# Role of Ultrasound Guided Foam Sclerotherapy in Treatment of Lower Limb Varicose Vein

Thesis

*Submitted for Partial Fulfillment of Master Degree in Radiodiagnosis*

By

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# List of Contents


| Title | Page No. |
|---|---|
| List of Tables | i |
| List of Figures | ii |
| List of Abbreviations | vi |
| Introduction | 1 |
| Aim of the Study | 4 |
| Review of Literature | |
| ⮚ Anatomy of Lower Limb Venous System | 5 |
| ⮚ Hemodynamics and Pathology | 28 |
| ⮚ Diagnosis and Imaging Criteria | 41 |
| ⮚ Technique of Sclerotherapy | 57 |
| Patients and Methods | 94 |
| Results | 101 |
| Illustrative Cases | 111 |
| Discussion | 128 |
| Summary and Conclusion | 136 |
| References | 137 |
| Arabic Summary | |

# List of Tables


| Table No. | Title | Page No. |
|---|---|---|
| **Table (2-1):** | CEAP Clinical Classification | 37 |
| **Table (2-2):** | CEAP Etiological Classification | 38 |
| **Table (2-3):** | CEAP Anatomical Classification | 38 |
| **Table (2-4):** | CEAP Pathophysiological Classification | 38 |
| **Table (4-1):** | Ideal concentration of various sclerosants based on vessels size | 64 |
| **Table (4-2):** | Findings included in the DUS investigations | 78 |
| **Table (4-3):** | Comparison of high ligation and Stripping (HL/S), endovenous laser ablation (EVLA) / radiofrequency ablation (RFA)/USGFS | 93 |
| **Table (5-1):** | Showing the percentage of the sex and age of the patients in our study | 94 |
| **Table (6-1):** | Showing the percentage of the sex and age of the patients in our study | 101 |
| **Table (6-2):** | Demonstrating the complain & duration of the symptoms | 102 |
| **Table (6-3):** | Demonstrating the category of the Varciose veins, the no of perofrators & caliber of them | 103 |
| **Table (6-4):** | Demonstrating the relation between the category of the disease in relation to the age & sex | 105 |
| **Table (6-5):** | Demonstrating the category of the disease in relation to the complain and duration | 106 |
| **Table (6-6):** | Demonstrating the category of the disease in relation to the procedure, complications | 107 |
| **Table (6-7):** | Demonstrating the category of the disease in relation to the U/S follow up & patient response | 109 |

# List of Figures


| Fig. No. | Title | Page No. |
|---|---|---|
| **Fig. (1-1):** | Diagram shows superficial and deep compartments | 6 |
| **Fig. (1-2):** | Diagram shows the subgroups of the perforators | 7 |
| **Fig. (1-3):** | A transverse view, the saphenous eye or "Egyptian" eye is featured with the LSV located between the superficial and aponeurotic deep fasciae | 8 |
| **Fig. (1-4):** | Diagram displaying GSV and its tributaries | 10 |
| **Fig. (1-5):** | Long saphenous vein & ant acc saphenous vein distally & proximally before their reunion | 12 |
| **Fig. (1-6):** | The anatomical variant of the LSV | 12 |
| **Fig. (1-7):** | Diagram demonstrating SFJ | 13 |
| **Fig. (1-8):** | The Accessory saphenous veins | 16 |
| **Fig. (1-9):** | Diagram displaying SSV | 18 |
| **Fig. (1-10):** | Diagram displaying deep veins of lower limb | 19 |
| **Fig. (1-11):** | Diagram displaying perforating veins | 23 |
| **Fig. (1-12):** | Mechanism of valve closure | 24 |
| **Fig. (1-13):** | US shows superficial saphenous compartment with GSV "Egyptian eye" | 26 |
| **Fig. (1-14):** | US shows the tibio-gastrocnemius triangle has been described to identify the GSV | 26 |
| **Fig. (1-15):** | US shows the AASV is in alignment (alignment sign) with the femoral artery | 27 |

# List of Figures (Cont...)


| Fig. No. | Title | Page No. |
|---|---|---|
| **Fig. (2-1):** | Normal venous drainage of lower limb | 29 |
| **Fig. (2-2):** | Diagram shows the difference between normal functioning valve and incompetent valve in varicose vein | 32 |
| **Fig. (3-1):** | Duplex scan demonstrating SFJ normal flow | 49 |
| **Fig. (3-2):** | Duplex scan demonstrating SFJ reflux following provocation | 49 |
| **Fig. (3-3):** | Duplex scan demonstrating SFJ reflux duration | 50 |
| **Fig. (3-4):** | APG curve | 52 |
| **Fig. (3-5):** | Plethysmography | 53 |
| **Fig. (3-6):** | Ascending venography | 55 |
| **Fig. (4-1):** | Diagram shows the effect of foam on the injected vein | 68 |
| **Fig. (4-2):** | Diagram shows the chemical formula of Polidocanol | 70 |
| **Fig. (4-3):** | Foam generation by Tessari technique | 73 |
| **Fig. (4-4):** | Cannulation of the dilated and tortuous veins under US guidance | 74 |
| **Fig. (4-5):** | Post-treatment bandaging | 75 |
| **Fig. (5-1):** | The percentage of the sex of the patients in our study | 94 |
| **Fig. (5-2):** | The percentage of the patients complain in our study | 96 |
| **Fig. (6-1):** | The percentage of the sex of the patients in our study | 101 |

# List of Figures (Cont...)


| Fig. No. | Title | Page No. |
|---|---|---|
| **Fig. (6-2):** | The percentage of the category of the varicose veins. | 104 |
| **Fig. (6-3):** | The percentage of the category of the varicose veins in relation to sex. | 105 |
| **Fig. (6-4):** | The category of the varicose veins in relation to procedure. | 108 |
| **Fig. (6-5):** | The percentage of the U/S findings in the follow up. | 110 |
| **Fig. (7-1):** | Lower limb varicosities along the course of great saphenous vein. | 111 |
| **Fig. (7-2):** | A Doppler examination for the patient showing multiple varicosities. | 112 |
| **Fig. (7-3):** | The Doppler examination after the injection of the sclerotherapy. | 113 |
| **Fig. (7-4):** | The patient left lower limb after treatment. | 113 |
| **Fig. (7-5):** | The superficial spiders before sclerotherapy treatment. | 114 |
| **Fig. (7-6):** | The butterfly introduction into the superficial spiders with free flow of venous blood confirming the proper placement. | 115 |
| **Fig. (7-7):** | The injection of the sclerosant. | 115 |
| **Fig. (7-8):** | The superficial spiders after injection. | 116 |
| **Fig. (7-9):** | Lower limb before treatment. | 117 |
| **Fig. (7-10):** | Refluxing perforator. | 118 |
| **Fig. (7-11):** | U/S guided needle introduction. | 118 |
| **Fig. (7-12):** | The vein after injection of the sclerosant. | 119 |

# List of Figures (Cont...)


| Fig. No. | Title | Page No. |
|---|---|---|
| **Fig. (7-13):** | Lower limb after treatment. | 120 |
| **Fig. (7-14):** | The patient right lower limb before the procedure. | 121 |
| **Fig. (7-15):** | The infiltration of the local anathesia. | 122 |
| **Fig. (7-16):** | The needle introduction by U/S guidance with confirmation of the proper placement by blood flow. | 122 |
| **Fig. (7-17):** | The introduction of the guide wire. | 123 |
| **Fig. (7-18):** | The introduction of the catheter. | 123 |
| **Fig. (7-19):** | The distal tip of the catheter (orange arrow) to be 5 cm away from the saphenofemoral junction (red arrow). | 124 |
| **Fig. (7-20):** | The injection of the sclerosant. | 124 |
| **Fig. (7-21):** | The patient right lower limb after the procedure. | 125 |
| **Fig. (7-22):** | Multiple superficial Spiders. | 126 |
| **Fig. (7-23):** | Direct injection of the superficial spiders. | 127 |

# List of Abbreviations

| Abb. | Full term |
|---|---|
| *AASV* | *Anterior Accessory Saphenous Vein* |
| *APG* | *Air Plethysmography* |
| *CVD* | *Chronic Venous Disorder* |
| *CVI* | *Chronic Venous Insufficiency* |
| *CVU* | *Chronic Venous Ulceration* |
| *DUS* | *Doppler Ultrasound* |
| *DVT* | *Deep Vein Thrombosis* |
| *ECM* | *Extracellular Matrix* |
| *EF* | *Ejection Fraction* |
| *EV* | *Ejected Volume* |
| *EVLA* | *Endovenous Laser Ablation* |
| *FS* | *Foam Sclerotherapy* |
| *GSV* | *Great Saphenous Vein* |
| *HHD* | *Handheld Doppler* |
| *HL/S* | *High Ligation and Stripping* |
| *HRT* | *Hormone Replacement Therapy* |
| *IVUS* | *Intravascular Ultrasound* |
| *NSAIDS* | *Nonsteroidal Anti-Inflammatory Drugs* |
| *OCP* | *Oral Contraceptive Pills* |
| *PASV* | *Posterior Accessory Saphenous Vein* |
| *PTS* | *Post-Thrombotic Syndrome* |
| *RFA* | *Radiofrequency Ablation* |
| *RVF* | *Residual Volume Fraction* |
| *SD* | *Standard Deviation* |
| *SFJ* | *Saphenofemoral Junction* |
| *SMC* | *Smooth Muscle Cell* |
| *SPSS* | *Statistical Program for Social Science* |
| *SSV* | *Short Saphenous Vein* |

# List of Abbreviations (Cont...)

| Abb. | Full term |
|---|---|
| *STD* | *Sodium Tetradecyl Sulfate* |
| *SVS* | *Steam Vein Sclerosis* |
| *SVT* | *Superficial Vein Thrombosis* |
| *US* | *Ultrasound* |
| *USGFS* | *Ultrasound-Guided Foam Sclerotherapy* |
| *VFI* | *Venous Filling Index* |
| *VFT* | *Venous Filling Time* |
| *VV* | *Varicose Veins* |

# INTRODUCTION

Half of the adult population have minor stigmata of venous disease (women 50–55 per cent; men 40–50 per cent) but fewer than half of these will have visible varicose veins (women 20–25 %; men 10–15 per cent) ***(Evans et al., 1999).***

In general, age and gender were the most relevant risk factors for varicose veins. Male: female, 3.4: 6.5. In addition in females the most frequent risk factors were oral contraception and in both gender a predominately standing or sitting posture at work. Regarding the family history, varicose veins by the mother were most frequent compared to varicose veins by the father or both ***(Kroeger et al., 2004).***

Veins have one-way valves which prevent blood from backing up into the legs when we stand or sit. When the valves become incompetent (or begin refluxing), blood pools and causes an increase in pressure in the leg veins becoming enlarged and twisted ***(Emory Healthcare, 2015).***

This may contribute to varicose veins and causes symptoms of fatigue, heaviness, aching, burning, throbbing, itching, cramping, swelling and restlessness of the legs. Severe varicose veins can compromise the nutrition of the skin, leading to eczema, inflammation or even ulceration of the lower leg ***(Emory Healthcare, 2015).***

Surgical (traditional) treatment are the oldest method for dealing with varicose veins, through vein stripping to remove the affected veins. Conventional surgery have no limitations in terms of size, location and course of the vessels to be operated on ***(Menyhei et al., 2008).***

Complications of vascular surgery for varicose veins can be categorized into minor and major complications. The incidence of major complications were 0.8%. Minor complications were 17%. Overall, there were no perioperative mortality. Minor complications include Wound complications (hematoma, cellulitis or abscess) and minor neurological disturbance (numbness or tingling). Major complications include deep venous thrombosis (0.5%), pulmonary embolism ***(Critchley et al., 2007).***

The non-surgical methods can be classified into thermal techniques, which require the use of anesthesia and intumescence, and nonthermal techniques. The first group consists of endovenous laser ablation (EVlA), radiofrequency ablation (RF), and steam vein sclerosis (SVS). The second group comprises sclerotherapy, echosclerotherapy, the Sapheon method, and the ClariVein method ***(Gloviczki et al., 2011).***

Sclerotherapy are the chemical glue of abnormal veins. The modern goal of therapy are irreversible fibrotic occlusion ***(Orsini and Brotto, 2007).***

Sclerotherapy are an old technique that have been revolutionized by recent technological advances. Foaming detergent sclerosants offered increased potency and could be visualized by means of ultrasonography. Real Time ultrasound guidance allowed better anatomic visualization, greater hemodynamic understanding, more precise foam targeting and delivery, and monitoring for unwanted foam passage into deep veins. With these advances, sclerotherapy have now become a competitive treatment for any type or size of vein ***(Sarvananthan et al., 2012).***

Its advantages include: relatively low price, can be administered in an outpatient setting and an excellent method for treating recurrent varicose veins ***(Sarvananthan et al., 2012).***

# AIM OF THE STUDY

To study the safety and efficacy of sclerotherapy in the treatment of varicose veins.

# Chapter 1
# ANATOMY OF LOWER LIMB VENOUS SYSTEM

Variations are the rule rather than the exception in the venous system. It are therefore difficult to define "normal" venous anatomy. The veins of the lower limbs are organized into three systems: superficial, deep, and perforating veins. These veins are located in two compartments: the superficial compartment and the deep compartment ***(John et al., 2004).***

The superficial compartment are the space between the deep fascia and the dermis. Ultrasound have confirmed a separate space in the superficial compartment known as the saphenous compartment ***(John, et al., 2004).***

This space are bounded superficially by the saphenous fascia (portion of the membranous layer of the superficial tissue overlying the saphenous vein). The deep boundary of the saphenous compartment are formed by the muscular fascia of the limb. The saphenous compartment contains the great saphenous vein, accompanying arteries, and nerves ***(Caggiati et al., 2002).***

Saphenous tributaries and accessory, collateral, and communicating veins lie outside this compartment. The deep compartment are bounded by the muscular fascia and contains t