Percutaneous Treatment of Venous and Lymphatic Malformations

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Conflict of interest

- No disclosures
Objectives

1. Concept and classification

2. Sclerotherapy agents

3. Technique

4. Venous and lymphatic malformations cases
Vascular anomalies classification

1. Hemangiomas (endothelial proliferation)
2. Vascular malformations (No proliferation)

Morphogenesis

- Low Flow
  - Capillary Malformations
  - Lymphatic Malformations
  - Venous Malformations

- High Flow
  - AVMs
  - AVFs

# ISSVA consensus 1996

## Table 1 Combined ISSVA and Jackson Classification of Vascular Anomalies

<table>
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<tr>
<th>Tumors</th>
<th>Simple</th>
<th>Combined</th>
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<tr>
<td>Infantile hemangioma</td>
<td>Low Flow</td>
<td>High Flow</td>
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<tr>
<td>Congenital hemangioma</td>
<td>Capillary malformation (CM)</td>
<td>Arteriovenous fistula (AVF)</td>
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<td></td>
<td>Lymphatic malformation (LM)</td>
<td>Arteriovenous malformation (AVM)</td>
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<td>Venous malformation (VM)</td>
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<tr>
<td>Tufted angioma</td>
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<td>Kaposiform hemangioendothelioma</td>
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<td>Hemangiopericytoma</td>
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<td>Pyogenic granuloma</td>
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<td>Spindle-cell hemangioendothelioma</td>
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2. ISSVA consensus 1996
Patient Problems

1. Cosmetic Deformity
2. Hemorrhage (acute or chronic)
3. Analgesia
4. Functional Problems
   - airway
   - feeding
   - speech, vision, hearing
Multidisciplinary Team

Vascular Birthmark Institute of NY
Roosevelt Hospital  New York
Alcohol (98%)

- Extremely effective
- Direct toxic effect on the endothelium that activates the coagulation system and causes the microaggregation of red blood cells.
- Occlusion of the lumen occurs within minutes or days.
- Side effects:
  - If it reaches the capillary bed of any given tissue (e.g., skin), and it usually causes significant soft-tissue swelling and necrosis
  - Compartment syndrome (nerve compression).
  - If reaches systemic circulation
    - CNS depression,
    - Hemolysis,
    - Cardiac arrest

1. Draw up 5 mL/1 ampule at a time
2. Give to physician for the sterile field

Max 1mg/Kg
Sotradecol

- Sodium tetradecyl de sulfate
- Contains 2% benzyl alcohol and is commonly used for venous malformations and varicose veins.
- Less painful for the patient, and less toxic than absolute alcohol.

PYXIS:
Stocks Sotradecol 3% 30 mg/mL (2 mL vial)

TO MIX:
1. Draw up 2.5 mL of STS (Sotradecol 3%)
2. For each 2.5 mL add 0.25 mL of Lipiodol
3. Add 0.5 mL of air

To dilute the solution to less than 3% (for more superficial lesions to prevent skin breakdown) add normal saline in equal parts to STS.

Max 0.5mg/Kg
Doxycycline

- **Doxycycline** is an antibiotic medicine belonging to the class called "tetracyclines."
- It is an effective sclerosant agent for lymphatic through inhibition of endothelium growth and local inflammation.
- Extremely painful and must be combined with local anesthetic.
- Necrosis and discoloration.
PYXIS:
Stocks DOXYCYCLINE 100MG VIAL (powdered form for reconstitution)

TO MIX:
1. Add 5mL of sterile water for injection to 1 vial = 20mg/mL
2. Add 5 mL Isovue-300 contrast = 10 mg/mL
3. Total mixture = 100 mg/10 mL
   • Repeat as above for additional vials

For example:
• 2 vials + 10 mL sterile water for injection + 10 mL contrast = 200mg/20 mL
• 3 vials + 15 mL sterile water for injection + 15 mL contrast = 300 mg/30 mL

Maximum dose:
Doxycycline 20mg/kg or 1 gram

Addendum:
*Physician may ask for Bupivicaine 0.25% (2.5 mg/mL)
*This is placed on the sterile field in the original concentration. No mixing is required.
*It is a local anesthetic used with sclerotherapy.
*No maximum dose recorded for sclerotherapy use.
*Usage in pediatric patients (under age 12) is not recommended as per enclosed IFU
OK-432

- **OK-432** is a lyophilized biological preparation containing the cells of *Streptococcus pyogenes*.
- This sclerosant agent particularly useful for lymphatic malformations (cystic hygroma lesions).
- Shrinkage of the lesions is usually noted around 5 to 6 weeks.
- The mechanism of this therapy is uncertain.
- Presently, OK-432 has not been approved by the FDA.
Bleomycin

- 15 mgrs (15 IU) per procedure
- 400 mgrs total life doses
Bleomycin

+ • Minimal inflammatory response
  • Ideal for mucosal lesions
  • Intraorbital

- • Dose limited per procedure
  • Total dose limited
  • Pulmonary fibrosis
  • “high” flow
  • Skin hyperpigmentation
Bleomycin Precautions

- Protect Airway from Airway Access!!
- Avoid Tape removal
- Avoid scratching
We developed a simple technique using a fine 25G angiocath placed through the malformation.

It is then connected to a transparent IV tubing filled with the sclerotherapy embolic agent, and or contrast material.
Then via gentle withdrawing of the microcatheter, with the column of liquid agent at 15 to 25 cms above the puncture level, and observing the fluid meniscus.
a microcystic channel is entered, the fluid column will advance and permeate the vascular territory.

As the compartment becomes occluded, the pressure, or height of the column must be raised, permitting us to confirm the progressive occlusion of the microcyst.
The passive permeation of the lesion is observed with a radiopaque sclerosing liquid (Doxycycline mixed with iodinated contrast material)
Venous Malformations

Normal Vein
- Adventitia
- Media (muscle cells)
- Intima
- Nerve endings to each muscle cell

Malformed Vein
- Early Stage
- Late Stage
Lymphatic malformations
Questions?

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Page me through the operator any time

• Stroke team on call

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