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Complex Low-Flow Vascular Malformations and the Journal Reports of Multiple Sclerosant Agents: A World in Endovascular Confusion and Chaos!!!  
JVIR 2015; 26:1494-1496

Nothing to Disclose

Ul Haq et al. “Bleomycin Foam Treatment of Venous Malformations: A Promising Agent for Effective Treatment with Minimal Swelling.”  
JVIR 2015; 26:1484-1493

Ul Haq et al:  
- 20 patients underwent 21 Bleomycin procedures  
- 6 procedures involved additional sclerosants  
- 40% complication rate (per patient basis)  
  - 30% minor, 10% major  
- 29% complication rate (per procedure basis)  
  - 22% major, 7% major  
- All patients had decrease in symptoms

Ul Haq et al:  
- “…use of Bleomycin should be reserved for locations where post-procedure swelling would be dangerous.”  
- 1 patient required endotracheal intubation for 4 days due to severe and prolonged tongue swelling to maintain airway for 4 days.  
- Another patient required prolonged intubation and hospitalization for 15 days after Bleomycin and ethanol in the tongue.
Ul Haq et al: “Swelling was seen only in the area treated with alcohol, not in the area treated with Bleomycin foam.”
- 10% had prolonged intubation secondary to severe swelling obstructing the airway.
- This severe swelling is a potential with any sclerosant injections.

Hassan et al. “Noninvasive Management of Hemangiomas and Vascular Malformations Using Intralesional Bleomycin Injection”
Ann Plast Surg 2013; 70:70-73

Hassan et al:
- 71% effectiveness rate; 29% failure rate
- 14% complication rate
- 5 major ulcerations in 75 patients treated

Plast Reconstr Surg 2011; 127:2031-2044

Sainsbury et al:
- 82.7% effectiveness rate; 17.3% failure rate
- Complications included:
  - Severe Blistering
  - Ulcers
  - Severe Swelling
  - Infections
  - Recurrences

Bai et al. “Sclerotherapy of Microcystic Lymphatic Malformations in Oral and Facial Regions.”
Bai et al:
- 43% effectiveness rate; 57% failure rate with IR endovascular treatment alone
- 74% effectiveness rate; 26% failure rate with IR Rx followed by surgery

J Vasc Surg 2011; 53:150-155

Young et al:
- 81% effectiveness rate; 19% failure rate – Macrocystic LM
- 63% effectiveness rate; 37% failure rate – Microcystic LM
- Complications included:
  - Ulcerations
  - Hematoma
  - Bleeding
  - Fevers
  - Soft Tissue Atrophy

Zhang et al. “Comparison Between Absolute Ethanol and Bleomycin for the Treatment of Venous Malformations in Children.”
Exp Ther Med 2013; 6:305-309

Zhang et al:
- 138 children consecutively treated
- 71 of 75 patients (95%) had “cured”, “markedly effective” or “effective treatment” with absolute ethanol
- 41 of 63 patients (65%) had “effective” treatment in the Bleomycin group
- The difference in ETOH group and Bleo group were statistically significant: $X^2 = 19.6, P<0.05$
- ETOH group of 75 patients had 14 cases of skin necrosis
- Bleo group of 63 patients had 5 cases of skin necrosis
- ETOH group statistically superior to Bleo group
Zhang et al: “Cured” = disappearance post-Rx without recurrence

- “Markedly Effective” = >80% was ablated
- “Effective” = improved, <80% reduction
- “Ineffective” = No VM reduction or continued increase

Zhang et al: Ethanol Group
- 30 cases 1 treatment, 30 cases 2x, 15 cases 3x
- Superficial VMs: 38 of 40 (95%) effective rate
- Deep VMs: 33 of 35 (94%) effective rate
- 15 of 75 cured; 33 markedly effective; 13 effective; 4 ineffective
- Failure rate: 5.3%
- Skin Necrosis: 14 superficial cases; 35%

Zhang et al: Bleomycin Group
- 6 cases 1 treatment, 23 cases 2x, 31 cases 3x, 3 cases 4x
- Superficial VMs: 32 of 47 (68%) effective rate
- Deep VMs: 9 of 16 (56%) effective rate
- 6 of 67 cured; 19 markedly effective; 16 effective; 22 ineffective
- Failure rate: 33.1%
- Skin Necrosis: 5 superficial cases; 10.6%

Lee et al. “Advanced Management of Venous Malformation with Ethanol Sclerotherapy: Midterm Results.”

Lee et al:
- 87 patients; 399 procedures
- 95% significant or complete ablation
- 12.4% complication rate
Johnson et al. “Percutaneous Ethanol Sclerotherapy of Venous Malformations of the Tongue.”
AJNR 2002; 23:779-782

- Tongue VMs; 100% success rate
- 1 patient with massive tongue VM and concurrent breathing difficulties prior to treatment remained intubated 5 days and then uneventfully discharged

Su et al. “Absolute Ethanol Sclerotherapy for Venous Malformations in the Face and Neck.”

- Head and Neck VMs; 56 of 60 patients cured (90%)
- 4 minimal residual
- No skin necrosis; no nerve injuries

Clinics (Sao Paulo) 2010; 65: 837-840

- Used local anesthesia only; 39 patients with extremity VMs with main symptoms of pain
- Complete cure or significant symptom improvement 94%
- 1 skin ulcer; 3 transient paresthesias
Lee et al. “Ethanol Sclerotherapy for the Management of Craniofacial Venous Malformation: the Interim Results.”
Korean J Radiol 2009; 10;269-276

- 87 patients; craniofacial VMs
- Mean follow-up 35 months; 305 procedures
- 71 of 87 excellent outcomes (75% reductions)
- 1 Pt transient tongue decreased sensation; 1pt transient facial nerve palsy
- No skin necrosis

JVIR 2014; 25:206-213

- VMs in 31 patients; AVMs in 15 patients
- Major complication rate:
  VMs: 9.7% (per patient); 5.4% (per procedure)
  AVMs: 13.3% (per patient); 3.9% (per procedure)
- Minor complication rate:
  VMs: 16.1% (per patient); 9.8% (per procedure)
  AVMs: 6.7% (per patient); 2% (per procedure)
- Major: 1 ulcer injury; digit amputation; 1 leg compartment syndrome requiring fasciotomy; 1 skin ulcer; 1 transient sciatic neuropathy
- 24 patients cured; 12 patients significantly improved; 10 patients no change

The Yakes Vascular Malformation Center
January 2002 – October 2016

Yakes VMC

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<tr>
<th>Procedures</th>
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<td>Patients</td>
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<td>Ethanol Used</td>
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Patients

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<tr>
<th>VM/LM : AVM</th>
<th>TF Ratio</th>
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<tr>
<td>Head &amp; Neck</td>
<td>1,517</td>
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<td>Lower Extremity</td>
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<td>Chest/Abdomen</td>
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<td>Pelvic/Buttock</td>
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Minor Complications

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<th>Minor Complications</th>
<th>Count</th>
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<tbody>
<tr>
<td>Skin Injury</td>
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<tr>
<td>Temporary Nerve Injury</td>
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<td>Superficial Blood Clot</td>
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<td>Infection</td>
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<td>Bleeding</td>
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Major Complications

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<tr>
<th>Major Complications</th>
<th>Count</th>
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<td>DVT</td>
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<td>Cardio-Pulmonary Arrest</td>
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<td>Hypoxia/Airway Compromise</td>
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<td>Complications from Focal Swelling</td>
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<td>Cerebrovascular Accident</td>
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<td>Anaphylaxis</td>
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<tr>
<td>Bowel Perforation</td>
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Summary

- Ethanol publications state its efficacy routinely at 90-100% of cases.
- All other second tier sclerosants state their efficacy 60-80%.