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Study Of Functional Outcome Of Distal Femur Fractures Managed With Locking Compression Plating.

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ABSTRACT

Distal femur fractures are complex injuries requiring stable fixation to restore function and mobility. Locking compression plating (LCP) has emerged as a preferred surgical technique, providing stable fixation and allowing early mobilization. Main aim to evaluate the functional outcomes of distal femur fractures managed with LCP in a sample of 40 patients over one year. This retrospective study included 40 patients treated with LCP for distal femur fractures. Preoperative evaluations included clinical examinations and radiographic assessments. Surgeries were performed using standard techniques, followed by individualized rehabilitation protocols. Patients were followed up at regular intervals, and functional outcomes were assessed using the Knee Society Score (KSS) and Short Form-36 (SF-36) health survey. The study population had a mean age of 42 years, with a male predominance (65%). High-energy trauma was the primary mechanism of injury (70%). The union rate was 95%, with an average range of motion of 110 degrees. The mean KSS was 85, and SF-36 scores were 70 (physical) and 75 (mental). Complications included superficial infections (5%), deep infections (2.5%), and non-union (5%). LCP provides satisfactory clinical and functional outcomes in the management of distal femur fractures, with high union rates, good range of motion, and low complication rates. Further research with larger sample sizes and longer follow-up is recommended.

Keywords: Distal femur fractures, Locking compression plating, Functional outcomes.

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INTRODUCTION

Distal femur fractures are complex injuries that significantly impact the function and mobility of the lower limb [1]. These fractures are often the result of high-energy trauma, such as motor vehicle accidents, or low-energy mechanisms in osteoporotic patients. The anatomical complexity of the distal femur, combined with its proximity to the knee joint, presents unique challenges in achieving optimal alignment and stability during treatment [2].

Locking compression plating (LCP) has emerged as a preferred surgical technique for managing distal femur fractures [3]. This method provides stable fixation, allows for early mobilization, and accommodates both osteoporotic and non-osteoporotic bone. The LCP system employs a combination of locking and compression screws, which enhance the biomechanical stability of the construct and promote better healing outcomes [4].

The functional outcome of patients treated with LCP for distal femur fractures is a critical measure of the success of this surgical approach. It encompasses factors such as range of motion, pain levels, weight-bearing capacity, and overall quality of life [5, 6]. Our study aims to evaluate the functional outcomes in patients who have undergone distal femur fracture management with locking compression plating. By analyzing these outcomes, we can better understand the efficacy of LCP in restoring function and improving the quality of life for affected individuals.

METHODOLOGY

This retrospective study was conducted over one year to evaluate the functional outcomes of distal femur fractures managed with locking compression plating (LCP). A total of 40 patients with distal femur fractures were included in the study. Patients were selected based on specific inclusion criteria, which comprised individuals aged 18 years and above who sustained distal femur fractures and were treated with LCP. Exclusion criteria included patients with pathological fractures, those who underwent alternative surgical interventions, and individuals with incomplete follow-up data.

Preoperative evaluations included detailed patient histories, clinical examinations, and radiographic assessments. Standard anteroposterior and lateral radiographs of the affected femur were obtained to determine the fracture pattern and plan the surgical approach. All surgeries were performed under general or spinal anesthesia by experienced orthopedic surgeons. The surgical technique involved an open reduction and internal fixation using the LCP system, ensuring proper alignment and stabilization of the fracture fragments. Intraoperative fluoroscopy was utilized to confirm the accuracy of fracture reduction and implant placement.

Postoperative care protocols included standardized rehabilitation regimens tailored to each patient's needs. Early mobilization with weight-bearing as tolerated was encouraged to enhance recovery. Patients were followed up at regular intervals—typically at 6 weeks, 3 months, 6 months, and 12 months post-surgery. During these follow-up visits, clinical assessments were conducted to evaluate wound healing, range of motion, pain levels, and overall limb function. Radiographic evaluations were also performed to monitor fracture healing and detect any potential complications.

Functional outcomes were assessed using validated scoring systems, such as the Knee Society Score (KSS) and the Short Form-36 (SF-36) health survey. These tools provided comprehensive measures of knee function, pain, and the overall quality of life. Data were collected and analyzed to determine the effectiveness of LCP in restoring function and improving patient outcomes. Statistical analyses, including descriptive statistics and inferential tests, were performed to identify significant trends and correlations in the data.

RESULTS

Table 1: Demographics of Patients

| Characteristic | Number of Patients (N=40) | Percentage (%) |
|---------------------|---------------------------|----------------|
| Age Group (Years) | | |
| 18-30 | 10 | 25 |
| 31-50 | 15 | 37.5 |
| 51-70 | 12 | 30 |
| >70 | 3 | 7.5 |
| Gender | | |
| Male | 26 | 65 |
| Female | 14 | 35 |
| Mechanism of Injury | | |
| High-energy Trauma | 28 | 70 |
| Low-energy Trauma | 12 | 30 |

Table 2: Clinical Outcomes at 12 Months Post-Surgery

| Outcome Measure | Mean ± SD | Range |
|-------------------------------------|-------------|--------|
| Range of Motion (Degrees) | 110 ± 20 | 80-130 |
| Pain Score (VAS) | 2.5 ± 1.5 | 0-6 |
| Time to Full Weight-bearing (Weeks) | 8 ± 2 | 6-12 |
| Union Rate (%) | 38/40 (95%) | |

Table 3: Functional Scores

| Functional Score | Mean ± SD | Range |
|--------------------------------|-----------|--------|
| Knee Society Score (KSS) | 85 ± 10 | 60-100 |
| SF-36 Physical Component Score | 70 ± 15 | 50-90 |
| SF-36 Mental Component Score | 75 ± 10 | 55-95 |

Table 4: Complications and Adverse Events

| Complication | Number of Patients (N=40) | Percentage (%) |
|-----------------------|---------------------------|----------------|
| Superficial Infection | 2 | 5 |
| Deep Infection | 1 | 2.5 |
| Non-union | 2 | 5 |
| Hardware Failure | 1 | 2.5 |
| Reoperation | 3 | 7.5 |

DISCUSSION

The management of distal femur fractures presents significant challenges due to the complexity of the anatomy and the necessity for stable fixation to restore function and mobility [7]. In this study, we evaluated the functional outcomes of distal femur fractures managed with locking compression plating (LCP) in 40 patients over a one-year period. The results demonstrate the effectiveness of LCP in achieving satisfactory clinical and functional outcomes, with high union rates and acceptable complication profiles.

Demographics and Injury Mechanisms

The study cohort comprised a diverse age group, with a significant proportion of patients (37.5%) aged between 31 and 50 years. This distribution reflects the bimodal nature of distal femur fractures, which are common in both younger, active individuals involved in high-energy trauma and older adults with osteoporotic bone subjected to low-energy mechanisms. The male predominance (65%) aligns with existing literature, suggesting that men are more likely to be involved in high-energy accidents, such as motor vehicle collisions, which accounted for 70% of the injuries in this study [8].

Clinical Outcomes

The clinical outcomes at 12 months post-surgery indicate a high rate of fracture union, with 95% of patients achieving union. This high union rate underscores the effectiveness of LCP in providing stable fixation, essential for the healing of distal femur fractures. The average range of motion achieved was 110 degrees, with a standard deviation of 20 degrees, indicating that most patients regained substantial knee mobility. The variability in range of motion can be attributed to factors such as the severity of the initial injury, the presence of comorbid conditions, and adherence to postoperative rehabilitation protocols [9].

Pain management is a critical component of postoperative care, and the results showed an average pain score of 2.5 on the Visual Analog Scale (VAS). This low pain score suggests effective pain management and satisfactory patient comfort levels following LCP fixation. Early mobilization, encouraged in the postoperative care protocol, likely contributed to reduced pain levels and improved overall outcomes. Patients were able to achieve full weight-bearing on average within 8 weeks, reflecting the stability provided by the LCP system [10].

Functional Scores

Functional outcomes, as measured by the Knee Society Score (KSS) and the Short Form-36 (SF-36) health survey, were promising. The mean KSS of 85 indicates good knee function, with most patients experiencing minimal functional limitations. The SF-36 scores further corroborate these findings, with physical and mental component scores of 70 and 75, respectively. These scores highlight the overall positive impact of LCP fixation on patients' quality of life, encompassing both physical recovery and mental well-being.

Complications and Adverse Events

Complications are an inherent risk in orthopedic surgery, and this study observed a relatively low complication rate. Superficial infections occurred in 5% of patients, managed successfully with antibiotics and local wound care. One patient developed a deep infection, necessitating surgical debridement, but this did not adversely affect the final functional outcome. Non-union was observed in 5% of patients, a complication rate consistent with other studies on distal femur fractures. These cases required additional interventions, such as bone grafting, to achieve union.

Hardware failure and reoperation rates were low, at 2.5% and 7.5%, respectively. The incidence of hardware failure is a concern in orthopedic implants, but the low rate observed in this study suggests that LCP provides robust and reliable fixation. Reoperations were primarily due to complications such as non-union and deep infection, highlighting the importance of close postoperative monitoring and timely intervention to address complications.

Comparison with Other Studies

The findings of this study are consistent with existing literature on the use of LCP for distal femur fractures. Studies have demonstrated that LCP provides superior fixation stability, particularly in osteoporotic bone, compared to traditional plating methods. The high union rates and functional scores observed in this study align with these reports, reinforcing the role of LCP as a preferred treatment modality for distal femur fractures [7, 9, 10].

CONCLUSION

In conclusion, the management of distal femur fractures with locking compression plating provides satisfactory clinical and functional outcomes. The high union rates, good range of motion, low pain scores, and favorable functional scores observed in this study demonstrate the efficacy of LCP in restoring function and improving the quality of life for patients with distal femur fractures. The low complication rates further support the use of LCP as a reliable fixation method. Continued research and long-term follow-up are essential to further understand the benefits and limitations of this treatment approach, ensuring optimal patient outcomes in the management of distal femur fractures.

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