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ORIGINAL ARTICLE

Functional outcomes, of open reduction and internal fixation of danis-weber type b ankle fractures.

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ABSTRACT… Objective: To evaluate the functional outcomes, of open reduction and internal fixation of Danis-Weber Type B Ankle Fractures in adults. **Study Design:** Descriptive Cross sectional Study. **Setting:** Surgical Department of a Medical Facility. **Period:** January 2023 to November 2023. **Methods:** In all, 152 participants were examined in this study. The OMAS score and Visual Analogue Score were used to categorize the functional results (VAS). Documentation was also done on the age distribution, gender distribution, and kind of trauma. Regarding the length of the fracture, functional outcomes were stratified, and statistical analysis was used to ascertain significance. **Results:** Out of 152 patients, 63.15% were male and 36.84% was female. The mean age of the patients was 47.57±8.5 years. Out of the 152 patients, 69 (45.39%) patients had an excellent functional outcome, 24 (15.78%) patients had a good outcome, 44 (28.94%) patients had fair outcome, and 15 (9.86%) patients had poor outcome. Falls from height were responsible for 42 (27.63) cases of fractures, while road traffic accidents (RTA) accounted for 110 (72.36%) of them. There were no appreciable variations in functional results when stratification based on fracture duration was applied. **Conclusion:** Our research results demonstrated that open reduction and internal fixation (ORIF) is an efficacious method in the treatment of Danis-Weber Type B ankle fractures. Most patients treated with ORIF achieved excellent to good functional performance, indicating remarkable regained range of motion and joint stability.

Key words: Ankle Fracture, Danis-Weber Type B Fractures, Internal Fixation, Open Reduction.

INTRODUCTION

Ankle fractures are among the most frequent fractures seen in orthopedic surgery with incidence of 187 fractures per 100,000 person-years, and most of them are caused by sports-related injuries.[1] The classification system of Weber is the most popular method applied in the classification of ankle fractures, which depends on the level at which the fibula has been fractured with respect to the tibiofibular syndesmosis. In particular, fractures of the Weber type B are at the level of syndesmosis but also have an atypical fracture oriented above it. Such Fractures mainly occur in young males and elderly females, the cases of fractures avulsion being present with severe trauma.[2] It is accepted that the Weber type B fracture is caused by twisting of the foot towards the ground while either pronated or supinated, which is the position of the patient in the Lauge-Hansen SER IV ankle fracture classification.[3] One of the most common injuries encountered in orthopedic practice is these fractures and in most cases, surgery is necessary that includes internal fixation and open reduction (ORIF) of the displaced fracture.[4]

Weber B tibiofibular joint fractures serve as a critical biomechanical disruption that often results in syndesmotic injuries medical literature reports happen in as many as 40 percent of people leading to instability and syndesmotic diastasis.[5] Preservation of stability at the ankle level is of paramount importance and depends mainly on the soundness of the lateral column of the joint.[6] Postoperative complications after surgical fixation of the Weber B injuries include post-traumatic osteoarthrosis and even more severe complications including local limb threatening

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complications.[7]

Restoration of anatomical alignment, stabilization of the fracture and preservation of knee motion are among the main goals in addressing Type B fractures.[11] It is only in the stabilized or non-displaced fractures devoid of syndesmotic instability, that non-operative modalities such as casting are entertained.[8] Unstable fractures on the other hand, require ORIF in order to restore stability.[9] In elderly patients, however, there are limitations to surgical fixation techniques because of the quality of the bones in such individuals since the achievement of stable fixation is more difficult. Such patients may have particular difficulties for instance, in adhering to post-operative instructions where for example, some weight bear practices are advised, and the patients are physically incapable. Hence, there is often a change in focus of the surgical technique in the direction of achieving sufficient stability for performing early or immediate full weight-bearing so that minimum complications are experienced and healing is fast.[10,11] This strategy calls for strong osteosynthesis with the help of implants that can endure high loads without compromising the repair. Also, surgical planning in such scenarios is aggravated by existing conditions in older population, like high incidence of cardiovascular or metabolic illness.[12] Hence, many patients experience complication such as the implant not being able to hold or the bone uniting.[13,14]

Due to the high prevalence rate of ankle fractures, many studies have been conducted on different surgical techniques and their outcomes. It is worth noting, however, that the quality of many such studies is often undermined by inclusion of mixed populations, presence of selection bias, small sample sizes, and use of basic functional measures or surveys for outcomes. More adaptive designs, with strict adherence to principles of research methods, are required to generate appropriate outcome data. This research intends to address this issue by providing current and relevant evidence concerning functional assessment of patients treated by ORIF in Danis-Weber Type B fractures as these species of fractures have their own biomechanics and clinical aspects which are usually overshadowed when in combination with other types in the existing literature.

METHODS

152 patients who had open reduction and internal fixation for ankle fractures were included in this study, which took place in the orthopedic ward and outpatient department (OPD) of the Mardan hospital complex between January 2023 and November 2023. Ethical Approval of the study was obtained from the IREB of Mardan medical complex Mardan (No.635/BKMC-01-01-23). All individuals with isolated Denis-Weber type B fracture in both genders having age 20 to 50 years were included in the study. Patients with any comorbidity, open fractures, multiple trauma and bi-malleolar fractures were excluded. Individuals who met the inclusion criteria for the study were chosen from among patients who presented to the orthopedic department with ankle fractures. Consent of all the patients were sought both for surgical procedure and their inclusion in the study. All the patients' undergone operative fixation of the ankle fracture under general anaesthesia through direct incision over the fibula. Following the reduction of the fracture, a 7-hole neutralization plate and a 3.5 mm lag screw were applied to the fibula with 3 screws above and 3 screws below the fracture. All the patients were given oral broad-spectrum antibiotics for 14 days following the surgery. Stiches were removed at 14th postoperative day. Partial weight bearing were started at 6 weeks postoperatively after radiological evidence of callus formation initiation and full weight bearing was started at 3rd month postoperatively if a well-developed callus was present. Olerud Molander Ankle Score (OMAS) score was used to evaluate functional results at 3rd month postoperatively. The OMAS is a nine-item survey used to evaluate the reported outcomes of patients who have had ankle fractures containing multiple-choice and single-answer questions. Scores range from 0 to 100. Score 90-100 indicated excellent results (no disability), 60 to 89 indicated good results (mild disability), 30-59 indicated fair results (moderate disability) while 0-29 indicated poor results (severe disability). Kind of trauma (falls or traffic accidents) resulted in ankle fractures was recorded. The study also

recorded the age distribution in three age groups (16–40, 41–55, and 56–80 years), the gender distribution, and the stratification of functional results according to the length of the fracture. Data obtained were analyzed in excel software version 2023. OMAS score was stratified according to duration of fracture before fixation. Chi square test was applied keeping p value to be ≤ 0.05 as significant.

RESULTS

Out of 152 patients, 96 (63.15%) were male and 56 (36.84%) were female, Figure-1. The mean age of the patients was 47.57±8.5 years. Falls from height were responsible for 42 (27.63%) cases of fractures, while road traffic accidents (RTA) accounted for 110 (72.36%) of them, Fig. 2. Out of the 152 patients, 69 (45.39%) patients had an excellent functional outcome, 24 (15.78%) patients had a good outcome, 44 (28.94%) patients had fair outcome, and 15 (9.86%) patients had poor outcome, Table-I. Stratification of different categories of OMAS score according to fracture duration, shows that there is no statistical significant relationship exists between the duration of fracture and functional outcome after open reduction & internal fixation of the ankle fractures, Table-II.

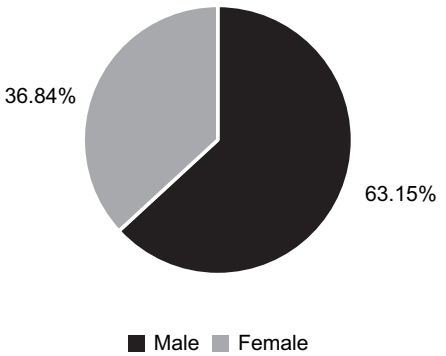

Figure-1. Gender-wise distribution of patients

Functional outcome	(OMAS) score	Frequency	Percentage
Excellent	90 – 100	69	45.39%
Good	60- 89	24	15.78%
Fair	30 – 59	44	28.94%
Poor	0-29	15	09.86%

Table-I.

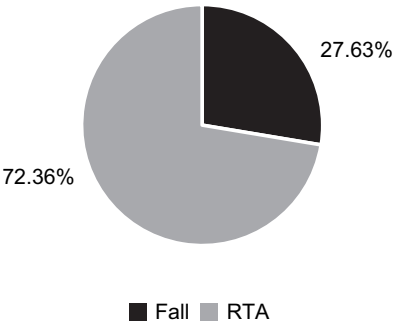

Figure-2. Distribution of patients according to pattern of trauma

Functional Outcome		Duration of Fracture		P-Value
		< 2 Days	> 2 Days	
Excellent	Yes	30	39	0.989
	No	36	47	
Good	Yes	10	14	0.850
	No	56	72	
Fair	Yes	20	24	0.746
	No	46	62	
Poor	Yes	06	09	0.778
	No	60	77	

Table-II. Stratification of functional outcome with duration of fracture (n=152)

DISCUSSION

This present study was carried out with the main aim of assessing the functional outcomes following open reduction and internal fixation (ORIF) for Danis-Weber Type B ankle fractures in adults as concerns the recovery of the functional and mobility capacities of the affected patients after the surgical intervention. In this regard, the focus was also to learn if the joint in question can be 'fixed' with respect to stability, relieved of pain and the patient able to return to her typical level of activity as encountered prior to injury sustained. Further, the obtained results present the information about the structure of the patients who suffered such injuries, indicating the age and gender distribution and mechanisms of injuries within these populations. This information is essential in customizing intervention measures and anticipatory activities to the high-risk groups of the population. Also, the research addresses the most common types of injuries, including the ones resulting from road traffic and falls, which are important in setting a research agenda on injury

preventive practices. Assessing the outcomes of the recovery stage after surgical interventions also contributes to the understanding of the factors important for rehabilitation, such as when the surgical operation was performed, compliance with rehabilitation programs, and if there were any complications. In summary, the present study comprehensively enhances the understanding of prognosis and long-term results of the treatment of ankle fractures Danis-Weber Type B by ORIF, therefore assisting in clinical judgement and improving orthopedic care and patient management in the future.

The information exposes a marginal imbalance between the sexes with 63.15 % of the patients being male while 36.84 % female. Such ratios have been documented in other studies where males were reported to suffering more traumatic injuries than females due to a higher engagement in risky behavior and jobs.[15] The average age attained of 47.57±8.5 years indicates that most victims are middle-aged people perhaps due to active living combined with the inevitable drop in bone density as people age. Seeman et al also pointed out this observations in their study.[16]

The principal finding of this study pertains to the causative factors of the fractures analyzed: an overwhelming 72.36% associated with road traffic accidents (RTA), whilst a fall from height accounted for only 27.63%. This pattern is in line with global statistics that showed that road traffic accidents are a common cause of orthopedic injuries, especially among the young and active population.[17] Considering the high incidence of RTA related fractures, specific preventive measures such as enhancing road safety standards and use of safety equipment, may be instrumental in curtailing the occurrence of such injuries.[18]

The results of the functional outcomes following surgery using the Olerud-Molander Ankle Score (OMAS) revealed that 45.39% of the patients showed excellent results, 15.78% had good results, 28.94% had fair results, and 9.86% had poor results. This indicates that close to 39% of patients had good-to-excellent recovery after ORIF, which provides further justification for the success of the procedure in restoring stability and function of the ankle. Similar observation was made by Khan et al. which is reassuring to the findings in this study.[19] However, the number of patients that achieved fair to poor outcome (about 39% in total) calls for caution in relation to patient selection, surgical technique and rehabilitation in order to optimize healing.

Quite particularly, the research discovered that there was no statistically significant effect of the duration of the fracture on the ultimate functional outcome. The absence of such a correlation would then make it necessary to emphasize timely surgical intervention without paying attention to the elapsed time from the moment of injury, thus indicating the need for an early diagnosis and orthopedic referral. In this regard our study findings are comparable with Fong et al., 2009.[20] It shows that other determinants apart from the duration of a fracture may be more beneficial in predicting outcomes such as patient's pre-existing illnesses, compliance with treatment after the surgery or extent of soft tissue damage.

In short, the study supports ORIF as an effective treatment for Danis-Weber Type B ankle fractures, with the majority of patients achieving satisfactory functional outcomes. However, nearly 40% of patients with fair to poor results indicate areas for improvement in post-surgical care. Future research could focus on identifying specific predictors of poor functional outcomes and optimizing rehabilitation strategies to enhance recovery rates. Additionally, the high incidence of fractures due to RTAs calls for broader public health measures to prevent such injuries.

CONCLUSION

Our research results demonstrated that open reduction and internal fixation (ORIF) is an efficacious method in the treatment of Danis-Weber Type B ankle fractures. Most patients treated with ORIF achieved excellent to good functional performance, indicating remarkable regained range of motion and joint stability. This surgical technique provides an opportunity to bring all the fractured bone segments to their

desired anatomical positions to promote healing, thus avoiding the risks of malunion or chronic instability. In addition, the results also indicate that ORIF is aimed at restoring normal function and additionally promotes early mobilization of patients which in turn improves their post-surgical outcomes. These findings emphasize that ORIF is effective and the treatment of choice for this category of ankle fractures and it gives very good results in restoring optimal function.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Tariq Ahmed	Data analysis, Referencing.	
3	Khalid Khan	Data Collection, Referencing.	
4	Farmanullah Khan	Designed the analysis, Data collection, Data analysis, Referencing, Wrote the paper.	
5	Aimon Zia	Data collection.