



**51<sup>ST</sup> VEITH symposium**

Session 65: VENOUS GUIDELINES, IMPORTANT PAPERS, AND REIMBURSEMENT  
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**Primary venous insufficiency  
increases risk of deep vein thrombosis**



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**Disclosures**

**DVT risk factors**

Age

Cancer

Surgery

Hormonal therapy

Pregnancy

IBD

SLE

Previous VTE

Trauma

Immobility


Air travel

CHF

Thrombophilia

COPD

Obesity



1. Anderson FA, Jr., Spencer FA. Risk factors for venous thromboembolism. *Circulation* 2003; 107:1673-81.  
2. Goldhaber SZ. Risk factors for venous thromboembolism. *J Am Coll Cardiol* 2010; 55:1911-7.

**Varicose veins is another risk factor for DVT**


**OR=4.2**  
95% CI [1.6-11.3]



1. Hall JA, Silverstein MD, Kahn CR, et al. Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. *Arch Intern Med*. 2001;161:892-899.

**Varicose veins is another risk factor for DVT**

**OR=7.3**  
95% CI [6.1-8.7]




1. Miller RM, Li L, Leupold R, Engerer P, et al. Varicose veins are a risk factor for deep venous thrombosis in general practice patients. *Vasa*. 2022;50(5):303-5.

**Varicose veins is another risk factor for DVT**

Contradictory data <sup>1</sup>

Assessment of VVs is  
observer-dependent <sup>2</sup>

Up to **35%** of patients  
with primary CVD  
do **NOT** have VVs <sup>3</sup>



1. Cogo A, Bernardi E, Prandoni P, et al. Acquired risk factors for deep vein thrombosis in symptomatic outpatients. *Arch Intern Med*. 1994;154(2):368-8.  
2. Shalunji H, Weinberg A, Srinivasan S. Interobserver variability in the assessment of the clinical severity of varicose veins insufficiency. *Phlebology*. 2012;Feb;30(2):63-5.  
3. Gaitanaris G. The full spectrum of venous insufficiency. *Angiology*. 2002;53(4):549-55.

### Gap in knowledge

**REFLUX**  
is the early sign and essential pathophysiology of the PCVD<sup>1,2,3</sup>

1. Casanova MR, Belcaro G, Nicolaidis AN. Reflux epidemiology of varicose veins and chronic venous diseases: the San Valentino Vascular Screening Project. *Angiology*. 2002 Mar-Apr;53(2):129-30.  
2. Schmitt-Bernburg U, Heuch-Schäfer S, Hubner-Plattschky B, et al. Prospective epidemiological study on the beginning of varicose veins. *Strocham Study* 1990. *Phlebologie*. 2003;32:17-25.  
3. Robertson J, Evans G. Local incidence and risk factors for venous reflux in the general population. Edinburgh Venous Study. *Eur J Vasc Endovasc Surg*. 2002;24(2):209-14.

### Aim of the study

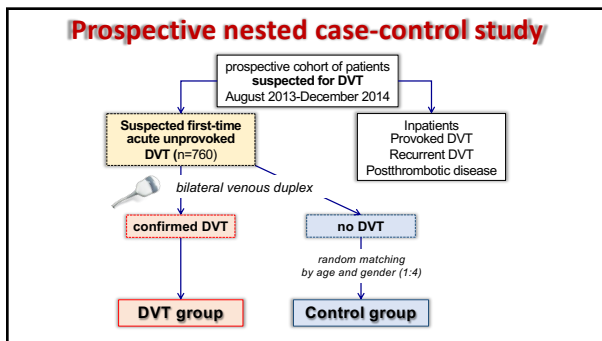
Primary reflux

?

Deep vein thrombosis

### JVS-VL 2016; 4: 161-6

### JVS-VL 2016; 4: 161-6



- ### Reflux evaluation
- Registered vascular technologist (RVT)
  - Mid-calf compression
  - Semi-sitting position, 30-45° head-up tilt
  - Reflux threshold  $\geq 0.5$  seconds \*
  - 3 deep segments: CVF, FV, PV
  - 6 superficial segments: SFJ, GSV thigh/knee/calf, SPJ, SSV
  - Non-saphenous reflux was not considered

### Statistical analysis

- **Prospective** electronic database
- Multivariate logistic regression
- Independent variable: **prevalence of reflux**
- Covariables included: BMI, smoking
- **Adjusted ORs**, 95%CI calculated
- P≤.05
- SPSS 13.0 software (IBM Corp., NY)

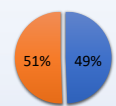
### Results

**DVT cases**  
(N=87)

**Non-DVT controls**  
(N=348)

**62.5±15.3**  
Age

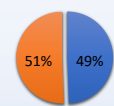
**62.4±15.1**  
Age



51% 49%

■ Women ■ Men

**Gender**



51% 49%

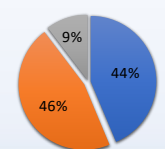
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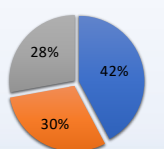
**Non-DVT controls**  
(N=348)

#### DVT location / DVT symptoms distribution



9% 44% 46%

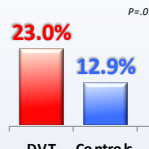
■ Left leg ■ Right leg ■ Both legs



28% 42% 30%

■ Left leg ■ Right leg ■ Both legs

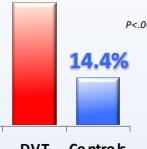
### Deep reflux

**Affected/symptomatic leg**  


23.0% 12.9% P=.027

■ DVT ■ Controls

**OR = 2.01**  
[1.11-3.62]

**Unaffected/asymptomatic leg**  


36.8% 14.4% P<.0001

■ DVT ■ Controls

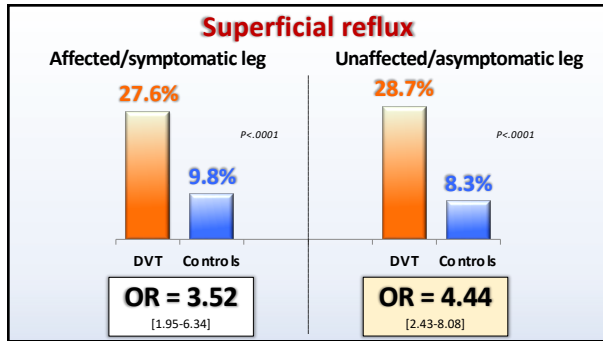
**OR = 3.47**  
[2.04-5.88]

### Deep reflux

Reflux location	DVT group (n=87)		Controls (n=348)		P-value
	n	%	n	%	
Unilateral	34	39.1	55	15.8	<.00001
Bilateral	9	10.3	20	5.7	.147
Common femoral	18	10.3	50	7.2	<.00001
Femoral	16	9.2	11	1.6	<.00001
Popliteal	25	14.4	44	6.3	<.00001

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### Superficial reflux

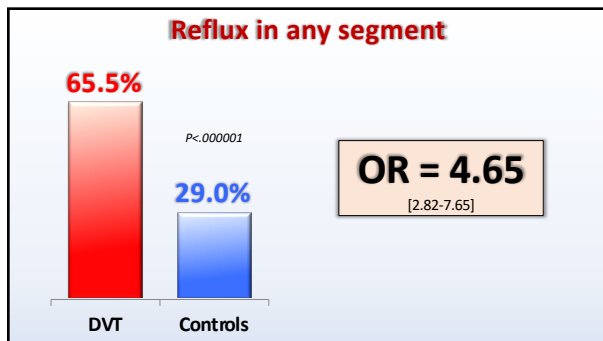
Reflux location	DVT group (n=87)		Controls (n=348)		P-value
	n	%	n	%	
Unilateral	27	31.0	37	10.6	.00001
Bilateral	11	12.6	13	3.7	.003
Saphenofemoral junction	26	22.8	26	3.8	<.00001
Great saphenous, thigh	29	25.4	25	3.7	<.00001
Great saphenous, calf	28	24.6	22	3.2	<.00001
Small saphenous	5	4.4	1	0.1	.0003

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### Control group vs General population

Reflux location	Non-DVT controls	General population
Superficial veins		
Deep veins		
Any segment		

1. Evans CJ, Allan PL, Lee AJ. Prevalence of venous reflux in the general population on duplex scanning: the Edinburgh vein study. J Vasc Med Biol. 1998;20:757-76.  
 2. Cigal IM, Barancoski M, Pomeroy A, et al. Chronic venous disease in an ethnically diverse population: the San Diego Population Study. Arterioscler Thromb Vasc Biol. 2002;22:e48-52.  
 3. Malyak JJ, Goldmann BE. Prevalence and localization of reflux in the superficial and deep venous systems in the general population: results from the Boston Vein Study. J Vasc Med Biol. 2002;14:669-72.

### Control group vs General population

Reflux location	Non-DVT controls	General population
Superficial veins	14.4%	
Deep veins	21.6%	
Any segment	<b>29.0%</b>	

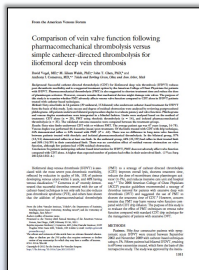
1. Evans CJ, Allan PL, Lee AJ. Prevalence of venous reflux in the general population on duplex scanning: the Edinburgh vein study. *J Vasc Surg* 1998;20:767-76.  
 2. Chiqui MJ, Samanico M, Frankel A, et al. Chronic venous disease in an ethnically diverse population: the San Diego Population Study. *Am J Epidemiol* 2003;158:448-56.  
 3. Alvarado JJ, Hoffmann BB, Lischke C. Distribution and prevalence of reflux in the superficial and deep venous systems in the general population: results from the Bonn Vein Study, Germany. *J Vasc Surg* 2008;48:680-7.

### Control group vs General population

Reflux location	Non-DVT controls	General population
Superficial veins	14.4%	19.0-21.0%
Deep veins	21.6%	9.0-20.0%
Any segment	<b>29.0%</b>	<b>27.9-35.0%</b>

1. Evans CJ, Allan PL, Lee AJ. Prevalence of venous reflux in the general population on duplex scanning: the Edinburgh vein study. *J Vasc Surg* 1998;20:767-76.  
 2. Chiqui MJ, Samanico M, Frankel A, et al. Chronic venous disease in an ethnically diverse population: the San Diego Population Study. *Am J Epidemiol* 2003;158:448-56.  
 3. Alvarado JJ, Hoffmann BB, Lischke C. Distribution and prevalence of reflux in the superficial and deep venous systems in the general population: results from the Bonn Vein Study, Germany. *J Vasc Surg* 2008;48:680-7.

### Supporting evidence



**36%** of patients recovering from DVT have deep reflux in the noninvolved lower extremity

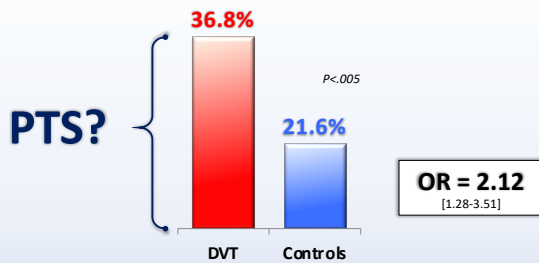
1. Vogel D. Comparison of vein valve function following pharmacomechanical thrombolysis versus simple catheter-directed thrombolysis for iliofemoral deep vein thrombosis. *J Vasc Surg* 2012;55:1331-4.

### Postthrombotic syndrome



1. Kahn SR, Patashnik H, Madanhan S, et al. Definition of post-thrombotic syndrome of the leg for use in clinical investigations: a recommendation for standardization. *J Thromb Haemostasis* 2005;7:879-883.

### Pre-existing primary deep reflux



### Limitations

Non-saphenous reflux was not considered

Postthrombotic reflux after previous clinically silent DVT is possible in some patients

## Conclusions

Symptomatic patients with **first-time DVT** have a **higher-than-expected** prevalence of **primary chronic venous disease**

**Valvular reflux** may be considered a **novel risk factor** for **DVT**

**Thank you!**