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Angiology: Open Access

Perspective

A Detailed Meta-Analysis of Surgical versus Non-Surgical Approaches in Chronic Venous Disease

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DESCRIPTION

Compression stockings are widely considered the cornerstone of non-surgical management for chronic venous insufficiency. The use of graduated compression helps to reduce venous pressure and enhance blood flow back to the heart. The biological mechanism behind compression therapy involves the reduction of venous stasis, enhancement of the calf muscle pump function and prevention of further venous dilation. Meta-analytic studies consistently show that compression therapy significantly reduces swelling, pain and the incidence of venous ulcers. The use of compression stockings has been shown to improve the quality of life for patients with mild to moderate CVD and is often recommended as a first-line treatment, especially in cases where surgery is not immediately indicated.

Sclerotherapy is a minimally invasive procedure that involves injecting a sclerosing agent into the affected veins, causing them to collapse and eventually be absorbed by the body. The biological action of sclerotherapy is based on the chemical irritation of the vein lining, leading to endothelial cell damage and fibrosis. This results in the obliteration of the targeted veins, reducing the symptoms of venous reflux and improving the appearance of varicose veins. Studies included in the meta-analysis demonstrate that sclerotherapy effectively reduces the diameter of varicose veins, improves symptoms and enhances cosmetic outcomes. However, sclerotherapy is typically most effective for smaller varicose veins and may not address more severe forms of venous reflux or underlying valve incompetence.

Endovenous Laser Therapy (EVLT) and Radiofrequency Ablation (RFA) are percutaneous, minimally invasive procedures that involve the thermal destruction of the incompetent saphenous vein. Both procedures use heat to induce endothelial damage, leading to vein closure and eventual absorption. These therapies have rapidly gained popularity due to their relatively low complication rates, short recovery times and effective outcomes. In the meta-analysis, EVLT and RFA were found to be highly effective in treating patients with moderate-to-severe CVD, resulting in significant improvements in venous reflux and symptom relief. The biological rationale for their success lies in the thermal denaturation of the vein wall proteins, leading to the collapse of the vein lumen and improved venous return. These procedures have been shown to be effective in achieving long-term symptom relief and reducing the need for more invasive surgical options.

Surgical interventions for chronic venous disease are typically considered when non-surgical treatments fail to provide sufficient relief or when more severe anatomical changes are present. Surgical options include vein stripping, valvular surgery and, in rare cases, venous bypass procedures.Vein stripping, which involves the complete removal of the incompetent saphenous vein, was historically the gold standard for treating chronic venous disease. The procedure involves making small incisions to access and remove the vein, typically performed under general or regional anesthesia. While vein stripping is highly effective in eliminating the source of venous reflux, it has been associated with a higher risk of complications, including hematoma, wound infection, nerve injury and Deep Vein Thrombosis (DVT). The biological rationale behind vein stripping is the physical removal of the refluxing vein, which prevents blood from pooling in the lower extremities and improves circulation.Recent studies included in the meta-analysis show that while vein stripping remains an effective option for more advanced CVD, it is being increasingly replaced by less invasive techniques, such as EVLT and RFA, due to their superior safety profiles and faster recovery times. However, vein stripping may still be necessary in cases with extensive varicosities or when other treatments fail.

In patients with severe venous insufficiency, especially those with extensive venous reflux and damage to the venous valves, valve repair or venous bypass surgery may be indicated. Valve repair involves reconstructing the damaged venous valves to restore proper blood flow, while venous bypass reroutes blood around the affected veins using a graft. These procedures are more complex and are generally reserved for patients with significant venous reflux or chronic ulcers that do not respond to less invasive treatments. The biological mechanism behind these

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Received: 19-Nov -2025, Manuscript No. AOA-25-40123; **Editor assigned:** 21-Nov-2025, PreQC No. AOA-25-40123 (PQ); **Reviewed:** 05-Dec-2025, QC No. AOA-25-40123; **Revised: 12-Dec -2025, Manuscript No.** AOA-25-40123 **(R); Published: 19-Dec -2025.** DOI: 10.35841/2329-9495.25.13.593

Citation: Martinez S (2025). A Detailed Meta-Analysis of Surgical versus Non-Surgical Approaches in Chronic Venous Disease. Angiol Open Access. 13. 593.

interventions is the restoration of normal venous flow, preventing the pathological reflux that leads to venous stasis and ulceration.

While highly effective, these surgeries carry higher risks of complications and longer recovery times compared to minimally invasive techniques.The meta-analysis comparing surgical and non-surgical interventions for chronic venous disease demonstrated that minimally invasive treatments, such as EVLT, RFA and sclerotherapy, are generally as effective as, or even superior to, traditional surgical interventions like vein stripping in terms of recovery time, complication rates and patient satisfaction. These non-surgical techniques provide significant symptom relief and are associated with fewer complications, making them the preferred treatment option for many patients.

CONCLUSION

Both surgical and non-surgical interventions have a role in the management of chronic venous disease, with each modality offering distinct advantages depending on the severity of the condition. The biological mechanisms behind these treatments reflect the underlying pathophysiology of venous insufficiency, ranging from thermal injury to vein walls to mechanical removal of refluxing veins. Minimally invasive treatments like EVLT and RFA are highly effective for most patients and have been shown to achieve long-term symptom relief with minimal risk.