Epistaxis Management
Kevin Whitehead, MD
Co-Director, Utah HHT Center of Excellence

HHT Patient and Family Conference
Pompano Beach, FL
September 22, 2019

Disclosures

• I am a cardiologist, not an ENT surgeon
  • I refer many patients to ENT surgeons, but I have never done any of the procedures discussed here...
  • No conflicts of interest
  • Discussing off-label use of medications

Disclosures

• THANKS:
  • Dr. Miles Conrad, UCSF (HHT Center Director)
  • Dr. Jacob Husseman, UCSD (ENT)
  • Dr. Douglas Reh, Johns Hopkins (ENT)
**Epistaxis**
- Very common - most common Otolaryngologic emergency in the U.S.
- Lifetime incidence of 60%
- About 7-14% of general population each year
- Of those with epistaxis about 6% seek medical care
- Anterior > Posterior
- Males > Females
- Winter > Summer

**Role of the Nose**
- Our preferred airway
  - Filter air
  - Smell, sample the environment
  - Prepare air for lungs
    - Warm and humidify air

**Rich nasal vasculature**
- The nose has a robust blood supply coming from both the internal and external carotid systems
- The rich blood supply allows the nasal mucosa to warm and humidify each breath
Telangiectasias form in characteristic sites
- Sites that experience trauma, require new vessel growth
  - Nasal mucosa
  - Mouth, lips, tongue, palate
  - Sun-exposed skin of face, ears
  - Hands, especially fingertips
- Telangiectasia is a small AVM
  - Vein part is thin-walled, expects low pressure
  - Artery part brings high pressure and high flow to vein

Normal Telangiectasia

Telangiectasia - high flow vessel
Nosebleed Management

HHT Epistaxis

- Nasal telangiectasias, a recipe for bleeding
  - Minimal trauma can induce significant epistaxis
- Put a vessel with thin walls, but high pressure and flow anywhere and there is risk of bleeding
- Put that vessel in a location that already needs high flow, where the surface protection is always being dried out...

HHT: Aftermath of a nosebleed

Epistaxis Severity Score (ESS)
Epistaxis Severity Score

https://www2.drexel.edu/HHT-ESS/

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Reason</th>
<th>Probability</th>
<th>Coefficient</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>History of nosebleeds</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Sinusitis or chronic rhinitis</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Allergic rhinitis</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Intubation or nasal surgery</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Male gender</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Female gender</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Age &gt; 60 years</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>History of bleeding</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Use of blood thinners</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>History of head trauma</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

HHT Guidelines - 2006

- Use agents that humidify nasal mucosa
- "Endonasal coagulation" recommended as first-line treatment
- Use ENT surgeon with HHT experience
- For epistaxis surgery
- For any other nasal surgery
- When packing the nose, use a method with low chance of causing rebleeding on removal
- Possible to consider blood thinners, consider risks and benefits
- All based only on expert opinion

Management of Epistaxis

- Preventative measures
  - Moisturization
- Acute nose bleed management
  - Afrin, packing
- Surgical intervention
  - Cautery, laser, sclerotherapy, embolization, septodermoplasty
- Medical Therapies
  - Bevacizumab, Timolol, Tranexamic acid, Estrogen
Prevention efforts

- Moisturization
- Saline irrigation +/-
- Humidifiers
- Blood pressure control
- Avoidance of anticoagulants
- Cotton Young’s procedure

Acute nosebleed care

- Each patient is the individual expert for their nose
- Many carry a supply kit
- Often, less is more
- Seek care when uncomfortable

Acute nosebleed management 101

- Blow the nose
- Liberally spray Afrin
- Pinch the nose and maintain pressure
- Lean slightly forward
- Ice pack
Nasal packing options

- Traditional ribbon gauze
- Expandable packs
  - Merocel, Rhino Rocket
- Absorbable materials
  - Surgicel, Surgifoam, Nasopore
- Balloons
  - Rapid Rhino

Use the material that is the least traumatic and most comfortable that will control the bleed.

Select materials that are less likely to cause repeat bleeding when removed.

What not to do!!!

- Avoid large non-dissolvable packs when possible
  - May worsen epistaxis
  - May cause epistaxis when removed
- Embolization and arterial ligation
  - No good evidence for efficacy

Vaseline gauze
Expandable packs

Balloon packing

Dissolvable Nasal Packing

Surgicel Fibrillar

Surgicel

ORC – oxidized regenerated cellulose
Nosebleed Management

Dissolvable Nasal Packing

Floseal
Bovine collagen granules coated in thrombin
www.baxter.com

Sinu-Foam
Carboxy-methylcellulose
www.arthrocare.com

Spray Foams

- Floseal
  - Advantages
    - Dissolvable
    - Hemostatic
    - Easy
    - Quick
  - Disadvantages
    - Cost
    - Scar tissue

- Sinu-Foam
  - Advantages
    - Dissolvable
    - Hemostatic
    - Even without thrombin
    - Easy
    - Quick
  - Disadvantages
    - Cost

Surgical ligation or embolization

- Surgeon can operate and ligate (cut) a supply vessel
- Interventional radiologist can plug a supply vessel from the inside (embolization)
- Emergency option when a nasal hemorrhage won't stop despite packing
  - (VERY UNUSUAL)
- Buys a short period of improvement, bleeding can come back worse than before

Cautery

- **Silver Nitrate**
  - Chemical cautery
  - Cauterizes by destroying tissue
  - Very easy to cause more tissue damage
  - Septal perforations not uncommon with excessive use

Cautery

- **Electricity to cause cautery = Electrocautery**
  - Technically a misnomer
  - **Electrocautery** - heats the tip of the device itself, and when applied to tissues, causes cauterization
  - **Electrosurgery** - passes electricity into the tissues, heating the tissues

Cautery

- **Monopolar Electrosurgery**
  - Passes electric current through the tissue
  - To grounding pad on body
  - Heats the tissues in very close proximity to the device without heating the device itself
  - Cauterizing tissue
  - **Monopolar** - more heat, risk of more tissue damage
Cautery

- **Bipolar Electrosurgery** – pass electrical current between the two tips of the surgical device, thus cauterizing tissue held by the tips of the device
- **Bipolar** – less heat, therefore less tissue damage

Cautery

Treatments for HHT Related Epistaxis

- Laser Cauterization
- Commonly Used
  - KTP (532 nm)
  - Yag (1060 nm)
  - Argon (500 nm)
- Cumbersome
  - Safety glasses, delivery
  - Expensive
Coblation
- Electricity is passed through saline to create a plasma field
- Operates at lower temperatures
- Coblation = "Cold Ablation"
- Subsequently less adjacent tissue damage
- Somewhat bulky wand

Sclerotherapy
- Injection with an agent which causes thickening of the vessel wall, obstruction of blood flow, clot formation and collapse of the lesion
- Previously used for treatment of other vascular lesions
- Studies have shown efficacy with improvement in ESS
- Minor complications of swelling, pain/headache, vasovagal
- Potential significant complications
  - Learning curve, experienced provider


Septodermoplasty

Now have skin in the nose
- Question of durability
- High maintenance
- Recurrence at edges and even within the graft
Young’s Procedure

- “End-stage” treatment option
- Circumferential flaps are elevated and sutured together
- Can be very effective
  - "Gave me my life back"
- Technically challenging
- Suture line can break down
- No nasal airway
- Mouth breathing, dental issues
- Sleep apnea management?
- Lose sense of smell

Medical Therapies, Early Ideas

- Avastin (Bevacizumab)
  - Could it be sprayed topically or injected to mucosa?
- Tranexamic acid and Aminocaproic acid
  - Promotes clotting (inhibits clot breakdown)
- Estrogen
  - Systemic therapy in female patients
  - Could be used topically in males and females
- Timolol
  - Properties of a VEGF inhibitor, lacking literature

NOSE study

JAMA | Original Investigation

Effect of Topical Intranasal Therapy on Epistaxis Frequency in Patients With Hereditary Hemorrhagic Telangiectasia: A Randomized Clinical Trial

Kevin Whitehead, MD
NOSE study

- No drug was better than placebo
- $800 bottle of Avastin gave same benefit as $5 bottle of saline
- Effect on ESS:
  - Placebo: 5.71 → 3.74
  - Avastin: 5.16 → 3.54
  - Estriol: 5.19 → 3.56
  - Tranexamic Acid: 5.43 → 4.06

Benefit of saline? Or placebo effect?

Bevacizumab nasal injection

Injected Bevacizumab
Karnezis TT, Davidson TM. Treatment of hereditary hemorrhagic telangiectasia with submucosal and topical bevacizumab therapy. Laryngoscope. 2012
- Prospective study, n=19 patients
- Injection under anesthesia
- 6/19 given additional topical Avastin
- Some given concurrent KTP laser
- ESS: 8.12 → 2.00
- Durability of treatment?
- Topical vs. Injected?
- Long-term safety

Rose Geranium Oil

Rose Geranium Oil
- N = 20 patients
- Mean follow-up 183 days
- ESS improved: 5.3 → 3.5 (p<0.0001)
- Improvement did not depend on severity:
  - Patient’s ESS < 5: ESS improved 1.29 (p<0.002)
  - Patient’s ESS > 5: ESS improved 2.33 (p<0.003)
- Overall Satisfaction (10 pt Likert): 7.8, 50% rated 10
- No adverse side effects.
**Timolol**

**Beta Blockers** (Propranolol) regress infantile hemangioma, possible anti-angiogenesis effect. Liquid timolol is used for glaucoma.

**Timolol**


- Timolol 0.5% ophthalmic solution: 1 drop / nostril qd
- Case report, n=1
- Evidence anecdotal
- Adverse effects: bradycardia, bronchial constriction (wheezing)

**IV Bevacizumab (Avastin)**

- Decreases bleeding
- Improves quality of life
- Downside:
  - Expensive
  - Blocks new vessel growth
  - Wound healing, etc.
  - High blood pressure, clotting risks
- Off-label - Not studied in HHT with clinical trials
- What is the right dose?
- What is a safe and effective duration?

**Mouse studies of Pazopanib**

![Mouse image](image-url)
Nosebleed Management

Medical Management

- Anti-angiogenic:
  - Bevacizumab (Avastin)
  - Pazopanib (Votrient)
  - Thalidomide (Thalomid)
  - Pomalidomide (Pomalyst)
  - Lenalidomide (Revlimid)

- Anti-fibrinolytic
  - Tranexamic acid (Lysteda)
  - Aminocaproic acid (Amicar)

- Estrogens and analogs
  - Estradiol (Estrace)
  - Tamoxifen (Soltamox)
  - Raloxifene (Evista)

Risk for serious side effects, need experienced supervision

Medical Management

- Other:
  - Doxycycline (many brands)
  - Tacrolimus (Prograf)
  - Sirolimus (Rapamune)
  - Beta blockers
    - Propranolol
    - Timolol drops

Risk for serious side effects, need experienced supervision