João Flávio Nogueira
Sinus Centro – Fortaleza, Brazil

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www.sinuscentro.com.br


Why do we have paranasal sinuses?

Abstract
Introduction: The paranasal sinuses, comprising the frontal, maxillary, sphenoid, and ethmoid sinuses, have existed in humans and other primates over the course of nearly two million years. This review aims to define the current evidence for the role of the paranasal sinuses, and to attempt to propose an answer to the question: Why do we have paranasal sinuses?

Materials and methods: A literature review was conducted, searching Medline (1966-2007), Embase (1988-2007), and the Cochrane Library and Ovid (1946-2007). Combinations of the following search terms were used: “paranasal sinuses,” “pathology,” “anatomy,” “function,” “evolution,” and “morphology.” Any relevant references were included to increase the depth of pertinent information. The content, relevant theories identified in the literature review are discussed and the evidence for these are critically evaluated.

Results: The current, relevant theories are described:

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1) "Evolutionary" theories: The paranasal sinuses may play a role in the production of nasal sounds and in aiding the immune defense of the nasal cavity. However, there is a distinction between nasal and other respiratory organs. It may still be that the sinuses serve as an aid to facial growth and architecture, or perhaps as channels through which the nasal cavity may have an additional role as an accessory to the nasal cavity.

2) "Physiological" theories: The paranasal sinuses may act to improve nasal function, or to stabilize the environment of the nasal cavity. The sinuses may act as a buffer to protect the nasal mucosa from rapid changes in temperature and humidity. The sinuses may also help to humidify and warm the inspired air. It may also be that the sinuses serve as an aid to facial growth and architecture, or perhaps as channels through which the nasal cavity may have an additional role as an accessory to the nasal cavity.

3) "Pathological" theories: The paranasal sinuses may play a role in the production of nasal sounds and in aiding the immune defense of the nasal cavity. However, there is a distinction between nasal and other respiratory organs. It may still be that the sinuses serve as an aid to facial growth and architecture, or perhaps as channels through which the nasal cavity may have an additional role as an accessory to the nasal cavity.

4) "Developmental" theories: The paranasal sinuses may play a role in the production of nasal sounds and in aiding the immune defense of the nasal cavity. However, there is a distinction between nasal and other respiratory organs. It may still be that the sinuses serve as an aid to facial growth and architecture, or perhaps as channels through which the nasal cavity may have an additional role as an accessory to the nasal cavity.

5) "Emotional" theories: The paranasal sinuses may play a role in the production of nasal sounds and in aiding the immune defense of the nasal cavity. However, there is a distinction between nasal and other respiratory organs. It may still be that the sinuses serve as an aid to facial growth and architecture, or perhaps as channels through which the nasal cavity may have an additional role as an accessory to the nasal cavity.
There is no convincing evidence that a reduction in nasal airflow is a causative factor for rhinitis or sinusitis.
There is very little exchange between the paranasal sinus and the nasal cavity during stable airflow.
Inflammation

- Swelling
- Edema
- Nasal discharge
- OMC blockage
- Sinusitis
- Pain (?)
- Mucosal changes

There is no cure

Control

Clinical treatment

- Anti-inflammatory
- Anti-allergic
- Nasal lavage
- ATB

Surgery

Objectives

- Unblock sinuses drainage pathways
- Preserving the anatomy
- Access for topical medication

Evolution endoscopic sinus surgery
At the initial surgery, patients presented many histopathological alterations, such as an inflammatory process infiltrating the submucosa, atypical respiratory epithelium with an important increase in goblet cells, metaplasia, or mixed epithelium.

Group 1 patients persisted with the same alterations 1 year later, but ciliary dysmorphosis was more accentuated.

Group 2 patients presented a predominantly pseudostratified epithelium, but some areas contained an increased number of goblet cells and a reduction in the number of ciliated cells.

Conclusion:
Recovery of the maxillary sinus mucosa of patients with CRS, observed by electron and light microscopy, was incomplete 1 year after endoscopic surgery.

5F – 7F Fogarty biliary balloon catheters
Temporary ventilation
US$ 85.00
The purpose of this investigation was to determine whether BCD within the frontal recess is associated with reproducible patterns of fracture in bony lamellae, to characterize changes between pre- and postintervention measurements of the frontal sinus outflow tract, and to compare the degree of change seen with endoscopic Draf I dissection.

METHODS: Eight cadaver heads underwent pre- and postintervention endoscopic visualization and computed tomography (CT) of the frontal recess and frontal sinus outflow tract. Frontal recesses were assigned for either BCD or Draf I dissection.

RESULTS: Inter-rater reliability was strong for all measures (r > 0.77; p < 0.001). The sagittal and coronal dimensions of the frontal sinus outflow tract increased significantly after BCD and Draf I dissection (p < 0.028). Mean change in the sagittal dimension was significantly less after BCD compared with Draf I dissection (1.0 ± 0.8 mm versus 4.0 ± 1.3 mm; p = 0.018). The anterior face of the ethmoid bulla was the most frequently fractured lamella after BCD (56%).

CONCLUSION: The sagittal and coronal dimensions of the frontal sinus outflow tract increased significantly after BCD and Draf I dissection. A significantly greater change in dimensions of the frontal sinus outflow tract is observed after Draf I dissection compared with BCD. No orbital or skull base injury was noted with either technique.


INDICATIONS BCD

Balloon sinuplasty for the surgical management of immunocompromised and critically ill patients with acute rhinosinusitis

CONCLUSION
Critically ill and immunocompromised patients with acute sinus disease are exposed to potentially lethal complications. Although these patients who fail medical management may require surgery, they are often poor surgical candidates. Balloon sinuplasty represents a potentially less invasive surgical option than standard ESS and should be considered in appropriate critically ill or immunocompromised patients.

NITRIC OXIDE

- Free radical
- NOS-2
- Immunological response
  - Increase of NO
  - Vasodilatation
  - Hipotension

NITRIC OXIDE

- Paransal sinuses?
- Maxillary sinus is producer
- Increase of MCF
- May act as protector of upper airways

High nitric oxide production in human paranasal sinuses


Background: Nitric oxide (NO) is produced in significant quantities in the nasal sinuses and is thought to have a beneficial effect on the mucociliary transport of the sinuses and nose and to have significant antibacterial properties that contribute to the health of the sinuses.

Methods: Twenty-nine patients who were post-endoscopic sinus surgery were included with 52 who were maxillary sinus ostia cannulated. There were 22 large maxillary sinus ostia and 30 small ostia. Smoking, allergy status, and topical steroid use were recorded. NO levels were measured in the nose and maxillary sinus after decongestion with patients mouth breathing and breath holding.

Results: This study shows that enlargement of the maxillary sinus ostium above its normal size (20 mm²) produces a significant decrease in both the maxillary sinus and the nasal cavity NO levels. In addition, the size of the ostium showed a significant correlation to the sinus NO level.
OBJECTIVES: Assess the effectiveness of functional endoscopic sinus surgery as a treatment for patients with chronic rhinosinusitis.

SEARCH STRATEGY: The Cochrane Ear, Nose and Throat Disorders Group Trials Register, MEDLINE (1966 to January 2006) and EMBASE (1974 to January 2006) were searched.

SELECTION CRITERIA: Randomised controlled trials.

DATA COLLECTION AND ANALYSIS: Comparisons between FESS versus medical treatment, FESS versus conventional sinus surgery.

MAIN RESULTS: The three included studies were randomised controlled trials. The evidence available does not demonstrate that FESS, as practised in the included trials, is superior to medical treatment with or without sinus irrigation in patients with chronic rhinosinusitis.

A middle meatal antrostomy fashioned by FESS was also not shown to be superior to an inferior meatal antrostomy formed by traditional sinus surgery techniques.

CONCLUSIONS: FESS as currently practised is a safe surgical procedure. The limited evidence available suggests that FESS as practised in the included trials does not confer additional benefit to that obtained by medical treatment (with sinus irrigation) in chronic rhinosinusitis. More randomised controlled trials comparing FESS with medical and other treatments, with long-term follow-up, are required.

*Pre-op*

*Post-op*


US$ 1,200.00
• Surgery for access of medication and lavage
• In selected cases we should preserve as much as we can the anatomy
• Nasal aerodynamics
• FESS x TESS
• Balloons are tools