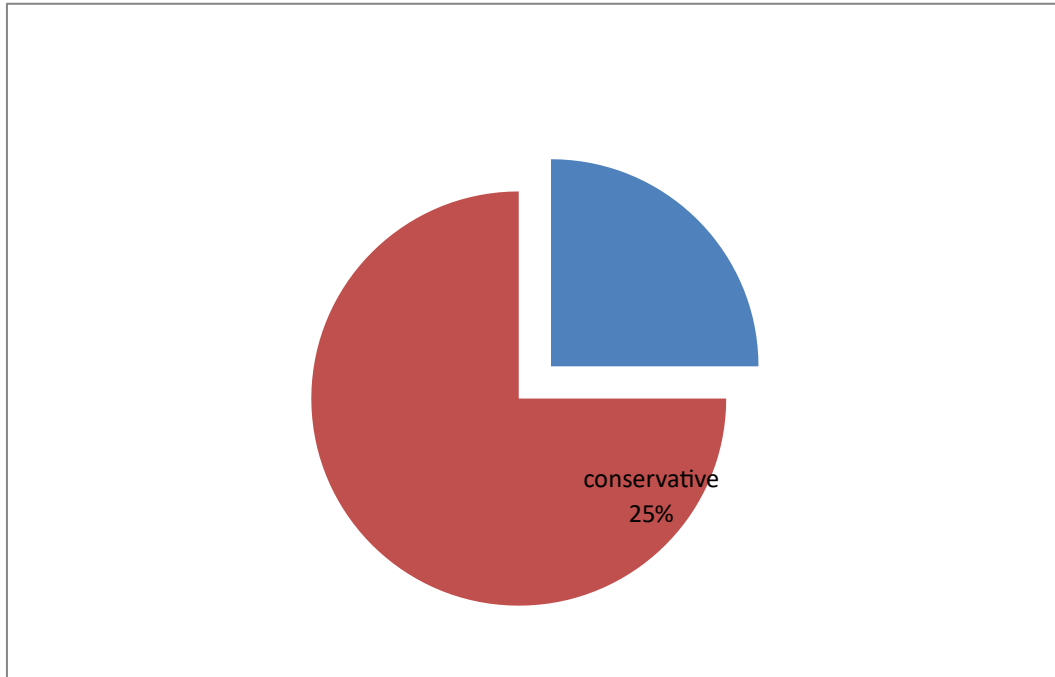


figure 9 : conservative treatment of tibia fracture

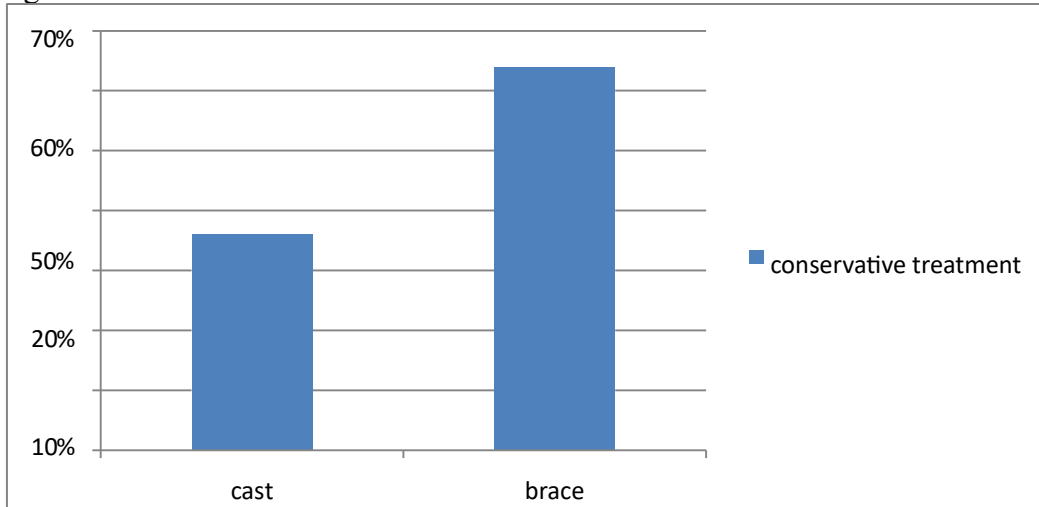


Table 9: surgical treatment of fracture of tibia

Surgical treatment of tibia fracture	Plates and screws	84%
	Intramedullary nail	5%

	External fixation	12%
--	-------------------	-----

Figure 10 : surgical treatment of fracture of tibia

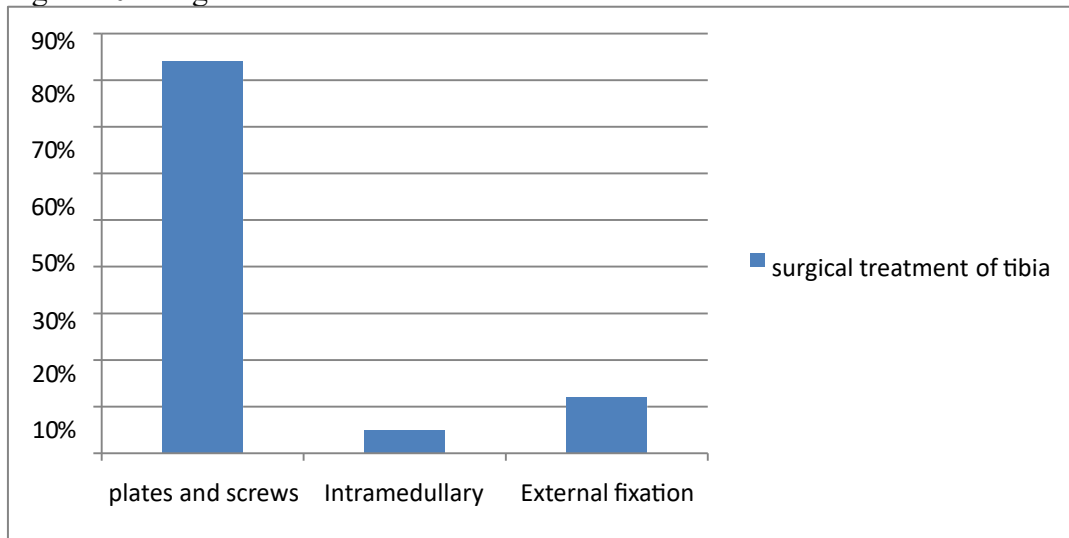
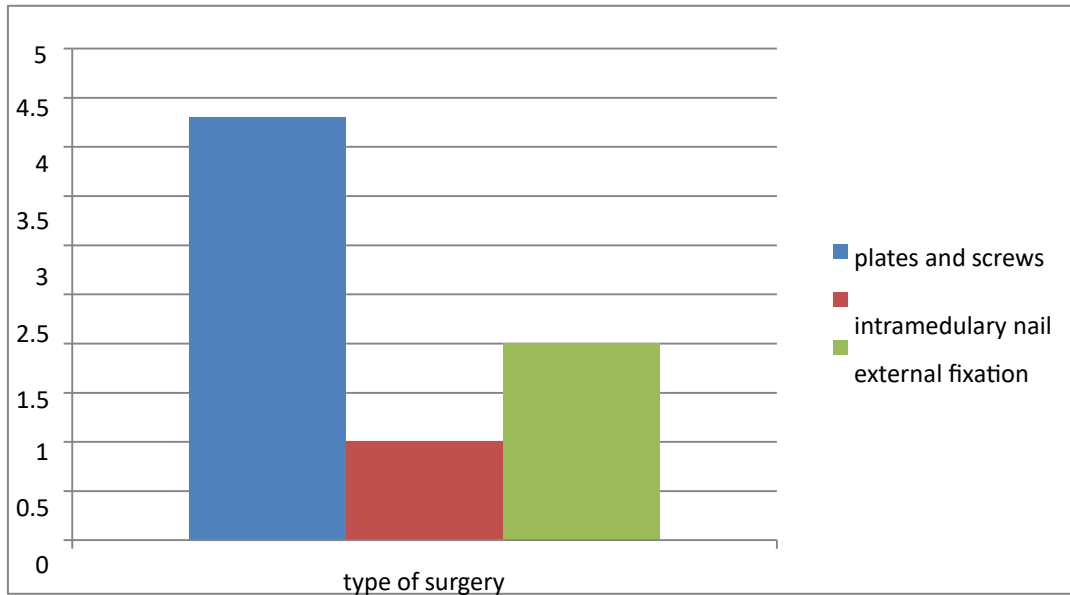


Table 10 : outcome of fracture of tibia

Outcome of fracture tibia	Complicated	10%
	Not complicated	90%

Figure 12: types of surger



Discussion:

Tibial shaft fractures are common fracture in adults.

Regarding to table (1) it's show that 56% of the fractures are men and 44% are women, this percentage is natural due to the higher percentage of male participating in daily activities and sport injuries.

Regarding to Table (2) it's shows that the majority of fractures were between 18-39 years old and that's because elderly often sustain such a fracture after a simple trauma, while younger patients mostly caused by a high violent trauma such as sport injuries , road traffic accidents (RTA) and motorcycle accidents.

In table (3) it is shows that the majority of cases due to transport accidents (40) while only 7 cases due to falls and 3 cases due to bullets and shells, this indicates that RTA are common trauma nowadays.

Regarding to table (4) we found that the majority of cases is open fractures because of high violent trauma such as road traffic accidents and falls from height

According to table (5) It is appears that spiral shape is the most common in percentage compared to transverse and oblique fractures due to mechanism of trauma.

In table (6) it is show that the Most fractures were involved the lower third of the shaft (40%) this will result in delay union or non-union of fracture due to decrease blood supply in this region of the tibia.

Regarding to table (7) the displacement fracture more common than an undisplaced fracture due to severity of trauma.

According to table (8) it is show that the conservative treatment by brace have a higher percentage than conservative treatment by cast, this is because the brace is preferable for the patient due to decrease complications compared to the cast such as ischemia and skin complications.

In table (9) it is show that surgical treatment by plates and screws is higher than other modalities of surgery due to Faster union time due to its solid composition and less chance of complications such as malunion and nonunion.

Regarding to table (10) we discussed the outcome of the fracture and we found that 90% there is no complication while 10% complicated fractures, this is due to rapid and accurate management of fracture of tibia and use the correct method of treatment **Conclusion:**

The outcome of management of fracture tibia depends on severity of trauma , type of fracture and the correct method of treatment.

References

- Arangio GA, Lehr S, Reed JF., 3rd Reemployment of patients with surgical salvage of open, high-energy tibial fractures: an outcome study. *J Trauma.* 1997;42:942–945. doi: 10.1097/00005373-199705000-00027. [PubMed] [CrossRef] [Google Scholar].
- Bone LB, Sucato D, Stegemann PM, Rohrbacher BJ. Displaced isolated fractures of the tibial shaft treated with either a cast or intramedullary nailing: an outcome analysis of matched pairs of patients. *J Bone Joint Surg Am.* 1997;79:1336–1341. [PubMed] [Google Scholar]
- Gustilo RB, Mendoza RM, Williams DN. Problems in the management of type III (severe) open fractures: a new classification of type III open fractures. *J Trauma.* 1984;24(8):742–746. doi:6471139
- Cannada LK, Anglen JO, Archdeacon MT, Herscovici D, Jr, Ostrum RF. Avoiding complications in the care of fractures of the tibia. *J Bone Joint Surg Am.* 2008;90:1760–1768. [PubMed] [Google Scholar].
- Court-Brown CM, Gustilo T, Shaw AD. Knee pain after intramedullary tibial nailing: its incidence, etiology, and outcome. *J Orthop Trauma.* 1997;11:103–105. doi: 10.1097/00005131-199702000-00006. [PubMed] [CrossRef] [Google Scholar]
- Weiss RJ, Montgomery SM, Ehlin A, Al Dabbagh Z, Stark A, Jansson K-A. Decreasing incidence of tibial shaft fractures between 1998 and 2004: information based on 10,627 Swedish inpatients.
- Luo P, Xu D, Wu J, Chen YH. Locked plating as an external fixator in treating tibial fractures: a PRISMA-compliant systematic review. *Medicine.* 2017;96(49):e9083. doi: 10.1097/MD.0000000000009083. [PMC free article] [PubMed] [CrossRef] [Google Scholar].

- Weber CD, Hildebrand F, Kobbe P, Lefering R, Sellei RM, Pape HC. Epidemiology of open tibia fractures in a population-based database: update on current risk factors and clinical implications. *Eur J Trauma Emerg Surg.*
- Connelly CL, Bucknall V, Jenkins PJ, Court-Brown CM, McQueen MM, Biant LC. Outcome at 12 to 22 years of 1502 tibial shaft fractures. *Bone Joint J.*
- KHATOD, M., et al.: Outcomes in open tibia fractures: relation - ship between delay in treatment and infection. *J. Trauma*, 55: 949–954, 2003
- LAM, S.W., et al.: Systematic review shows lowered risk of nonunion after reamed nailing in patients with closed tibial shaft fractures. *Injury*, 41: 671–675, 2010
- Rajasekaran S, Naresh Babu J, Dheenadhayalan J, et al. A score for predicting salvage and outcome in Gustilo type- IIIA and type-IIIB open tibial fractures. *J Bone Joint Surg.*
- PARK, S., et al.: Compartment syndrome in tibial fractures. *J. Orthop. Trauma*, 23: 514–518, 2009
- PATZAKIS, M.J., WILKINS, J., MOORE, T.M.: Considerations in reducing the infection rate in open tibial fractures. *Clin. Orthop. Relat. Res.*, 178: 36–41, 1983
- REICHERT, I.L., MCCARTHY, I.D., S.P. HUGHES, S.P.: The acute vascular response to intramedullary reaming. Microsphere estimation of blood flow in the intact ovine tibia. *J. Bone Jt Surg.*, 77-B: 490–493, 1995.
- RIEMER, B.L., et al.: Nonreamed nailing of closed and minor open tibial fractures in patients with blunt polytrauma. *Clin. Orthop. Relat. Res.*, 320: 119–124, 1995.
- WOLL, T.S., DUWELIUS, P.J.: The segmental tibial fracture. *Clin. Orthop. Relat. Res.*, 281: 204–207, 1992
- 20.1. WHITTLE, A.P., et al.: Treatment of open fractures of the tibial shaft with the use of interlocking nailing without reaming. *J. Bone Jt Surg.*, 74-A: 1162–1171, 1992.
- Tampe U, Weiss RJ, Stark B, Sommar P, Al Dabbagh Z, Jansson K-Å. Lower extremity soft tissue reconstruction and amputation rates in patients with open tibial fractures in Sweden during 1998–2010
- The National Board of Health and Welfare, the National Patient Register. Available from: <https://www.socialstyrelsen.se/en/statistics-and-data/registers/>. (https://www.socialstyrelsen.se/en/statistics-and- data/registers/) Accessed September 16, 2020.