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Physiologic Assessment of the Severity of Iliac Vein Obstruction

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Management of Lower Extremity Venous Outflow Obstruction: Results of an International Delphi Consensus

Stephen A. Black, A. ✉ • Manjit Gohel • Rick de Graaf • … Bruce Fleck • Lawrence V. Hofmann • the International Venous Delphi Consensus Study Group † • Show all authors • Show footnotes

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No consensus: Q19. The threshold for stenting venous lesions in symptomatic patients who have either a greater than 50% reduction in cross sectional area as measured by IVUS or a greater than 50% reduction in luminal diameter as measured on venogram

Consensus: Q53. Venous stenting should be clinically driven and not based solely on image findings as iliofemoral venous compressive lesions occur naturally in a high percentage of the asymptomatic population, and not all need to bestented.

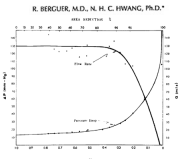
"Critical stenosis" concept

Mann, F. C., Herrick, J. F., Essex, H. E., Baldes, E. J. Surgery 4: 249-252, 1938

No change in ICA flow in <50% stenosis, 50% reduction in 90% stenosis

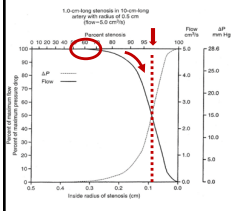
May AG, DE Weese JA, Rob CG. Surgery. 1963 Apr;53:513-24.

Critical Arterial Stenosis:
A Theoretical and Experimental Solution



Hemodynamics of stenosis: Physiological effects of stenosis

Flow rate
Poiseuille's law



Flow **Q** = $\frac{\Delta P}{R\ (resistance)}$ — Chemoregulation

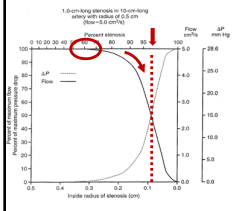
P *const*

Vasodilation

P↓ **ΔP**↑

Hemodynamics of stenosis: Physiological effects of stenosis

Flow rate
Poiseuille's law



Flow **Q** = $\frac{\Delta P}{R\ (resistance)}$ — Chemoregulation

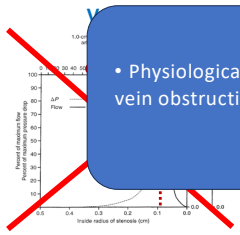
Vasodilation

Rperipheral

R=Rs+Rp

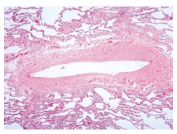
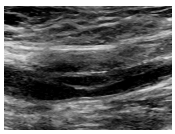
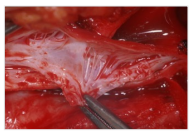
Hemodynamics of stenosis: Physiological effects of stenosis

Flow rate



- Physiological assessment of severity of iliac vein obstruction should measure resistance to the flow

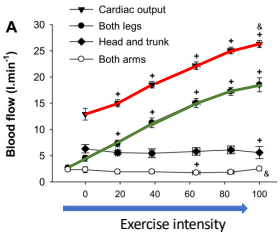
Venous Compliance and Resistance

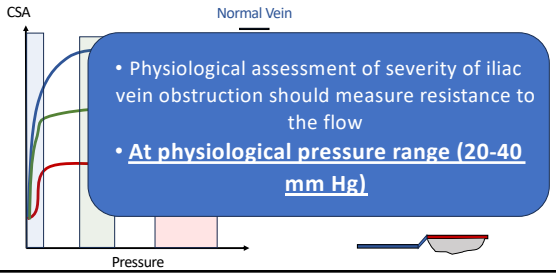
Peri-venous fibrosis | Stenosis | Synechia

Venous flow during excercise

Jose A. L. Calbet et al. J Appl Physiol 2007;103:969-978

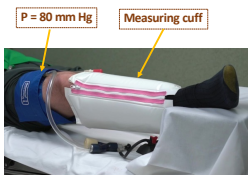


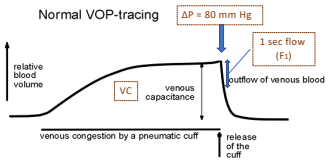
Venous Compliance & Resistance



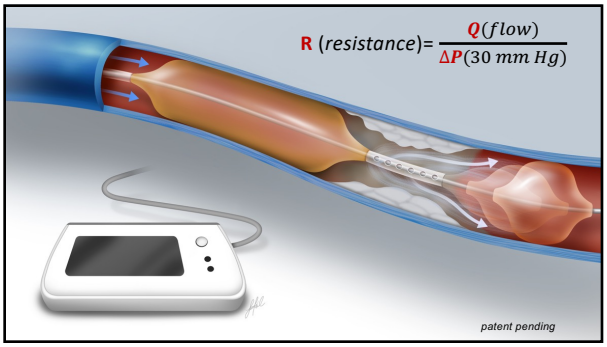
- Physiological assessment of severity of iliac vein obstruction should measure resistance to the flow
- **<u>At physiological pressure range (20-40 mm Hg)</u>**

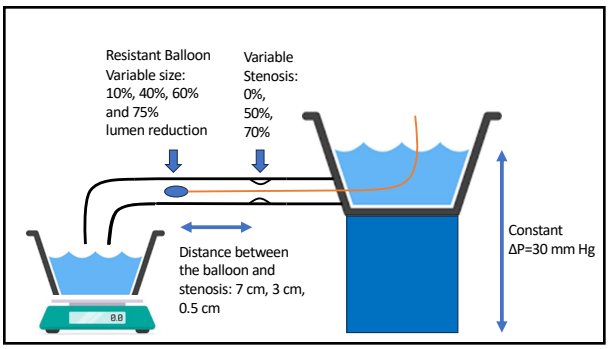
Non-invasive measurement of Resistance

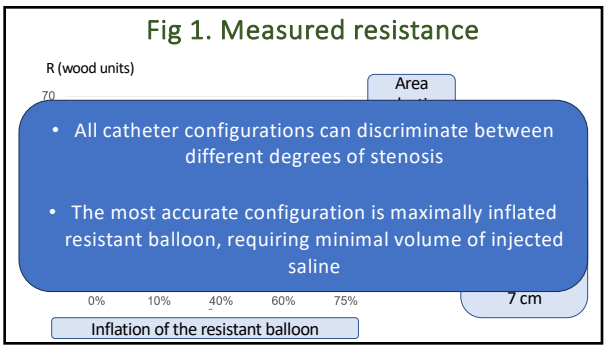


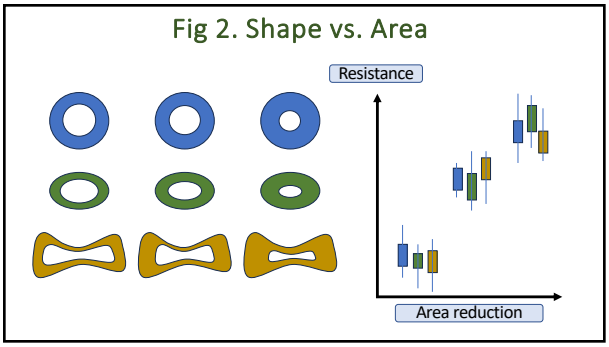


Resistance (R): $R \approx \Delta P/F = 80 mm\ Hg/\ F_1$









CONCLUSIONS

- Severity of venous obstruction relates to the outflow resistance at physiological pressure range
- Anatomical approach is unable to assess the severity of outflow obstruction
- Direct measurement of the venous resistance may help to assess the severity of venous obstruction