The Best Management for AVMs with Ethanol and/or Coils by SMC Classification
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Angiographic Classification of Extremity AVMs

Type I: Arterio-venous Fistulae
Type II: Arteriolo-venous Fistulae
Type III: Arterio-venulo Fistulae with or without fistula dilatation

Ethanol Embolotherapy
- General anesthesia to control pain
- Swan-Ganz catheter insertion to monitor PA pressure
- Staged multi-session embolotherapy
  - to reduce the risk of too extensive embolization
  - total dose of ethanol < 1mL/Kg of body weight
  - single bolus injection of ethanol < 0.1 mL/Kg

Approach to AVMs
- Transarterial Transvenous approach
- Direct puncture
- Selection of approach
  - Types of AVMs
  - Extreme arterial tortuosity
  - Previous arterial ligation

M/4 with leg swelling
Before Tx 6 month F/U

Approach to AVMs

F/44 with pulsating mass

F/48: Pain and swelling

12 cc of 80-100% ethanol
After 7 sessions of Tx

Using Coils

- When to use coils
  - Type II AVMs (21% of all AVMs)
  - Before ethanol injection
  - To reduce the blood flow of AVMs
- Where to use coils
  - Starting point of the draining vein
- How to use coils
  - Direct puncture
  - Transvenous approach

송오룡
M/27 with Back pain and dyspnea

신오숙
F/49 : Forearm AVM

Before Tx
After Tx
Trans-venous coil embolization
+ Intra-arterial ethanol injection

Completion angiography

Before Tx

6 month F/U

Ethanol & Coil Embolotherapy of Pelvic AVM
Mean duration of f/u, 33 mo (1-96 mo)

<table>
<thead>
<tr>
<th>Results</th>
<th>N=12 (Type II AVM)</th>
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<tbody>
<tr>
<td>Complete remission</td>
<td>10 (83%)</td>
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<tr>
<td>Partial remission</td>
<td>2 (17%)</td>
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<tr>
<td>Aggravation / recurrence</td>
<td>0</td>
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</tbody>
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- Reduce the number of repeated treatment (mean, 1.9 sessions/ pt)


Results

- Therapeutic outcome (n=176)
  - cure 39%
  - partial response 51%
  - no response or failure 10%
- The most common form of AVM
  - type IIIb 52%
- Positive influence on clinical outcome
  - Localized ($p = 0.002$)
  - type I or II ($p = 0.001$)

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Complications of Ethanol Embolotherapy

- 45% of overall complication rates (76/176)
- 35% of minor complication
  - Localized skin blister or skin necrosis (46/176)
  - transient nerve palsy (4/176)
  - finger joint stiffness (2/176)
- 10% of major complications
  - skin necrosis required skin graft (2) or escharctomy (3)
  - finger amputation (3) and limb amputation (1)
  - thrombolysis for distal embolism (3)
  - permanent nerve injury (1)
  - pancreatitis (1) and ARF (1)

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Conclusions

- Ethanol embolotherapy of peripheral AVMs
  - Effective in more than 90% of the patients
  - Therapeutic outcomes of localized or type I and type II AVMs were better than other types
  - Pulmonary artery monitoring and infusion of vasodilator is essential during treatment
  - Relatively high complication rates

Thank You for Attention