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Evaluation of Post-Surgical Outcomes in Orthopedic Trauma Patients: A Cross-Sectional Analysis

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ABSTRACT

This study investigates the post-surgical outcomes of orthopedic trauma patients. Orthopedic injuries, often requiring surgical intervention, can significantly impact a patient's quality of life. The recovery trajectory post-surgery is crucial for effective rehabilitation and long-term outcomes. The primary objective is to evaluate the short-term and long-term post-surgical outcomes in patients undergoing orthopedic surgery for trauma. Key metrics include pain levels, mobility, functional recovery and the incidence of post-surgical complications. A cross-sectional study was conducted with a sample size of 200 patients who underwent orthopedic surgery for trauma. Data collection involved patient surveys, medical record analysis and physical assessments conducted at three and six months post-surgery. Statistical analysis was used to evaluate outcomes and identify factors influencing recovery. Preliminary findings indicate varying degrees of recovery, with significant improvements in pain management and mobility. However, a notable percentage of patients experienced post-surgical complications, impacting their recovery trajectory. Detailed results will discuss the correlation between patient demographics, type of surgery, and recovery outcomes. The study provides insights into the recovery patterns of orthopedic trauma patients post-surgery. Identifying factors that contribute to better or poorer outcomes can guide improvements in surgical techniques, post-operative care and patient counseling.

INTRODUCTION

Orthopedic trauma refers to severe injuries to the musculoskeletal system, often necessitating surgical intervention. The outcomes of these surgeries significantly impact patient recovery, quality of life, and the burden on healthcare systems. Recent advancements in orthopedic surgical techniques and post-operative care have shown promising results in enhancing patient recovery and reducing complications^[1].

However, despite these advancements, post-surgical outcomes in orthopedic trauma patients vary widely. Factors such as the nature of the injury, patient demographics, and the type of surgical intervention play a crucial role in determining these outcomes^[2]. Understanding these factors is essential for improving surgical techniques, rehabilitation protocols and patient counseling strategies. Moreover, the incidence of post-surgical complications remains a significant concern. Complications such as infection, delayed healing and reduced mobility can adversely affect the patient's recovery trajectory and overall quality of life^[3]. Identifying risk factors for these complications is crucial for developing targeted interventions to mitigate them.

Aim: To evaluate the short-term and long-term post-surgical outcomes in orthopedic trauma patients through a comprehensive cross-sectional analysis.

Objectives:

- To assess the extent of functional recovery in orthopedic trauma patients following surgical intervention, focusing on mobility and pain management
- To identify and analyze the prevalence and types of post-surgical complications in the patient cohort
- To investigate the relationship between patient demographics, type of surgical procedure and post-surgical recovery outcomes

MATERIALS AND METHODS

Source of Data: Data for this study were collected from the orthopedic department of Lt BRKM Government Medical College Dimrapal, Jagdalpur, which included patient records, surgery details and post-operative follow-up information.

Study Design: A cross-sectional study design was employed, focusing on patients who had undergone orthopedic surgery for trauma within the last year.

Sample Size: The study included 200 patients, selected using a stratified sampling method to ensure representation across different types of orthopedic trauma surgeries.

Inclusion Criteria:

- Had undergone orthopedic surgery for trauma within the past 12 months
- Were aged 18 years or older
- Had consented to participate in the study

Exclusion Criteria:

- Had a history of chronic orthopedic conditions unrelated to the trauma
- Had undergone multiple surgeries for the same injury
- Were unable to provide informed consent

Study Methodology: The study involved a detailed review of patient medical records, assessments of surgical outcomes and patient interviews. Functional recovery was measured using standardized scales for pain and mobility.

Statistical Methods: Data were analyzed using descriptive and inferential statistics. Chi-square tests for categorical data and t-tests for continuous data were used to compare outcomes across different patient groups. Multivariate regression analysis was employed to identify predictors of post-surgical outcomes.

Data Collection: Data collection involved a structured questionnaire for patient interviews, along with a review of medical records for clinical data. Follow-up assessments were conducted at designated intervals post-surgery to evaluate recovery progress.

OBSERVATION AND RESULTS

Table 1 presents the relationship between patient demographics, types of surgical procedures, and recovery outcomes in a study of 200 orthopedic trauma patients. It shows that younger patients (18-40 years) had a significantly higher likelihood of favorable recovery (OR = 2.2, 95% CI: 1.3-3.7, $p=0.002$) compared to the older age groups, with 35% of this age group achieving favorable outcomes. Gender-wise, male patients had a marginally higher odds ratio (OR = 1.8, 95% CI: 1.1-2.9, $p=0.02$) for favorable recovery, with equal representation (50%) of both genders in the study. In terms of surgical procedures, patients who underwent Internal Fixation Surgery (40% of the sample) were more likely to experience favorable recovery (OR=2.5, 95% CI: 1.5-4.1, $p<0.001$) compared to those who had Joint Replacement Surgery. The latter group, constituting 60% of the sample, showed a lower, statistically non-significant odds ratio (OR = 1.2, 95% CI: 0.7-2.0, $p=0.50$) for favorable recovery. This data indicates that age, gender and type of surgical procedure are significant factors influencing recovery outcomes in orthopedic trauma patients.

Table 1: Relationship between patient demographics, surgical procedure type, and recovery outcomes in orthopedic trauma patients (n = 200)

Demographic/surgical procedure	No. of patients (n = 200)	Percentage	Odds ratio (OR)	95% Confidence interval (CI)	p-value
Age group					
18-40 years	70	35	2.2	1.3-3.7	0.002
41-60 years	50	25	1.4	0.8-2.4	0.20
>60 years	30	15	Referent	-	-
Gender					
Male	100	50	1.8	1.1-2.9	0.02
Female	100	50	Referent	-	-
Type of surgical procedure					
Internal fixation surgery	80	40	2.5	1.5-4.1	<0.001
Joint replacement surgery	120	60	1.2	0.7-2.0	0.50

Table 2: Prevalence and types of post-surgical complications in orthopedic trauma patients (n = 200)

Post-surgical complication	No. of patients (n = 200)	Percentage	Odds ratio (OR)	95% Confidence interval (CI)	p-value
Infections					
Surgical site infection	30	15	2.5	1.3-4.7	0.005
Deep tissue infection	10	5	4.0	1.6-10.2	0.003
Mobility complications					
Joint stiffness	40	20	1.8	0.9-3.6	0.08
Delayed bone healing	25	12.5	2.2	1.1-4.4	0.02
Other complications					
Chronic pain	50	25	3.1	1.7-5.6	<0.001
Re-hospitalization	15	7.5	2.8	1.2-6.5	0.015
Additional surgical intervention	20	10	3.5	1.5-8.2	0.004

Table 3: Functional recovery in orthopedic trauma patients post-surgery (n = 200)

Functional recovery aspect	No. of patients (n = 200)	Percentage	Odds ratio (or)	95% confidence interval (ci)	p-value
Mobility improvement					
Full mobility restored	120	60	2.4	1.5-3.8	<0.001
Partial mobility improvement	60	30	1.2	0.7-2.0	0.05
No improvement in mobility	20	10	Referent	-	-
Pain management					
Significant pain reduction	150	75	3.0	1.9-4.7	<0.001
Moderate pain reduction	40	20	1.5	0.8-2.8	0.10
No change in pain levels	10	5	Referent	-	-

Table 2 outlines the prevalence and types of post-surgical complications in a cohort of 200 orthopedic trauma patients. Infections were a notable complication, with 15% of patients experiencing surgical site infections (OR = 2.5, 95% CI: 1.3-4.7, $p = 0.005$) and 5% developing deep tissue infections (OR=4.0, 95% CI: 1.6-10.2, $p = 0.003$). Mobility complications were also significant, with joint stiffness affecting 20% of patients (OR = 1.8, 95% CI: 0.9-3.6, $p = 0.08$) and delayed bone healing observed in 12.5% (OR = 2.2, 95% CI: 1.1-4.4, $p = 0.02$). Furthermore, a quarter of the patients suffered from chronic pain (OR = 3.1, 95% CI: 1.7-5.6, $p < 0.001$), while 7.5% needed re-hospitalization (OR = 2.8, 95% CI: 1.2-6.5, $p = 0.015$), and 10% required additional surgical intervention (OR = 3.5, 95% CI: 1.5-8.2, $p = 0.004$). This data highlights the considerable incidence of various complications following orthopedic surgery, underscoring the need for careful post-operative management and follow-up in this patient population.

Table 3 provides a comprehensive overview of functional recovery in 200 orthopedic trauma patients following surgery, focusing on mobility improvement and pain management. A significant 60% of patients achieved full mobility restoration, showing a high likelihood of this outcome (OR = 2.4, 95% CI: 1.5-3.8, $p < 0.001$). Additionally, 30% of the patients experienced partial mobility improvement (OR = 1.2, 95% CI: 0.7-2.0, $p = 0.05$), while 10% saw no improvement in mobility. In terms of pain management, a substantial 75% of patients reported

significant pain reduction, with a strong odds ratio indicating this outcome (OR=3.0, 95% CI: 1.9-4.7, $p < 0.001$). Moderate pain reduction was noted in 20% of the patients (OR = 1.5, 95% CI: 0.8-2.8, $p = 0.10$) and a small fraction of 5% experienced no change in pain levels. This data highlights the generally positive impact of surgical intervention on mobility and pain reduction in orthopedic trauma patients, while also acknowledging variability in patient responses.

DISCUSSIONS

The results from Table 1 of our study, which investigates the relationship between demographics, surgical procedure types and recovery outcomes in 200 orthopedic trauma patients, offer intriguing insights that can be discussed in the context of existing literature.

Age Group and Recovery Outcomes: Our findings indicate that younger patients (18-40 years) have significantly better recovery outcomes (OR = 2.2, 95% CI: 1.3-3.7, $p = 0.002$) compared to older age groups. This aligns with the study by Özdemir *et al.*^[1] which found that younger patients tend to have more favorable post-surgical outcomes due to factors like better overall health and faster healing rates. In contrast, patients aged over 60 showed less favorable outcomes, consistent with findings by Seid Tegegne *et al.*^[2] emphasizing the impact of age-related physiological changes on surgical recovery.

Gender Differences in Recovery: Our study found that male patients had a slightly higher likelihood of favorable recovery (OR = 1.8, 95% CI: 1.1-2.9, $p = 0.02$). This is in contrast with the research by Kasahun *et al.*^[3] which did not find significant differences in recovery outcomes based on gender. The reasons for this discrepancy could be due to varying patient demographics or differing surgical techniques.

Impact of Surgical Procedure Type: Patients who underwent Internal Fixation Surgery had significantly better recovery outcomes (OR = 2.5, 95% CI: 1.5-4.1, $p < 0.001$) compared to those who had Joint Replacement Surgery. This finding is supported by the study of Panattoni *et al.*^[4] which highlighted the efficacy of internal fixation techniques in promoting quicker and more robust recovery in trauma patients. However, it contrasts with findings by Raizah *et al.*^[5] which suggested that joint replacement surgeries generally have high success rates. The variation might be attributed to the specific nature of injuries and patient profiles in different studies.

The data from Table 2 in our study on the prevalence and types of post-surgical complications in 200 orthopedic trauma patients provides valuable insights that can be contextualized with existing research in the field.

Infections: Our findings indicate a significant prevalence of surgical site infections (15%, OR = 2.5) and deep tissue infections (5%, OR = 4.0). These rates are consistent with the study by Pradhan *et al.*^[6] which also highlighted the risk of infections following orthopedic surgeries. The high odds ratio for deep tissue infections underscores the need for stringent post-operative care, a point also emphasized in research by Utomo *et al.*^[7] **Mobility Complications:** Joint stiffness was observed in 20% of our patients, while 12.5% experienced delayed bone healing. The latter had a notably higher odds ratio (OR = 2.2). This aligns with findings by Meyer-Szary *et al.*^[8] who reported similar trends in mobility-related complications post-orthopedic surgeries. However, the incidence of joint stiffness is slightly higher than what was reported by Pei *et al.*^[9] suggesting potential variations in surgical techniques or patient demographics.

Other Complications: Chronic pain was a significant complication in our study (25% of patients), which is in line with the prevalence reported by Gomes *et al.*^[10] The high odds ratio (OR = 3.1) for chronic pain emphasizes its impact on patient quality of life post-surgery. Additionally, the necessity for re-hospitalization (7.5%) and additional surgical interventions (10%) were notable, with the latter

showing a high odds ratio (OR = 3.5), echoing the concerns raised in the study by Schwartz *et al.*^[11] Table 3 from our study provides an in-depth look at functional recovery in 200 orthopedic trauma patients post-surgery, with a particular focus on mobility improvement and pain management. This data can be contextualized with existing research in the field.

Mobility Improvement: Our study showed that 60% of patients achieved full mobility restoration post-surgery, a significant finding as indicated by the odds ratio (OR = 2.4). This aligns with the research by Yeung *et al.*^[12] who reported high rates of mobility recovery following orthopedic surgeries. However, our study also notes that 30% of patients only had partial mobility improvement, suggesting variability in patient outcomes that resonate with findings by Bajuri *et al.*^[13] The challenges in achieving full mobility, especially among a subset of patients, underline the need for tailored rehabilitation programs.

Pain Management: A substantial 75% of our patients experienced significant pain reduction post-surgery, a very promising outcome (OR = 3.0). This is consistent with studies like that of Tashkandi *et al.*^[14] which also reported high success rates in pain management after orthopedic surgeries. However, 20% of our patients only reported moderate pain reduction and 5% experienced no change in pain levels, highlighting the complexity of pain management in post-surgical care, as discussed by Cocco *et al.*^[15] These variations might be due to individual pain thresholds, the type of surgery, or other underlying health conditions.

CONCLUSION

The cross-sectional analysis conducted in the study provides crucial insights into the recovery trajectories and challenges faced by patients undergoing orthopedic surgeries. Our findings indicate that while a significant proportion of patients experience favorable outcomes in terms of mobility restoration and pain reduction the prevalence of post-surgical complications and the variability in recovery outcomes underscore the complex nature of post-operative care in orthopedic trauma.

Notably, factors such as patient age, gender, and the type of surgical procedure play a pivotal role in influencing these outcomes. Younger patients tend to have better recovery rates, while the impact of gender on recovery is less clear and warrants further investigation. Additionally, the type of surgical procedure significantly affects the likelihood of a favorable recovery, with internal fixation surgeries showing higher success rates in our cohort.

Complications such as infections, joint stiffness, and chronic pain present considerable challenges,

affecting a notable percentage of patients and potentially hindering their recovery process. These findings emphasize the need for targeted strategies to mitigate such complications and suggest that a personalized approach to post-operative care, considering individual patient characteristics and the specifics of their surgical procedures, may be beneficial.

Overall, this study contributes valuable information to the existing body of knowledge on orthopedic trauma surgery outcomes. It highlights the importance of comprehensive post-surgical care and the need for ongoing research to optimize recovery protocols and improve patient quality of life post-surgery. As the field of orthopedic surgery continues to evolve, such insights will be crucial in shaping patient-centered care strategies and improving surgical outcomes.

Limitations of study

Cross-Sectional Design: The cross-sectional nature of the study limits our ability to establish causal relationships between surgical procedures and recovery outcomes. Longitudinal studies would be more effective in tracking changes over time and establishing causality.

Sample Size and Diversity: With a sample size of 200 patients, our study may not capture the full spectrum of variability in orthopedic trauma surgeries and patient outcomes. Additionally, the study might lack representation from all demographic groups, limiting the generalizability of the findings.

Single Center Data: Data was collected from a single healthcare center, which may not reflect the practices or patient outcomes of other centers with different patient demographics, surgical techniques, or post-operative care protocols.

Subjective Measures of Recovery: Some outcomes, particularly related to pain and mobility, were based on patient self-reports, which are subjective and could be influenced by individual pain tolerance, psychological factors, or reporting bias.

Lack of Control Group: The absence of a control group, such as patients treated non-surgically or with different surgical techniques, limits the comparative analysis of surgical outcomes.

Confounding Variables: While efforts were made to control for confounding factors, there may still be unaccounted variables such as patient's pre-existing health conditions, lifestyle factors, or socio-economic status that could influence recovery outcomes.

Short-Term Focus: The study primarily focuses on short-term recovery outcomes. Longer-term follow-up would be necessary to fully understand the durability and long-term implications of these surgical interventions.

Exclusion Criteria: The exclusion criteria might have eliminated patients who could provide additional insights into the recovery process, particularly those with complex medical histories or multiple surgeries.

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