ORIGINAL ARTICLE

Characteristics of patients suffering tibial nonunion: A descriptive study carried out in a tertiary care hospital, Lahore, Pakistan

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ABSTRACT

Aim: To determine the characteristics of the patients suffering tibial nonunion in our population.
Methodology: This was a descriptive study, in which gender, age groups, side of the fracture, anatomic location of tibia, fibula involvement, coexisting systemic disease, and coexisting skin trauma were the qualitative variables, while age of the patients was the only quantitative variables. SPSS version 25 was used, where frequencies and percentages were computed for qualitative variables and mean and standard deviation for quantitative variable. The data was presented in tables and graphs.
Results: Out of total of 144 patients, 10.4% were Child, 4.2% adolescents, 58.3% young adults, 29.9% middle aged adults, and 46(.2%) older adults. 87.5% were male and 12.5% were female. 68.8% patients had right tibia while 31.3% had left tibia involved. Anatomic location of tibial lesion was proximal, middle, and distal in 21(14.6%), 108 (75%), and 15(10.4%) patients respectively. Fibula was also fractured in 89.6% (129 out of 144) patients. 39.6% patients had co-existing systemic disease while 79.2% had open fracture. Their age ranged between 2 to 80 years. The mean age of female patients was 31.50 + 18.81 years, while the mean age of male patients was 35.57+17.77 years.
Conclusion: Tibial nonunions were comparatively more prevalent in male gender and young adult age group. Right tibia was involved more than left tibia. Majority non-unions involved middle of tibial shaft and fibula fracture was coexisting as well. A big proportion of the patients had coexisting systemic disease. Most of tibial nonunions were seen in open fractures. Female patients suffering non-union were relatively younger than male patients
Keywords: Tibial nonunions, characteristics of fractures, Descriptive study, SPSS

INTRODUCTION

Tibial nonunion[1] is an arrest in the fracture repair process, where fracture still is unable to unite usually by 6-9 months post-injury.It occurs most commonlydue to inadequate fracture stabilization and poor blood supply.[2]Its incidence ranges between 8-13%[1,3,4] The subcutaneous position of tibia increases the incidence of being open fractures that produce a higher incidence of nonunion.[5]According to Weber-Cech classification[6,7] tibial nonunions are of 3 types: hypertrophic nonunions, atrophic nonunions and normotrophic nonunions. Treatment option for nonunion include surgery and bone stimulation. Surgical treatment[8] comprises of removal of all scar tissue, fixation of fracture, and bone grafting. Bone stimulation may be done with eitherultrasound or electromagnetic waves[9]. Ultrasound stimulation provides better healing in long bones that have not healed after three months of treatment.[10] Despite good management, treatment failure rate of tibial non-union have been reported upto 20%[11]. Factors which significantly increase the risk of non-union of fracture include smoking[12], male gender,[13] open fracture[5], NSAIDs use, [14] obesity, alcoholism, infection, osteoporosis, and renal insufficiency. [13, 15]Inspite of all these available informations, the author wants to determine the characteristics of patients suffering tibial nonunion in our population because local data is scarce on this issue. Also, if any discrepancy is found, further researches can be offered.

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METHODOLOGY

This descriptive analysis was conducted in the Department of Orthopedics, Mayo hospital, Lahore on the data of the patients from July 2002 till June 2012. All the patientssuffering tibial non-union of all age groups were included in this study.Non-union was defined by non-healing at 9 months of management of the fracture.[1]The age of the patients was categorized into childhood if < 13 years, adolescence if 13-18 years, young adults if 19-44years, middle aged adults if 45-65 years, and older adults if >65 years.[16,17]Gender of the patients,side of fracture, anatomic location of tibial lesion, fibula involvement, coexisting systemic disease, and coexisting skin trauma were also noted.Statistical analysis was completed using SPSS, version 25. Gender, age groups,side of the fracture, anatomic location of tibia, fibula involvement, coexisting systemic disease, and coexisting skin traumawere the qualitative variables, while age of the patients was the only quantitative variables. Frequencies and percentages were computed for qualitative variables, while mean and standard deviation were calculated for quantitative variable. The data was presented in tables and graphs.

RESULTS

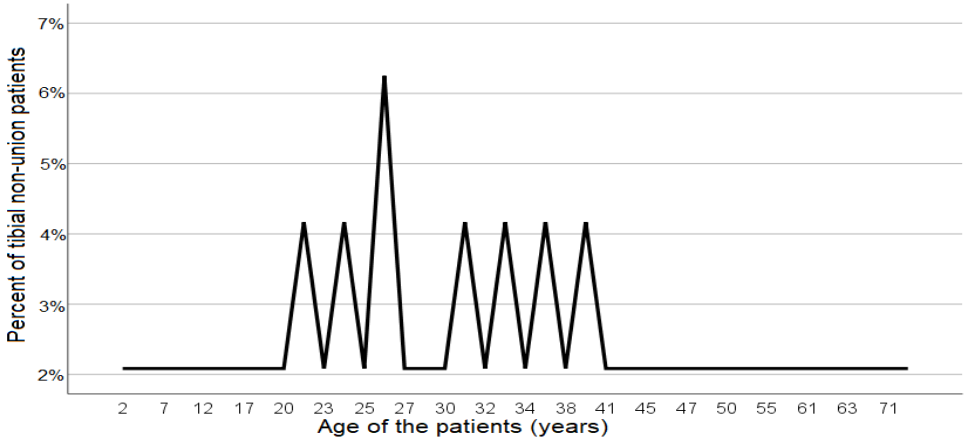
Out of total of 144 patients suffering tibial non-union, 126 (87.5%) were male and 18(12.5%) were female.The group distribution of age of the patients was as follow: 15(10.4%) were Child (age <13 years), 6(4.2%) were adolescents (age 13-18 years), 84(58.3%) were young adults (age 19-44 years), 33(29.9%) were middle aged adults (age 45-65 years), and 6(4.2%) were older adults (age >65 years).

Side of the lesion was right tibia in99 (68.8%) patients while left tibia in 45(31.3%) patients. Anatomic location of tibial lesion was proximal, middle, and distal in 21(14.6%), 108 (75%), and 15(10.4%) patients respectively. Fibula was also fractured in 89.6% (129 out of 144) patients. 39.6% (57 out of 144) patients had co-existing systemic disease. 79.2% (114 out of 144) patients had skin lesion as well i.e. open fracture while 20.8% (30 out of 144) patients had close fracture (Table 1). The age of the tibial nonunion patients ranged between 2 to 80 years with a mean value of 35.06 + 17.89 years. The %age distribution of age of these patients was shown in picture 1. The mean age of female patients suffering non-union was less than that of male patients. The mean age of female patients was 31.50 + 18.81 years, while the mean age of male patients was 35.57+17.77 years.

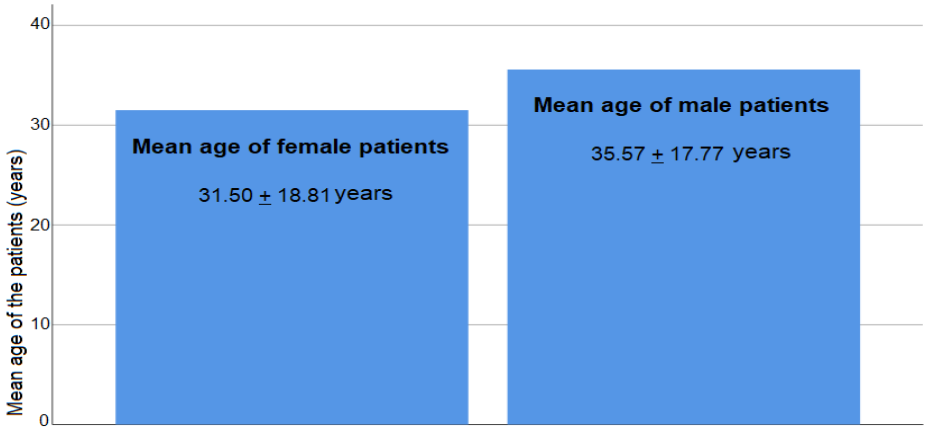
Table 1:Characteristics of tibial non-union patients treated with external fixation (n = 144).

Characteristics	Frequency %
Gender	
Male	126 (87.5%)
Female	18 (12.5%)
Age groups	
Childhood: age <13 years	15 (10.4%)
Adolescence: age 13-18 years	6 (4.2%)
Young adults: age 19-44 years	84 (58.3%)
Middle aged adults: age 45-65 years	33 (29.9%)
Older adults: age >65 years	6 (4.2%)
Side of lesion	
Right tibia	99 (68.8%)
Left tibia	45 (31.2%)
Anatomic location of tibial lesion	
Proximal	21 (14.6%)
Middle	108 (75%)
Distal	15 (10.4%)
Associated fibula lesion	
Yes	129 (89.6%)
No	5 (10.4%)
Co-existing systemic disease	
Present	57 (39.6%)
Not present	87 (60.4%)
Type of fracture	
Open fracture	114 (79.2%)
Close fracture	30 (20.8%)

Picture 1: Percentage distribution of age of patients suffering tibial non-union (n=144)



Picture 2: Difference of mean age in gender among patients suffering tibial non-union (n=144)



DISCUSSION

In our study, 87.5% tibial non-union patients were male. In a similar study performed in 2000 till 2006, 75% tibial non-union patients belonged to male gender.[18]Zura et al[13] also concluded that male gender is a risk factor for non-union of tibial fracture. It is well known that female hormone estrogen enhances fracture healing[19,20]. Whether the lack of this hormone or some other factors are responsible for the prevalence of tibial nonunion in male gender, further studies are required. In our study, majority nonunion tibia patients were young adults i.e. their age ranged 19-44 years. Mean age of our patients was 35.06 years. These findings were in concordance with available data in literature. Ferreira et al[21] from South Africa mentioned mean age of tibial nonunion patients of 36.5 years. In a study of 4895 non-unions patients from Scotland, the overall peak incidence was seen between 30 and 40 years of age. Similarly, from our institution, Farmanullah and his colleagues[18]found mean age of tibial nonunion patients of 30 years in their research work.In 2013, Antonova and his colleagues[5] found that patients with nonunion were more likely to have their tibial fracture open (87% vs. 70%) and had more pre-fracture comorbidities (30 vs. 21) than those without nonunion in a large study of 853 patients. Similarly, in our data, among tibial nonunion patients, 79.2% (114 out of 144) patients had open fracture, only 20.8% patients had closed fracture, and 39.6% patients had comorbidities as well.In our study, majority nonunion patients involved their right tibia (68.8%). Similarly, Farmanullah[18] also noticed right tibial involvement more than left tibia in nonunion patients. In our data, majority of tibial non-unions involved middle of shaft (75%). Whether site and side of involved tibia has any role to be a non-union later, vast studies with a large sample size are required to elaborate these findings.

CONCLUSION

Tibial nonunions werecomparatively more prevalent in male gender and young adult age group. Right tibia was involved more than left tibia. Majority non-unions involved middle of tibial shaft and fibula fracture was coexisting as well. A big proportion of the patients had coexisting systemic disease. Most of tibial nonunions were seen in open fractures.Female patients suffering non-union were relatively younger than male patients.

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