Pterygopalatine Fossa Approach and SPA Ligation

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**Sphenopalatine Artery Ligation**
- quick, definitive treatment of posterior epistaxis
- less expensive, more readily available than interventional angiography
- less expensive than posterior packing with hospital admission

**Sphenopalatine Artery**
- termination of the internal maxillary artery
- with the descending palatine
- may branch *before* entering nose through the sphenopalatine foramen
  - posterior septal branch
  - branch to middle turbinate

*adapted from Citardi, in Gates, Curr. Ther., 1998*
Endoscopic Ligation

- transpalatal sphenopalatine injection facilitates dissection
  - 1.5 cc of 1:100,000 epinephrine
  - 25 gauge needle with 45° bend, 2.5 cm deep
- intranasal decongestion
  - oxynatolone or 1:1000 epinephrine

TESPAL - Technique

- mucosal incision of lateral nasal wall
  - just anterior to inferior portion of basal lamella of middle turbinate

Endoscopic Ligation

- key landmark is the crista ethmoidalis
  - a ridge of bone on the perpendicular process of the palatine bone
  - posterior to the maxillary hiatus
  - anterior to the SPF

Rohen, Color Atlas of Anatomy; Bolger, 1999
**Endoscopic Ligation**

- ligate artery with two clips
- replace mucosal flap
- no packing necessary
- elevate blood pressure and observe for persistent bleeding

**Endoscopic Ligation - Outcome**

- short term success rates approach 100%
- 3 longer term studies show recurrences can rarely occur 1-2 years

Abdelkader SA, J Otol Laryngol, 2007; Nouraei M, Laryngoscope, 2007; Orlandi RR, AJNR, 2010

**Pterygopalatine Fossa**
Pterygopalatine Fossa

Body of sphenoid bone

pterygoid process

posterior wall of maxillary sinus

Contents

- fat
- internal maxillary artery
  - terminal branches
- maxillary nerve
  - multiple branches
- pterygopalatine ganglion
  - aka sphenopalatine ganglion

Communications

- infraorbital fissure
  - to orbit
- pterygomaxillary fissure
  - to infratemporal fossa
- sphenopalatine foramen
  - to nose
  - foramen rotundum
  - to cranial cavity
  - Vidian/pterygoid canal
  - to cranial cavity
  - pterygopalatine canal
  - to oral cavity
Communications

- foramen rotundum
  - to cranial cavity

- Vidian/pterygoid canal
  - to cranial cavity

- pterygopalatine canal
  - to oral cavity
  - divides into greater and lesser palatine canals

Why Approach the Pterygopalatine Fossa?

- lesion biopsy
  - often difficult to access for FNA
  - lesions may be poorly cellular

- lesion resection
  - typically juvenile angiofibromas (JNA)
  - lateral extension of nasopharyngeal lesions
  - sarcomas, etc.

- access to lateral aspect of sphenoid sinus
  - usually spontaneous encephaloceles

Approaching the Pterygopalatine Fossa

- transnasal transethmoidal endoscopic

- sublabial transmaxillary microscopic

Transnasal Tranethmoidal Endoscopic

- preliminary steps:
  - total ethmoidectomy
  - wide sphenoidotomy
  - wide maxillary antrostomy
  - removal of posterior nasal mucosa from within sinus
  - identification of sphenopalatine foramen and artery
  - PPF is dissected from medial to lateral

- remove posterior wall of maxillary sinus
  - (anterior wall of PPF)
  - medial to lateral, starting at sphenopalatine foramen
  - starting with Kerrison rongeur, moving to ethmoidal spoon (J) curette more laterally
  - preserve periosteum posterior to bone until all bone is removed
  - to control visualization

- incise periosteum to expose PPF contents
Transnasal Transethmoidal Endoscopic
- blunt dissection to identify neurovascular structures
  - internal maxillary artery and its branches
  - Vidian nerve
  - infraorbital nerve
  - pterygopalatine ganglion
- initially, dissect inferior to sphenopalatine foramen
- remove fat with bipolar
- clip and divide artery as needed

Accessing Lateral Sphenoid Sinus
- identify and remove periosteum of pterygoid process
- drill away underlying bone, medial to pterygoid muscle attachment
- carefully open into sphenoid sinus

Transnasal Transethmoidal Endoscopic
- advantages
  - minimal morbidity
  - readily extended into sphenoid sinus or contralateral nose
  - superb visualization (with control of bleeding)
- disadvantages
  - limited lateral extension
  - typically one-handed dissection

Sublabial Transmaxillary Microscopic
Sublabial Transmaxillary Microscopic

- Adaptation of transmaxillary ligation of internal maxillary artery
- Wider posterior maxillary wall opening
- Can extend into the medial infratemporal fossa
- Care to preserve posterolateral maxillary buttress
- Extension medially into the nasal cavity, ethmoid sinuses, and sphenoid sinus
- Can be extended superiorly into orbit or posteriorly into cavernous sinus

Sublabial Transmaxillary Microscopic

- " Pearls"
  - Extended sublabial incision – consider degloving
  - Perform middle meatal antrostomy, total ethmoidectomy, and sphenoidotomy in most comfortable way
  - (E.g., endoscopically)
  - Prior to initiating sublabial approach

Sublabial Transmaxillary Microscopic

- " Pearls"
  - Dissect PPF contents from medial to lateral (known to unknown)
  - Start at SPF and remain below it initially
  - Dissection plan is identical to endoscopic approach
  - Can be disorienting beyond posterior wall of maxillary sinus – consider image guidance

Sublabial Transmaxillary Microscopic

- Advantages
  - Superior, lateral, and posterior extension
  - Two handed dissection
  - Suctioning
- Disadvantages
  - Moderate swelling/bruising
  - More limited field of view
  - Can be disorienting superomedially

Potential Complications

- Skull base penetration
- Cerebrospinal fluid leak, meningitis
- Cranial nerve injury
  - Optic nerve
  - Maxillary nerve and its branches
  - Vidian nerve, pterygopalatine ganglion, and postganglionic fibers
- Vascular injury and bleeding
  - Internal maxillary artery and its branches
- Internal carotid artery
  - Eustachian tube injury
  - Mucocele and sinusitis
  - Nasolacrimal duct obstruction
  - Trismus
  - Oral-antral fistula

Approaching the Pterygopalatine Fossa

- Which approach?
  - Purpose of surgery – biopsy or resection
  - Lesion location – lateral or medial PPF
  - Nature of lesion – vascular? malignant?
  - Size of lesion – extension intracranially? infratemporally? contralaterally?
- Approaches are not mutually exclusive but complimentary
  - Also in combination with lateral approaches