

Fracture and dislocation: Management of fracture and dislocation including general principles, bone and joint disease

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ABSTRACT:

Background: Fractures and dislocations are common orthopedic injuries that require prompt management to avoid long-term complications such as joint instability, bone deformity, and functional disability. Effective management includes proper diagnosis, timely reduction, immobilization, and rehabilitation to ensure optimal outcomes. The management of bone and joint diseases related to fractures and dislocations, such as osteoarthritis or osteomyelitis, further complicates treatment and requires a comprehensive approach.

Aim: This study aimed to evaluate the management approaches for fractures and dislocations, including the role of general principles in treatment, and to explore the impact of bone and joint diseases on fracture and dislocation recovery.

Methods: A total of 60 patients were enrolled in this study from November 2023 to October 2024 at Mayo Hospital, Lahore. The study included individuals presenting with fractures and dislocations of various joints, alongside underlying bone or joint diseases. Patients were treated according to established protocols, which included reduction techniques, immobilization, and rehabilitation measures. Clinical outcomes, including recovery time, complications, and functional recovery, were monitored and recorded throughout the study period.

Results: The results indicated that early intervention and adherence to the general principles of fracture management significantly improved recovery times and functional outcomes. Among patients with pre-existing bone or joint diseases, a longer recovery period was observed, with a higher incidence of complications, such as delayed union and joint stiffness. The study also found that comprehensive management strategies, addressing both the fracture or dislocation and the underlying bone or joint condition, led to better overall outcomes.

Conclusion: The study concluded that a structured approach to the management of fractures and dislocations, integrating principles of timely reduction, immobilization, and rehabilitation, is essential for successful recovery. Bone and joint diseases complicate the recovery process, emphasizing the need for individualized treatment plans to optimize outcomes.

Keywords: Fractures, Dislocations, Bone Diseases, Joint Diseases, Orthopedic Management, Recovery, Immobilization, Rehabilitation, Mayo Hospital.

INTRODUCTION:

Fractures and dislocations are common musculoskeletal injuries that involve the disruption of the

continuity of bone or the normal alignment of joints. These injuries often result from trauma, such as falls, vehicle accidents, or sports-related incidents. The management of fractures and dislocations requires a comprehensive understanding of anatomy, biomechanics, and the principles of orthopedics to ensure optimal healing and function. This approach involves both non-operative and operative interventions based on the severity of the injury, the patient's overall health, and the specific characteristics of the fracture or dislocation [1].

The general principles of fracture management are centered on achieving proper alignment, stabilizing the bone, and promoting healing while minimizing complications such as infection, malunion, or nonunion. Fractures were typically classified based on their location, type (e.g., transverse, oblique, comminuted), and severity, which influenced the treatment approach. Non-displaced fractures were often managed conservatively with immobilization through casts, splints, or braces. In contrast, displaced fractures required reduction, either closed or open, to restore the bone to its proper anatomical position [2]. For more complex fractures or those involving multiple bones or joints, surgical intervention with internal fixation devices such as plates, screws, or rods was commonly necessary. This approach aimed to stabilize the fracture and allow for early mobilization of the affected limb to reduce the risk of joint stiffness and muscle atrophy.

Dislocations, on the other hand, referred to the complete displacement of a bone from its joint, which often resulted in damage to the surrounding ligaments, tendons, and soft tissues [3]. Prompt reduction, the process of returning the bone to its proper position, was crucial to prevent long-term complications such as neurovascular damage, joint instability, and osteoarthritis. In many cases, dislocations were treated by closed reduction techniques, where the physician manually manipulated the bone back into place under local anesthesia. However, in cases where closed reduction was unsuccessful or associated with other complicating factors such as fractures or extensive soft tissue damage, surgical intervention was required [4].

Bone and joint diseases, including conditions such as osteoarthritis, rheumatoid arthritis, and osteoporosis, played a significant role in the management of fractures and dislocations. Osteoarthritis, characterized by the degeneration of joint cartilage, increased the risk of joint instability and fracture in older adults. Similarly, rheumatoid arthritis, an autoimmune condition causing inflammation and deformities in joints, often complicated the healing process in patients with dislocations or fractures. Osteoporosis, a condition marked by reduced bone density and increased fragility, made bones more susceptible to fractures even with minor trauma. The presence of these conditions necessitated a more cautious and tailored approach to treatment, with an emphasis on preserving joint function and preventing further damage [5].

In summary, the management of fractures and dislocations involved a combination of conservative and surgical strategies aimed at restoring the anatomical integrity of bones and joints. The treatment was guided by the principles of proper alignment, immobilization, and early rehabilitation to optimize healing outcomes. The presence of underlying bone and joint diseases posed additional challenges, requiring careful consideration of the patient's overall health and the potential impact on recovery [6]. Through advancements in orthopedic techniques and a multidisciplinary approach, the management of fractures and dislocations continued to evolve, improving patient outcomes and quality of life [7].

METHODOLOGY:

This retrospective observational study was conducted to evaluate the management of fractures and dislocations, with an emphasis on general principles, bone, and joint diseases. The study was carried out at Mayo Hospital, Lahore, over a 12-month period from November 2023 to October 2024. The study protocol was approved by the institutional ethics committee, and all procedures adhered to the principles of the Declaration of Helsinki.

Study Population:

The study population consisted of 60 patients who presented to Mayo Hospital with fractures or dislocations during the study period. Patients were included if they met the following criteria:

Inclusion Criteria:

Patients aged 18 years or older.

Confirmed diagnosis of fracture or dislocation based on clinical and radiological evaluation.

Patients with associated bone or joint diseases, such as osteoporosis, osteoarthritis, or rheumatoid arthritis.

Patients willing to participate in the study and provide informed consent.

Exclusion Criteria:

Patients with open fractures requiring extensive surgical intervention or reconstructive surgery.

Cases of pathological fractures secondary to malignancy.

Patients with incomplete medical records.

Those who were lost to follow-up during the treatment period.

Data Collection

Data were collected retrospectively from the hospital's medical records system. The following information was retrieved for each patient:

Demographics: Age, gender, and occupation.

Clinical Presentation: Type, location, and severity of the fracture or dislocation.

Radiological Findings: X-ray, CT, or MRI results confirming the diagnosis and providing insights into the extent of the injury.

Management Protocols: Treatment methods employed, including conservative approaches (casting, splinting, or traction) and surgical interventions (internal or external fixation).

Outcomes: Time to union, complications, functional outcomes, and recurrence of dislocations.

Treatment Approaches:

The study adhered to standard management protocols for fractures and dislocations as recommended by the hospital's orthopedic guidelines. These included:

Initial Assessment and Stabilization:

Pain management using NSAIDs or opioids.

Immediate reduction of dislocations under sedation or anesthesia.

Immobilization using splints or temporary casts.

Definitive Management:

Conservative Treatment: Closed reduction followed by immobilization using plaster of Paris casts or functional braces.

Surgical Treatment: Indicated for complex or unstable fractures and dislocations. Techniques included open reduction and internal fixation (ORIF) using plates, screws, or intramedullary nails, as well as external fixation for severe cases.

Post-Treatment Care:

Physiotherapy to restore joint mobility and muscle strength.

Monitoring for complications such as nonunion, malunion, or infection.

Follow-up visits at 2 weeks, 6 weeks, and 3 months to assess healing progression.

Statistical Analysis

All collected data were entered into a statistical software program for analysis. Descriptive statistics, including mean, median, and standard deviation, were calculated for continuous variables, while categorical variables were summarized as frequencies and percentages. Chi-square tests were used to compare categorical outcomes, and independent t-tests were employed for continuous variables. A p-value of <0.05 was considered statistically significant.

Limitations:

Being a single-center study, the findings may not be generalizable to other populations. Additionally, the retrospective nature of the study limited control over data quality, and some cases had incomplete follow-up information.

Ethical Considerations:

Patient confidentiality was maintained by anonymizing all data. Written informed consent was obtained from all patients for the use of their clinical data in the study. The study was registered with the hospital’s clinical research registry.

RESULTS:

Table 1: Demographic and Clinical Characteristics of the Study Population:

Parameter	Frequency (n = 60)	Percentage (%)
Age Group (years)		
18–30	12	20.0
31–50	30	50.0
51–70	18	30.0
Gender		
Male	36	60.0
Female	24	40.0
Type of Injury		
Fractures	40	66.7
Dislocations	20	33.3
Common Sites of Injury		
Upper Limb	25	41.7
Lower Limb	20	33.3
Spine	15	25.0

The study population consisted of 60 patients, predominantly male (60%) compared to female (40%), highlighting a possible gender predisposition related to occupational or physical activity differences. The largest proportion of patients (50%) belonged to the 31–50 age group, reflecting the active working population who are more prone to fractures and dislocations due to accidents or overuse injuries. Fractures were more common (66.7%) than dislocations (33.3%), aligning with typical patterns of trauma-related injuries. Among injury sites, upper limb fractures and dislocations were the most prevalent (41.7%), likely due to protective reflexes during falls. Lower limb injuries accounted for 33.3% of cases, often resulting from high-energy trauma like road accidents, whereas spinal injuries were observed in 25% of patients, frequently associated with compression fractures or vertebral dislocations.

Table 2: Management and Outcomes of Fractures and Dislocations: Management Techniques Recovery Outcomes Associated Joint Diseases

Parameter	Frequency (n = 60)	Percentage (%)
Closed Reduction	18	30.0
Open Reduction and Internal Fixation (ORIF)	24	40.0
External Fixation	8	13.3
Conservative Management	10	16.7
Complete Recovery	42	70.0
Partial Recovery	12	20.0
Complications	6	10.0

Osteoarthritis	9	15.0
Chronic Joint Instability	3	5.0

Management of fractures and dislocations was tailored based on the injury's severity and site. Open reduction and internal fixation (ORIF) was the most commonly employed technique (40%), indicating its widespread utility for complex or unstable fractures requiring precise anatomical alignment. Closed reduction was used in 30% of cases, primarily for simpler fractures and dislocations, as it allowed for realignment without invasive procedures. External fixation was implemented in 13.3% of cases, often for severe or open fractures requiring stabilization. Conservative management, including splints or traction, was applied to 16.7% of patients with less severe or stable injuries.

The recovery outcomes were encouraging, with 70% of patients achieving complete recovery, defined by restored functionality and radiological evidence of bone or joint healing. Partial recovery was reported in 20% of cases, largely attributed to residual stiffness or mild functional limitations. However, 10% of patients developed complications, such as delayed union, malunion, or infection, underscoring the challenges associated with complex injuries or delayed presentation.

Associated Joint Diseases

The study also observed the impact of fractures and dislocations on long-term joint health. Post-traumatic osteoarthritis was the most common joint disease, affecting 15% of patients, primarily those with intra-articular fractures or joint dislocations. Chronic joint instability was identified in 5% of cases, reflecting suboptimal soft tissue healing or ligament damage.

DISCUSSION:

In the management of fractures and dislocations, several fundamental principles guided the approach to treatment. These principles ensured the restoration of function, prevention of complications, and promotion of healing. The first and foremost principle in fracture management was achieving accurate reduction and stabilization of the bone fragments to allow for proper healing. This was often achieved through either closed reduction, where bone fragments were realigned externally, or open reduction, which involved surgical intervention when closed methods were insufficient [8]. Dislocations, similarly, required prompt reduction to prevent complications such as nerve damage, joint instability, and prolonged pain.

In both fracture and dislocation management, immobilization played a critical role in ensuring the realignment was maintained. The use of casts, splints, or external fixation devices provided the necessary support, preventing excessive movement during the healing process. For more complex fractures or dislocations, particularly those involving the spine or large joints, surgical stabilization was often necessary, which could include internal fixation using plates, screws, or rods [9]. The goal was to provide a stable environment that minimized the risk of nonunion or malunion of fractured bones.

The management of bone and joint disease in the context of fractures and dislocations was particularly important in patients with underlying conditions such as osteoporosis, rheumatoid arthritis, or osteoarthritis. These diseases often complicated the healing process, making fracture management more challenging. In patients with osteoporosis, for instance, bones were more brittle, increasing the risk of fractures even with minor trauma [10]. The management of such fractures required not only attention to the proper reduction and immobilization but also consideration of the patient's bone density, with potential interventions such as bisphosphonates or calcium and vitamin D supplementation to enhance bone healing.

In patients with rheumatoid arthritis or other inflammatory joint diseases, fractures and dislocations often presented with additional complications such as joint deformity, ligament laxity, or chronic inflammation. These conditions could impair the body's ability to heal fractures efficiently and required a multidisciplinary approach, including consultation with rheumatologists to optimize disease control

during the healing process [11]. The management of these patients often involved the careful consideration of surgical interventions, with the goal of restoring joint function while minimizing the risk of infection or joint instability.

Furthermore, the rehabilitation phase post-fracture or dislocation was crucial to achieving optimal functional outcomes. Early mobilization, once adequate healing had occurred, was essential to prevent joint stiffness, muscle atrophy, and loss of function. In some cases, physical therapy was employed to help restore strength and range of motion [12]. The rehabilitation process, however, had to be tailored to the individual patient's needs, taking into account the location and severity of the fracture or dislocation, as well as any underlying bone or joint disease that could affect recovery.

One of the most critical aspects of fracture and dislocation management was the prevention and management of complications [13]. Infection, particularly in open fractures or following surgical interventions, was a major concern. Appropriate antimicrobial therapy, wound care, and sometimes surgical debridement were necessary to prevent infection. Another complication was the risk of post-traumatic osteoarthritis, particularly in fractures involving the joint surface. In such cases, long-term management strategies, including joint protection and sometimes joint replacement, were necessary to preserve function and minimize pain [14].

Overall, the management of fractures and dislocations required a multifaceted approach, integrating general principles of fracture care with consideration for the impact of bone and joint disease. The integration of medical, surgical, and rehabilitative strategies ensured that patients achieved the best possible outcomes, both in terms of healing and functional recovery [15].

CONCLUSION:

The study highlighted the effective management of fractures and dislocations through the application of general principles, including accurate diagnosis, timely intervention, and appropriate immobilization techniques. Emphasis was placed on understanding the underlying bone and joint diseases that contribute to these injuries, ensuring a comprehensive treatment approach. Surgical and non-surgical strategies were tailored to individual patient needs, optimizing outcomes and minimizing complications. Rehabilitation and physiotherapy played a pivotal role in restoring function and mobility. The findings underscored the importance of a multidisciplinary approach and adherence to evidence-based protocols in achieving favorable recovery and improving patient quality of life.

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