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Impact of Diabetes Mellitus on Outcomes in Orthopedic Sports Medicine Surgeries

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Abstract

Background: Diabetes mellitus (DM) is a chronic metabolic disorder associated with impaired wound healing, increased infection risk, and poor surgical outcomes. Its impact on orthopedic sports medicine procedures has become increasingly relevant due to rising diabetes prevalence.

Objective: To evaluate the effect of diabetes mellitus on postoperative outcomes in patients undergoing orthopedic sports medicine surgeries.

Methods: A comparative cohort study was conducted including 150 patients undergoing elective sports-related orthopedic procedures (e.g., ACL reconstruction, rotator cuff repair). Patients were divided into

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diabetic (n=60) and non-diabetic (n=90) groups. Outcomes assessed included infection rate, wound healing time, functional recovery, and complication rates over a 6-month follow-up period.

Results: Diabetic patients showed a significantly higher rate of postoperative infections (15% vs 5%, p=0.01) and delayed wound healing (mean 18 days vs 12 days, p<0.001). Functional recovery scores were lower in diabetic patients. Complication rates were also higher in the diabetic group.

Conclusion: Diabetes mellitus negatively impacts surgical outcomes in orthopedic sports procedures. Optimizing glycemic control pre- and postoperatively is essential to improve outcomes.

Keywords: Diabetes mellitus, Orthopedic surgery, Sports medicine, Surgical outcomes, Infection

1. Introduction

Orthopedic sports medicine surgeries have become increasingly common in recent decades, driven by a growing interest in physical fitness, competitive sports, and an aging yet active population. Procedures such as anterior cruciate ligament (ACL) reconstruction, meniscal repair, rotator cuff repair, and cartilage restoration are routinely performed to restore joint stability, relieve pain, and improve functional outcomes. The success of these interventions depends largely on optimal biological healing, adequate vascular supply, and effective postoperative rehabilitation. However, the presence of systemic comorbidities can significantly influence surgical outcomes, with diabetes mellitus emerging as one of the most critical factors affecting recovery.

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Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It is a rapidly growing global health concern, with an estimated prevalence exceeding 500 million individuals worldwide. The disease is associated with a wide range of microvascular and macrovascular complications, including neuropathy, nephropathy, retinopathy, and cardiovascular disease. In addition to these well-recognized complications, diabetes has profound effects on wound healing, immune function, and tissue regeneration, all of which are essential for successful surgical outcomes.

In the context of orthopedic surgery, diabetes has been consistently associated with an increased risk of postoperative complications, including surgical site infections, delayed wound healing, implant failure, and prolonged hospital stay. Hyperglycemia impairs leukocyte function, reduces chemotaxis and phagocytosis, and promotes a pro-inflammatory environment that compromises host defense mechanisms. Furthermore, diabetes-induced microangiopathy leads to reduced tissue perfusion and oxygenation, which are critical for wound healing and collagen synthesis. These pathophysiological changes are particularly relevant in orthopedic sports procedures, where soft tissue healing and graft incorporation are key determinants of success.

Sports medicine surgeries often involve reconstruction or repair of ligaments, tendons, and cartilage, structures that rely heavily on adequate vascularization and cellular activity for healing. For instance, ACL reconstruction requires successful graft integration within bone tunnels, a process dependent on angiogenesis and collagen remodeling. Similarly, rotator cuff repair relies on tendon-to-bone healing, which can be adversely affected by impaired metabolic and inflammatory responses in diabetic patients.

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Studies have suggested that hyperglycemia may alter collagen cross-linking and reduce biomechanical strength, potentially leading to higher failure rates in such procedures.

Another important consideration is the impact of diabetes on postoperative rehabilitation. Patients with poorly controlled diabetes may experience delayed recovery due to muscle weakness, neuropathy, and reduced physical endurance. These factors can limit participation in rehabilitation programs, thereby affecting long-term functional outcomes. Additionally, diabetes-related complications such as peripheral neuropathy may increase the risk of falls and reinjury, further complicating recovery.

The role of glycemic control in improving surgical outcomes has been widely emphasized in the literature. Hemoglobin A1c (HbA1c) is commonly used as an indicator of long-term glycemic control, and higher levels have been associated with increased risk of postoperative complications. Several studies have demonstrated that optimizing glycemic control prior to surgery can significantly reduce the incidence of infections and improve wound healing. However, there remains variability in defining optimal glycemic thresholds and in implementing standardized perioperative protocols, particularly in resource-limited settings.

Despite the growing body of evidence linking diabetes to adverse surgical outcomes, there is a relative paucity of data specifically focusing on orthopedic sports medicine procedures. Most existing studies have examined general orthopedic surgeries, such as joint arthroplasty and fracture management, which may not fully reflect the unique biological and functional demands of sports-related interventions. Given

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the increasing number of diabetic patients undergoing sports surgeries, there is a need for focused research to better understand the extent of risk and to develop targeted management strategies.

Furthermore, advances in surgical techniques and postoperative care have improved overall outcomes in orthopedic sports medicine, but the influence of systemic conditions like diabetes continues to pose significant challenges. Identifying modifiable risk factors and implementing evidence-based interventions can help mitigate these risks and enhance patient outcomes. This includes not only optimizing glycemic control but also addressing associated factors such as obesity, sedentary lifestyle, and poor nutritional status.

In this context, the present study aims to evaluate the impact of diabetes mellitus on postoperative outcomes in patients undergoing orthopedic sports medicine surgeries. By comparing diabetic and non-diabetic patients in terms of infection rates, wound healing, functional recovery, and complication profiles, this study seeks to provide valuable insights into the role of diabetes in surgical prognosis. The findings are expected to contribute to improved perioperative management, better patient selection, and ultimately enhanced clinical outcomes in this growing patient population.

2. Methodology

Study Design

Comparative cohort study

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Study Setting

Orthopedic Department of a tertiary care hospital

Study Duration

12 months

Sample Size

150 patients

Inclusion Criteria

- Patients aged 18–60 years
- Undergoing elective orthopedic sports surgery
- Diagnosed cases of diabetes (for study group)

Exclusion Criteria

- Chronic infections
- Immunocompromised patients
- Revision surgeries

Grouping

- **Group A:** Diabetic patients (n=60)

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- **Group B:** Non-diabetic patients (n=90)

Outcome Measures

- Postoperative infection
- Wound healing duration
- Functional recovery (Lysholm score / DASH score)
- Complication rates

Statistical Analysis

Data analyzed using SPSS v26. Independent t-test and chi-square test applied. Significance at $p<0.05$.

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3. Results

3.1 Demographics

Variable	Diabetic	Non-Diabetic
Mean Age	52 ± 8	48 ± 7
Male (%)	65%	68%

3.2 Postoperative Outcomes

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Outcome	Diabetic	Non-Diabetic	p-value
Infection	15%	5%	0.01
Healing Time	18 days	12 days	<0.001
Complications	20%	8%	0.02

3.3 Functional Recovery

- Lower functional scores observed in diabetic patients
- Delayed rehabilitation milestones

4. Discussion

This study highlights the significant negative impact of diabetes mellitus on outcomes in orthopedic sports medicine surgeries. Diabetic patients experienced higher infection rates, delayed wound healing, and poorer functional recovery compared to non-diabetic patients.

The increased susceptibility to infection in diabetic patients can be attributed to impaired immune function and reduced blood supply. Hyperglycemia creates an environment conducive to bacterial growth, further increasing infection risk.

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Delayed wound healing observed in diabetic patients is consistent with previous literature. Impaired collagen synthesis, decreased angiogenesis, and neuropathy contribute to prolonged recovery times.

Functional outcomes were also adversely affected, likely due to delayed healing and reduced rehabilitation efficiency. These findings emphasize the importance of strict glycemic control in the perioperative period.

Despite these challenges, appropriate management strategies can significantly improve outcomes. Preoperative optimization of blood glucose levels, careful surgical technique, and close postoperative monitoring are essential.

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5. Conclusion

Diabetes mellitus is associated with poorer surgical outcomes in orthopedic sports medicine procedures. Effective glycemic control and multidisciplinary care are crucial to improving patient outcomes.

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