BALLOON SINUPLASTY

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Sinus Centro – Fortaleza, Brazil

DISCLOSURE

- Research grant from Acclarent / J&J (2011)
- Silver Books – Karl Storz (2011)

www.sinuscentro.com.br

WHERE I AM FROM

Review Article

Why do we have paranasal sinuses?

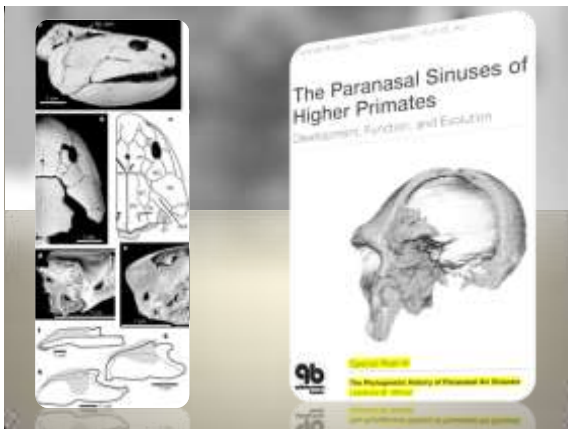
Abstract

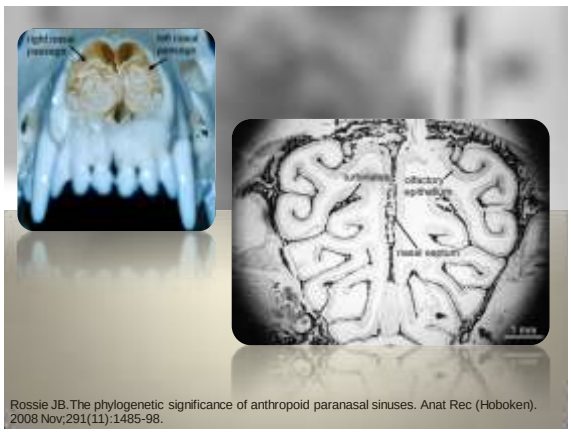
Introduction: The paranasal sinuses, comprising the frontal, maxillary, ethmoid and sphenoid sinuses, have caused consternation and debate over their true function over the course of nearly two millennia. This review aims to define the current evidence for the role of the paranasal sinuses, and to attempt 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), the Cochrane Library and Ovid (1966–2007). Combinations of the following search terms were used: 'paranasal sinuses', 'physiology', 'anatomy', 'function', 'evolution' and 'thinology'. Any relevant references were cascaded to increase detection of pertinent information. The current, testable theories identified in the literature review are discussed and the evidence for them critically analysed.

Results: The current, testable theories are described.

Discussion: The paranasal sinuses may act simply to improve nasal function, certainly, it has been demonstrated that they may act as an adjunct in the production of nitric oxide and in aiding the immune defences of the nasal cavity. However, there is a distinction between utility and evolutionary origin. It may still be that the sinuses arose as an aid to facial growth and architecture, or persist as residual remnants of an evolutionary structure with an as yet unknown purpose, and in doing so have found an additional role as an adjunct to the nasal cavity.





Rossie JB. The phylogenetic significance of anthropoid paranasal sinuses. Anat Rec (Hoboken). 2008 Nov;291(11):1485-98.

Do chronic changes in nasal airflow have any physiological or pathological effect on the nose and paranasal sinuses? A systematic review.

There is no convincing evidence that a reduction in nasal airflow is a causative factor for rhinitis or sinusitis

Patency of the maxillary sinus ostium in healthy individuals.

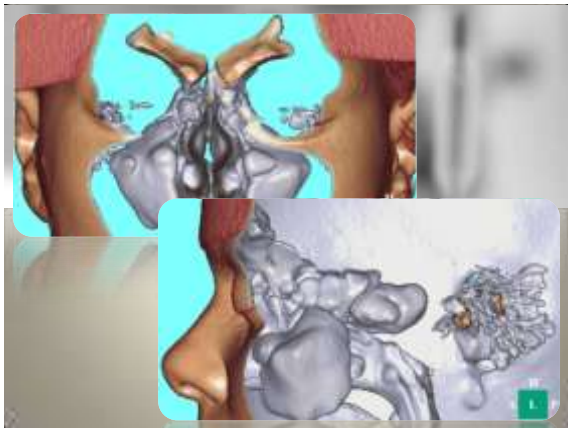
Assessment of Septal Deviation Effects on Nasal Air Flow: A Computational Fluid Dynamics Model

Xiao Hong Chen, BE; Hoow Paeh Lee, MS, PhD; Vincent Fook Hin Chong, MD; De Yan Wang, MD, PhD

Results: In the nose model with septal deviation, major changes in the pattern of inspiratory airflow (e.g., flow partitioning and nasal resistance, velocity and pressure distributions, intensity and location of turbulence), wall shear stress, and increasing of total negative pressure through the nasal cavity were demonstrated qualitatively and quantitatively. In the healthy nose, the area with the highest intensity of turbulent flow was found in the functional nasal valve region, but it became less apparent or even disappeared in the septal deviation one.

Computational fluid dynamics simulation of airflow in the normal nasal cavity and paranasal sinuses.

There is very little exchange between the paranasal sinus and the nasal cavity during stable airflow



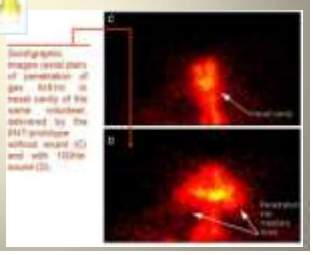
INFLAMMATION

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

INFLAMMATION

- There is no cure
- Control
  - Clinical treatment
    - Anti-inflamamatory
    - Anti-allergic
    - Nasal lavage
    - ATB

INFLAMMATION



SURGERY

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

SURGERY

- **Evolution endoscopic sinus surgery**

1970s 1980s e 1990s

F.E.S.S.

SURGERY

Anselmo-Lima WT, Ferreira MD, Valera FC, Rossato M, de Mello VR, Demarco RC. **Histological evaluation of maxillary sinus mucosa after functional endoscopic sinus surgery**. Am J Rhinol 2007;21(6):719-24

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 dysmorphy 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.**

http://www.elmundo.es/elmundosalud/especiales/2005/03/galeria_cuerpo/21.html

SURGERY

Anselmo-Lima WT, Ferreira MD, Valera FC, Rossato M, de Mello VR, Demarco RC. **Histological evaluation of maxillary sinus mucosa after functional endoscopic sinus surgery**. Am J Rhinol 2007;21(6):719-24

Conclusion:

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

Minimally invasive sinus technique: what is it? Should we consider it?

Peter J. Catalano

SURGERY

Pre- and Postoperative Sinus Penetration of Nasal Irrigation

Conclusions: Unoperated sinuses or cases with gross sinus ostial obstruction will not be reliably penetrated by sinus irrigant. A 3.95-mm ostial diameter seems to be the minimum size to guarantee penetration in paranasal sinuses to maximize the potential for topical sinus treatment.

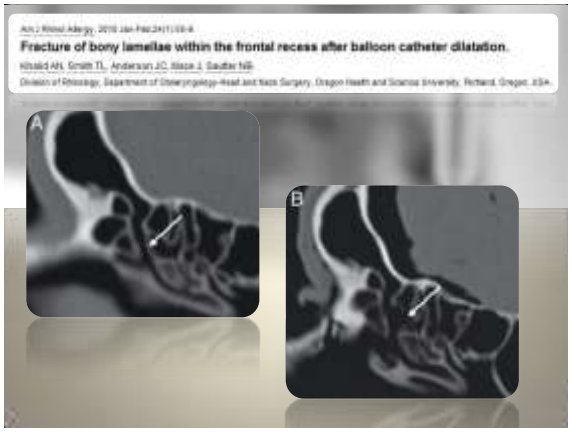
Lanza DC. Postoperative care and avoiding frontal recess stenosis. In: Abstracts of the International Advanced Sinus Symposium, Philadelphia, Pa, July 1993.

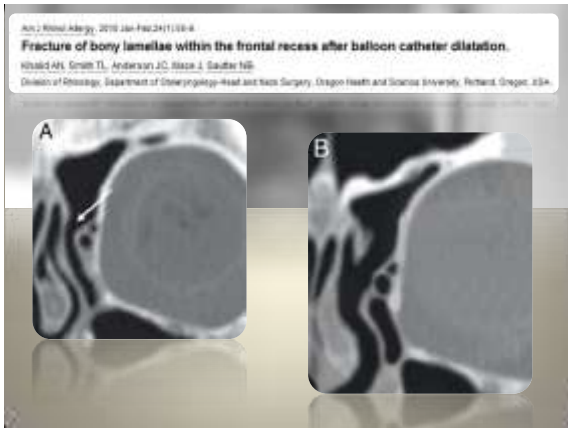
5F – 7F Fogarty biliary balloon catheters

Temporary ventilation

US$ 85,00


Relieva Luma


Fracture of bony lamellae within the frontal recess after balloon catheter dilatation.
A
B


Fracture of bony lamellae within the frontal recess after balloon catheter dilatation.
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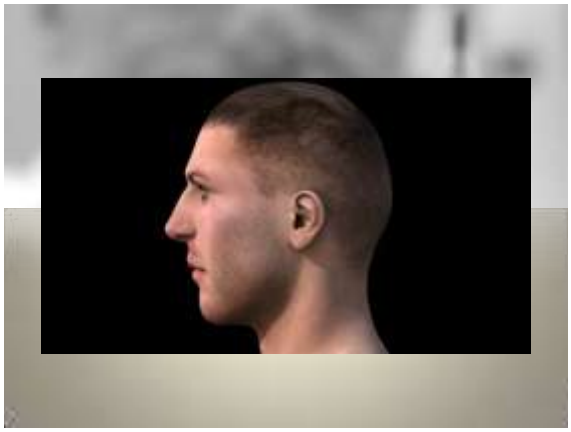
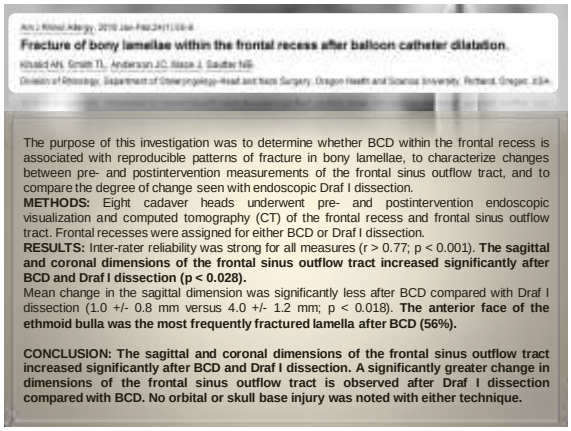
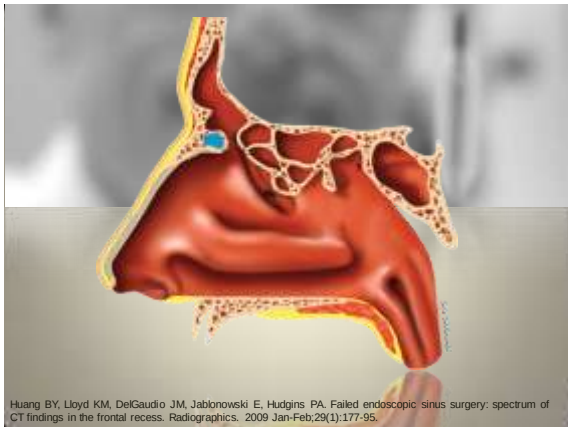
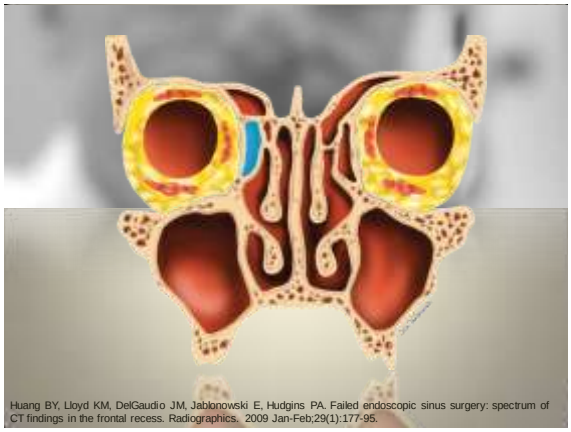



Fracture of bony lamellae within the frontal recess after balloon catheter dilatation.
The purpose of this investigation was to determine whether BCD within the frontal recess is associated with reproducible patterns of fracture in bony lamellae, to characterize changes between pre- and postintervention 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 +/- 1.2 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.



Huang BY, Lloyd KM, DelGaudio JM, Jablonowski E, Hudgins PA. Failed endoscopic sinus surgery: spectrum of CT findings in the frontal recess. Radiographics. 2009 Jan-Feb;29(1):177-95.



Huang BY, Lloyd KM, DelGaudio JM, Jablonowski E, Hudgins PA. Failed endoscopic sinus surgery: spectrum of CT findings in the frontal recess. Radiographics, 2009 Jan-Feb;29(1):177-95.

INDICATIONS BCD

SHORT SCIENTIFIC COMMUNICATION

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

Maria L. Wiltfong, MD, Samuel S. Becher, MD, James A. Stevenson, MD, and Paul T. Russell, MD, Nashville, TN

CONCLUSION

Critically ill and immunocompromised patients with acute sinus disease are exposed to potentially morbid 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.

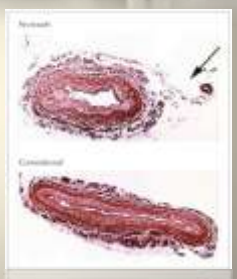
CASE REPORT

Reduction of anterior frontal sinus fracture involving the frontal outflow tract using balloon sinuplasty

Captain Kevin Hueman, MD, US Army, and Major Robert Eller, MD, USAF, San Antonio, TX

NITRIC OXIDE

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



NITRIC OXIDE

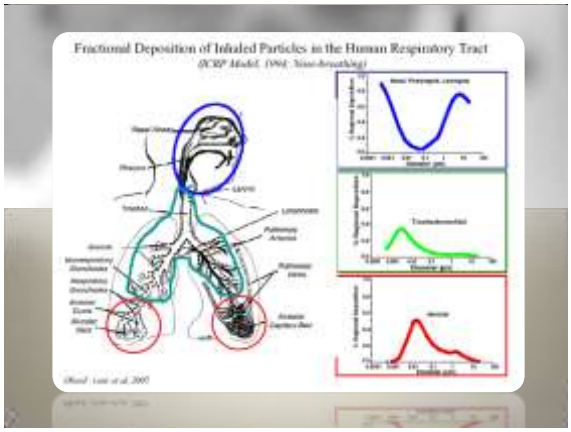
- Paransal sinuses?
- Maxillary sinus is producer
  - Increase of MCF
  - May act as protector of upper airways

Nature Medicine 1, 370 - 373 (1995)
doi:10.1038/nm0495-370

High nitric oxide production in human paranasal sinuses

J.O.N. Lundberg[2, 3], T. Farkas-Szallasi[1, 2], E. Weitzberg[3], J. Rinder[1, 3], J. Lidholm[3], A. Änggård[4], T. Hökfelt[2], J.M. Lundberg[1] & K. Alving[1]

NITRIC OXIDE



NITRIC OXIDE

Short communication

Nasal nitric oxide, the guardian of paranasal sinuses, is paradoxically increased by high doses of intravenous glucocorticoids

Conclusions: We conclude that GCs do not decrease but even increase nasal NO

IMPLICATIONS ?

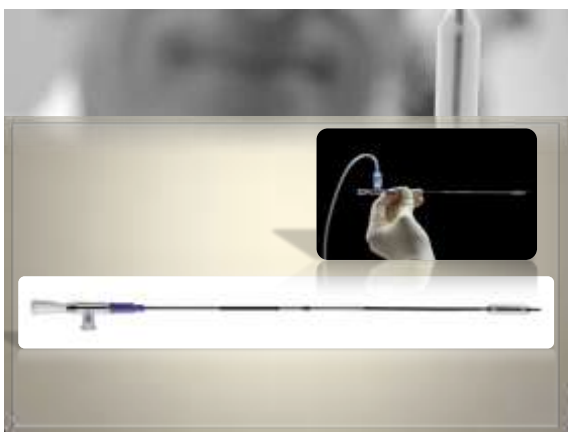
SURGERY x NITRIC OXIDE

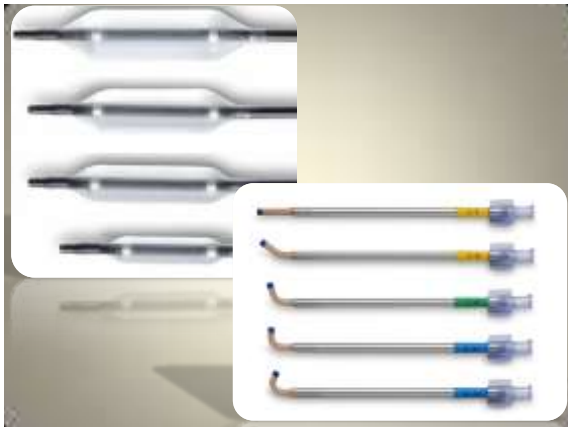
Kirihene RK, Rees G, Wormald PJ. The influence of the size of the maxillary sinus ostium on the nasal and sinus nitric oxide levels. Am J Rhinol. 2002 Sep-Oct;16(5):261-4.

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.

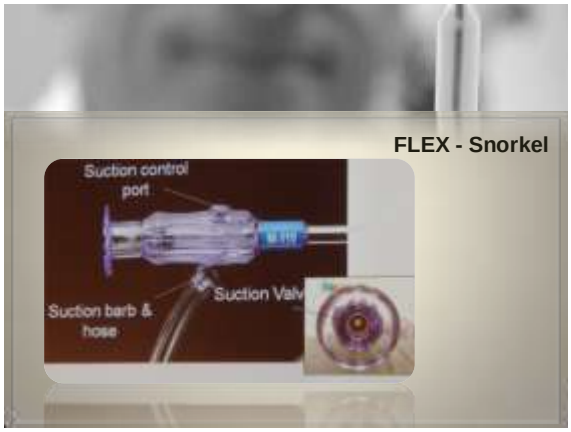
Methods: Twenty-nine patients who were post-endoscopic sinus surgery were included with 52 who were maxillary sinus ostia cannulated. There were 22 large maxillary sinus ostia and 30 small ostia. Smoking, allergy status, and topical steroid use were recorded. NO levels were measured in the nose and maxillary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

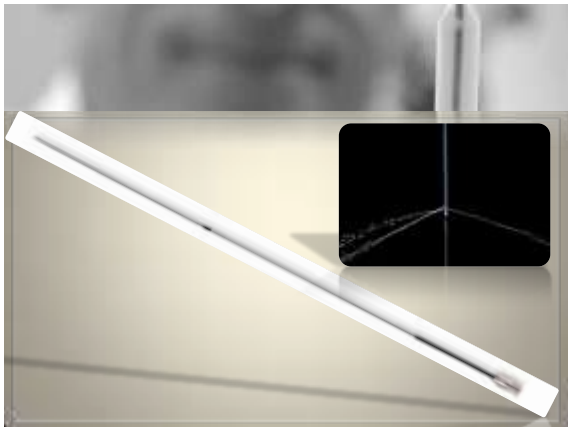
Results: This study shows that enlargement of the maxillary sinus ostium above its normal size (20 mm²) produces a significant decrease in both the maxillary sinus and the nasal cavity NO levels. In addition, the size of the ostium showed a significant correlation to the sinus NO level.

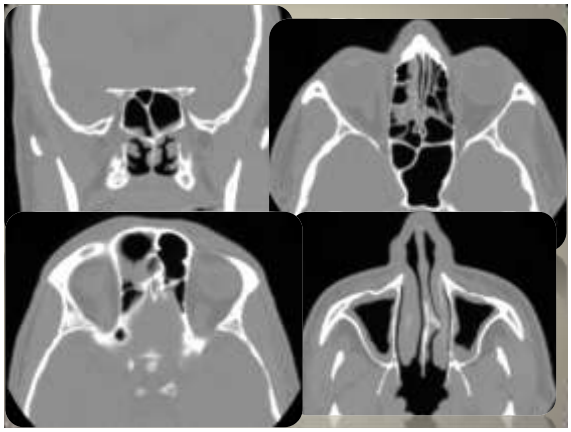





FLEX - Snorkel
Bevel shape
Slimmer tip area


FLEX - Snorkel
Suction control port
Suction barb & hose



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entellus
FinESS

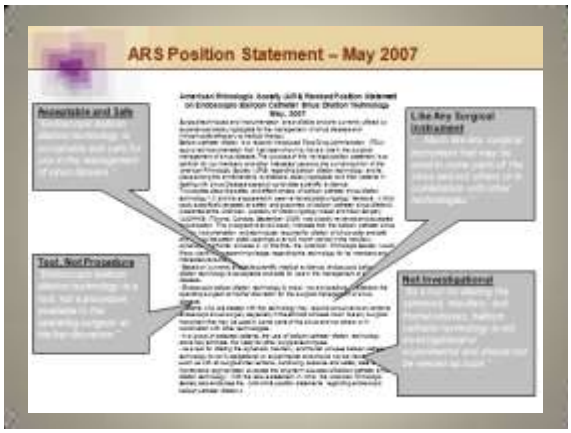
HYBRID PROCEDURES

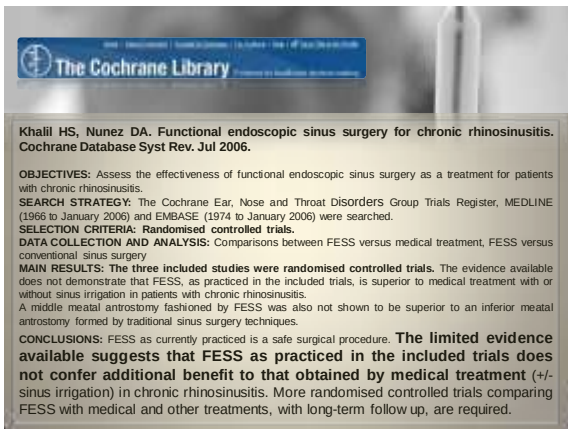
Doctors can use sinuplasty as a "pure" procedure with just the balloon technique or it can be used in a hybrid fashion —balloon remodeling along with some surgery, usually ethmoidectomy.

Setzen M. Sinuplasty gaining momentum for sinus procedures.Triological Society Annual Meeting 2007:7-8

HYBRID PROCEDURES

Comparison of outcomes of simple polypectomy plus balloon catheter dilatation versus functional endoscopic sinus surgery in nasal polyposis: a preliminary study.

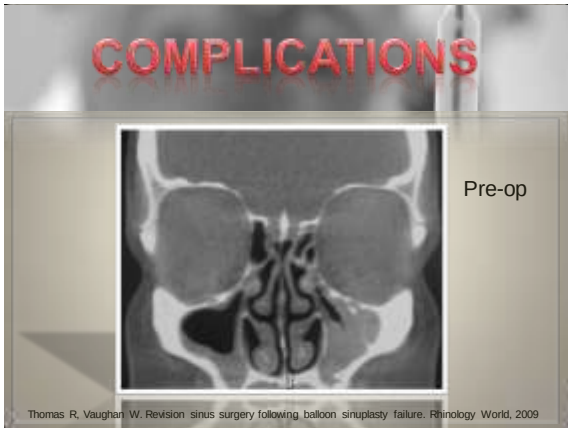




Khalil HS, Nunez DA. Functional endoscopic sinus surgery for chronic rhinosinusitis. Cochrane Database Syst Rev. Jul 2006.

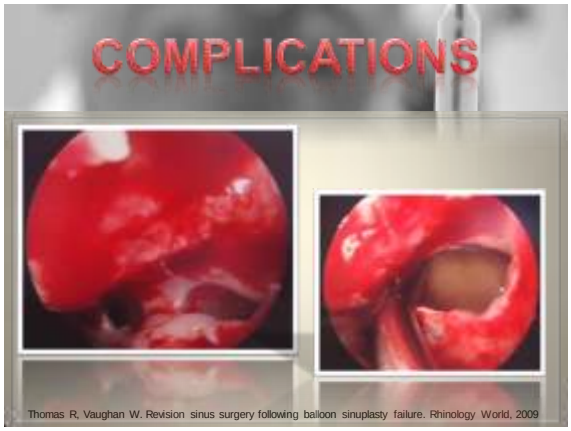
OBJECTIVES: Assess the effectiveness of functional endoscopic sinus surgery as a treatment for patients with chronic rhinosinusitis.
SEARCH STRATEGY: The Cochrane Ear, Nose and Throat Disorders Group Trials Register, MEDLINE (1966 to January 2006) and EMBASE (1974 to January 2006) were searched.
SELECTION 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 practiced 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 practiced is a safe surgical procedure. **The limited evidence available suggests that FESS as practiced in the included trials does not confer additional benefit to that obtained by medical treatment** (+/- sinus irrigation) in chronic rhinosinusitis. More randomised controlled trials comparing FESS with medical and other treatments, with long-term follow up, are required.


BMJ
Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials
Results We were unable to identify any randomised controlled trials of parachute intervention.
Conclusions As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using randomised controlled trials. Advocates of evidence based medicine have criticised the adoption of interventions evaluated by using only observational data. We think that everyone might benefit if the most radical protagonists of evidence based medicine organised and participated in a double blind, randomised, placebo controlled, crossover trial of the parachute


COMPLICATIONS
Pre-op
Thomas R, Vaughan W. Revision sinus surgery following balloon sinuplasty failure. Rhinology World, 2009


COMPLICATIONS
Thomas R, Vaughan W. Revision sinus surgery following balloon sinuplasty failure. Rhinology World, 2009


COMPLICATIONS
Post-op
Thomas R, Vaughan W. Revision sinus surgery following balloon sinuplasty failure. Rhinology World, 2009


COMPLICATIONS
Thomas R, Vaughan W. Revision sinus surgery following balloon sinuplasty failure. Rhinology World, 2009


COSTS
US$ 1.200,00
Friedman M, Schalch P, Lin HC, Mazloom N, Neidich M, Joseph NJ. Functional endoscopic dilatation of the sinuses: Patient Satisfation, postoperative pain, and cost. Am J Rhinol. 2008, 22(2):204-9.


Acclarent


Acclarent


ENDOSCOPIC 3D
SURGERY
sinus & oto

CONCLUSION

- 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