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INTRODUCTION

When a patient recovers from a high-speed collision, soft tissue trauma often happens, Tibia is the most common long bone broken. The injury requires a major trauma energy transfer, which results in 94 percent of open tibial fractures in adults.¹

Open tibia fractures in young people heal more reliably with fewer complications than those in teenagers. Open fracture incidences vary from 6 to 7%, while second and third 2 to 3% are open fractures in the third degree.²

A road traffic collision causes 80 percent of these fractures, and 33 percent of them occur in several fragments. Conservative care is typically performed in open fractures in the first grade, while osteosynthesis is often carried out in open fractures in the second and third grades.²

MANAGEMENT OF OPEN DIAPHYSEAL FRACTURE OF TIBIA IN ADULTS: A COMPARATIVE STUDY BETWEEN PLASTER OF PARIS CAST VERSUS EXTERNAL FIXATOR.

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ABSTRACT... Objectives: To determine the management of open diaphyseal fracture of tibia with plaster of Paris (pop) cast vs external fixator in orthopedic ward PUMHSW Hospital Nawabshah. **Study Design:** Cross-Sectional Comparative study. **Setting:** Orthopedic Department, Peoples University of Medical And Health Science Shaheed Benazirabad. **Period:** 18 months from January 2017 to June 2018. **Material & Methods:** The data was analyzed in SPSS Version 22.0. **Results:** Out of 50 patients with tibial diaphyseal fractures, there were 34 males compared to females 16 (2.1:1) (68% vs 32%) with an average age of 41 years. Patients with external fixator applied yielded decreased rates of infection; shorter duration of hospital stay and early union compared to patients with plaster of Paris (pop) cast application. However, the difference reached statistical significant value. **Conclusion:** Open Tibial diaphyseal fractures should be managed with external fixation that yields better results. A plaster cast is the initial treatment of modality in patients with open tibial diaphyseal fractures.

Key words: External Fixator, Pop Cast, Tibial Diaphyseal Fractures.

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Open diaphysis fractures management depends on the fracture type and the damage to soft tissue.

The treatment of stability and minimally displaced fractures is usually non-operatively treated, but unstable tibia and fibula fractures can require surgical and external fixator reduction and stabilization, particularly in elderly patients.

Modification methods include plaster-cast percutaneous pins, external fixators, plates and squeezes, and intramedullary clasps.³ Nonetheless, stabilization with external fixators is normally necessary to prevent infection in 3rd degree fractures.⁴ Casting and manipulation of adult tibial fractures is a successful procedure. External fixation continues to be the norm for high-grade open fractures (Gustillo III) or comminuted fractures.⁵

For young adults, most of the single tibia open fractures can be treated using wound and plaster cast immobilization.⁶

External fixators are still to be used, in particular if a large fracture or soft tissue injury requires a flap procedure.⁷ A unilateral structure is the most flexible external fixer for grades II and III. Unipolar devices for adults and elderly patients are generally preferred because they require minor correction by adjustment on both sides of the fixator.⁸

The external fixator provides advantages of preventing infection, quick and better healing and excellent functional performance. Factors like the degree of damage done to the soft tissue periodically are far more important than wound size, following wound debridement and injury speed.⁹⁻¹⁴ Infections, body disease, vascular lesions, distorting the corner, misrotation, and difference in leg length cause complications. The tibia is currently the most commonly fractured long bone in the body.

In a given population group in developed Western countries, Open tibial fractures have shown 2 open tibia fractures in 1000 accidents each year; this represents 0.2% of all injuries. The effect and magnitude in the developing world may still be greater. The tibia diaphyseal fractures of Alho et al. indicate 2 tibia shaft fractures per 1000 people per year. Patients with shaft fractures average age about 37 years and the highest occurrence of adolescent men is recorded. Literature studies indicate that tibial diaphysis fractures in the developed world are decreasing in incidence. The frequency of diaphyseal fractures in tibials has been shown to decline from 18 June/105/year in 1998 to 16 January/105/year in 2004.¹⁵ Researchers also found that a 48% drop in standing height caused a fracture, compared to an 21% decrease resulting from a traffic accident. In the last 20 years, this decrease is accompanied by a fracture network review throughout Edinburgh. The occurrence was 26/105/year from 1988 to 1990 of tibial diaphyseal fractures.¹⁶ This fell to 21.5/105/year in 2003 and in 2007/8 it was 14.3/105/year.

However, a study of case of tibial diaphyseal fractures between 1988 and 1990 found that 37.5% was a result of a road accident, 30.9% were due to sport accidents and 17.8% were due to a drop in a steady height. 20 years later, 27.4% of fractures accompanied sport accidents in 2007/8, 20.5% were due to a road accident and 32.8% were at a steady decline. It can be noted that, from 36 years in 1988-1990 to 20 years in 2000, the median age of tibial diaphyseal fracture was raised from 37 years and in 2007/2008 to 40 years. Many patients with a diaphyseal tibia fracture are usually diagnosed with conservative treatment at our centre. Plaster cast is common practice, although external fixators are also being used to fix the fracture of tibial shaft in adults. Due to socio-economic constraints, our locally manufactured unilateral fixator and AO fixers have been used. The outcomes of both treatment methods were compared in this analysis.

MATERIAL & METHODS

We conducted this cross-sectional study for the duration of 18 months from January 2017 through June 2018, on 50 patients in the orthopedic department of Peoples University of Medical and Health Science, Shaheed Benazirabad.

Freshly opened tibial diaphyseal fractures and patients within one week of injuries arrived for adults over 18 and below 65 years, and Gustelo Grade I, II were selected.

Old open fractures (arrival one week), infected fractures, III-A, III B & 3C fractures, pathological fractures, Tibia malunion fractures and Non-union fractures were not included in the analysis although patients less than 18 years of age and above 65 years were removed in the study.

A checklist for recording the follow-up observations was used to differentiate the findings between the two-study group.

Patients were selected according to the criteria for inclusion. Both patients have been treated as an emergency and a culture and sensitivity check has been submitted when healthy. Wound debridement and fracture repair with Paris (Pop)

cast external fixator or plaster.

For either of the above mentioned two methods open fractures were fixed. According to culture and sensitivity studies, postoperative antibiotics have improved. The Ethical Committee of Peoples University of Medicine and Health Science for Women (SBA) has accepted this proposal.

Data collection through questionnaires and entry into the computer was organized with the help of biostatisticians to prevent mistakes.

Results were analyzed in SPSS analysis of results. Frequencies, percentages and the use of Chi-square tests for comparing the proportions between groups was calculated (POP vs. External fixator). Numerical parameters have been used to compare means among groups (POP versus External Fixator). Mean ± SD was used, and student T-test was applied. As appropriate level, P-value < 0.05 has been considered.

RESULTS

Of the 50 patients admitted with diaphysical open fracture, 34 were males (68% versus 32%) with a 41 year average age, compared to 16 (2.1:1) females.

With contrast to the age of old people, however, the group A males used with Paris Plaster (Pop) cast were most often tibial fractures from 36 to 50 years, and 20 to 35 years, compared with the age group A males had more of the external fixator.

The infection rate of the patients with external fixators with only 3 patients was apparent to be small, compared to 5 in plaster casts.

In most patients with an external fixator, the hospital stayed for 1 week, I n = 17, and the remainder were stayed for the 2nd and 3rd week.

The hospital stay lasted for one week in 9 patients with pop cast, 8 of whom remained for second week and the rest were 8 weeks or more because of their infection rate during their stay.

The early-union outcomes were tested regularly

in patients with an external fixator; 15 patients with an EF applied only 2 had non-union. The findings were analyzed.

For patients with pop cast, union and non-union were usually postponed for 8 patients, with only 9 patients transitioning to early union.

The chi-square was used to measure the effectiveness, but there was no statistically meaningful significance. During our series there was no burial.

	Number	Percentage
Age in years, Mean + SD (Range)	41.8 ± 7.173 (18 to 65 years)	-

Table-I. Baseline characteristics of the patients (n = 50)

of the 50 patients admitted with diaphysical open fracture, 34 were males (68% versus 32%) with a 41 year average age, compared to 16 (2.1:1) females.

Age in Groups		
20-35 Years	11	22.0%
36-50 Years	37	74.0%
>50 Years	02	4.0%

Table-II. Distributin of patients according to age in groups

With contrast to the age of old people, however, the group A males used with Paris Plaster (Pop) cast were most often tibial fractures from 36 to 50 years, and 20 to 35 years, compared with the age group A males had more of the external fixator.

Gender		
Male	34	68.0%
Female	16	32.0%

Table-III. Distribution of patients according to gender

Variables	Popcast Applied n=25	External Fixator Applied n=25	P-Value
Duration of Hospital stay			
One week	9(36.0%)	17(68.0%)	0.077
Two weeks	8(32.0%)	4(16.0%)	
Three weeks or Greater	8(32.0%)	4(16.0%)	

Table-IV. Duration of hospital stay differ

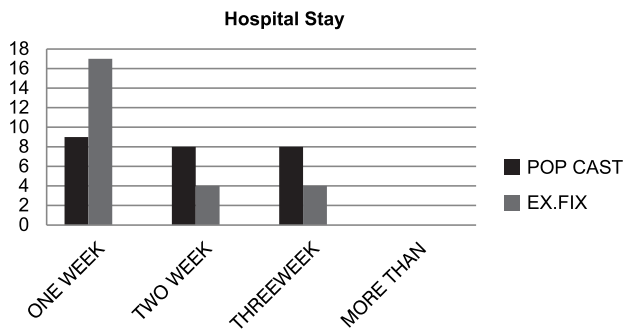


Figure-1. Hospital stay.

The hospital stay lasted for one week in 9 patients with pop cast, 8 of whom remained for second week and the rest were 8 weeks or more because of their infection rate during their stay.

Variables	Popcast Applied n=25	External Fixator Applied n=25	P-Value
Rate of infection	5(20.0%)	3(12.0%)	0.440

Table-V. Rate of Infection

The infection rate of the patients with external fixators with only 3 patients was apparent to be small, compared to 5 in plaster casts.

Variables	Popcast Applied n=25	External Fixator Applied n=25	P-Value
Outcome			
Early union	9(36.0%)	15(60.0%)	0.078
Delayed union	8(32.0%)	8(32.0%)	
Non-union	8(32.0%)	2(8.0%)	

Table-VI. Outcome

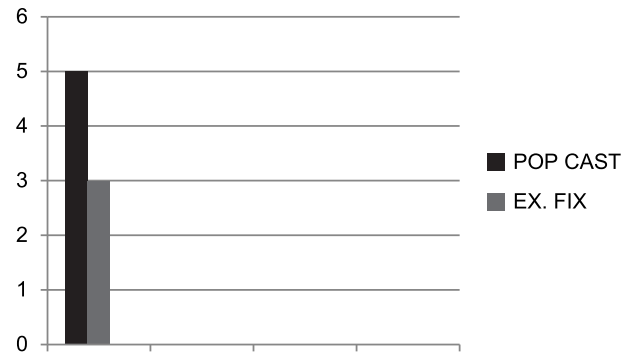


Figure-2. Infection.

The early-union outcomes were tested regularly in patients with an external fixator; 15 patients with an EF applied only 2 had non-union. The findings were analyzed.

For patients with pop cast, union and non-union were usually postponed for 8 patients, with only 9 patients transitioning to early union.

The chi-square was used to measure the effectiveness, but there was no statistically meaningful significance. During our series there was no burial.

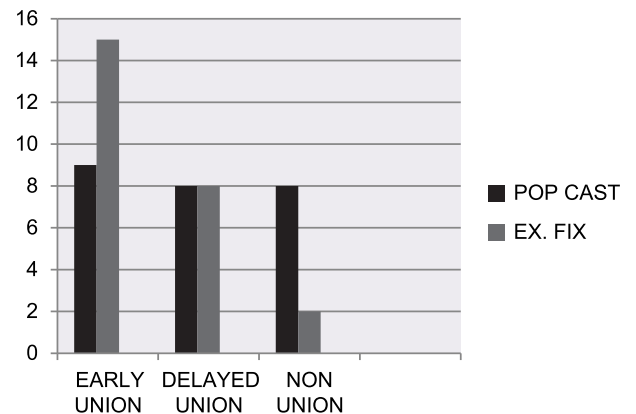


Figure-3. Outcome.

DISCUSSION

The most frequent fractures of the lower limb present to the orthopedic surgeon are the tibial diaphyseal fractures. Every year 500,000 patients in the US are incised. Pakistan has the most common long bone fractures of 30.4 percent in tibial diaphysis.¹⁷

About 76,8% of cases were the most common cause of tibial fractures.¹⁷ Almost all patients had ancient history of the preceding accident on the lane.

Higher incidences of tibial fractures have been observed in males and females. Our research has also found that tibial fractures are increasingly prevalent among males.¹⁸

The conventional treatment of tibial diaphyseal fractures was a conservative approach, i.e. plaster cast regardless of its injury degrees.

The cornerstones of recovery after low power fractures are pop cast application and immobilization. Nevertheless, high-energy lesions are related to widespread disruptions in the soft tissue and need surgical treatment.

The most common surgical treatment for management of high-impact tibial diaphysis fractures is external fixation in non-union or delayed unions also in fractures.

In our research, the outcomes of the patients treated with external fixation for complex fractures were also good; however, patients with complex fractures did not show better results with plaster cast leading to non-union or delayed union.

In comparison, patients receiving an external fixation had shorter hospitalization period than patients with plaster cast, who had a longer hospital stay.

For patients with deep soft tissue wounds, Shakir et al have pointed out the efficacy of external fixation.

The literature suggests that a higher infection risk is associated with delayed treatment. Petrisor et al. have reported a 62.5% infection rate in open fractures.¹⁹

In their research, Reuss and Cole have examined that delayed fracture presentation over 48 hours is also associated with adverse outcome and that infection rates.²⁰

Earlier studies of long bone diaphysal fractures also show early intervention avoiding non-union injury.¹⁷

Our research has also shown that patients who have reported a late I injury have experienced delayed union for more than 48 hours.

Even if the Union was prolonged and the risk of infection increased with the duration of hospitalization in Gustilo II or III patients. The study therefore concluded that Gustilo III patients should be treated with the treatment.

External fixing in patients with large fractures should be the treatment selected, while patients with Plaster cast application should theoretically be treated with the Gustilo I or II.

CONCLUSION

Open tibial diaphysis fracture with external fixation should be controlled which produces improved results. For patients with limited fracture, plaster cast is the initial treatment of modality.




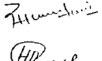

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1	Parvez Ahmed	Designed the research, assessed the vases, wrote the paper, interpretation of discussion and data entry in SPSS.	
2	Khawand Bukhsh Umrani	Collected the data, did the literature search, drafted the manuscript assisted in writing the paper.	
3	Mahtab Ali Shahani	Involved in data collection, analyzed the data revised the manuscript.	
4	Zamir Hussain Tunio	Revised the original manuscript, reviewed the cases, analyzed the data and assisted in writing the paper, Interpretation in results writing.	
5	Abdul Hafeez Qureshi	References, citation manager & designing of results and charts and Graphs in manuscript.	
6	M. Aslam Mengal	Data entry in SPSS and other technical help, help in corrections.	