

Endovenous laser therapy for treatment of varicose veins, a Systematic Review

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Abstract: Varicose veins are a common vascular condition, particularly affecting the lower limbs, characterized by dilated veins that can cause pain, swelling, and, in severe cases, skin changes and ulcers. This systematic review assesses the efficacy and safety of treatments for varicose veins, including ambulatory phlebectomy, foam sclerotherapy, endovenous laser therapy (EVLT), and transilluminated powered phlebectomy (TIPP). In Brazil's public health system (SUS), phlebectomy is the most common treatment due to its cost-effectiveness.

A thorough search of peer-reviewed literature identified 10 studies, including randomised controlled trials (RCTs), systematic reviews, and meta-analyses, that evaluated treatment outcomes in adult patients. Ambulatory phlebectomy was found to be an effective treatment with high patient satisfaction and low recurrence rates. Foam sclerotherapy, a less invasive option, showed a higher recurrence rate compared to phlebectomy. EVLT combined with phlebectomy significantly reduced recurrence rates compared to EVLT alone, showing better long-term outcomes. TIPP, while effective in treating superficial varicosities, was associated with a higher complication rate, particularly hematoma formation.

The review highlights that treatment selection should be personalized, considering factors like disease severity, patient preferences, and risk profiles. Ambulatory phlebectomy and EVLT, especially when combined, provide strong results with lower recurrence, while foam sclerotherapy may be more suitable for patients preferring a less invasive option, despite a higher risk of recurrence. TIPP, although effective, presents more risks, necessitating careful patient selection.

Overall, this review underscores the importance of individualized treatment plans for varicose veins, balancing the benefits and risks of each intervention. Further research is recommended to compare long-term outcomes across newer and established treatments, particularly TIPP and combined EVLT and phlebectomy approaches.

Keywords. varicose veins, ambulatory phlebectomy, foam sclerotherapy, endovenous laser therapy, and transilluminated powered phlebectomy.

1. Introduction

Varicose veins are a common vascular condition characterised by dilated, tortuous veins, predominantly affecting the lower limbs. They can lead to symptoms such as pain, swelling, and, in severe cases, skin changes and ulcers. Various treatment modalities have been developed to address this condition, ranging from conservative management to invasive surgical procedures.

This pathology has been common on patients with severe obesity and

predominantly women. Furthermore, has classification 0 to VI. Where 0 does not have any clinical signals and VI has skin alterations, like dermatitis, and active ulcers. Although a large classification, just from III has suggestions to operate this patient.

In Brazil, with a large ethnic and social population Endovenous laser therapy is an expensive operation to do. Due to these circumstances the most usual surgery to treat varicose veins on SUS (Unique health System) is phlebectomy.

This systematic review aims to evaluate the efficacy and safety of different treatment options for varicose veins, including ambulatory phlebectomy, foam sclerotherapy, and endovenous laser therapy, among others.

2. Methodology

A comprehensive search of relevant databases was conducted to identify studies assessing treatments for varicose veins. The search terms included "varicose veins," "ambulatory phlebectomy," "foam sclerotherapy," "endovenous laser therapy," and "transilluminated powered phlebectomy." Only studies published in English and peer-reviewed journals were considered.

The inclusion criteria for this review encompassed randomised controlled trials (RCTs), systematic reviews, and meta-analyses. Studies that evaluated treatment outcomes in adult patients with varicose veins were selected, with interventions including ambulatory phlebectomy, foam sclerotherapy, transilluminated powered phlebectomy, and endovenous laser therapy.

Data extraction focused on the study design, sample size, intervention details, measured outcomes, and reported complications.

3. Results

A total of 10 studies were included in the review, comprising randomised controlled trials, systematic reviews, and meta-analyses. These studies varied in terms of sample size, intervention type, and follow-up duration.

3.1 Efficacy of Interventions:

Ambulatory Phlebectomy: Roos and Neumann (1998) and Roos, Nieman, and Neumann (2003) demonstrated that ambulatory phlebectomy is an effective treatment for varicose veins, particularly in

cases involving the foot. The studies reported high patient satisfaction and low recurrence rates. The technique was shown to be superior to compression sclerotherapy in a randomized controlled trial, with better cosmetic outcomes and fewer complications.

Foam Sclerotherapy: Belramman et al. (2019) compared foam sclerotherapy to ambulatory phlebectomy for the treatment of varicose vein tributaries. The study protocol suggested that foam sclerotherapy is less invasive but may be associated with a higher recurrence rate compared to phlebectomy. However, the study is ongoing, and definitive conclusions are yet to be drawn.

Endovenous Laser Therapy (EVLT): Carradice et al. (2009) conducted a randomized clinical trial comparing concomitant or sequential phlebectomy after EVLT. The results indicated that EVLT combined with phlebectomy significantly reduced the recurrence of varicose veins compared to EVLT alone. This combination approach was associated with better long-term outcomes.

Transilluminated Powered Phlebectomy (TIPP): Luebke and Brunkwall (2008) and Lin et al. (2016) assessed the effectiveness of TIPP. The meta-analysis by Luebke and Brunkwall showed that TIPP is effective in treating superficial varicosities with a low complication rate. However, Lin et al. highlighted that TIPP is associated with a higher incidence of hematoma formation compared to traditional techniques.

Overall, the treatments reviewed were associated with low complication rates. However, certain techniques, such as TIPP, were noted to have specific risks, such as hematoma formation. Foam sclerotherapy, while less invasive, had a

higher risk of recurrence compared to surgical options.

4. Discussion

This systematic review highlights the efficacy and safety of various treatments for varicose veins. Ambulatory phlebectomy and EVLT, especially when combined, offer robust outcomes with low recurrence rates. TIPP presents a viable option but may carry a higher risk of complications. Foam sclerotherapy is effective but may be best suited for patients seeking a less invasive option despite the potential for higher recurrence.

Clinical Implications: The findings suggest that treatment choice should be individualized based on patient preferences, the severity of varicose veins, and the risk profile of each intervention. While surgical options like phlebectomy and EVLT offer long-term benefits, less invasive treatments like foam sclerotherapy remain important alternatives, particularly for patients with contraindications to surgery.

Limitations: The review is limited by the heterogeneity of the included studies, particularly in terms of follow-up duration and outcome measures. Additionally, some studies had small sample sizes, which may affect the generalizability of the results.

Future Research: Further research is needed to directly compare the long-term outcomes of different treatment modalities, particularly between newer techniques like TIPP and established methods such as phlebectomy and EVLT.

5. Conclusion

Ambulatory phlebectomy and endovenous laser therapy are effective treatments for varicose veins, offering low recurrence rates and high patient satisfaction. While

foam sclerotherapy provides a less invasive option, it may be associated with higher recurrence. Transilluminated powered phlebectomy, though effective, requires careful consideration due to its higher complication rates. Clinicians should tailor treatment choices to individual patient needs, balancing efficacy, safety, and patient preferences.

6. References

- Leopardi, D., Hoggan, B., Fitridge, R., Woodruff, P., & Maddern, G. (2009). Systematic review of treatments for varicose veins. *Annals of vascular surgery*, 23(2), 264-276.
- Agarwal, P., Reza, A., Desai, D., & Vardey, M. (2021). Varicose veins: a clinical profile. *International Surgery Journal*. <https://doi.org/10.18203/2349-2902.isj20215149>.
- Bentes, L., Lemos, R., Santos, D., & Reis, J. (2022). Epidemiological profile of surgical treatment of varicose veins in Brazil from 2010 to 2020. *Jornal Vascular Brasileiro*, 21. <https://doi.org/10.1590/1677-5449.202102021>.
- Richards, T., Anwar, M., Beshr, M., Davies, A., & Onida, S. (2020). Ambulatory Selective Variceal Ablation under Local anaesthetic (ASVAL) technique for the treatment of symptomatic varicose veins - a systematic review. *Journal of vascular surgery. Venous and lymphatic disorders*.
- Luebke, T., & Brunkwall, J. (2008). Meta-analysis of transilluminated powered phlebectomy for superficial varicosities. *The Journal of cardiovascular surgery*, 49(6), 757-764.
- Roos, K., & Neumann, H. (1998). Muller's Ambulatory Phlebectomy for

Varicose Veins of the Foot. *Dermatologic Surgery*, 24, 465–470.

- Carradice, D., Mekako, A., Hatfield, J., & Chetter, I. (2009). Randomized clinical trial of concomitant or sequential phlebectomy after endovenous laser therapy for varicose veins. *British Journal of Surgery*, 96.
- Belramman, A., Bootun, R., Lane, T., & Davies, A. (2019). Foam sclerotherapy versus ambulatory phlebectomy for the treatment of varicose vein tributaries: study protocol for a randomised controlled trial. *Trials*, 20.
- Roos, K., Nieman, F., & Neumann, H. (2003). Ambulatory Phlebectomy Versus Compression Sclerotherapy: Results of a Randomized Controlled Trial. *Dermatologic Surgery*, 29, 221–226.
- Sadick, N. (2005). Advances in the treatment of varicose veins: ambulatory phlebectomy, foam sclerotherapy, endovascular laser, and radiofrequency closure. *Dermatologic clinics*, 23(3), 443-455, vi.
- Hager, E., Ozvath, K., & Dillavou, E. (2017). Evidence summary of combined saphenous ablation and treatment of varicosities versus staged phlebectomy. *Journal of vascular surgery. Venous and lymphatic disorders*, 5(1), 134-137.
- Lin, P., Matos, J., Chen, A., Kim, W., Poi, M., Jiang, J., & Bechara, C. (2016). Treatment Outcomes and Lessons Learned From Transilluminated Powered Phlebectomy for Varicose Veins in 1034 Patients. *Vascular and Endovascular Surgery*, 50, 277-282.