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MANAGEMENT OF EARLY SCALP ISCHEMIA AND NECROSIS AFTER HAIR TRANSPLANT: A PRACTICAL FLOW-BASED PROTOCOL (CASE REPORT)

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ABSTRACT

Scalp ischemia and necrosis are rare but clinically significant complications following hair transplantation, with a reported incidence of 0.1–1%. ^{1, 2} These complications may lead to graft loss, delayed healing, and permanent scarring if not recognized early. Current management strategies are often summarized using mnemonic-based approaches such as LAW(N) (Lidocaine, Aspirin, Warm compress, Nitroglycerin), which lack a structured, cause-oriented framework. ^{2, 3}

We present a case of early scalp ischemia successfully managed using a structured FLOW protocol, emphasizing Fixing the cause, Local vasodilation, Optimization of oxygenation, and Wound care. Early intervention resulted in complete recovery without progression to necrosis.

This case highlights the importance of early diagnosis and a systematic approach to management, providing a practical and reproducible strategy for clinicians.

INTRODUCTION

Hair transplantation is a widely performed aesthetic procedure with a high safety profile and predictable outcomes. However, rare complications such as scalp ischemia and necrosis can significantly impact patient satisfaction and surgical success. ¹⁻³

These complications are typically associated with excessive graft density, use of vasoconstrictive agents, prolonged surgical time, and compromised vascularity. ^{2,4} Early recognition is critical, as delayed intervention may lead to irreversible tissue damage and poor cosmetic outcomes. ³

Although various supportive measures have been described, there is a lack of structured, cause-oriented management protocols. This case report presents a practical approach using the FLOW model.

Case Report

A 34-year-old male underwent follicular unit extraction with high-density implantation in the frontal scalp. The procedure was uneventful.

On postoperative day 1, the patient reported severe localized pain in the recipient area, associated with visible blanching and delayed capillary refill. Clinical suspicion of early scalp ischemia was made.

Immediate intervention was initiated:

Reduction of local tissue pressure

Avoidance of further vasoconstrictive agents

Application of topical nitroglycerin paste every 2 hours

Oral aspirin 75 mg daily

Pentoxifylline 400 mg three times daily

Gentle warm compresses under supervision

Within 48 hours, improvement in color and capillary refill was noted. By day 5, the affected area showed significant recovery with no progression to necrosis.

At 2-week follow-up, healing was satisfactory with minimal graft loss and acceptable cosmetic outcome

DISCUSSION

Scalp ischemia following hair transplantation is a multifactorial complication involving both mechanical and vascular factors. Excessive graft density, increased tissue pressure, and vasoconstriction contribute to compromised microcirculation, leading to tissue hypoxia and potential necrosis.²⁻⁴

Traditional mnemonic-based approaches such as LAW(N) primarily focus on improving local perfusion but do not adequately address the underlying cause of ischemia.³ This limitation may reduce their effectiveness when used as standalone strategies.

The FLOW protocol represents a more comprehensive and pathophysiology-driven approach. By emphasizing early correction of causative factors—such as reducing mechanical pressure and discontinuing vasoconstrictive influences—alongside restoration of microcirculation, it provides a more effective strategy for tissue salvage.

Topical nitroglycerin plays a key role by promoting vasodilation and improving local blood flow.^{5,6} Pentoxifylline enhances microcirculation by improving red blood cell deformability and reducing blood viscosity.⁷ These interventions, combined with supportive measures such as hydration and controlled warmth, contribute to improved tissue oxygenation.

Adjunctive therapies such as platelet-rich plasma and hyperbaric oxygen have been suggested in literature to further enhance tissue recovery, although high-level evidence remains limited.^{8,9}

Importantly, early diagnosis remains the most critical determinant of outcome. Delayed recognition significantly increases the risk of irreversible tissue damage, leading to graft loss and poor cosmetic results.^{3,4}

This case demonstrates that timely intervention using a structured and cause-oriented protocol can effectively reverse early ischemic changes and prevent progression to necrosis. The FLOW model offers a practical and reproducible framework that may improve clinical outcomes in routine practice.

CONCLUSION

Scalp ischemia following hair transplantation, although rare, requires prompt recognition and effective management. Mnemonic-based approaches such as LAW(N) are useful but insufficient as standalone protocols.

The FLOW model provides a structured, practical, and clinically effective approach by integrating cause correction with perfusion optimization. Early intervention remains the cornerstone of successful management and prevention of necrosis.

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