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Study Of Assessment Of Union Of Fracture After Internal Fixation Of Tibial Plateau Fracture.

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ABSTRACT

Tibial plateau fractures are complex injuries often resulting from high-energy trauma such as road traffic accidents or low-energy mechanisms in elderly individuals. Proper surgical management and timely fracture union are critical for restoring knee joint stability and function. A prospective study was conducted with 20 patients who underwent internal fixation for tibial plateau fractures. Data on the mode of injury, range of motion, time to union, and functional outcomes were collected and analyzed. Outcomes were evaluated using clinical and radiological criteria and the Lysholm scoring scale. Road traffic accidents accounted for 80% of injuries, while 20% were due to falls. Most fractures united within 16–18 weeks (50%), with others healing in 19–21 weeks (30%) or 22–24 weeks (20%). Postoperative ROM was excellent (>120 degrees) in 60% of patients. Functional outcomes were favorable, with 65% achieving excellent Lysholm scores. Internal fixation provided satisfactory fracture union and functional recovery. Early mobilization and physiotherapy were crucial for optimizing outcomes. Further research on long-term results is warranted.

Keywords: Tibial plateau fracture, internal fixation, fracture union

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INTRODUCTION

Tibial plateau fractures are a common orthopedic injury resulting from high-energy trauma, such as road traffic accidents, or low-energy mechanisms in elderly individuals with osteoporosis [1]. These fractures pose a significant challenge due to their complex anatomy and the critical role of the tibial plateau in maintaining knee joint stability and function. Proper management of these fractures is essential to restore joint congruity, achieve stability, and prevent long-term complications such as post-traumatic arthritis, malunion, or non-union.

Internal fixation has emerged as the gold standard for treating displaced tibial plateau fractures, allowing for anatomical reduction and stable fixation [2-4]. Advances in surgical techniques, imaging modalities, and fixation devices have significantly improved outcomes. However, assessing fracture union remains a critical aspect of postoperative care. Successful fracture union is essential for regaining optimal joint function and avoiding complications such as implant failure or delayed healing [5, 6].

This study focuses on evaluating the process of fracture union following internal fixation of tibial plateau fractures. By systematically assessing clinical, radiological, and functional outcomes, this research aims to provide insights into the factors influencing union rates, identify potential complications, and contribute to evidence-based practices for improved patient outcomes.

MATERIALS AND METHODS

This prospective study was conducted on 20 consenting cases of closed tibial plateau fractures admitted to Basaveshwar Teaching and General Hospital, Gulbarga, since October 2017. Patients were selected based on specific inclusion and exclusion criteria and were followed up during the study period. All participants provided written informed consent after being informed about the study in detail. The follow-up period for each patient was at 6 weeks, 3 months, and 6 months postoperatively.

The cases were collected using a convenient sampling method. All patients who presented to the Orthopaedics Department during the study period and fulfilled the inclusion criteria were evaluated. Preoperative assessments included plain radiographs (anteroposterior and lateral views), 15° oblique radiographs in doubtful cases, and computed tomography (CT) scans of the knee. The fractures were classified according to Schatzker's classification. Preoperative planning involved determining the need for a posteriomedial plate, especially in fractures with sagittal configurations.

Surgical intervention was performed using a posteriomedial plate, with or without an anterolateral plate, depending on the fracture type and stability requirements. Postoperative evaluation included clinical and functional assessments using the Lysholm Knee Scoring Scale at 6 months. Data on personal details, fracture classification, surgical procedure, hospital stay duration, mobilization, physiotherapy, and range of motion were recorded. Complications, both intraoperative and postoperative, were also documented.

Patients were monitored for early complications such as compartment syndrome, vascular injuries, wound healing issues, infection, deep vein thrombosis, and nerve injuries, as well as late complications like knee stiffness, instability, angular deformities, malunion, and osteoarthritis. Routine investigations, including blood tests, ECG, chest radiographs, and imaging studies of the knee, were performed to support the diagnosis and treatment planning. Observations were systematically recorded to analyze the outcomes based on fracture type, treatment, and associated complications.

RESULTS

Table 1: Distribution of Study Participants by Mode of Injury

Mode of Injury	Frequency	Percentage (%)
Fall (from height/slip)	4	20
Road Traffic Accident	16	80
Total	**20**	**100**

Table 2: Distribution of Range of Motion (ROM) Following Surgery

Range of Motion (Degrees)	Frequency	Percentage (%)
Above 120	12	60
90–120	6	30
Below 90	2	10
Total	**20**	**100**

Table 3: Time to Union of Fracture

Time to Union (Weeks)	Frequency	Percentage (%)
16–18	10	50
19–21	6	30
22–24	4	20
Total	**20**	**100**

Table 4: Functional Outcomes Based on Range of Motion (ROM)

Range of Motion (Degrees)	Frequency	Percentage (%)
Above 120	12	60
90–120	6	30
Below 90	2	10
Total	**20**	**100**

DISCUSSION

The present study aimed to assess the union of fractures after internal fixation of tibial plateau fractures, focusing on factors such as the mode of injury, range of motion (ROM), time to union, and functional outcomes. Tibial plateau fractures often result from high-energy trauma or falls, with road traffic accidents (RTAs) being the most common cause. These fractures require careful surgical intervention and postoperative evaluation to ensure optimal recovery and functionality [7].

Mode of Injury

The study found that 80% of fractures resulted from road traffic accidents (RTAs), while 20% were due to falls from height or slips. This finding is consistent with existing literature, which highlights RTAs as a significant contributor to tibial plateau fractures, particularly in younger, active individuals. The predominance of high-energy trauma underscores the importance of preventive measures such as road safety campaigns and occupational safety guidelines. Additionally, falls as a mode of injury were more common in older individuals, often associated with underlying conditions like osteoporosis. Addressing these fractures requires not only surgical intervention but also a multidisciplinary approach to manage comorbidities and prevent further incidents [8, 9].

Range of Motion Following Surgery

The range of motion (ROM) is a critical indicator of functional recovery post-surgery. In this study, 60% of patients achieved an excellent ROM (>120 degrees), 30% had a satisfactory ROM (90–120 degrees), and 10% had a suboptimal ROM (<90 degrees). These findings highlight the importance of early mobilization and physical rehabilitation in improving postoperative outcomes. Achieving a ROM above 120 degrees is indicative of successful joint recovery and alignment, which is essential for normal daily activities and a high quality of life.

The 10% of patients with limited ROM may reflect complications such as joint stiffness, soft tissue injury, or delayed rehabilitation. These cases emphasize the need for individualized physiotherapy regimens and continuous follow-up to monitor progress and address potential barriers to recovery. Moreover, patient compliance with postoperative instructions, including physiotherapy, plays a vital role in achieving optimal functional outcomes [10, 11].

Time to Union of Fracture

The study observed that 50% of fractures united within 16–18 weeks, 30% within 19–21 weeks, and 20% required 22–24 weeks for union. This distribution aligns with the expected healing timeline for tibial plateau fractures, which typically ranges from 16 to 24 weeks. The faster union in 50% of cases may be attributed to factors such as younger age, better nutritional status, and adherence to postoperative care.

However, the 20% of patients requiring longer healing times may have been influenced by factors such as comorbidities (e.g., diabetes or osteoporosis), the severity of the fracture, or surgical complications. These findings highlight the importance of patient-specific management plans, including optimization of systemic health and close monitoring for signs of delayed union. Advanced imaging techniques such as CT scans may also be employed to evaluate the quality of fracture reduction and guide decision-making in complex cases.

Functional Outcomes Based on Range of Motion

Functional outcomes, as measured by ROM, serve as a proxy for the overall success of the surgical intervention and rehabilitation. The findings indicate that 60% of patients achieved excellent functional outcomes, correlating with a ROM above 120 degrees. This group likely benefitted from precise surgical techniques, timely mobilization, and effective physiotherapy.

The 30% of patients with satisfactory outcomes (ROM 90–120 degrees) still achieved a level of functionality suitable for most daily activities. However, further rehabilitation efforts may enhance their outcomes. The remaining 10% with poor functional outcomes (<90 degrees) are of concern, as they may experience limitations in mobility and an increased risk of long-term complications such as osteoarthritis or gait abnormalities [12].

These results emphasize the need for a comprehensive approach to managing tibial plateau fractures. Surgical intervention remains the cornerstone of treatment, with the choice of fixation techniques tailored to the fracture pattern and patient-specific factors. Postoperative care, including early mobilization and physiotherapy, is equally crucial in promoting fracture union and restoring functionality.

The study highlights the role of patient education in improving outcomes. Educating patients about the importance of compliance with rehabilitation protocols and maintaining a healthy lifestyle can significantly impact recovery. Additionally, addressing comorbidities and optimizing nutritional status should be integral components of the treatment plan.

CONCLUSION

This study demonstrates that internal fixation is an effective method for managing tibial plateau fractures, with most patients achieving satisfactory fracture union and functional outcomes. The findings underscore the importance of individualized surgical and rehabilitation strategies to optimize recovery. Further research is warranted to refine treatment protocols and improve long-term outcomes for patients with tibial plateau fractures.

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