Endovenous Laser Ablation

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Venous insufficiency and varicose veins

Ann Epidemiol. 2005 Mar;15(3):175-84.

ELSEVIER
FULL-TEXT ARTICLE

The epidemiology of chronic venous insufficiency and varicose veins.

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Chronic venous disease is a common condition presenting to physicians in Western Europe and the United States. This article provides a comprehensive review of the published literature in the English language, from 1942 to the present, and focuses on the prevalence of chronic venous insufficiency and varicose veins, as well as the involved risk factors. Prevalence estimates vary widely by geographic location, with the highest reported rates in Western countries. Reports of prevalence of chronic venous insufficiency vary from < 1% to 40% in females and from < 1% to 17% in males. Prevalence estimates for varicose veins are higher, <1% to 73% in females and 2% to 56% in males. The reported ranges in prevalence estimations presumably reflect differences in the population distribution of risk factors, accuracy in application of diagnostic criteria, and the quality and availability of medical diagnostic and treatment resources. Established risk factors include older age, female gender, pregnancy, family history of venous disease, obesity, and occupations associated with orthostasis. Yet, there are several factors that are not well documented, such as diet, physical activity and exogenous hormone use, which may be important in the development of chronic venous disease and its clinical manifestations.

Publication Types:

- Review

Reflux

- Deep (Postthrombotic)

Reflux

- Deep (Postthrombotic)
- Superficial

Reflux

- Deep (Postthrombotic)
- Superficial
  - Great Saphenous Vein

Reflux

- Deep (Postthrombotic)
- Superficial
  - Great Saphenous Vein
  - Perforating Veins

Reflux

- Deep (Postthrombotic)
- Superficial
  - Great Saphenous Vein
  - Perforating Veins
  - Small Saphenous Vein

Reflux

↓

Venous hypertension

↓

Varicosities

Treatment principle

Eliminate the reflux

Treatment principle

Eliminate the reflux

Treat the varicosities

- Sclerotherapy
- Phlebectomy

Elimination of reflux

Surgery

- GSV
  - Ligation+Stripping
- Perforating veins
  - Ligation, SEPS
- SSV

Elimination of reflux
Endovenous ablation

- GSV
  - Thermal ablation (laser, RF)
- Perforating veins
  - US guided sclerotherapy
- SSV
  - US guided foam sclerotherapy
  - Thermal ablation (laser, RF)

Endovenous laser ablation of GSV

Endovenous laser ablation of GSV

WHY?

Ligation+stripping

- Precedure of choice until 5 yrs ago
- Ligation alone, upto 70% recur
- Stripping BTK, ↑risk of nerve injury
- Ligation+stripping of the GSV ATK
  - General anesthesia
  - Hematoma
  - Nerve injury, paresthesia
  - Wound infection
  - Incision scars

Ligation+stripping

- **Associated with 20-60% recurrence !**

1: Hartmann K, Klode J, Pfister R, Toussaint M, Weingart I, Waldermann F, Hartmann M.

Recurrent varicose veins: sonography-based re-examination of 210 patients 14 years after ligation and saphenous vein stripping.
Vasa. 2006 Feb;35(1):21-6.
PMID: 16535965 [PubMed - indexed for MEDLINE]

2: Blomgren L, Johansson G, Dahlberg-Akerman A, Thermaenius P, Bergqvist D.

Changes in superficial and perforating vein reflux after varicose vein surgery.
J Vasc Surg. 2005 Aug;42(2):315-20.
PMID: 16102633 [PubMed - indexed for MEDLINE]

3: Winterborn RJ, Foy C, Earnshaw JJ.

Causes of varicose vein recurrence: late results of a randomized controlled trial of stripping the long saphenous vein.
J Vasc Surg. 2004 Oct;40(4):634-9.
PMID: 15472588 [PubMed - indexed for MEDLINE]

4: Fischer R, Linde N, Duff C, Jeanneret C, Chandler JG, Seeber P.

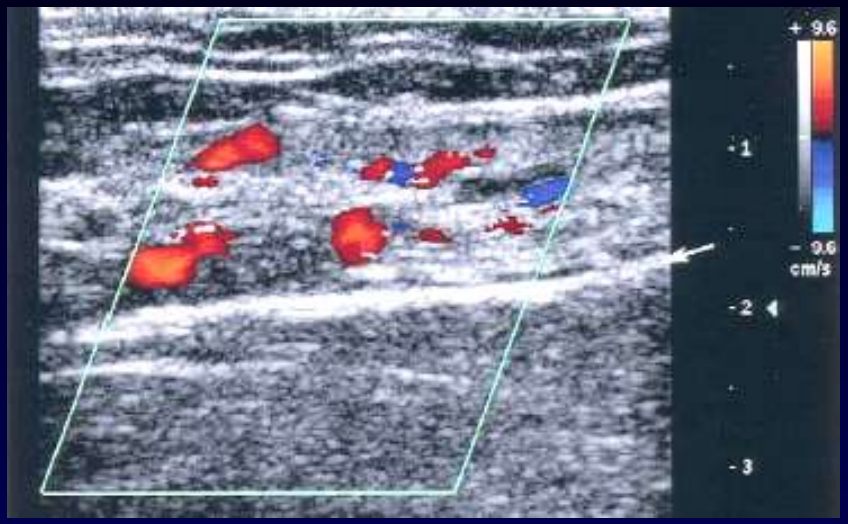
Late recurrent saphenofemoral junction reflux after ligation and stripping of the greater saphenous vein.
J Vasc Surg. 2001 Aug;34(2):236-40.
PMID: 11496274 [PubMed - indexed for MEDLINE]

Ligation+stripping

Reflux after GSV is ligated, or even removed

?

Neovascularization



- **Angiogenic stimuli caused by the surgery, normally happens in the healing wound**
- **Endovenous ablation: Little or no neovascularization, less recurrence**

Advantages of laser ablation

1. Local anesthesia
2. Little pain, little discomfort
3. Outpatient procedure
4. Immediate return to daily activities
5. Less complications
6. Higher patient satisfaction
7. Probably better long-term outcome

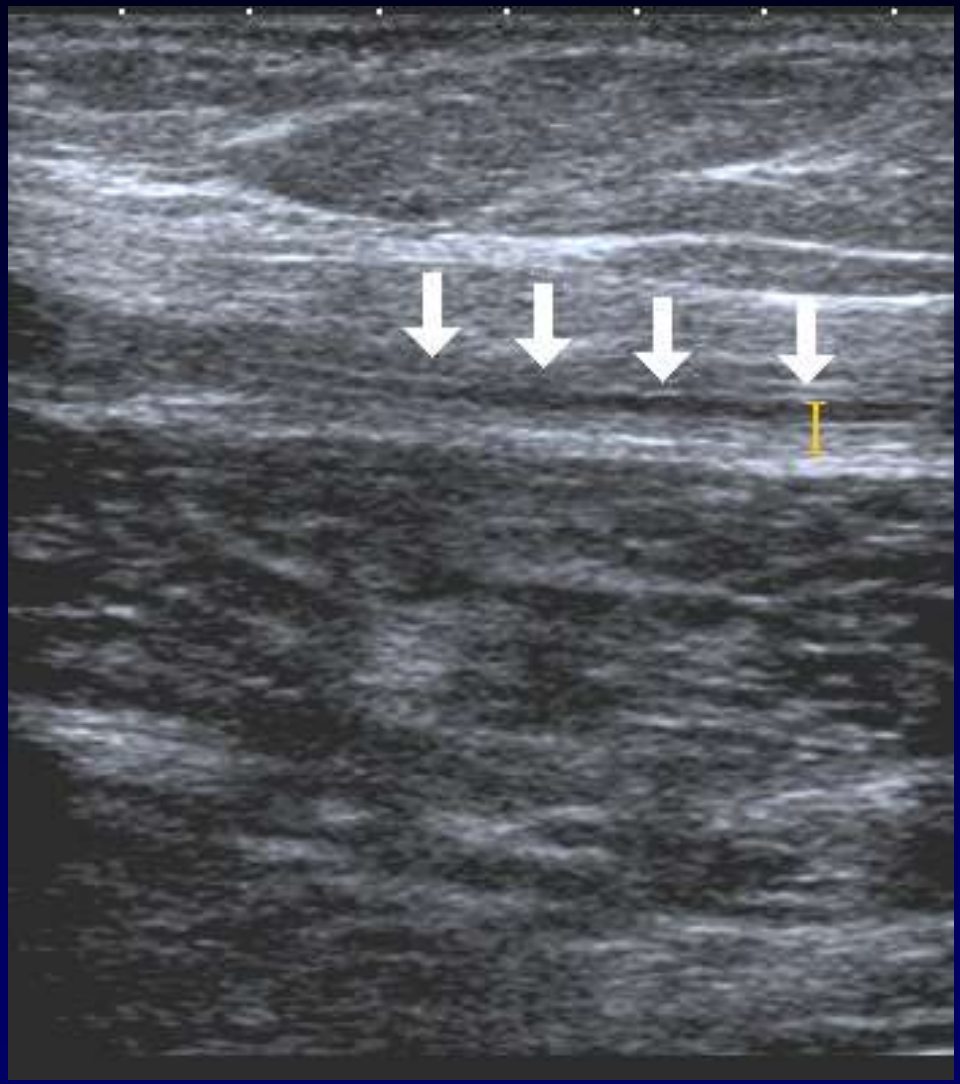
Procedure

Procedure

Postprocedure

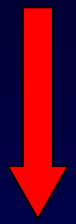
- Compression bandages for 1 week
- Grade II compression stockings
- Avoid vigorous activities, ↑ temp.
- Control Doppler US at 1week
  - Thrombus extension at SFJ??
- Subsequent controls at 3, 6 and 12m

Postprocedure, 3 months

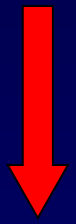


Mechanism

Absorbtion of laser by the blood



Heat (upto 1334 °C)



Steam bubble formation

Steam Bubble Formation

Steam Bubble Formation

Key factor for intimal damage (Heat conduction to intima)

Presence of blood necessary Saline or water→No bubbles

Proebstle TM. Thermal damage of the inner vein wall during endovenous laser treatment: key role of energy absorption by intravascular blood. **Dermatol Surg. 2002.**

Thrombosis vs intimal damage

Intimal damage: Permanent occlusion

Thrombosis : Recanalization

Intimal damage=↑Energy +↓blood

1. Minimal blood in the lumen
   - Good compression
2. Sufficient energy to the wall
   - 40-70 Joules/cm
3. Laser wave length???
   - Does not seem to be important

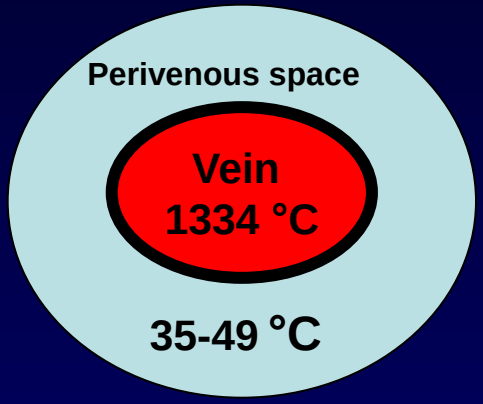
Importance of Tumescent Anest

1.Local anesthesia:

- Virtually no pain

2. Heat insulation:

- No thermal damage to the perivenous tissue



3. Compression

- Less blood in the vein lumen
- Intimal damage > Thrombosis
- Permanent closure

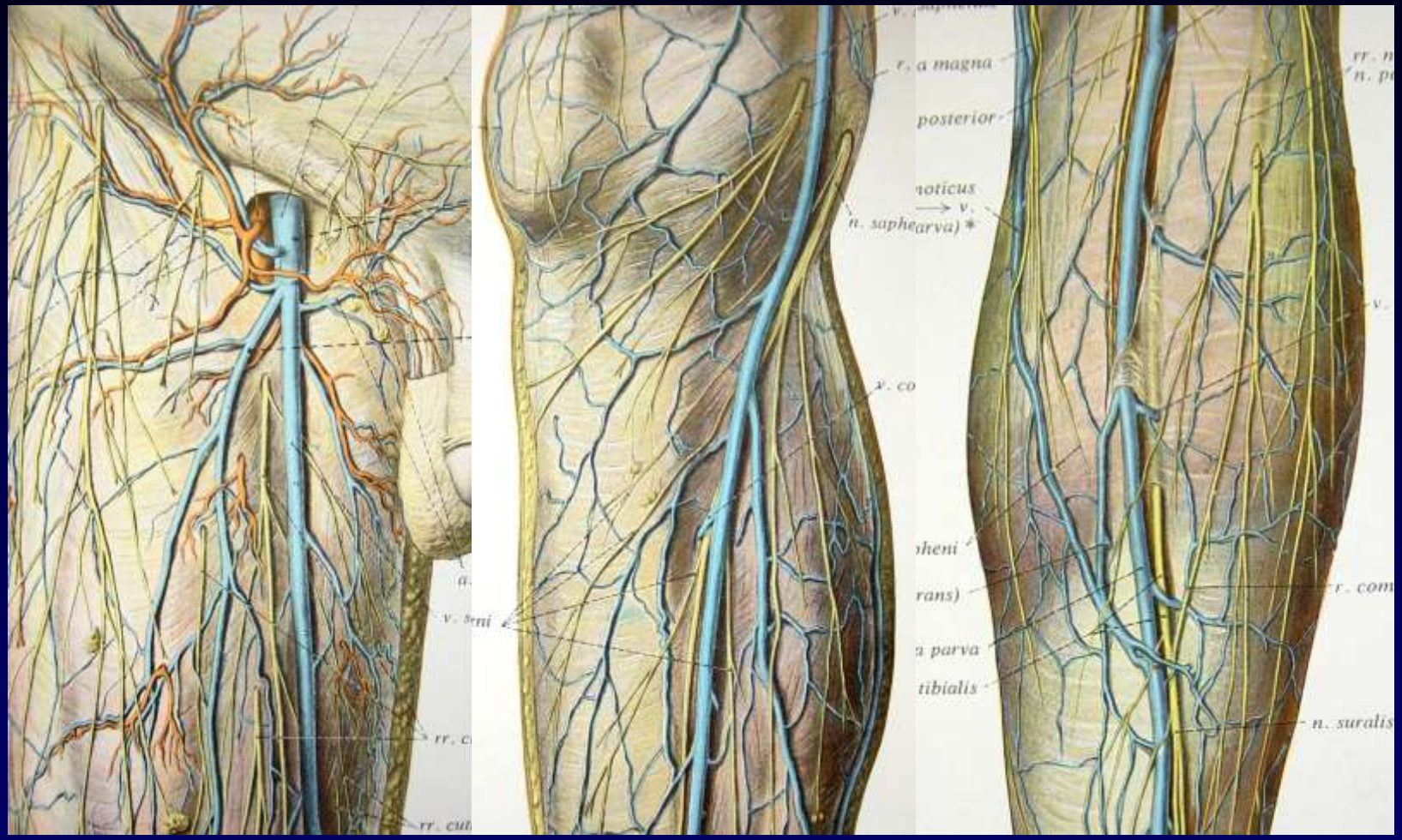
Laser ablation, results

- 97-100% immediate occlusion
- Over 90% long term occlusion
- Better than the historical controls of surgery
- Prospective randomised trial

Complications

- **Brusing, Ecchymosis 24-31%** (resolves in 1 month)
- **Skin burns, case report**
- **Paresthesia GSV<1%, transient**
- **DVT <1%**
- **PE, 1 suspected case**
- **AVF, 2 cases**

Paresthesia (numbness)



GSV ATK, no nerve GSV BTK, Saphenous n. SSV, sural nerve

Paresthesia (numbness)

- Good tumescent anesthesia
  - Touch the vein wall, not perforate

Conclusions

- Laser tx of choice for GSV reflux
- Good technique, no complication
- Typical IR procedure
  - US, diagnosis&treatment
  - Skills&experience
  - Patient referral, no big problem
    - “Patients hear”
    - Office procedure
    - No surgical back-up