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RESEARCH ARTICLE

FACTORS CONTRIBUTING TO VASCULARISED FLAP FAILURE IN MAXILLOFACIAL (HEAD AND NECK) RECONSTRUCTION.

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Abstract: Maxillofacial reconstruction using vascularised flaps has become a cornerstone in restoring both function and aesthetics following oncologic resections and traumatic injuries. Despite high success rates, flap failure remains a significant complication, leading to increased morbidity, prolonged hospitalization, and additional surgical interventions.This retrospective study evaluates the factors contributing to vascularised flap failure in head and neck reconstruction. Patient records from the Digital Information Archiving System (DIAS) between January 2023 and June 2023 were analyzed. Only patients undergoing radial and fibular flap reconstruction within the age group of 25–70 years were included. Patients with systemic comorbidities were excluded to minimize confounding variables.The study identified technical errors, vascular compromise, infection, and perioperative factors as key contributors to flap failure. Early detection and management of vascular compromise were found to significantly improve flap survival.The findings emphasize the importance of meticulous surgical technique, strict aseptic protocols, and proper postoperative monitoring to reduce flap failure rates and improve clinical outcomes.

Keywords: Vascularised flap, Flap failure, Maxillofacial reconstruction .

INTRODUCTION

Maxillofacial reconstruction is a vital component of contemporary surgical practice, aimed at restoring both functional and aesthetic integrity in patients affected by trauma, oncologic resections, congenital deformities, or severe infections. The complex anatomy of the head and neck region, involving critical structures such as muscles, nerves, blood vessels, and bones, necessitates precise and reliable reconstructive approaches to achieve optimal rehabilitation outcomes [1]. Restoration of essential functions such as mastication, speech, swallowing, and facial expression, along with aesthetic harmony, significantly improves the patient's quality of life and psychosocial well-being.

Among the various reconstructive modalities available, vascularised free tissue transfer has emerged as the gold standard in maxillofacial reconstruction. These flaps provide a robust blood supply, enabling improved healing, resistance to infection, and the ability to reconstruct complex composite defects involving both soft and hard tissues. Success rates of free flap reconstruction have been reported to exceed 90%, reflecting advancements in microsurgical techniques and perioperative care [2].

Commonly utilized flaps include the radial forearm free flap and fibular free flap. The radial forearm flap is widely preferred for soft tissue reconstruction due to its thin, pliable nature and reliable vascular pedicle, whereas the fibular flap is considered the gold standard for mandibular reconstruction because of its ability to provide sufficient bone length, structural strength, and potential for dental rehabilitation [3]. Despite these advantages, flap failure continues to pose a significant clinical challenge, with reported failure rates ranging between 5% and 15%, leading to increased morbidity, prolonged hospitalization, and additional surgical interventions [4].

The success of a vascularised flap is highly dependent on the maintenance of adequate blood flow through the microvascular anastomosis. Technical errors during surgery, such as improper suturing, vessel kinking, tension at the anastomotic site, or thrombosis, can compromise perfusion and ultimately lead to flap necrosis [5]. Even minor disruptions in vascular integrity can result in rapid deterioration of flap viability, emphasizing the importance of surgical precision and expertise.

In addition to technical factors, infection is a major contributor to flap failure. Postoperative infections can impair wound healing, induce inflammatory responses, and promote thrombosis within the microvasculature, thereby jeopardizing flap survival [6]. The oral and maxillofacial region is particularly susceptible to microbial contamination due to its proximity to the oral cavity, making strict aseptic protocols and infection control measures critical for successful outcomes.

Perioperative variables also play a crucial role in determining flap success. Factors such as prolonged surgical duration, excessive tissue handling, intraoperative blood loss, and inadequate postoperative monitoring can adversely affect flap viability. Early detection of vascular compromise through clinical

monitoring methods, including assessment of flap color, temperature, capillary refill, and bleeding characteristics, is essential for timely intervention and salvage of compromised flaps [7].

While systemic conditions such as diabetes mellitus, hypertension, and immunosuppression are well-documented risk factors for flap failure due to their impact on vascular health and wound healing, the present study specifically focuses on patients without such comorbidities. This approach allows for a more precise evaluation of local and procedure-related factors influencing flap outcomes, thereby providing clearer insights into preventable causes of failure.

Understanding the multifactorial etiology of vascularised flap failure is essential for improving surgical outcomes, minimizing complications, and enhancing patient prognosis. Hence, this study aims to comprehensively evaluate the various technical, biological, and perioperative factors contributing to flap failure in maxillofacial reconstruction.

AIM

To evaluate the factors contributing to vascularised flap failure in maxillofacial reconstruction.

OBJECTIVES

- To identify common causes of flap failure
- To assess the role of surgical technique in flap survival
- To evaluate the impact of infection on flap viability.
- To analyze perioperative factors influencing outcomes.

MATERIALS AND METHODS

This retrospective study was conducted using patient records from the Digital Information Archiving System (DIAS) between 10th January 2023 and 10th June 2023.

Inclusion Criteria

- Patients undergoing radial and fibular flap reconstruction
- Age group: 25–70 years.

Exclusion Criteria

- Patients with diabetes
- Patients with hypertension
- Immunocompromised patients
- Patients with systemic comorbidities.

Data Collection

- Type of flap used
- Surgical complications
- Presence of infection
- Flap survival or failure.

RESULTS AND DISCUSSION

The retrospective analysis revealed multiple contributing factors to vascularised flap failure. Technical errors during anastomosis were the most common cause, followed by infection and vascular compromise.

Table 1: Distribution of Flap Types

Flap Type	Number of Cases	Percentage (%)
Radial Flap	60	60%
Fibular Flap	40	40%
Total	100	100%

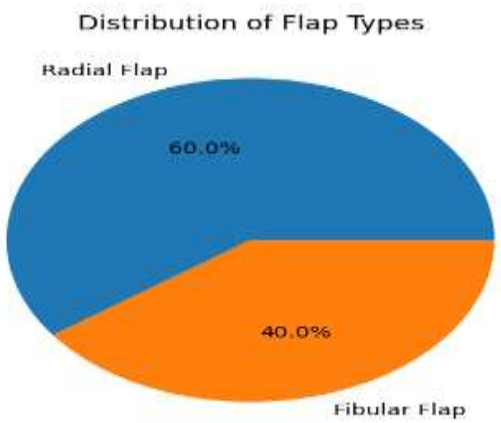
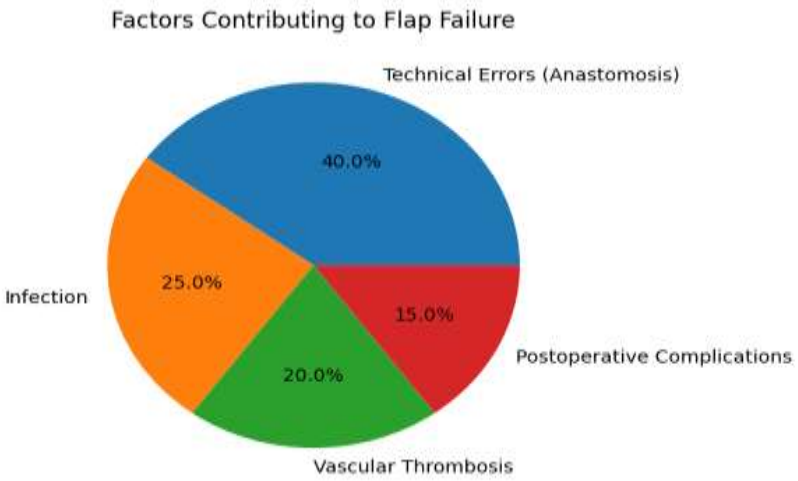


Table 2: Factors Contributing to Flap Failure

Factor	Number of Cases	Percentage (%)
Technical Errors (Anastomosis)	8	40%
Infection	5	25%
Vascular Thrombosis	4	20%
Postoperative Complications	3	15%
Total Failures	20	100%



DISCUSSION

- The study findings highlight that technical errors during microvascular anastomosis are the leading cause of flap failure. Improper suturing, vessel kinking, or inadequate blood flow can result in thrombosis and ischemia [8].
- Vascular thrombosis remains a critical determinant of flap survival. Both arterial and venous thrombosis can lead to rapid flap necrosis if not detected early [9].
- Infection was identified as the second most common factor. Surgical site infections can impair healing and compromise vascular integrity, leading to flap failure [10].
- Even in the absence of systemic diseases, local factors such as tissue handling, surgical time, and postoperative care significantly influence outcomes [11].
- Radial flaps demonstrated slightly higher usage due to their ease of harvest and reliability, while fibular flaps were primarily used for bony reconstruction [12].
- The study emphasizes that early postoperative monitoring, including flap color, temperature, and capillary refill, is essential for timely intervention [13].

CONCLUSION

- Vascularised flap failure in maxillofacial reconstruction is primarily influenced by technical errors, vascular compromise, and infection.
- Meticulous surgical technique, strict infection control, and vigilant postoperative monitoring are crucial in minimizing flap failure.
- Early detection and intervention significantly improve flap survival rates. Future studies should focus on advanced monitoring techniques and improving surgical protocols to enhance outcomes.

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