WHY NOT USE HOMEMADE FOAM FOR THE GSV

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Disclosures

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Varithena Vs. MD Reconstituted Foam Differences

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Results

So what is safe??

Sclerotherapy and foam sclerotherapy for varicose veins

• RCTs limited
• Foam better than liquid
• 3% polidocanol foam is no more effective than 1%
• Optimum ratio of gas to liquid is 4:1
• Carbon dioxide foam reduces the systemic complications
• The relative advantages or disadvantages of this treatment in the longer term have yet to be published.

Coleridge Smith 2009
What about Neurological events following foam sclerotherapy?

Division of Vascular and Endovascular Surgery

Study Results:
• 82 patients with treatment of GSV, of whom 60 were “bubble positive” (89% in R>L shunt)
• 57 patients had MRI at 24hrs and 28 days post-treatment
• All 60 patients had at least one post-treatment MRI
• No new brain MRI lesions detected in any patient at any time point
• Neurological exam & visual fields – No new abnormal findings
• Cardiac markers & ECG – No abnormalities

Bubble-Positive During Treatment: Patient Status

Case 1. 72 yr F. Bilateral weakness, resolved after 3 hours. CT air in vertebral artery.
Case 2. 35 yr F. Left sided weakness. Minor symptoms at 2 weeks

Case reports: summary

Sarvananthan, et al 2011

• 13 case reports of CVA
• 3 of the 9 TIA’s reported as case reports
• Onset of symptoms ranged from minutes (n=8), hours (n=4), following day n=2
• Other cases occurred at 2, 3, and 5 days
• 1 episode of speech or visual disturbance
• 11 patients found to have a right to left shunt (PFO)
Is foam sclerotherapy dangerous?

FDA TRIAL PHASE 2 – SAFETY

Proprietary Polidocanol Foam

Clinical Study Question

Clinical significance of cerebrovascular gas emboli during polidocanol endovenous ultra-low nitrogen microfoam ablation and correlation with magnetic resonance imaging in patients with right-to-left shunt.


When bubbles are detected in the cerebral arteries during or after polidocanol injectable foam ablation, do they cause identifiable injury?

Main modality to detect sub-clinical injury: diffusion weighted MRI (extremely sensitive to early edema formation)

Intravital Microscopy of Foam Injected into Rat Cremaster Microvasculature

Air-Based PCF (Tessari Method)

Complete filling of arterioles and cessation of flow

Varithena™ <0.8% nitrogen

Small bubbles not obstruct arterioles


Editorial

Neurological complications of foam sclerotherapy: fears and reality

Though strokes are exceptional, their prevention must be the physician’s main concern.

278 Phlebology 2011;26:277-279
There are all types of foam

How is PPF composition different from homemade foam?

Properties of Sclerosing Foams

- Challenges with sclerosing foams:
  - Foams coarsen (average bubble size increases), drain under gravity (liquid flows from around the bubbles) and separate into liquid. All of these connected properties influence the foam stability
  - Air (nitrogen) forms stable foam as the gas does not dissolve in blood. The bubbles therefore persist and can lead to adverse effects in vivo
  - CO₂ can be added to improve gas solubility but the resulting foams coarsen rapidly leading to drastically reduced stability
  - Physician foam compounding methods can generate large gas bubbles which can be problematic in the circulation

Foam Sclerotherapy

- Sclerosing foams contain surfactants (such as polidocanol) that disrupt the endothelial lining
- Performance is highly dependent on its physical characteristics (PCs) which are dependent on many factors:
  - Gas: liquid ratio (density) and gas solubility
  - Higher N₂ = stability (less soluble) but < adverse events, as bubbles persist in the blood
  - Higher CO₂ = stability (bubbles foam degrades quickly but is more soluble in blood
  - Bubble size and bubble homogeneity

Foam Bubble Size and Distribution

PPF possesses a narrow bubble size distribution with no large bubbles, similar to foams made using air (high nitrogen)

PCFs made by Tessari or Double Syringe Systems have broader bubble size distributions and large bubbles which affect foam stability

Foam Stability

- PPF small and narrow bubble size distribution = lower rate of increase in average bubble size (bubble coarsening) than CO₂-containing PCF’s
- PPF demonstrates a longer foam drainage time (FDT) than CO₂-containing PCF’s
- PPF displays a longer foam half separation time (FHT) than CO₂-containing PCF’s

Slow coarsening rate, longer drainage time and longer separation time = Enhanced PEM stability over PCF’s
Degradation Rate Changes With Gas Composition

100% CO₂

Room Air

Varithena™

Conclusions

Optimal foam sclerotherapy requires a stable foam to allow for foam handling and administration, good contact with the vessel wall, and ability to displace blood from the vein.

Air foams have good performance but have associated risks with persistent bubbles in the circulation.

Increased safety from soluble gases (CO₂) results in poor foam performance.

Conclusions

PPF possesses small bubbles and narrow bubble distribution with slow drainage and separation times, which improves foam performance by enhancing stability.

The biomimetic vein test produces a new measure of foam performance which demonstrates the advantages of the low degradation rate of PPF compared to PCFs.

The PPF O₂:CO₂ low nitrogen gas composition results in better overall performance in a variety of tests than physician compounded foams, without residual air bubbles.

Conclusions

HOWEVER, there have been no RCTs comparing Proprietary Polidocanol Foam to Physician Compounded Foam in terms of efficacy or Patient reported outcomes.

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