

“A COMPARATIVE STUDY BETWEEN SCLEROTHERAPY AND ENDOVENOUS ABLATION THERAPY IN MANAGEMENT OF VARICOSE VEINS”

Dr.Rudrappa kuligod¹ Dr.Nitin Nangare²

¹Resident, Department of General Surgery, Krishna Institute of Medical Sciences, Karad

² Professor, Department of General Surgery, Krishna Institute of Medical Sciences, Karad

ABSTRACT

Background: Sclerotherapy and endovenous laser ablation (EVLA) have emerged as alternative treatments to surgery for patients with varicose veins, but uncertainty exists regarding their effectiveness in the medium to longer term.

Objectives: To compare the clinical effectiveness, outcome, complications, recurrence and post operative improvement in CEAP classification in patients treated with EVLA and Sclerotherapy .

Methods: This is a prospective study. All patients fulfilling inclusion criteria with varicose veins in Krishna Hospital & Medical Research Centre, Karad will be included in the study

Results: More than 80% of the study population was classified as C2 or C3 venous disease. After 1 and 1/2 year, the anatomic success rate was highest after EVLA , followed by sclerotherapy. The complication rate was low and comparable between treatment groups. All groups showed significant (P < .001) improvement of quality of life and Chronic Venous Insufficiency 72.10% of patients with C2 class showed an improvement of the "C" of the CEAP classification.

Conclusion: Endovenous ablation therapy has shown high improvement with the outcomes such as hospital stay, or post operative complications.It can be concluded that the endovenous ablation therapy is an effective method to cure varicose vein which taken significantly higher time for complication of the wound.Compared to sclerotherapy, and apart from signs and symptoms endovenous ablation therapy is an effective therapy which should be used in the management of varicose veins.

Keywords: Endovenous laser ablation, Sclerotherapy, CEAP classification

Introduction

A disorder known as varicose veins is characterised by elongated, convoluted, and dilated veins in the leg. It is defined by blood flowing backward via this dysfunctional valve. Leg varicosities were first described around 1550 BC, and their correlation with trauma, childbearing age, and "standing too much before monarchs" was established in the 1600s AD. The causes of varicose veins risk factors include women's sex, pregnancy, lengthy periods of standing, and due to phlebitis.

The Trendelenberg surgery, vein stripping, stab avulsion, sclerotherapy, and minimally invasive techniques including radio frequency ablation and endovenous laser therapy are some of the therapeutic options for varicose veins. Based on the cause, varicose veins are divided into primary and secondary forms.

Primary varicose veins result from laxity and valvular dysfunction in the venous wall caused by genetic or developmental abnormalities. Primary varicose veins are the most typical cause for isolated superficial venous insufficiency. Secondary varicose veins develop as a result of valve system malfunction brought on by pelvic tumours, pregnancy, DVT, or other non-traumatic proximal venous blockage. When the valves of the deep and perforating veins are damaged, chronic venous stasis results.

This study was done to compare the results of two treatment modalities, namely foam sclerotherapy and stab avulsion as the treatment for perforator incompetence.

Aims and Objectives

Aim:

To compare the most effective treatment modality for lower limb varicose vein between endovenous ablation and sclerotherapy.

Objectives:

- To compare the outcome in patients treated with endovenous ablation and sclerotherapy
- To compare post operative success, return to work, hospital stay, improvement in HRQoL score in endovenous ablation and sclerotherapy
- To study complications and recurrence
- To study post operative improvement in CEAP classification.

Material and Method

SOURCE OF DATA-

This is a prospective study. All patients fulfilling inclusion criteria with varicose veins in Krishna Hospital & Medical Research Centre, Karad will be included in the study.

METHOD OF SELECTION-

Inclusion Criteria-

- Patients above the age of 18 years ,both male and female.
- Patients with primary SFJ incompetence.

Exclusion Criteria-

- Patients with recurrent varicose veins
- Patients with arterial diseases, haematological disorders, extensive perforator incompetence, significant cardiovascular disease

2. SAMPLE SIZE

3. STUDY DESIGN:

EXAMINATIONS-

- Clinical examination of varicose veins.
- Bidirectional Doppler velocity study.
- Duplex imaging/colour flow imaging.

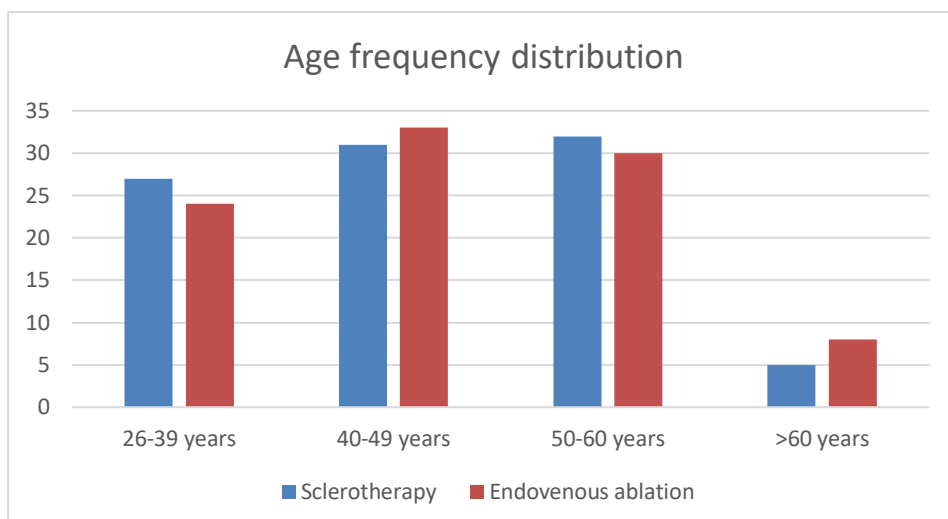
Observations and Results

All the patients fitting the inclusion criteria were included in the study. Total 190 patients were included in the study for the study duration. In both the groups 95 patients each were randomly allocated.

Procedure	Sclerotherapy		Endovenous ablation
Sample size	N=95		N=95

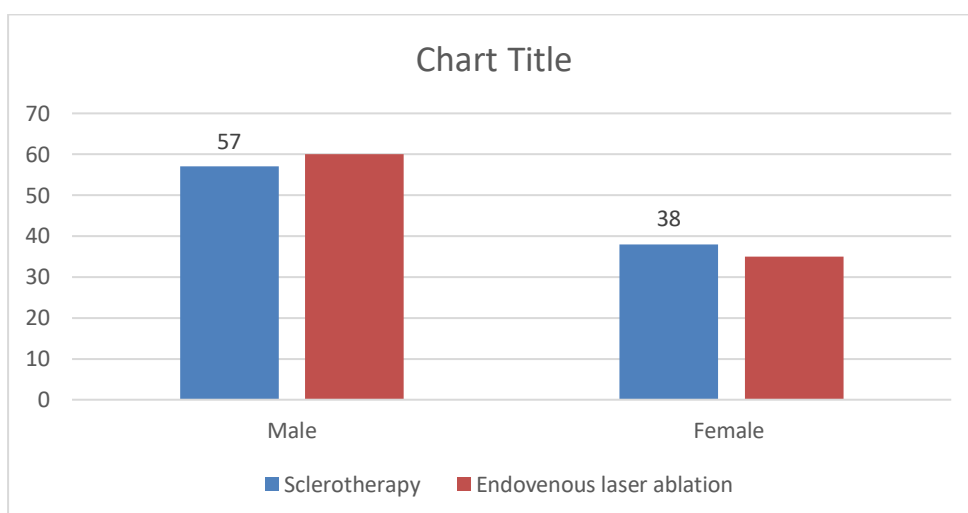
Age distribution:

Age group	Sclerotherapy	Endovenous ablation
26-39 years	27 (28.42%)	24 (25.3%)
40-49 years	31 (32.63%)	33 (34.73%)
50-60 years	32 (33.68%)	30 (31.57%)
>60 years	5 (5.3%)	8 (8.4%)
Total	95	95



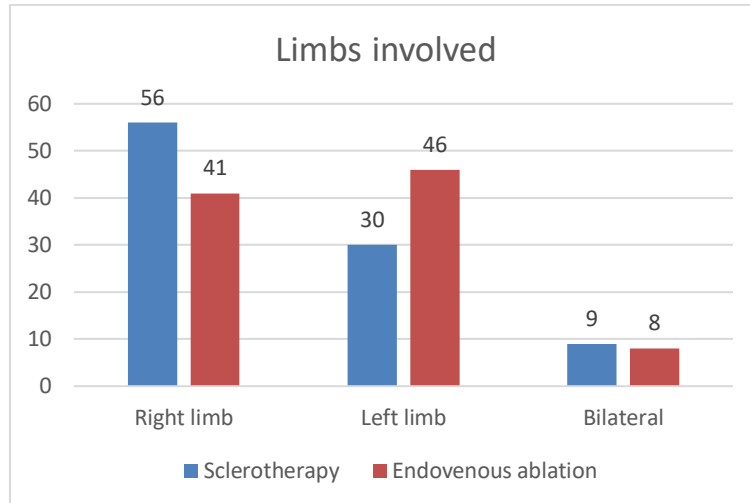
Gender distribution:

Gender	Sclerotherapy	Endovenous ablation	Total
Male	57 (60%)	60 (63.15%)	117 (60.9%)
Female	38 (40%)	35 (36.84%)	73 (39.1%)
Total	95	95	190



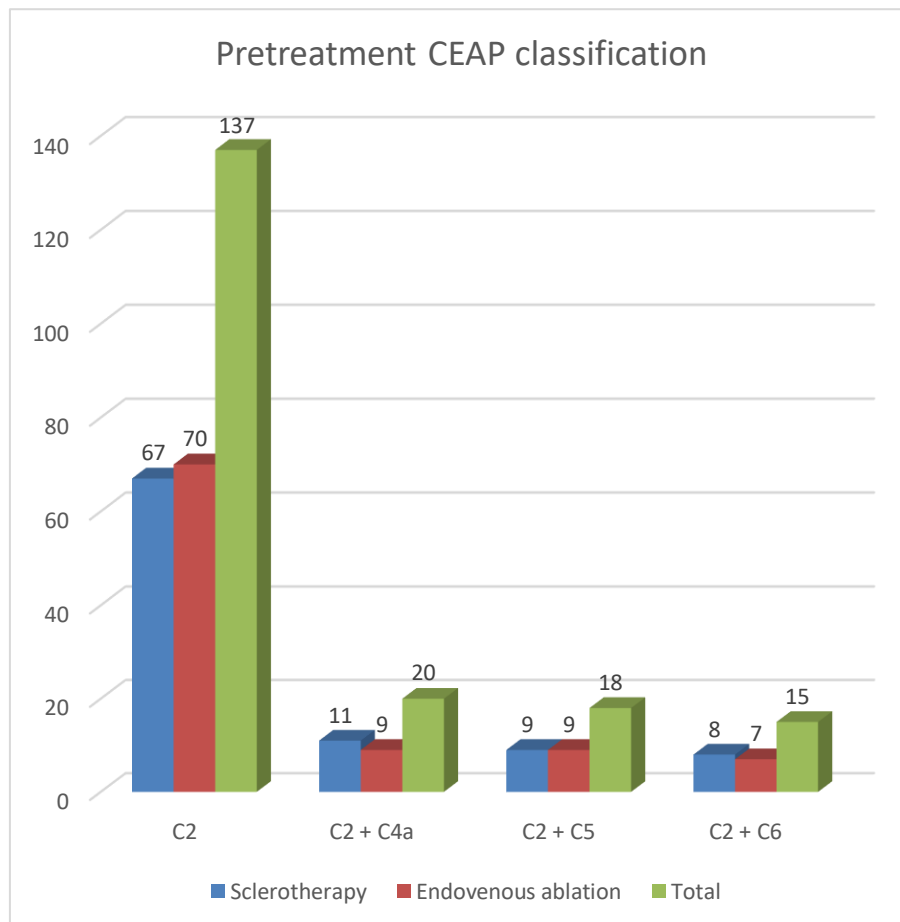
Limbs involved:

Limbs involved	Sclerotherapy	Endovenous ablation
Right	56 (58.9%)	41 (43.15%)
Left	30 (31.57%)	46 (48.42%)
Bilateral	9 (9.5%)	8 (8.4%)
Total	95	95



CEAP classification:

CEAP classification	Sclerotherapy	Endovenous ablation	Total
C2	67 (70.5%)	70 (73.68%)	137 (72.10%)
C2 + C4a	11 (11.57%)	9 (9.5%)	20 (10.52%)
C2 + C5	9 (9.5%)	9 (9.5%)	18 (9.47%)
C2 + C6	8 (8.42%)	7 (7.36%)	15 (7.89%)
Total	95	95	190



C2



C4a

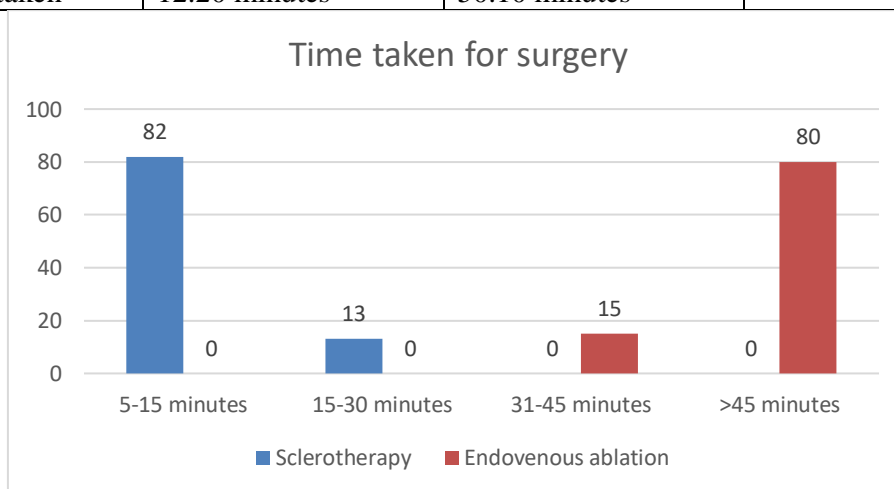






Time taken for surgery:

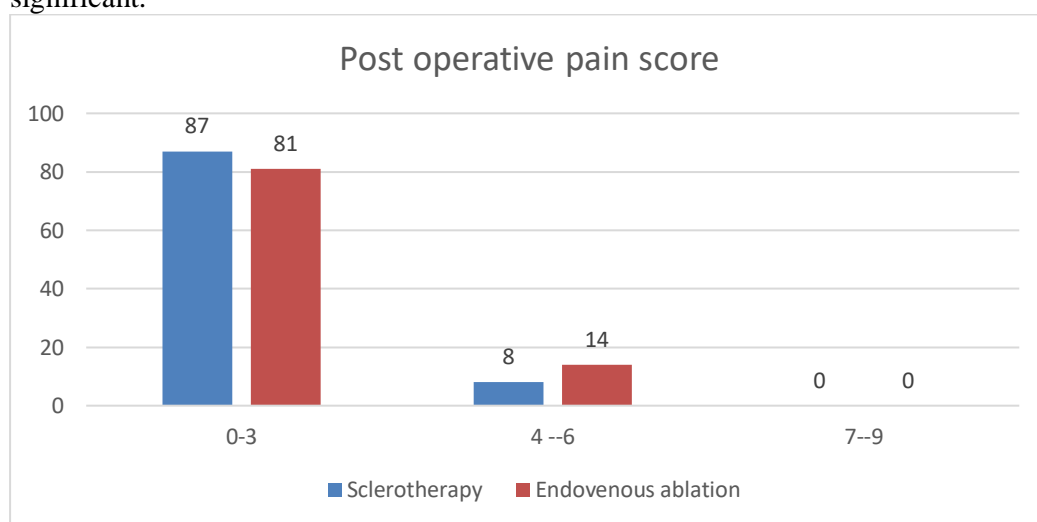
Time taken for the surgery	Sclerotherapy	Endovenous ablation	P value
5-15 minutes	82 (86.31%)	0	<0.05
15-30 minutes	13 (13.91%)	0	
31-45 minutes	0	15 (14)	
>45 minutes	0	80 (86%)	
Mean time taken	12.20 minutes	50.10 minutes	



Post operative pain according to visual analogue score:

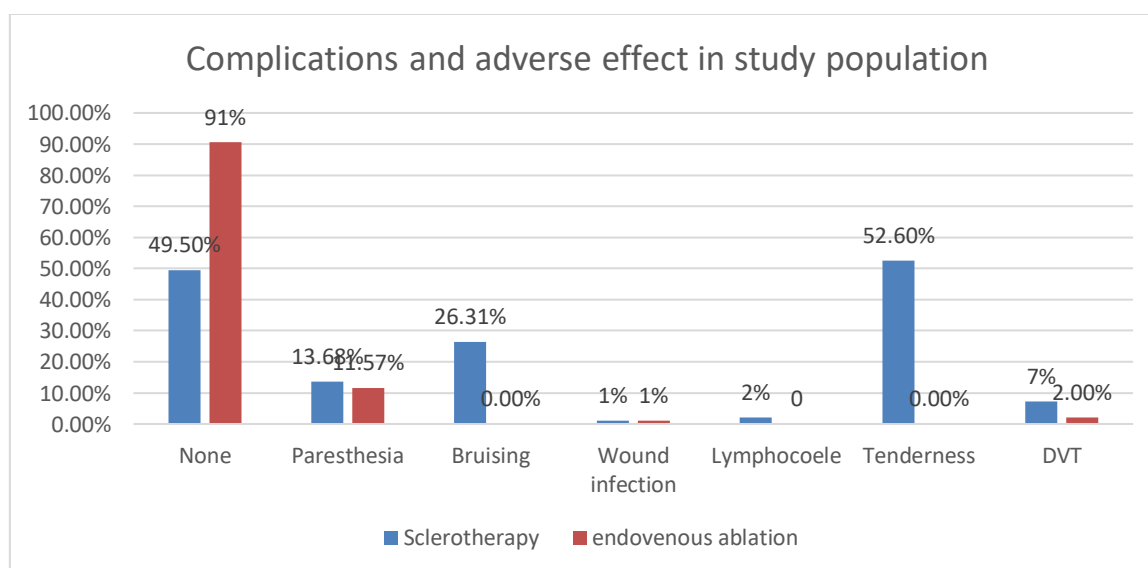
Pain score	Sclerotherapy	Endovenous ablation	P value
0-3	87	81	>0.05
4-6	8	14	
7-9	0	0	
Mean pain score	2.12	2.3	

On the visual analogue score the mean score in sclerotherapy process was 2.12 whereas it was 2.3 in endovenous ablation. P value was more than 0.05 therefore the difference was not statistically significant.



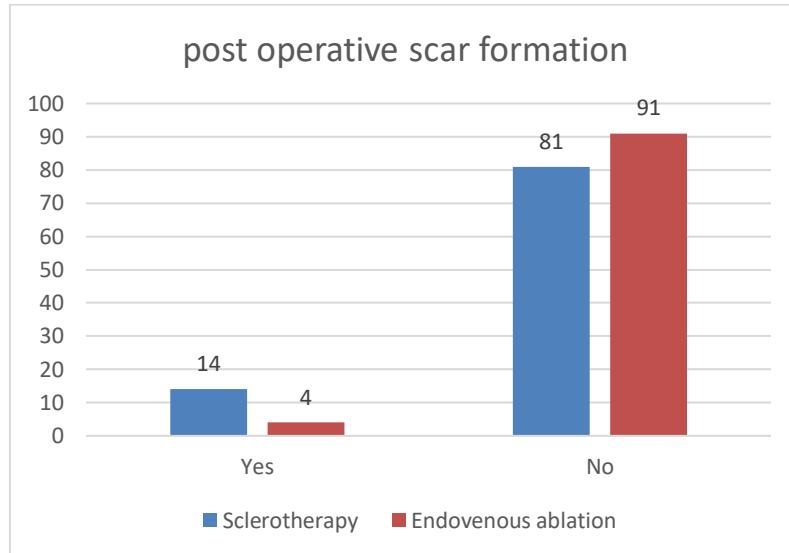
Complications and adverse events:

Complications	Sclerotherapy	Endovenous ablation
None	47 (49.5%)	86 (90.5%)
Paresthesia	13 (13.68%)	11 (11.57%)
Bruising	25 (26.31%)	0
Burns	1 (1%)	0
Wound infection	10 (10.5%)	1 (1%)
Lymphocele	2 (2%)	0
Tenderness	50 (52.6%)	0
DVT	7 (7.3%)	2 (2%)



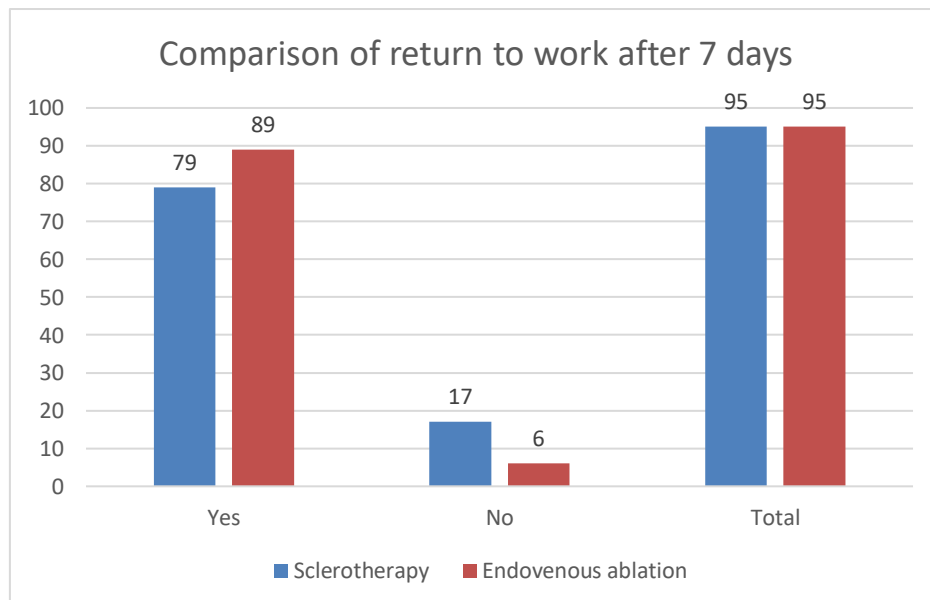
Scar /pigmentation:

Scar formation	Sclerotherapy	Endovenous ablation
Yes	14	4
No	81	91
Total	95	95
%	14.73%	4.2%



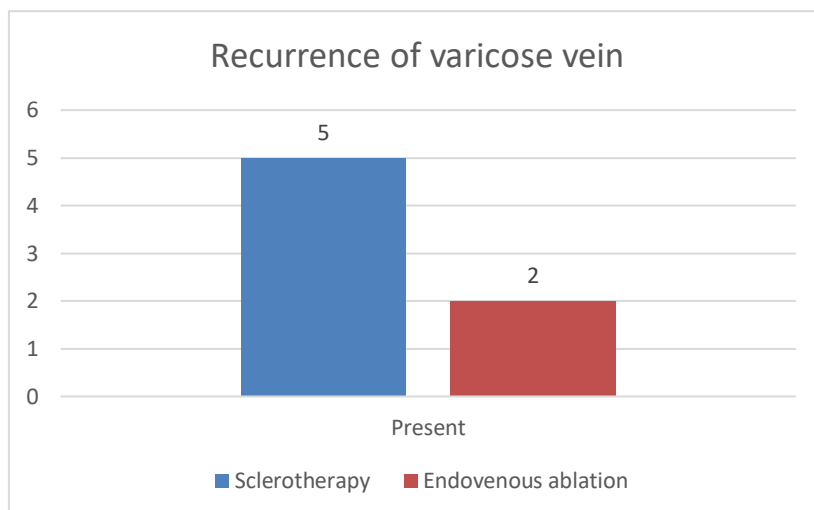
Return to work in seven days:

Return to work in 7 days	Sclerotherapy	Endovenous ablation
Yes	79	89
No	17	6
Total	95	95
%age	83.15%	93.68%



Recurrence:

Recurrence of varicose vein	Sclerotherapy	Endovenous ablation
Yes	5	2
Total	95	95
%	5.2%	2.1%



CEAP outcome analysis:

Measures		Pretreatment	72 hours	1 month	6 months
CEAP	Sclerotherapy	C2 to C6	Co	Co	Co
	Endovenous ablation	C2 to C6	Co	Co	Co

Discussion

Relatively less number of patients were included in C2 + C6 category with 8.42% from sclerotherapy group and 7.36% of endovenous ablation group.

Time taken by the surgeries was also calculated. The Varicose vein is a disorder in which elongated, convoluted and dilated veins are present in lower limb. For the management of varicose veins multiple treatment techniques have been developed.

The present study compared sclerotherapy and endovenous ablation. The study included total 190 participants which were randomly distributed in two groups with two different treatments. That endovenous ablation and sclerotherapy.

95 participants were allocated in either sclerotherapy or endovenous ablation group each.

Majority of the patients in the study population were found in 40-49 year age group and 50-60 year age with 62 patients each. Significant number of patients were present in 26-39 year age group as well.

In the study it was observed that there was male predominance in the study population with total 117 (60.9%) males out of 190 patients whereas only 73 (39.1%) female patients were present in the study population.

During the management of varicose vein the affected lower limbs were analysed. It was found during the study compared to left lower limb, right limb was more affected in the sclerotherapy group whereas left lower limb was more affected in the endovenous ablation group. Whereas there was less frequency of bilateral limb involvement.

The limbs were classified according to CEAP classification. This classification is used to assess the chronic venous diseases.

Following is the CEAP classification used to differentiate the affected limbs:

Grade	Description
C0	No visible or palpable sign of disease
C1	Telangiectasias or reticular vein
C2	Varicose vein
C3	Edema

C4a	Pigmentation or eczama
C4b	Lipodermatosclerosis or atrophic blanche
C5	Healed venous ulcer
C6	Active venous ulcer

It was found that in only C2 class 67 (70.5%) patient were present from sclerotherapy group whereas 70 (73.68%) patients were present in endovenous ablation group. Total 72.10% of the patients included in the study were in C2 category.

11.57% of the sclerotherapy group and 9.5% of endovenous ablation group were categorised into C2 + C4a group.

9.5% of sclerotherapy group and 9.5% of the endovenous ablation group were categorised into C2 + C5 group. time scale was divided into 5-15 minutes, 15-30 minutes, 31-45 minutes and > 45 minutes. The mean time taken by sclerotherapy was less in sclerotherapy compared to endovenous ablation. The mean time taken by sclerotherapy was 12.20 minutes whereas the mean time taken by endovenous ablation is 50.10 minutes. It was observed in the present study that 86.31% of participants from the sclerotherapy group took surgical time between 5-15 minutes whereas 13.69% of the patients took time between 15-30 minutes.

In endovenous ablation group almost 86% of the participants took more than 45 minutes of time from the completion of the surgery while only 15% took time between 31-45 minutes. The difference between completion of surgery was statistically significant with p value <0.05.

During post operative period the pain score was assessed using visual analogue score. Which was divided into three categories, such 0-3, 4-6 and 7-9.

It was found that in the sclerotherapy group 91.57% of the patients experienced lesser pain whereas 85.26% of the endovenous ablation group had pain score between 0-3. The mean pain score was 2.12 for the sclerotherapy whereas it was slightly higher with mean score of 2.3 in the endovenous ablation group. It was observed that the in endovenous ablation group there was slightly higher pain score compared to sclerotherapy group.

There was lower chance of complications in the endovenous ablation group with 86 patients (90.5%) of endovenous group who did not have any post operative complications such as paresthesia, bruising, burns etc. it was also observed that only 47% of the sclerotherapy population did not have any post operative complications. Most commonly paresthesia was present in both the groups with 13.68% in sclerotherapy group and 5.2% in the endovenous ablation group. Also bruising was more common post operative complication with 26.31%. and wound infection was also observed in 10.5% of the sclerotherapy population. Compared to sclerotherapy endovenous ablation had very low post operative complications. Where the % of bruising was nil, and even there was lower possibility of wound infection with only 1% of the patient who had wound infection.

Scar formation during post operative period was observed in the sclerotherapy population. 14 (14.73%) of the patients had scar formation compared to only 4 patients (4.2%) in the endovenous ablation group.

In the present study patients were followed up even after 7 days and the health status of the patients was analysed. It was observed that 83.15% of the patients were able to return to work within 7 days. Compared to 93.68% of the patients in endovenous ablation group who were able to return to work in 7 days. Thereby it was observed that there was difference in the health status of the patient. In the endovneous ablation it can be concluded that there is higher possibility of patient going back to work early compared to sclerotherapy.

During the follow up of the patients it was assessed for the recurrence of this disease. It was found that only in 2.1% the patient had the cases of recurrence in the patients of endovenous laser ablation whereas 5.2% of patients in sclerotherapy had chances of recurrence after the surgery.

The CEAP classification was further analysed post operatively. It was found that in both the study grous the score was divided into categories. For the ranging from C2 to C6. This result was

almost insignificant in both the groups as the pretreatment C2 + C6 which after the surgery 72 hours, 1 month and 6 months.

Conclusion

1. In this study total 190 patients were included with male predominance among the study population.
2. Endovenous ablation took approximately 50 minutes to complete the surgical closure.
3. Endovenous ablation therapy has shown high improvement with the outcomes such as hospital stay, or post operative complications.
4. It can be concluded that the endovenous ablation therapy is an effective method to cure varicose vein which taken significantly higher time for complication of the wound.
5. Compared to sclerotherapy, and apart from signs and symptoms endovenous ablation therapy is an effective therapy which should be used in the management of varicose veins.

Summary

The Varicose vein is a disorder in which elongated, convoluted and dilated veins are present in lower limbs. For the management of varicose veins multiple treatment techniques have been developed. The present study compared sclerotherapy and endovenous ablation. 72.10% of the patients included in the study were in C2 category. The mean time taken by sclerotherapy compared to endovenous ablation was also found to be less in both groups.

In endovenous ablation group almost 86% of the participants took more than 45 minutes from the completion of the surgery while only 15% took time between 31-45 minutes. The difference between completion of surgery was statistically significant with p value <0.05. In this study total 190 patients were included with male predominance among the study population. Compared to sclerotherapy 14 (14.73%) of the patients had scar formation compared to only 4 patients (4.2%) in the endovenous ablation group. Thereby it was observed that there was difference in the health status of the patient, suggesting endovenous ablation is better than sclerotherapy.

Bibliography:

1. R; RSM LAI. The foot venous system: Anatomy, physiology and relevance to clinical practice [Internet]. Dermatologic surgery : official publication for American Society for Dermatologic Surgery [et al.]. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/24372905/>
2. Yuan S-M, Jing H. A reappraisal of saphenous vein grafting [Internet]. Annals of Saudi medicine. U.S. National Library of Medicine; 2011 [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3101728/>
3. Anatomy, bony pelvis and lower limb, posterior tibial artery [Internet]. [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK536981/>
4. Home - books - NCBI [Internet]. National Center for Biotechnology Information. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://https.ncbi.nlm.nih.gov/books/>
5. CJ; GJT. Vertebrate limb bud formation is initiated by localized epithelial-to-mesenchymal transition [Internet]. Science (New York, N.Y.). U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/24626928/>
6. Barham G, Clarke NMP. Genetic regulation of embryological limb development with relation to congenital limb deformity in humans [Internet]. Journal of children's orthopaedics. U.S. National Library of Medicine; 2008 [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656784/>
7. Anatomy, bony pelvis and lower limb, foot fascia - statpearls - NCBI ... [Internet]. [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK526043/>
8. de Vries MR; Simons KH; Jukema JW; Braun J; Quax PH; Vein graft failure: From pathophysiology to clinical outcomes [Internet]. Nature reviews. Cardiology. U.S. National

- Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/27194091/>
9. D; FESLB. Improving coronary artery bypass graft durability: Use of the external saphenous vein graft support [Internet]. Multimedia manual of cardiothoracic surgery : MMCTS. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/25976117/>
 10. G; NCBRBVS. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus open surgery for great saphenous vein varices [Internet]. The Cochrane database of systematic reviews. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/25075589/>
 11. Lin F, Zhang S, Sun Y, Ren S, Liu P. The management of varicose veins [Internet]. International surgery. U.S. National Library of Medicine; 2015 [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4301287/>
 12. Author links open overlay panelJean-FrançoisUhlMDaPersonEnvelopeAndréCornu-ThenardMDbBernadetteSatgerMDcPatrick H.CarpentierMDc, Jean-FrançoisUhlMDaPersonEnvelope, a, AndréCornu-ThenardMDb, b, BernadetteSatgerMDc, et al. Clinical analysis of the Corona Phlebectatica [Internet]. Journal of Vascular Surgery. Mosby; 2011 [cited 2022Nov26]. Available from: <https://www.sciencedirect.com/science/article/pii/S0741521411016053>
 13. TW; JBNAEAOATW. Pathophysiology of varicose veins [Internet]. Journal of vascular surgery. Venous and lymphatic disorders. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/28411716/>
 14. J; C. Deep vein thrombosis in foot and ankle surgery [Internet]. The Orthopedic clinics of North America. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/26772954/>
 15. JC; YGKPMGJC. Comparison of cyanoacrylate embolization and radiofrequency ablation for the treatment of varicose veins [Internet]. Phlebology. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30114987/>
 16. Epstein D;OnidaS;BootunR;Ortega-OrtegaM;Davies AH; Cost-effectiveness of current and emerging treatments of varicose veins [Internet]. Value in health : the journal of the International Society for Pharmacoeconomics and Outcomes Research. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30098668/>
 17. Oliveira RÁ;MazzuccaACP;PachitoDV;RieraR;Baptista-Silva JCDC; Evidence for varicose vein treatment: An overview of systematic reviews [Internet]. Sao Paulo medical journal = Revistapaulista de medicina. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30020324/>
 18. de MikSM;StubenrouchFE;LegemateDA;BalmR;Ubbink DT; Treatment of varicose veins, international consensus on which major complications to discuss with the patient: A delphi study [Internet]. Phlebology. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30012048/>
 19. M; DPEB. Varicose veins and lower extremity venous insufficiency [Internet]. Seminars in interventional radiology. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/29628617/>
 20. Tolu I, Durmaz MS. Frequency and significance of perforating venous insufficiency in patients with chronic venous insufficiency of lower extremity [Internet]. The Eurasian journal of medicine. U.S. National Library of Medicine; 2018 [cited 2022Nov26]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6039150/>
 21. AM; NJNMH. [diagnostic work-up and treatment of superficial vein thrombosis] [Internet]. Ugeskrift for laeger. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30084349/>
 22. Davies HOB, Popplewell M, Bate G, Ryan RP, Marshall TP, Bradbury AW. Analysis of effect of National Institute for Health and Care Excellence Clinical Guideline CG168 on

management of varicose veins in primary care using the Health Improvement Network Database [Internet]. University of Birmingham. Elsevier; [cited 2022Nov26]. Available from: <https://research.birmingham.ac.uk/en/publications/analysis-of-effect-of-national-institute-for-health-and-care-exce>

23. Wallace T; El-Sheikha J; Nandhra S; Leung C; Mohamed A; Harwood A; Smith G; Carradice D; Chetter I; Long-term outcomes of endovenous laser ablation and conventional surgery for great saphenous varicose veins [Internet]. The British journal of surgery. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30132797/>
24. N; K. A synopsis of current international guidelines and new modalities for the treatment of varicose veins [Internet]. Australian family physician. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/28376578/>
25. M; SSR LBSS. Compression stockings for the initial treatment of varicose veins in patients without venous ulceration [Internet]. The Cochrane database of systematic reviews. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/22071857/>
26. Nandhra S; Wallace T; El-Sheikha J; Leung C; Carradice D; Chetter I; A randomised clinical trial of buffered tumescent local anaesthesia during endothermal ablation for superficial venous incompetence [Internet]. European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30392525/>
27. A; VMEKLM. Endovenous ablation [Internet]. International angiology : a journal of the International Union of Angiology. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30465420/>
28. Gloviczki P; Comerota AJ; Dalsing MC; Eklof BG; Gillespie DL; Gloviczki ML; Lohr JM; McLafferty RB; Meissner MH; Murad MH; Padberg FT; Pappas PJ; Passman MA; Raffetto JD; Vasquez MA; Wakefield TW; ; ; The care of patients with varicose veins and associated chronic venous diseases: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum [Internet]. Journal of vascular surgery. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/21536172/>
29. Uhlf J; Cornu-Thénard A; Carpentier PH; Widmer MT; Partsch H; Antignani PL; Clinical and hemodynamic significance of Corona Phlebectatica in chronic venous disorders [Internet]. Journal of vascular surgery. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/16376209/>
30. Cochrane Library [Internet]. [cited 2022Nov26]. Available from: <https://www.cochranelibrary.com/>
31. Hamann SAS; Timmer-de Mik L; Fritschy WM; Kuiters GRR; Nijsten TEC; van den Bos RR; Randomized clinical trial of endovenous laser ablation versus direct and indirect radiofrequency ablation for the treatment of great saphenous varicose veins [Internet]. The British journal of surgery. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/31095724/>
32. ; Endovascular radiofrequency ablation for varicose veins: An evidence-based analysis [Internet]. Ontario health technology assessment series. U.S. National Library of Medicine; [cited 2022Nov26]. Available from: <https://pubmed.ncbi.nlm.nih.gov/23074413/>
33. Lurie F, Lal BK, Antignani PL, Blebea J, Bush R, Caprini J, et al. Compression therapy after invasive treatment of superficial veins of the lower extremities: Clinical practice guidelines of the American Venous Forum, Society for Vascular Surgery, American College of Phlebology, Society for Vascular Medicine, and International Union of Phlebology [Internet]. Mayo Clinic. Elsevier Inc.; [cited 2022Nov26]. Available from: <https://mayoclinic.pure.elsevier.com/en/publications/compression-therapy-after-invasive-treatment-of-superficial-veins>

34. Ultrasound guided sclerotherapy with foam [Internet]. Venous Institute of Buffalo. 2020 [cited 2022Nov26]. Available from: <https://www.venousinstitute.com/ultrasound-guided-sclerotherapy-with-foam/>