Creative uses for acellular dermis

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Disclosure

• none

Learning Objectives

• Explain what is, and what is not, ENS
• Describe management of ENS
• Discuss septal perforation
Post nasal surgery issues

- Rhinitis sicca
  - Dryness directly correlates to volume of tissue absent, and meds, and other diseases
- Chronic pain syndrome
  - Implants of no help
- Persistent sensation of mucus
  - Implants of no help
- Empty nose syndrome
  - Breathing dysfunction after nasal (turbinate) surgery

Etiology

- Nasal surgery typically involving resection of turbinates
  - or some turbinate surgery that damages the mucosal surface, e.g., laser reduction
- Inferior turbinates most commonly involved
- Both IT & MT often involved
- Middle turbinates alone occasionally involved
Sensation to Airflow

- Airflow sensation poorly understood
  - Nasal vestibule most sensitive area
  - IT next most sensitive, and sensation decreases as move higher in the nose
    - Wrobel Ann Otol 2006;20:164–8
  - Reception localized to the mucosal surface
- ENS is a loss of sensation to airflow

ENS physiology

- Mucosa at surgical site may lose sensitivity to airflow
  - Poor sensory nerve regrowth after surgery
  - Zb: persistent numbness at inguinal herniorrhaphy site: 26.4%
- Airflow easily diverts toward “empty” space
- Normal mucosa has been robbed of airflow

Definition

- Paradoxical nasal obstruction
  - Widely patent nasal airway
  - Patient complains of a poor nasal airway
    - “blocked,” “empty,” “hollow”
- Dry mucosa/crusting with thick mucus
- Poor smell
- Poor voice
- Respiratory dysfunction
Definition

• What is not ENS
  – Pain is variable but often speaks against ENS
  – Iatrogenic atrophic rhinitis or secondary atrophic rhinitis
    • Tissue is missing, not atrophic; no odiferous crusts
    • Delayed ENS occurs – suggests atrophy or some delayed nerve injury possible

What ENS is

• Airflow easily diverts toward "empty" space
• Mucosa surrounding the "empty" space appears to have lost some sensitivity to airflow
• Normal mucosa has been robbed of airflow
• Conflicting messages to brain
  – Nose says “I’m suffocating”
  – Lungs/diaphragm says breathing fine

How common is ENS?

• 22.2% incidence of “atrophy” (likely ENS) following total inferior turbinectomy

• 8% of partial turbinectomy patients developed a dry nose
Definition

- ENS-IT
  - Inferior turbinate significantly resected
- ENS-MT
  - Middle turbinate significantly resected
- ENS-both
  - Both IT & MT significantly resected
- ENS-type symptoms
  - Appear to have adequate tissue, but symptoms and cotton test suggest ENS is present

ENS-IT
Diagnosis

- History of surgical intervention with turbinate resection/surgery
- Appropriate symptoms
  - Suffocation, possible crusts
- Improvement with “Cotton test”
  - Cotton placed into area of deficit to obstruct airflow leads to a subjective improvement in nasal patency

Cotton Test

- Requires that NO anesthetic agent be applied
- Takes time for patient to assess benefit
- Move cotton into different locations
- Alter size of cotton
- Record findings as surgical plan

Planning

- Review CT & nasal endoscopy to identify defect
- Cotton placed at selected area(s) to simulate graft
  - Air shifted away from empty area, toward unoperated area
  - Assess patient’s subjective sensation of nasal breathing
  - Alternatively, site infiltrated with saline to swell the site (e.g., IT injection)
Surgical Repair Technique

- Implant solid Alloderm into location identified per cotton test
- Septum
  - Craft alloderm into appropriate shape with chromic suture
- Lateral wall
- Injectables to existing turbinate

ENS surgical techniques

- Septal implantation
  - Original technique used d/t fear of nasolacrimal obstruction at side
  - Still used for ENS-MT (1 2x4cm thick)
  - Likely 100% post septoplasty → revision
  - Can craft acellular dermis into desired shape with chromic sutures
  - Anchor graft to mucosa for positioning
  - One side at a time if cartilage present

Septal Implantation
IT augment “spear” technique

Coronal CT showing healed lateral wall expansion site

ENS grafted
ENS implantation: my volume

- 81 cases performed on 57 different patients
  - Ranging from 1 to 5 case per patient
  - Performed from 2003 to 2013
  - ENS-IT 33, -both 12, -type 9, -MT 3

- Locations (may be >1 location/case)
  - Septum: 40
  - Lateral wall: 44
  - Inferior turbinate (spear): 18

Should turbinates be reduced?

Conclusion

- ENS is often a severely debilitating process
- Poorly understood
- Not accepted/believed by all ENT’s
- These patients can be made more comfortable and they tend to be very grateful
Endonasal Septal Perforation Repair

Outline

- Septal anatomy
- Perforations
- Surgical approaches
- Endonasal flap with acellular dermal graft

Septal anatomy

- cartilage
- bone: vomer, perpendicular plate of ethmoid
- maxillary crest
- anterior nasal spine
Septal blood supply

- Convergence of blood supply on ant. Septum
  - 90% epistaxis
  - Kisselbach’s plexus at Little’s area
- Contributors:
  - ant. ethmoidal
  - post. septal (terminal branch of sphenopalatine)
  - greater palatine
  - superior labial

Septal perforation origin

- Digital trauma (picking)
- Nasal sprays
- Cocaine
- Surgery (septoplasty)
- Septal cauterity for epistaxis
- Autoimmune disease
Septal Perforation

Perforation management option?

Most perforation repairs involve sliding mucosa
Septal rotation flap possible from either side.

Cut back of perf 180°.

Raise septal flap and encounter anterior edge of perf inside.

Routine septoplasty flap on left.

Rotation flap on right septum.
Inside septum after flap suturing

Acellular dermis visible per hole in left septum

Donor site on right

Splints in place for 3 weeks

Tissue grows into acellular dermis

3 weeks post

2 months post

What is the largest perf that can be repaired?

Likely 2.5cm if donor tissue present
Septal perforation repair results

- 20 patients treated
- 17 successful closures (85% overall)
  - 89% small <1cm
  - 80% medium 1-2cm
  - 100% large >2cm (1 patient)


Acellular dermis removed 6 months after implantation.

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