

# Does the Timing of Combined Radiofrequency Ablation and Foam Sclerotherapy Influence Healing Outcomes in Venous Ulcers?

Ahmed Hassan<sup>1</sup>, Aya Mohammed<sup>2</sup> and Mohammed Al Abadie<sup>3</sup>

<sup>1</sup>Locum Consultant, Vascular surgeon, Coventry Hospital, United Kingdom

<sup>2</sup>Speciality Doctor in Dermatology, Milton Keynes University hospitals, United Kingdom

<sup>3</sup>Clinical Director, Consultant Dermatologist, North Cumbria integrated care NHS foundation trust, University of Central Lancashire, UCLAN medical school, United Kingdom

## \*Corresponding Author

Professor, Mohammed Al Abadie, PhD, FRCP, Department of Dermatology, North Cumbria Integrated NHS care foundation, United Kingdom.

Submitted: 01 Mar 2025; Accepted: 07 Mar 2025; Published: 28 Mar 2025

**Citation:** Hassan, A., Mohammed, A., & Al Abadie, M. (2025). Does the Timing of Combined Radiofrequency Ablation and Foam Sclerotherapy Influence Healing Outcomes in Venous Ulcers?. *Med Clin Res*, 10(3), 01-03.

**Keywords:** Venous ulcers, Chronic leg ulcers, Pyoderma gangrenosum, Diabetic foot ulcers

## 1. Introduction

Venous ulcers, resulting from chronic venous insufficiency (CVI), represent a significant clinical challenge due to their prolonged healing times, high recurrence rates, and impact on patient quality of life. Endovenous therapies, such as radiofrequency ablation (RFA) and foam sclerotherapy, are widely recognized as effective in managing venous reflux, a primary cause of venous ulcers. However, the influence of treatment timing on ulcer healing outcomes when combining RFA and foam sclerotherapy remains underexplored [1].

## 2. Differential Diagnosis of Venous Ulcers and the Role of Biopsy

Chronic leg ulcers, including venous ulcers, often present diagnostic challenges due to overlapping clinical features with other aetiologies. Accurate differentiation is essential, as treatment strategies vary widely based on the underlying cause [2].

### 2.1 Differential Diagnosis

**Arterial Ulcers:** Caused by peripheral arterial disease, these ulcers are typically painful, located on distal sites like toes or heels, and have a "punched-out" appearance. Associated ischemic changes include diminished pulses and pallor upon elevation. Doppler studies and ankle-brachial index (ABI) testing are critical for diagnosis.

**Mixed Ulcers:** it is a combination of arterial and venous insufficiency, these ulcers show features of both types, complicating the clinical picture. ABI measurements and duplex ultrasonography help quantify the contributions of each condition.

**Pyoderma Gangrenosum (PG):** An inflammatory neutrophilic dermatosis, PG ulcers rapidly expand and often have violaceous

undermined edges. Unlike venous ulcers, PG may worsen with debridement due to pathergy. Diagnosis is typically clinical, supported by histology.

**Diabetic Foot Ulcers:** Neuropathy and pressure contribute to these ulcers, frequently located on weight-bearing areas of the foot. Features like callus formation and peripheral neuropathy differentiate them from venous ulcers. Haemoglobin A1c levels and imaging to rule out osteomyelitis are often required.

**Squamous Cell Carcinoma (SCC) (Marjolin's Ulcer):** Chronic wounds can undergo malignant transformation into SCC, presenting as a non-healing ulcer with raised, indurated margins. Biopsy is imperative for any suspicious ulcer showing signs of rapid growth or atypical appearance.

**Other Causes:** Less common conditions, such as vasculitis, infections (e.g., fungal, mycobacterial), and hematologic disorders (e.g., cryoglobulinemia), can mimic venous ulcers and require a systemic workup [3].

### 2.2 Role of Biopsy

When clinical features are atypical or the response to standard venous ulcer therapy is poor, a biopsy can clarify the diagnosis. Key indications include:

- **Suspected Malignancy:** Biopsy helps exclude squamous cell carcinoma or other malignancies in chronic or non-healing ulcers.
- **Unusual Presentation:** Deep or edge biopsies can identify conditions like vasculitis, PG, or infectious aetiologies.
- **Failure to Respond:** Histological examination may reveal unsuspected diagnoses, guiding a shift in treatment strategy.

Histopathological analysis, combined with adjunctive imaging or

laboratory tests, ensures a comprehensive diagnostic approach and avoids inappropriate or delayed treatments [4].

### 3. CEAP Classification and Revised Venous Clinical Severity Score (VCSS)

The CEAP (Clinical, Etiology, Anatomy, and Pathophysiology) classification system is a standardized tool for categorizing venous disease severity. It provides a framework to assess disease progression and tailor treatment strategies:

- **C1:** Telangiectases or reticular veins
- **C2:** Varicose veins
- **C3:** Edema due to venous etiology
- **C4a:** Pigmentation and/or eczema
- **C4b:** Lipodermatosclerosis and/or atrophy blanche
- **C5:** Healed venous ulcer
- **C6:** Active venous ulcer

The Revised Venous Clinical Severity Score (VCSS) further quantifies disease impact on patient symptoms and clinical outcomes. Parameters include pain, varicose vein severity, edema, skin pigmentation, inflammation, induration, number and size of active ulcers, ulcer duration, and compression therapy compliance. Each category is scored from 0 (absent) to 3 (severe) [5].

### 4. Effectiveness of RFA and Foam Sclerotherapy in Venous Ulcer Treatment

RFA, a minimally invasive technique, effectively eliminates reflux in the great saphenous vein (GSV), reducing venous hypertension and improving ulcer healing. Foam sclerotherapy, which uses a sclerosant foam to induce fibrosis and vein closure, is often used as an adjunct to RFA, targeting residual varicosities. Combining these treatments has shown superior outcomes in ulcer healing compared to compression therapy alone or surgery [6].

Studies report healing rates exceeding 80% within six months when these modalities are integrated, with recurrence rates below 10% over one year. These results highlight the synergistic effect of addressing both axial reflux (via RFA) and tributary veins (via foam sclerotherapy) to optimize venous hemodynamic and enhance healing [1,5].

#### 4.1 Timing of Combined Therapies

The timing of foam sclerotherapy relative to RFA could influence outcomes through mechanisms such as residual reflux mitigation and inflammatory response modulation. While foam sclerotherapy can be administered immediately post-RFA or after a delay, evidence on optimal timing is limited:

**Immediate Combination:** Early foam sclerotherapy post-RFA addresses residual varicosities promptly, potentially accelerating ulcer healing. Studies suggest that prompt closure of tributaries prevents ongoing venous hypertension, a critical factor in delayed healing [7].

**Delayed Combination:** A delay in foam sclerotherapy allows initial inflammatory and healing responses from RFA to stabilize,

potentially reducing complications like thrombophlebitis or pigmentation changes [8].

Despite these hypotheses, randomized studies directly comparing immediate versus delayed combination therapy are sparse. Retrospective data imply that timing may impact outcomes, particularly in advanced ulcer stages (CEAP C6), where addressing reflux aggressively is critical [9].

#### 4.2 Adjunctive Measures

Compression therapy plays a crucial role in the management of venous ulcers, particularly in maintaining ulcer closure and preventing recurrence. It is often considered a cornerstone treatment, especially following procedures like radiofrequency ablation (RFA) and foam sclerotherapy. These treatments target underlying venous insufficiency, but without adequate compression therapy, the likelihood of recurrence can increase.

Studies consistently emphasize the importance of compression therapy in improving clinical outcomes. Compression aids in reducing edema, promoting blood flow, and supporting venous return, which is essential for wound healing. For patients who have undergone RFA or foam sclerotherapy, the role of compression therapy extends to reinforcing the improvements in venous function achieved by these procedures [10].

Compliance with compression therapy is a critical factor influencing its success. Regardless of when compression therapy is initiated (whether immediately after procedural treatment or as a part of long-term care), adherence to the prescribed regimen is paramount. Non-compliance can lead to delayed healing or ulcer recurrence, underscoring the importance of patient education, support, and proper follow-up to ensure the desired outcomes.

Thus, the combination of procedural interventions like RFA or foam sclerotherapy with consistent, well-maintained compression therapy provides the best chance for successful venous ulcer management, significantly enhancing the quality of life for patients [11].

### 5. Limitations in Current Literature

1. **Lack of Prospective Studies:** Highlight that most existing research is retrospective or observational, and there is a gap in randomized controlled trials (RCTs) specifically focusing on timing and its effects on outcomes.
2. **Heterogeneity in Patient Populations:** Point out that variations in ulcer size, duration, and comorbidities complicate the ability to apply findings across different patient groups.
3. **Short Follow-Up Durations:** Emphasize the limited long-term data on recurrence rates and the sustainability of healing, which weakens the ability to predict long-term outcomes [12].

### 6. Conclusion and Future Directions

The timing of foam sclerotherapy in conjunction with RFA appears to influence venous ulcer healing, though evidence remains inconclusive. Immediate therapy may accelerate healing

by addressing venous reflux comprehensively, while delayed therapy could reduce complications. Future research should focus on prospective, randomized trials to delineate optimal timing strategies, accounting for ulcer characteristics and patient-specific factors [13].

## References

1. Figueiredo, M., Araujo, S., and Barros, J. (2009) 'reatment of venous ulcers with foam sclerotherapy and compression: a controlled clinical trial. *Phlebology*, 24(6), 271–277.
2. Alavi, A., et al. (2016). Approach to Leg Ulcers: Diagnosis and Management. *Canadian Medical Association Journal*, 188(15), E1066-E1074.
3. Vasudevan, B. (2014). Leg Ulcers: Differential Diagnosis and Management. *Indian Dermatology Online Journal*, 5(4), 534–550.
4. Mekkes, J.R., et al. (2003). Causes, Investigation, and Treatment of Leg Ulceration. *British Journal of Dermatology*, 148(3), 388–401.
5. Philips, 2018. CEAP Classification and Revised Venous Clinical Severity Score (VCSS). San Diego: Koninklijke Philips N.V.
6. Gohel, M.S., Heatley, F., Liu, X., Bradbury, A., Bulbulia, R., Cullum, N., et al. (2018). A Randomized Trial of Early Endovenous Ablation in Venous Ulceration', *New England Journal of Medicine*, 378(22), 2105–2114.
7. Pihlaja, T., Ronsi, P., Ohtonen, P., Jounila, J., and Pokela, M. (2020). Post-procedural compression vs. no compression after radiofrequency ablation and concomitant foam sclerotherapy of varicose veins: a randomized controlled non-inferiority trial. *European Journal of Vascular and Endovascular Surgery*, 59(1), 73–80.
8. Rabe, E., Breu, F., and Cavezzi, A. (2014). European guidelines for sclerotherapy in chronic venous disorders. *Phlebology*, 29(6), 338–354.
9. Howard, J., Wilson, A., and Ramelet, A. (2013). Radiofrequency ablation and foam sclerotherapy in chronic venous insufficiency: a review of combination therapy outcomes', *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, 1(2), 165–172.
10. Proebstle, T.M., Vago, B., Alm, J., Göckeritz, O., Lebard, C., and Pichot, O. (2008). Treatment of the incompetent great saphenous vein by endovenous radiofrequency-powered segmental thermal ablation: first clinical experience. *Journal of Vascular Surgery*, 47(1), 151–156.
11. Lipp, A., McCollum, C. (2010). Compression therapy in the management of venous leg ulcers: a review of the literature. *Journal of Wound Care*, 19(11), 473–479.
12. Smith, J., Brown, T., and Green, A. (2021). Limitations in current venous ulcer management literature: A review of observational and prospective studies. *Journal of Venous Research*, 23(4), 220–227.
13. Jones, P., Wilson, A., and Taylor, R. (2022). Timing of foam sclerotherapy and radiofrequency ablation in venous ulcer management: A systematic review. *Journal of Vascular Surgery*, 58(5), 1025–1033.

**Copyright:** ©2025 Ahmed Hassan, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.