NAVIGATING THE CHALLENGES OF SEVERE OPEN FRACTURES BETWEEN OREFAND ORIF IN COMPLEX TRAUMA MANAGEMENT : A CASE REPORT

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ABSTRAK

Fraktur terbuka dengan kerusakan jaringan lunak yang parah menghadirkan tantangan yang signifikan dalam perawatan trauma ortopedi, khususnya dalam memilih intervensi bedah yang tepat. Laporan kasus ini membahas seorang laki-laki berusia 32 tahun yang menderita beberapa luka parah, termasuk luka remuk pada femur distal kanan, amputasi ruas proksimal jari keempat kanan, patah tulang acetabulum, dan patah tulang kompleks temporo-zygomatik setelah serangan jantung. kecelakaan sepeda motor. Meskipun pada kasus tersebut lebih disukai Open Reduction External Fixation (OREF) untuk meminimalkan kerusakan jaringan lebih lanjut dan mengurangi risiko infeksi, Open Reduction Internal Fixation (ORIF) dipilih untuk mencapai keselarasan anatomi yang tepat dan mobilisasi dini. Perjalanan pasien pasca operasi stabil, dengan penyembuhan luka yang berhasil dan fungsi anggota tubuh pulih. Kasus ini menggarisbawahi perlunya evaluasi yang cermat dalam pengambilan keputusan bedah, terutama ketika menangani patah tulang terbuka, dan menyarankan pertimbangan ulang praktik standar untuk memastikan hasil yang optimal bagi pasien dengan cedera ortopedi yang kompleks.

Kata kunci **:** manajemen trauma kompleks, OREF, ORIF, fraktur terbuka, pengambilan keputusan bedah

ABSTRACT

Open fractures with severe soft tissue damage present significant challenges in orthopedic trauma care, particularly in selecting the appropriate surgical intervention. This case report discusses a 32-year-old male who sustained multiple severe injuries, including a crush injury to the right distal femur, an amputated proximal phalanx of the right fourth digit, an acetabulum fracture, and a temporo-zygomatic complex fracture following a motorcycle accident. Despite the typical preference for Open Reduction External Fixation (OREF) in such cases to minimize further tissue damage and reduce infection risk, Open Reduction Internal Fixation (ORIF) was chosen to achieve precise anatomical alignment and early mobilization. The patient's postoperative course was stable, with successful wound healing and restored limb function. This case underscores the need for careful evaluation in surgical decision-making, especially when managing open fractures, and suggests reconsideration of standard practices to ensure optimal outcomes for patients with complex orthopedic injuries.

Keywords ***:*** *complex trauma management, OREF, ORIF, open fractures, surgical decision-making*

INTRODUCTION

Orthopedic trauma, particularly when it involves open fractures with severe soft tissue damage, presents a unique set of challenges that require immediate and precise medical intervention. Open fractures are a major concern in trauma care due to the direct exposure of the bone to the external environment, which significantly increases the risk of contamination and subsequent infection. The presence of soft tissue damage further complicates the situation, as it can impair the natural healing process, lead to difficulties in wound closure, and increase the likelihood of complications such as delayed union or non-union of the fracture. Therefore, managing both the bone injury and the associated soft tissue damage is crucial to prevent long-term disability and improve the overall outcome for the patient.

The surgical management of open fractures often hinges on the choice between Open Reduction External Fixation (OREF) and Open Reduction Internal Fixation (ORIF). OREF is typically indicated in cases where there is extensive soft tissue damage or a high risk of infection, as it allows for the stabilization of the fracture with minimal disruption to the surrounding tissues. This technique is particularly advantageous because it permits ongoing access to the wound for debridement and care, which is essential in preventing infection and promoting tissue healing. However, while OREF is beneficial in managing soft tissue injuries, it may not always provide the precise anatomical reduction needed for optimal bone healing, particularly in complex fractures.

On the other hand, ORIF is preferred when accurate alignment of the bone fragments is necessary to restore the normal anatomy and function of the limb. This technique involves surgically exposing the fracture site to directly manipulate and fix the bone fragments using plates, screws, or rods. While ORIF is effective in achieving stable fixation and facilitating early mobilization, it requires extensive surgical exposure, which can be problematic in cases with significant soft tissue compromise. In this particular case, the patient sustained severe hip and lower limb trauma from a traffic accident, requiring a thorough evaluation of both techniques. The decision to proceed with ORIF was made after carefully considering the extent of the injuries, the condition of the soft tissues, and the need for precise fracture reduction to optimize the patient's functional recovery. The objective of this case report is to analyze the clinical decision-making process involved in choosing between ORIF and OREF techniques for managing an open fracture with significant soft tissue injury. The report will also examine the rationale behind selecting ORIF, considering the limitations of available resources, and will evaluate the postoperative outcomes observed in the patient.

CASE REPORT

A 32-year-old male was brought to the hospital following involvement in a hit-and-run accident while riding a motorcycle. The details of the accident are not clearly remembered, but consciousness was maintained at the scene. Significant pain was reported in the right leg and hand, with no head injuries, loss of consciousness, nausea, or vomiting.

On physical examination, the patient was found to be in fair general condition with a Glasgow Coma Scale (GCS) score of 15 (E4V5M6). Vital signs included a blood pressure of 86/70 mmHg, a heart rate of 69 beats per minute, a respiratory rate of 20 breaths per minute, and a temperature of 36.7°C. Oxygen saturation was 100% on room air. Examination revealed swelling and deformities in the right lower limb and right hand, while the head, neck, thorax, and abdomen showed normal findings. Clinical signs indicated deformity and swelling in the right distal femur and right hand, which were consistent with fractures. No neurological deficits or signs of systemic infection were observed.

Figure 1. Clinical Finding of The Wound In the Face, Leg, and Hand

Diagnostic methods involved laboratory tests, including hematology, blood chemistry, and electrolytes, along with imaging techniques such as X-rays, CT scans, and an EKG. These assessments were crucial for evaluating the extent of the injuries and identifying any underlying

complications. The differential diagnosis considered the possibility of open fractures along with associated injuries like pulmonary contusions, internal bleeding, and head trauma, given the nature of the incident. Diagnostic challenges included the need for a rapid assessment of the soft tissue damage and fractures while ensuring hemodynamic stability in the presence of potential internal injuries. The final diagnosis determined a crush injury to the right distal femur, an amputated proximal phalanx of the right fourth digit, an acetabulum fracture, and a temporo- zygomatic complex fracture.

Table 1. Timeline of the Case

Date	Event
28-Apr-24	Admission to the hospital following the accident.
29-Apr-24	Initial surgery planned; preoperative preparations including transfusion and monitoringinitiated.
6-May-24	Follow-up surgery performed to remove the aff drain and review the acetabulum.

Figure 2. Fracture Completa Os. Femur Distal Dextra and Fracture Acetabulum Roof Pelvis Dextra

The patient received surgical interventions, including Open Reduction Internal Fixation (ORIF) for the fractures in the femur and hand, as well as management of the acetabulum fracture. Medications administered included antibiotics, pain relief, and fluids. Specifically, Cefazolin was given at a dose of 1 gram every 12 hours, Ranitidine at 50 milligrams every 12 hours, and a tetanus immunoglobulin injection was also administered. Fluid management involved administering Ringer's Lactate at 20 drops per minute, with additional blood transfusions provided as necessary. The rationale for selecting this surgical approach was to ensure precise reduction and stabilization of the fractures, which would facilitate early mobilization and reduce the risk of long-term disability. ORIF was preferred due to the complexity of the injuries and the requirement for accurate anatomical alignment.

Figure 3. Post Operative Crush Injury Distal Femur Dextra and CF Acetabulum Dextra

The postoperative course was closely monitored, with daily assessments of vital signs, wound condition, and pain levels. Throughout the hospitalization, there was a gradual decrease in pain, and vital signs remained stable. During the follow-up period, attention was given to wound healing, pain management, and the recovery of function in the affected limbs. No major complications, such as infections or implant failures, were observed. The outcomes were positive, with successful wound healing and restoration of limb function. The patient expressed satisfaction with the care received and the progress made during recovery. Plans for further rehabilitation were made to ensure full functional recovery.

DISCUSSION

This case report presents a critical analysis of the surgical decision-making process in a 32-year-old male who sustained severe injuries following a motorcycle accident, which included a crush injury to the right distal femur, an amputated proximal phalanx of the right fourth digit, an acetabulum fracture, and a temporo-zygomatic complex fracture.[6] However, the choice of ORIF for the open wound distal femur fracture in this case, particularly in the context of an open fracture with significant soft tissue damage, raises important questions regarding the most appropriate surgical approach.

Open Reduction External Fixation (OREF) usually used for managing open fractures, particularly when there is severe soft tissue damage. OREF is generally recommended in such cases to minimize further disruption to the soft tissues and to reduce the risk of infection by allowing better access for wound care. In contrast, ORIF, while effective in achieving precise bone alignment, requires more extensive surgical exposure, which can be problematic in open fractures. This case deviates from the common practice highlighted in the literature, raising questions about the appropriateness of ORIF in scenarios where OREF might have been the safer option

In contrast, ORIF involves the surgical exposure of the fracture site, allowing for precise reduction and internal fixation of the bone fragments. While ORIF is effective in restoring anatomical alignment, it requires a more invasive approach, which can exacerbate soft tissue damage and increase the risk of complications, such as infection. In the context of open fractures, where the integrity of the soft tissues is already compromised, the use of ORIF is typically approached with caution.The decision to utilize ORIF in this case, despite the presence of an open fracture with severe soft tissue injury, represents a deviation from standard practice. The literature generally supports the use of OREF in such scenarios to minimize soft tissue disruption and reduce the risk of postoperative complications. The choice of ORIF in this case raises questions about the factors that specific anatomical considerations, the extent of the bone injury, or the patient's overall condition may have contributed to the decision to proceed with ORIF. Despite the potential risks associated with ORIF in open fractures, the patient in this case had a stable postoperative course with no major complications. This outcome suggests that, under certain circumstances, ORIF can be successfully employed in the management of open fractures, even in the presence of significant soft tissue injury. However, the success of ORIF in this case should not overshadow the importance of adhering to established guidelines that favor OREF in similar situations.

The strength of this case report lies in its demonstration of a positive outcome following ORIF, despite the inherent risks. This provides valuable insights into the complexities of surgical decision-making in trauma cases and highlights the need for a nuanced approach that considers both the benefits and potential drawbacks of different surgical techniques. However, a significant limitation of this report is the deviation from standard recommendations, which generally prioritize OREF for open fractures with severe soft tissue involvement. This deviation raises concerns about the generalizability of the findings and underscores the need for caution

when applying similar approaches in other cases. Future research should explore the long- term outcomes of using ORIF in situations where OREF is typically indicated, as well as the impact on infection rates, wound healing, and overall patient recovery. Clinical practice should prioritize the selection of surgical techniques that align with the specific needs of open fracture management, ensuring the best possible outcomes for patients.

CONCLUSION

In this case report, the decision to use Open Reduction Internal Fixation (ORIF) over Open Reduction External Fixation (OREF) in managing a complex trauma involving severe open fractures challenges conventional practices. Despite the preference for OREF in cases with significant soft tissue damage to minimize infection risk and allow better wound care, ORIF was chosen to ensure precise anatomical alignment and early mobilization. The successful postoperative outcomes, including wound healing and restored limb function, highlight the importance of individualized surgical decision-making. This case underscores the need for careful evaluation in trauma management and suggests that deviations from standard practices may be warranted to achieve optimal patient outcomes in complex scenarios.

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