



# Sinusitis:

## Medical and Surgical Management

R. Jonathan Lara, DO, FAOCO

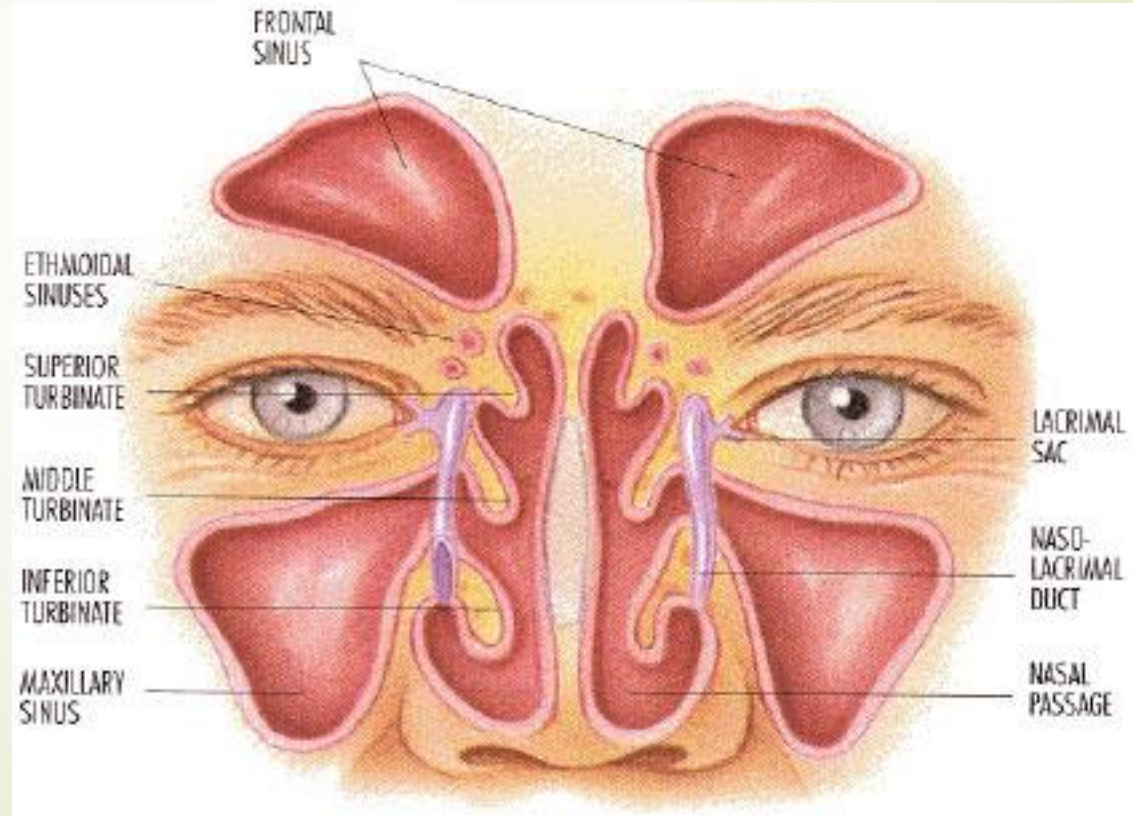
Sonoran Ear Nose & Throat

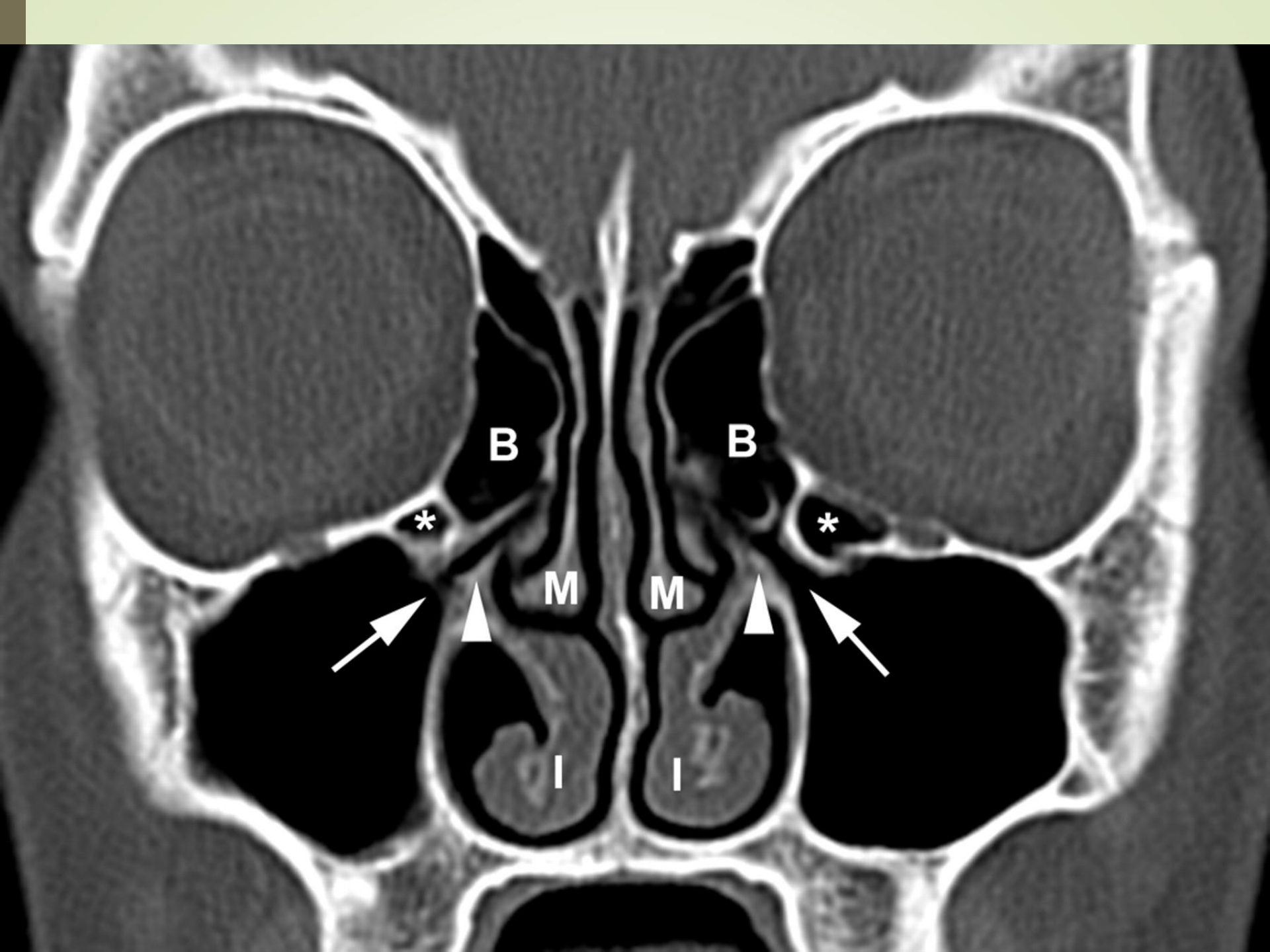
27<sup>th</sup> Annual Southwestern Conference on  
Medicine

April 26, 2018

# What are sinuses?

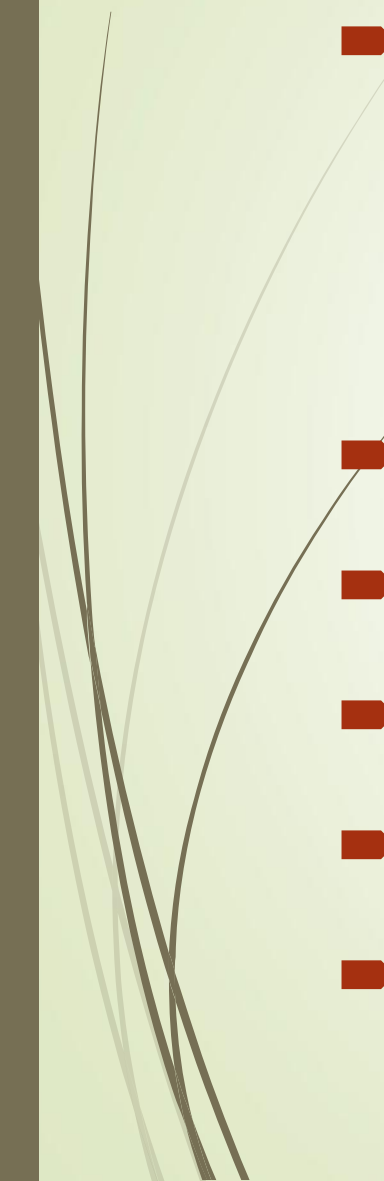
- Air filled cavities of the head
- Maxillary, ethmoid, frontal, sphenoid sinus cavities








# Why do we have sinuses?

- Provide mucus to upper airways/nose for:
    - Lubrication
    - Filter: Vehicle for trapping viruses, bacteria, foreign material for removal
  - Humidify air inhaled
  - Warm air inhaled
  - Give characteristics to individual voices
  - Lessen skull weight
  - Involved with smelling function
- 



# Sinusitis

- Sinus + Inflammation = Sinusitis
- Combination of obstruction, infection, inflammation
- Constellation of symptoms:
  - Facial pain, nasal obstruction, headache, thick nasal discharge, fatigue, fever
  - Complicated sinusitis – infection spreads outside sinus cavities

# Patient Impact of Sinusitis

## **Over 30 million Americans suffer from Sinusitis<sup>1</sup>:**

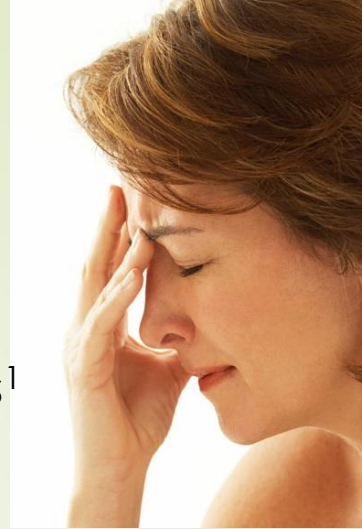
- It is more prevalent than heart disease: 1 in 8 adults<sup>1</sup>
- 18-22M office visits and 1.2M Hospital visits/year<sup>2</sup>

## **CRS significantly impacts on Quality of Life:**

- Greater impact than CHF or chronic back pain<sup>3</sup>
- Associated with fatigue and depression
- 73 million days of restricted activity or lost work per year<sup>2</sup>

## **However, it remains severely underdiagnosed:**

- 51% patients misdiagnose themselves with allergies<sup>4</sup>
- Only 36% are seen by their primary care physicians<sup>5</sup>



1. National Health Interview Survey, 2012

2. National Ambulatory Medical Care Survey, 2005; National Hospital Ambulatory Medical Care Survey, 2005

3. Gliklich et al. Otolaryngol Head Neck Surg 1995;113:104-9.

4. US Pharm. 2012; 37((7):27-30


5. Asthma and Allergy Foundation of America (AAFA) Kelton Research, April 2011.





# Scope of Sinusitis

- Affects 30-35 million persons/year
- 25 million office visits/year
- Direct annual cost **\$2.4 billion** and increasing
- Added surgical costs: \$1 billion
- Third most common diagnosis for which antibiotics are prescribed



# Quality-of-Life Issues

- Fatigue
- Concentration
- Nuisance
- Sleep disturbance
- Emotional well being
- Social interactions
- Missing school/work
- Halitosis
- Decreased production
- Impaired studying
- Sniffing/snorting
- Blowing nose



## Factors associated with diagnosis of rhinosinusitis [1]

Major	Minor
Facial pain/pressure <sup>a</sup>	Headache
Nasal obstruction/blockage	Fever
Nasal discharge/purulence	Halitosis
Discolored postnasal drainage	
Hyposmia/anosmia	Fatigue
Purulence in nasal cavity on examination	Dental pain
	Cough
	Ear pain/pressure/fullness

<sup>a</sup> Facial pain alone does not constitute a suggestive history for rhinosinusitis in the absence of another major nasal symptom or sign.

*Data from* Benninger MS, Ferguson BJ, Hadley JA, et al. Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology. *Otolaryngol Head Neck Surg* 2003; 129(3 Suppl):S1–32.



# Types of Sinusitis<sup>1</sup>

## ➤ Acute Rhinosinusitis (ARS):

- Symptoms of purulent nasal drainage accompanied by nasal obstruction and/or facial pain-pressure-fullness, **<4 weeks duration**.
- 80% of acute sinusitis episodes from viral etiology and can often clear up after a period of “watchful waiting.”<sup>2</sup>

## ➤ Recurrent Acute Rhinosinusitis (RARS):

- **4 or more recurrent episodes of acute sinusitis per year**, with clearing of symptoms between episodes.

## ➤ Chronic Rhinosinusitis (CRS):

- 2 or more sinusitis symptoms and evidence of swelling/inflammation that lasts **≥ 12 weeks duration**.

1. AAO-HNS Clinical Practice Guidelines 2015, Diagnostic Criteria for Rhinosinusitis

2. Infectious Diseases Society of America, news release, March 21, 2012

# Spotlight on Chronic Rhinosinusitis (CRS)

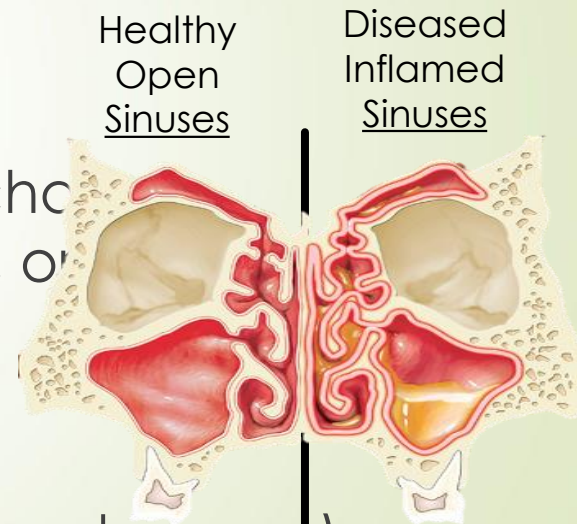
**Definition of CRS:** symptomatic inflammation of the mucosa of the nose and paranasal sinuses  $\geq 12$  weeks duration.

❑ **2 or More Symptoms:**

- Facial pain / pressure
- Mucopurulent/discolored discharge
- Nasal congestion/obstruction, or
- Decreased sense of smell

❑ **And Evidence of Inflammation:**

- Evidence of nasal polyps (via endoscopy)
- Purulent mucus or edema (via endoscopy)
- Inflammation shown on CT



# Treatment Options

## Lifestyle Modifications

- Environmental changes
- Smoking cessation
- Allergy testing & allergen avoidance

## Medical Management

- Antibiotics
- Intranasal steroids
- Oral steroids
- Allergy medication
- Decongestants
- Saline rinses
- Immunotherapy

## Sinus Surgery

- Endoscopic sinus surgery (w/ steroid-eluting stent)
- Balloon dilation
- Polyp removal
- Turbinate reduction
- Septoplasty



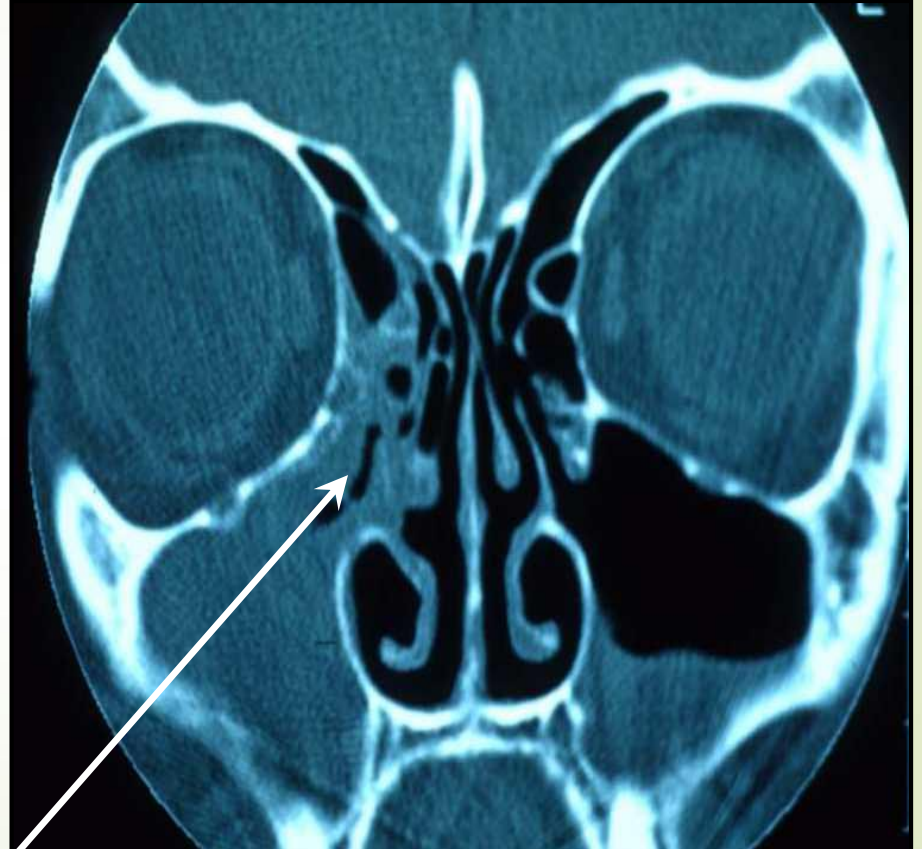
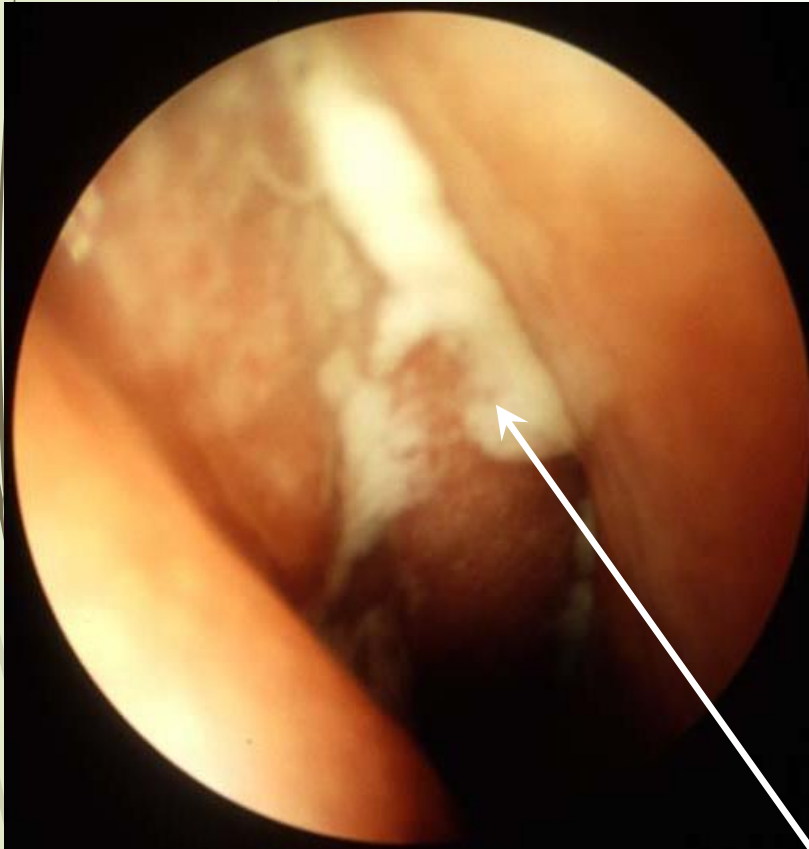
# Evaluation of Chronic Sinusitis

- Nasal Endoscopy – telescope into the nose
- CT or MRI scanning
  - Anatomic defects, tumors, fungi
- Allergy testing
  - Inhalants, fungi, foods
- Sinus aspiration for cultures
  - Bacterial
  - Fungal





# Acute sinusitis

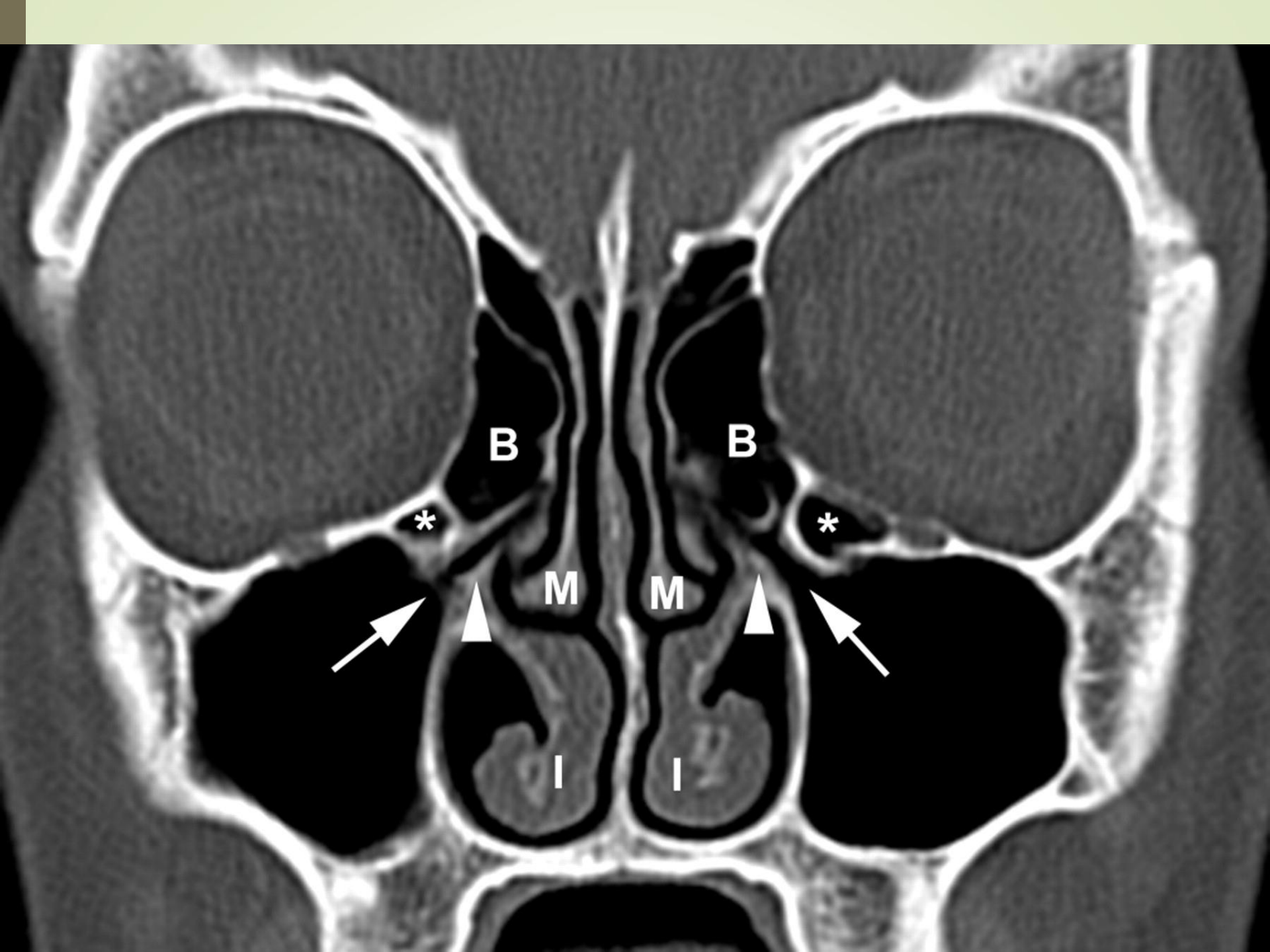


**Middle Meatal Pus**



# Chronic Sinusitis







# Medical Therapy



## Objectives of Treatment of Acute Bacterial Sinusitis

- Decrease time of recovery
- Prevent chronic recurrent disease
- Decrease exacerbations of asthma or other secondary diseases



# Treatment of Chronic Sinusitis

- Steam inhalation
- Nasal irrigation
- Nasal steroid spray
- Antihistamines (oral/nasal spray)
- Decongestants
- Antibiotics with active infections

# What is “Maximum Medical Therapy”?

- Oral antibiotics of 2-4 weeks duration with chronic bacterial sinusitis
- Oral antibiotics with multiple 1-3 week courses for patients with recurrent acute bacterial sinusitis
- Topical and/or systemic steroids (at discretion of physician)
- Saline irrigations (optional)
- Topical and/or systemic decongestants (optional, if not contraindicated)
- Treatment of concomitant allergic rhinitis



# Ongoing CRS Patient Management: A Chronic Puzzle Requiring Many Inputs

Lifestyle  
Modifications

Asthma Control

In-Office  
Procedures



Endoscopic  
Sinus Surgery

Medical  
Management

Allergy  
Treatments

We look forward to being an ongoing partner with you in the diagnosis and treatment of your chronic sinusitis patients.



# Nasal Irrigation

- Commercial buffered sprays
- Bulb syringe
  - 1/4 tsp of salt to 7 oz water
- Waterpik with lavage tip
  - 1 tsp salt to reservoir
- Disposable enema bucket
  - 2 tsp salt, 1 tsp soda per quart of water





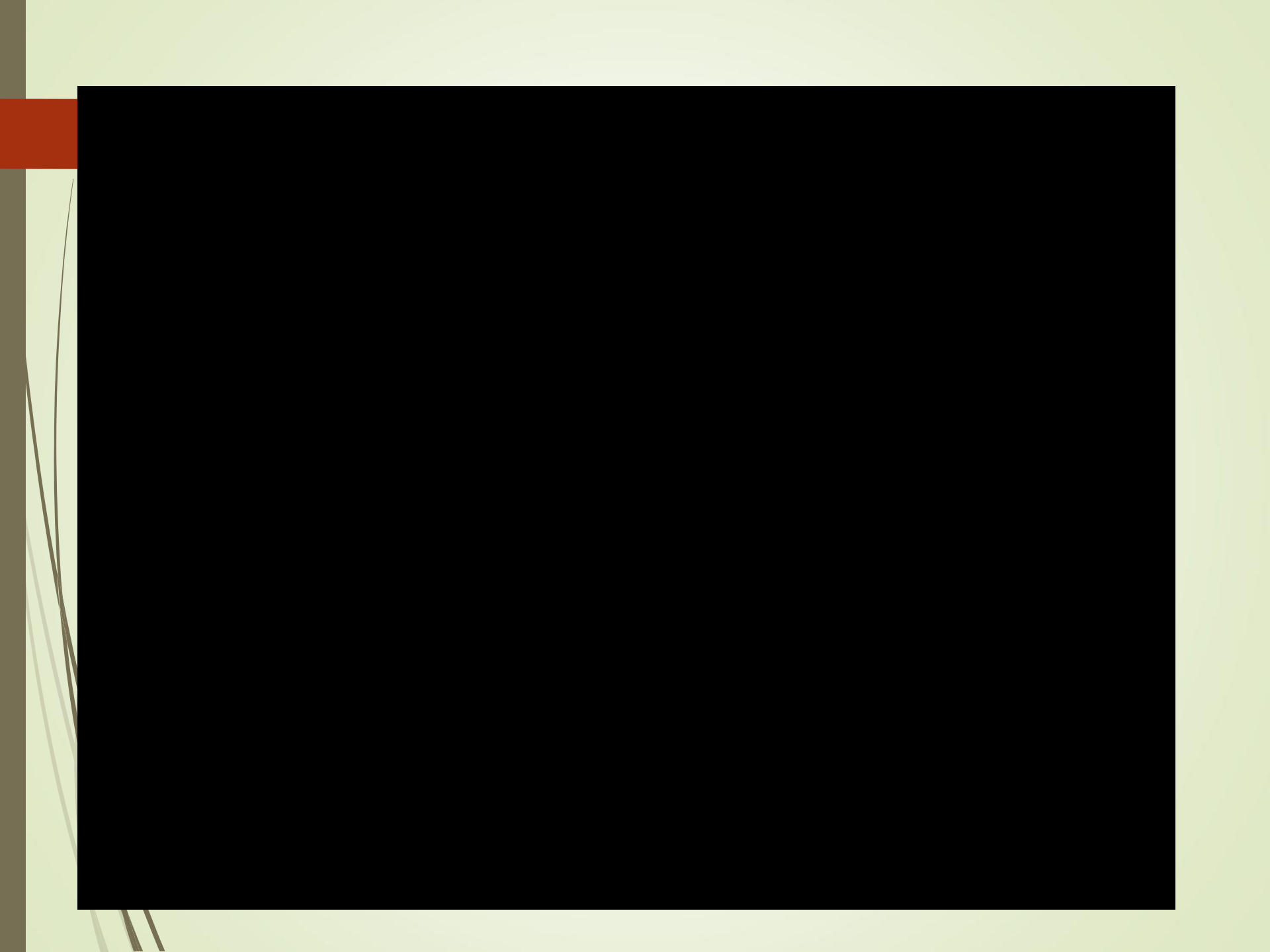
# Nasal Irrigation

- Washes away irritants
- Moistens the dry nose
- Waterpik with nasal irrigator
- Ceramic irrigators
- Enema bucket with normal saline and soda
  - “Hose-in-the-nose”-- \$2.50



# Nasal Irrigation

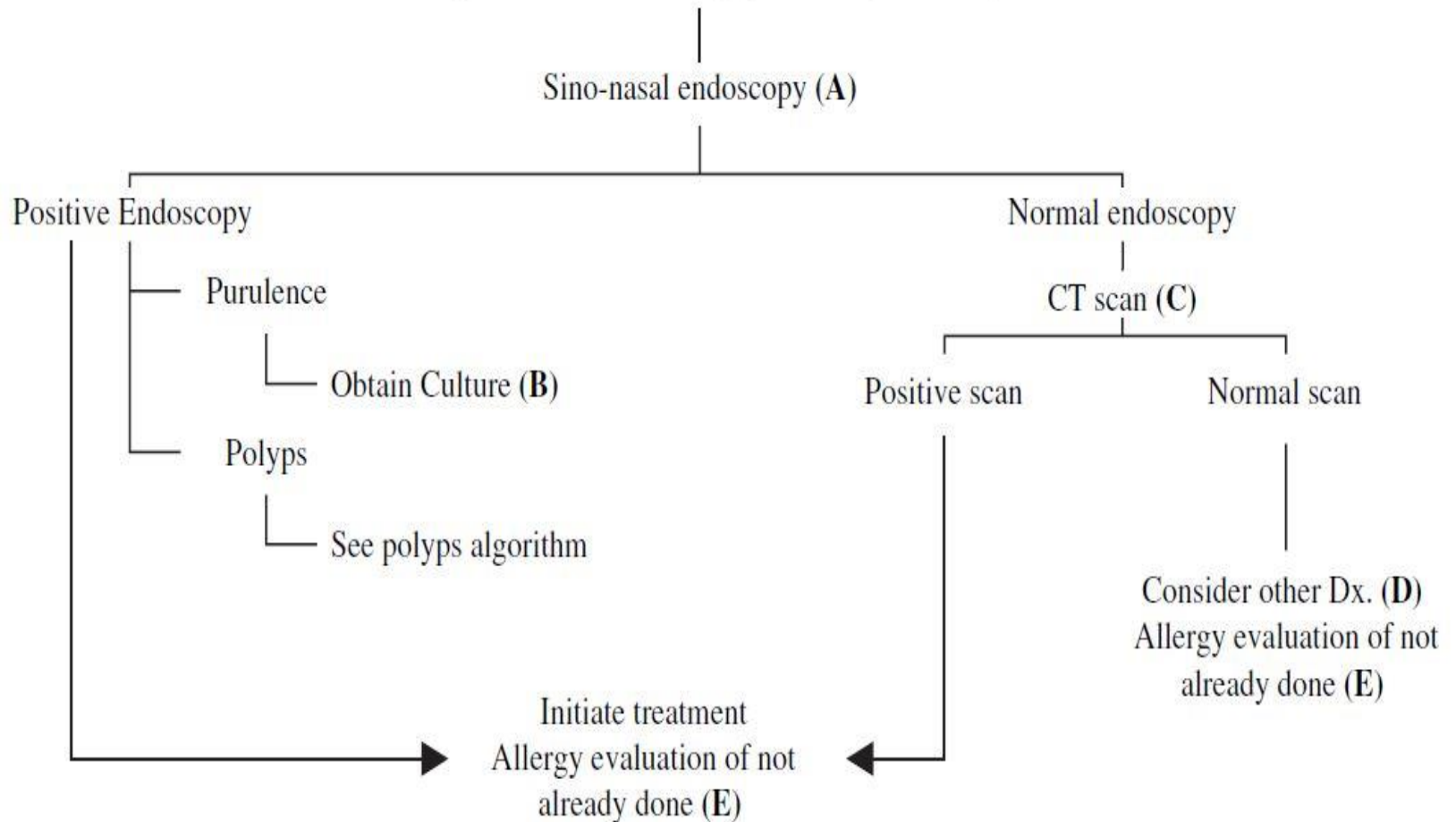
- With enema bucket/hose....
  - Add 2 teaspoons of salt and 1 tsp of baking soda to a quart of warm water
  - Over tub, sink, or in shower lean over, head tilted slightly downward and to side place hose in upper nostril (fluid may return from either nostril or through mouth) run in 1/2 solution. Turn head to opposite side and repeat process.
  - Use once, twice daily or as often as needed



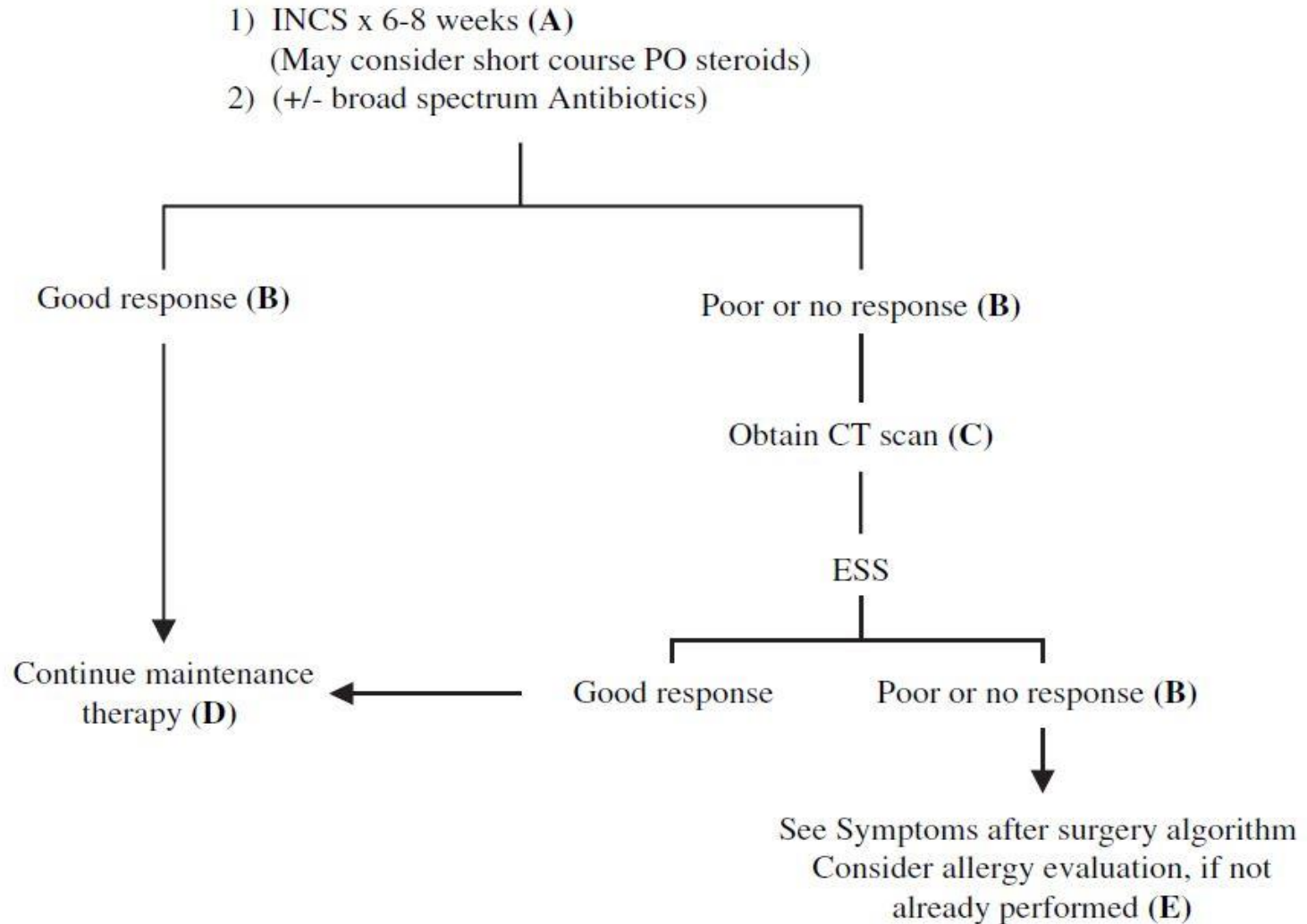
# Decongestants

- Topical nasal sprays (limit use to 3-7 days)
  - Phenylephrine
  - Oxymetazoline
  - Naphthazoline
  - Tetrahydrozoline
  - Zylometazoline
- Topical nasal spray (unlimited daily use)
  - Ipratropium
  - Faronase, Nasonex, Nasacort, Rhinocort, Veramyst, Omnaris
  - Astepro, Astelin, Patanase
- Oral
  - Pseudoephedrine 30-60 mg
  - Phenylephrine 2-4 times/day
  - Steroids

## Diagnosis of CRS suggested by history

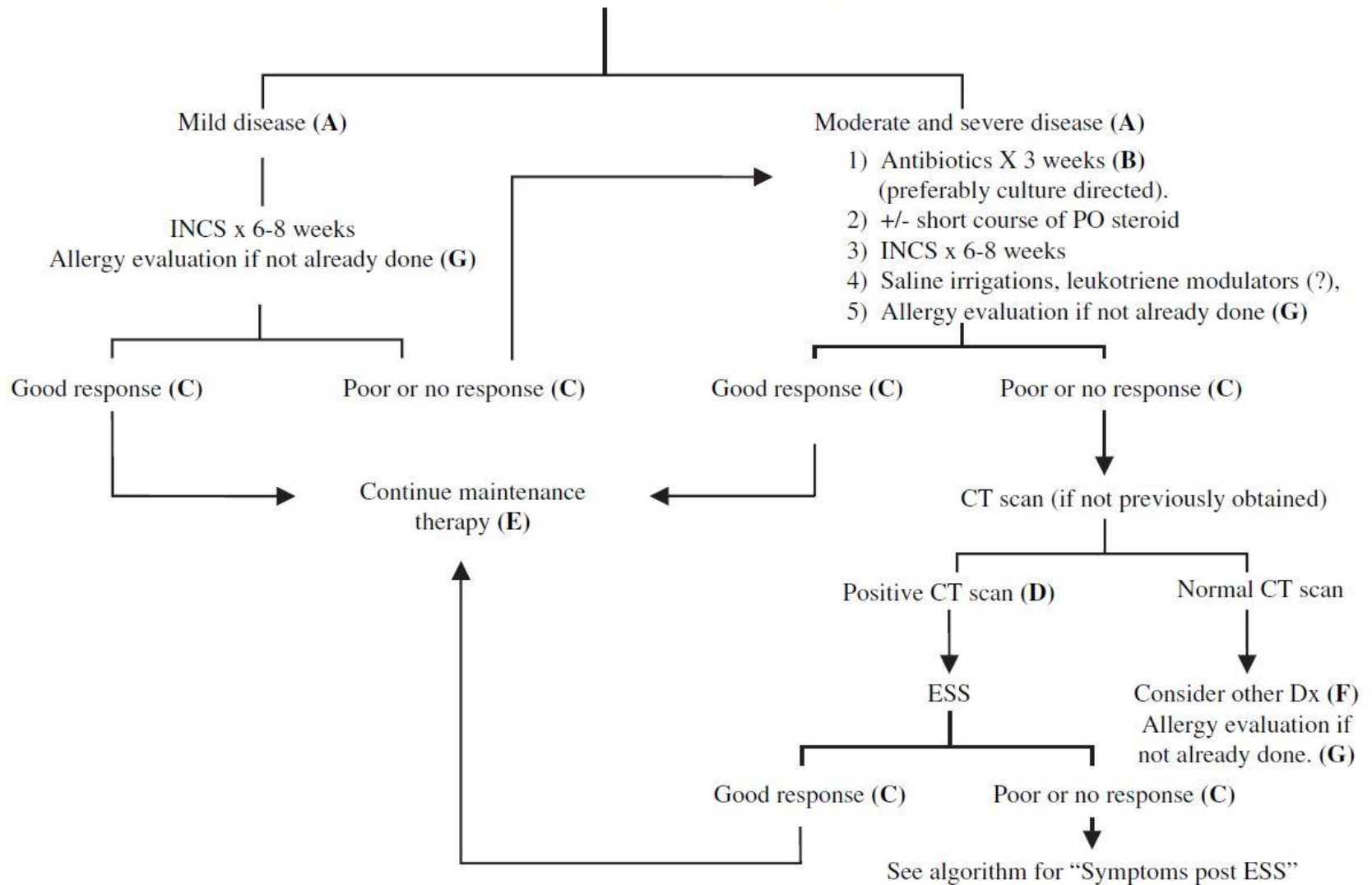


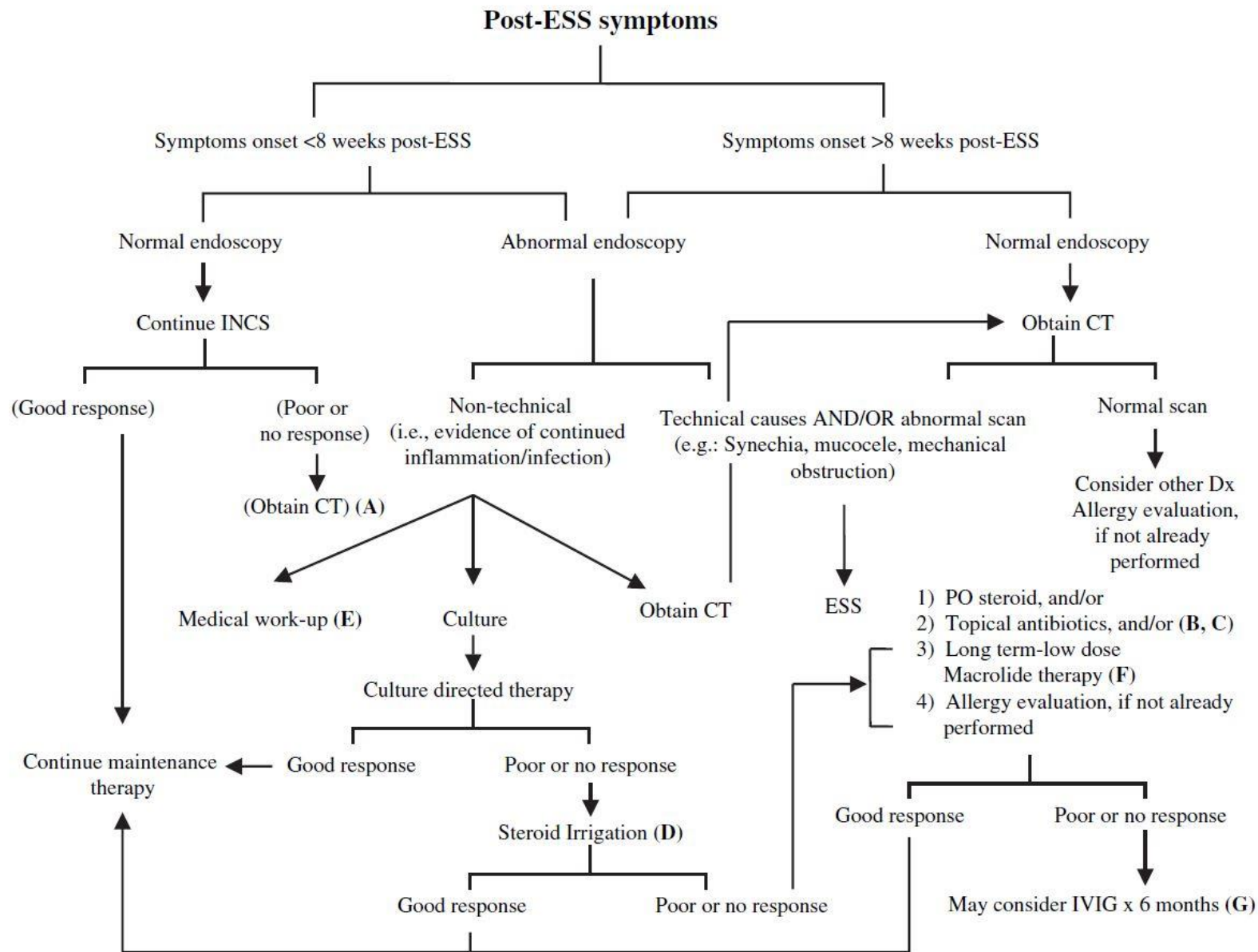
## Treatment of CRS with polyposis





## Treatment of chronic rhinosinusitis without polyposis







## Guideline

# Clinical Practice Guideline (Update): Adult Sinusitis

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Kaparaboyana Ashok Kumar, MD, FRCS<sup>5</sup>, Maggie Kramper, RN, FNP<sup>6</sup>,  
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Anju Peters, MD<sup>10</sup>, Sandra A. Walsh<sup>11</sup>, and Maureen D. Corrigan<sup>12</sup>**



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FOUNDATION

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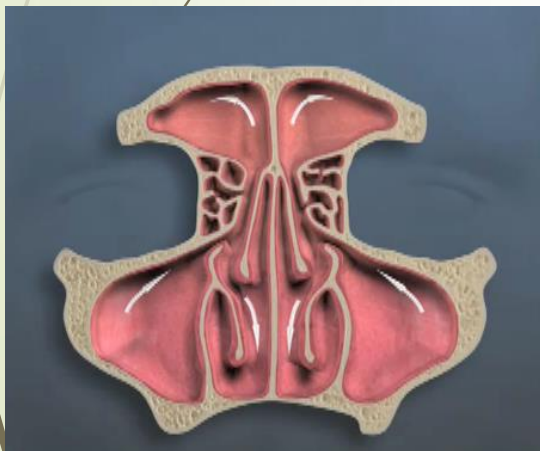
# Surgical Therapy



**"Sorry about the two scars. We had your  
X-ray upside down for a while."**

# Endoscopic Sinus Surgery

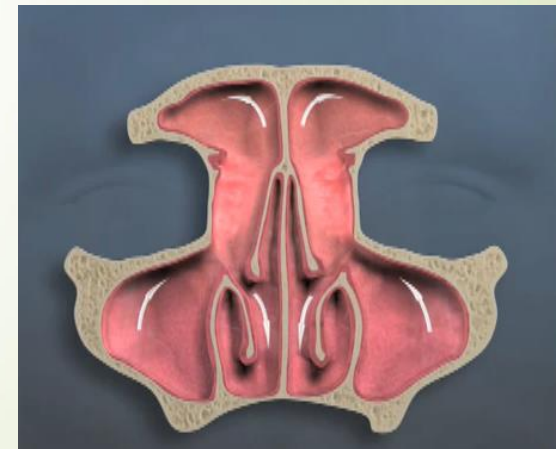
- Over 500,000 patients undergo sinus surgery each year (U.S.)
- Surgery is performed through minimally invasive endoscopic access of the nasal passages (MIST)
  - No external incisions or scars
  - No Gauze packing- rarely used due to other advances



**Healthy sinuses with  
normal drainage pathway**



**Chronic sinus disease  
blocks  
the drainage pathway**



**Sinus surgery restores the  
natural drainage pathway**



# Indications for & Role of Surgical Treatment of Rhinosinusitis<sup>1</sup>

## ► Potential Indications:

- Failure to adequately control symptoms of CRS despite “maximal medical therapy” where there is objective evidence of disease.
- Sinonasal polyposis with nasal airway obstruction or suboptimal asthma control
- Allergic fungal rhinosinusitis
- Recurrent acute rhinosinusitis (RARS)

## ► Role of Surgery:

- Ventilates (drains) sinus cavities
- Removes inflamed/diseased tissue and polyps
- Enlarges sinus pathways to provide optimal access for topical therapies



1. Adapted from American Academy of Otolaryngology- HNSF, Clinical Indicators: Endoscopic surgery, Adult 2015. Other potential indicators include: Unilateral paranasal sinus opacification, consistent with CRS, fungus ball, benign neoplasm, etc.; Complications of sinusitis, including extension to adjacent structures; Mucocele.

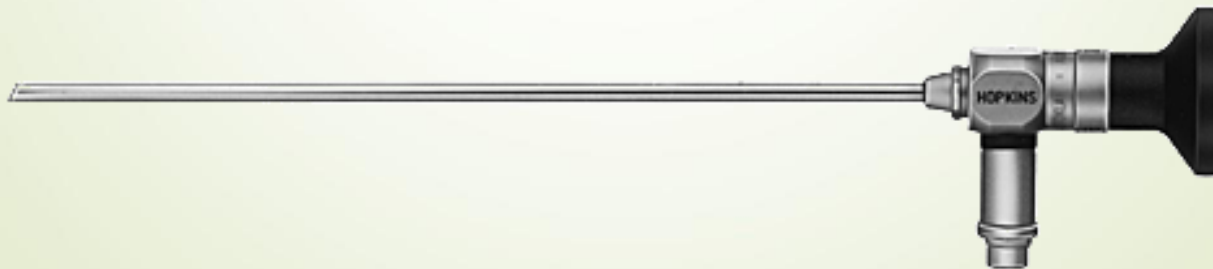


# Why Surgical Treatment?

- Polyps
- Failure of medical therapy (allergy)
- Complicated sinusitis
- Suspect tumor
- Goal: enhance sinus anatomy to improve aeration and drainage and prevent sinusitis = “open and drain the sinuses”

# F.E.S.S.

- Functional Endoscopic Sinus Surgery
- 1980's - **Messerklinger**
- Improved equipment/scopes allowed for surgery through the nostrils
- Enhance drainage of sinuses through the naturally-occurring windows

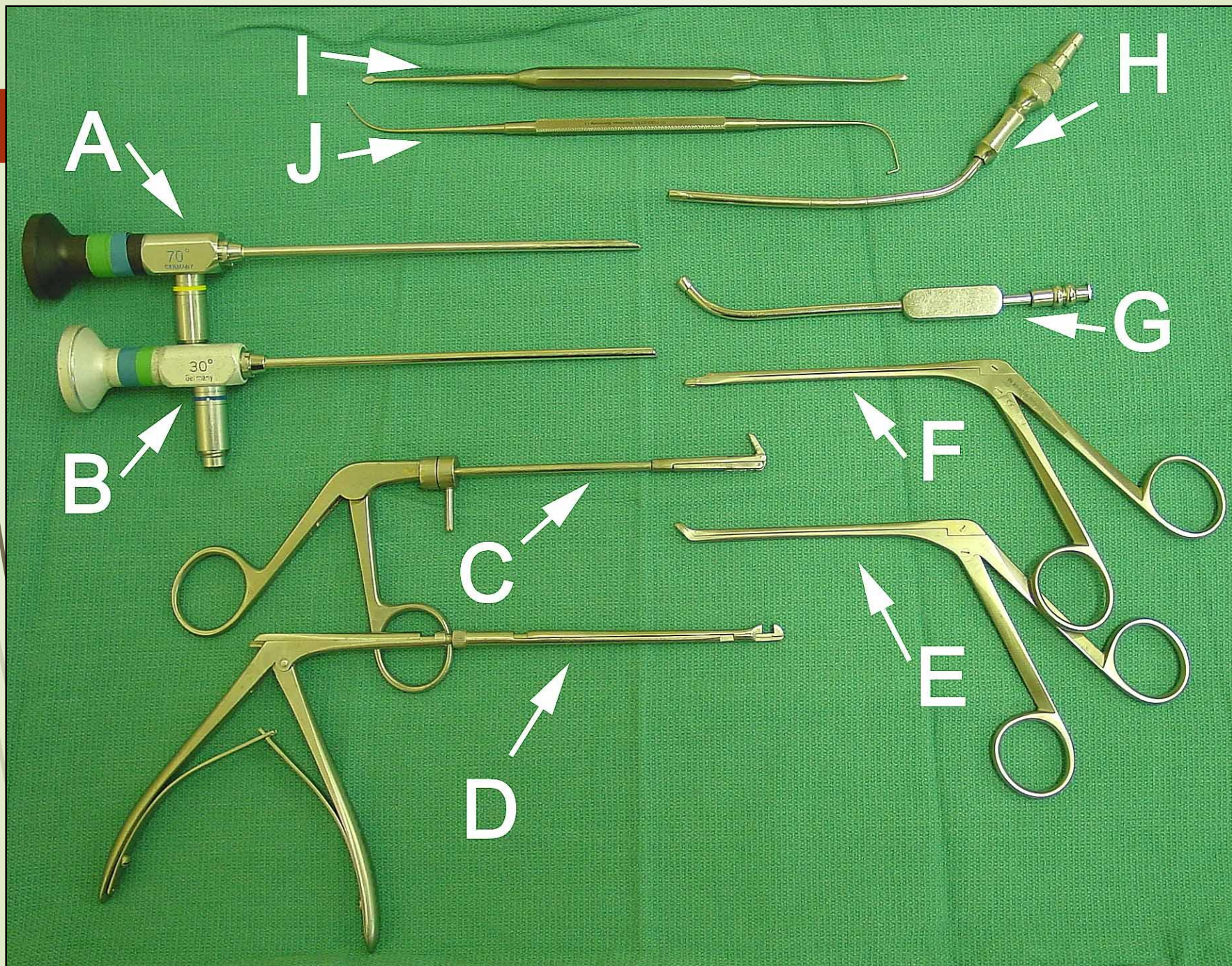


# The Good“Old Days”

- Caldwell-Luc –  
Puncture the front  
cheek
- Naso-antral windows
- External approaches
- Extensive nasal packing  
– 10 feet of packing!
- Hospitalization
- Lengthy recovery











# Preoperative Evaluation

- Medical / cardiac clearance for general anesthesia
- Hold anticoagulation medications
- Preoperative corticosteroids
- Outpatient surgery
- 1.5 to 2.5 hours case duration
- Prescriptions

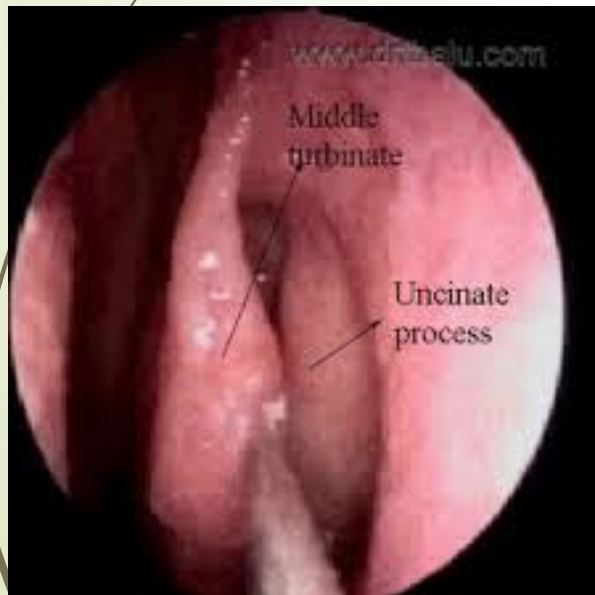


# What is the Ostiomeatal Complex

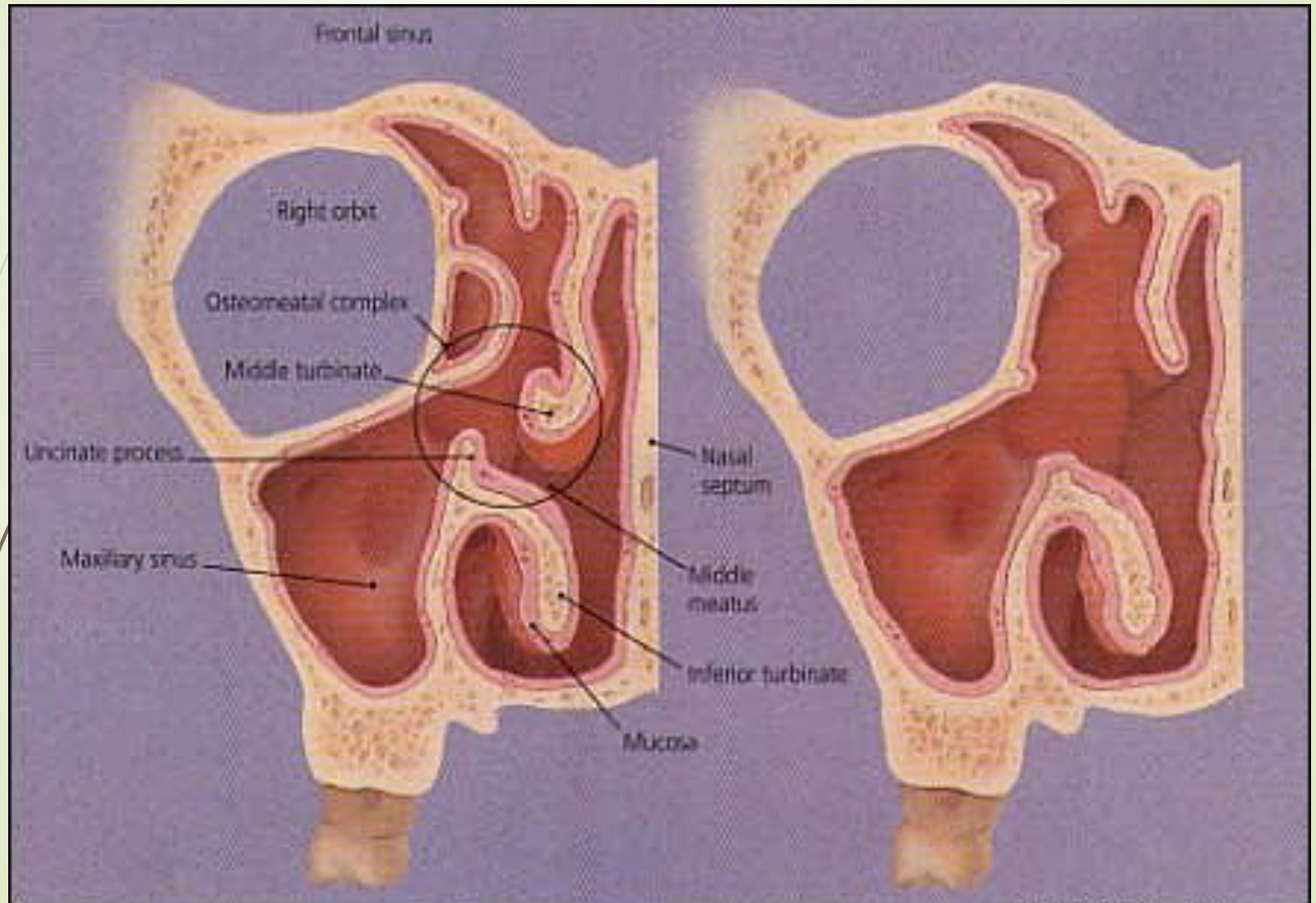
- Ostiomeatal complex (OMC) is that area under the middle meatus (air space) which drains the ethmoid, frontal and maxillary sinuses.
- So... the OMC is the functional space where the sinuses drains, and therefore our surgical target.

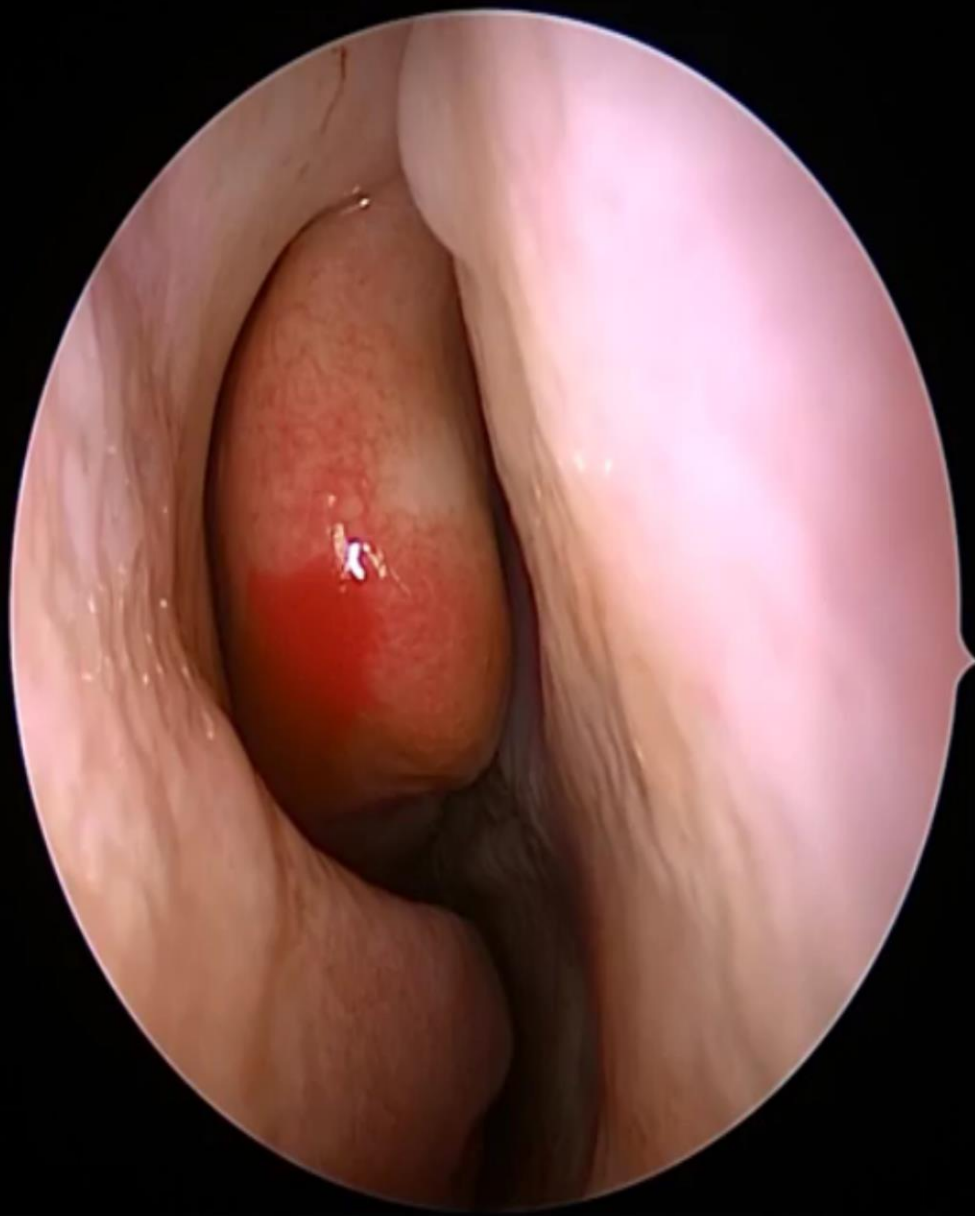
# The Middle Meatus

- Anatomic space between middle and inferior turbinates
- Site of drainage for frontal, anterior ethmoid, and maxillary sinuses
- Sinus surgery failure: lateralized middle turbinate




# Surgical Technique



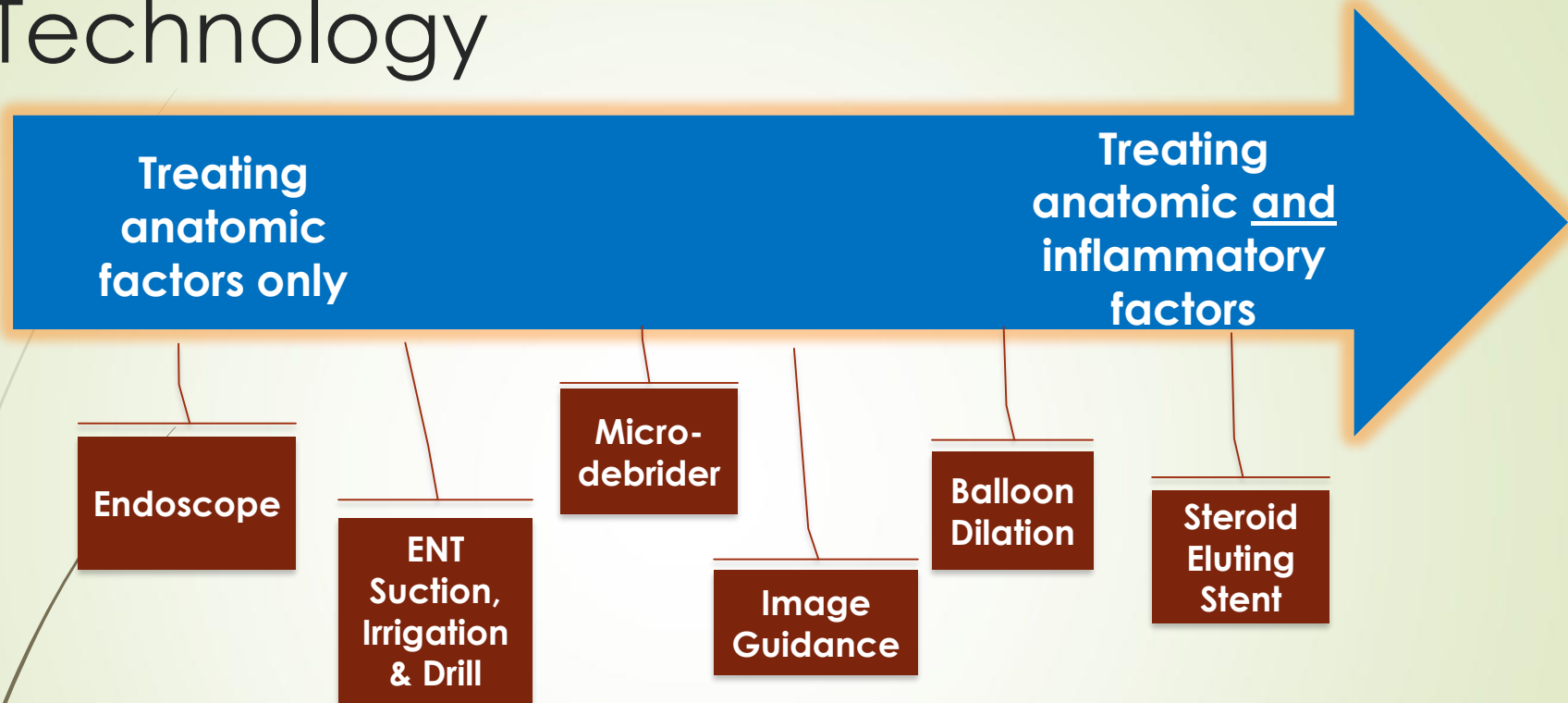




# Surgical Goals

- Restore/augment sinus drainage passageways
  - Clear polyps/inspissated mucous or infection/fungal balls
  - Preserve mucosa – No more sinus scraping.
  - Avoid complications
  - Minimal packing
- 

# Evolution of Sinus Surgery Technology



- Endoscopic sinus surgery was introduced in the US over 25 years ago
- Trend from treating anatomic factors only to also addressing underlying inflammatory factors.
- Advanced technologies have paved the way for less invasive and more targeted treatments.

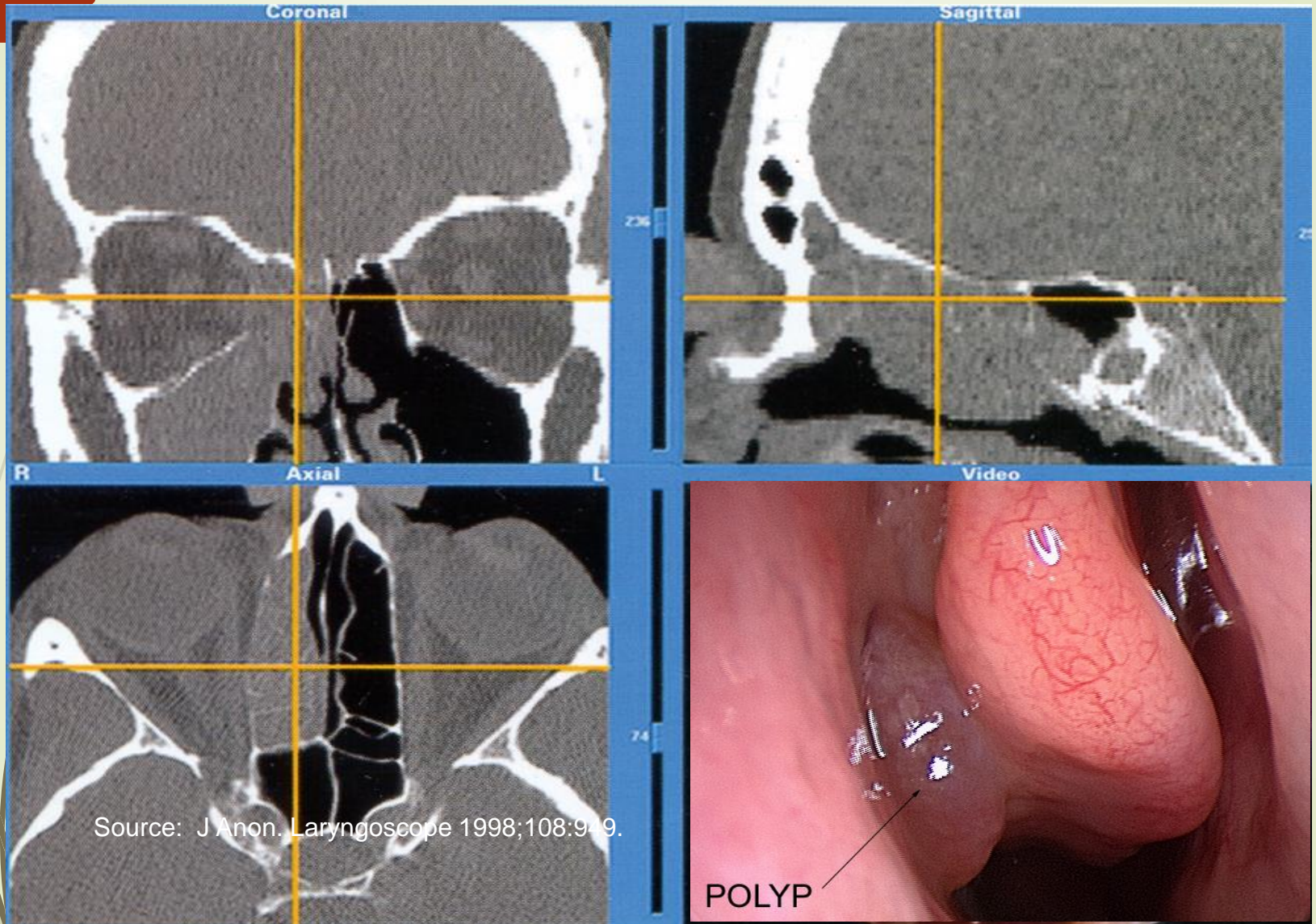


# Stereotactic Image Guidance

- Wear headband while in surgery
- Like a GPS system for sinus surgery
- Allows for safer surgery, more complete dissection, faster



# Stereotactic Image Guidance





# Balloon Sinuplasty™

- New minimally-invasive way of creating a wider window into certain sinuses
- New technique with less bleeding, quicker surgery time, decreased healing time
- Safe and effective – 0% Complication Rate



## ✗ *Relieva Balloon Sinuplasty™* devices

+ Designed for customized access

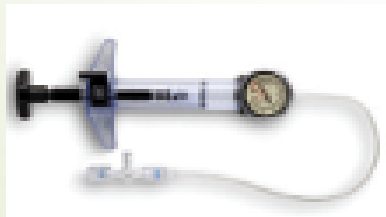
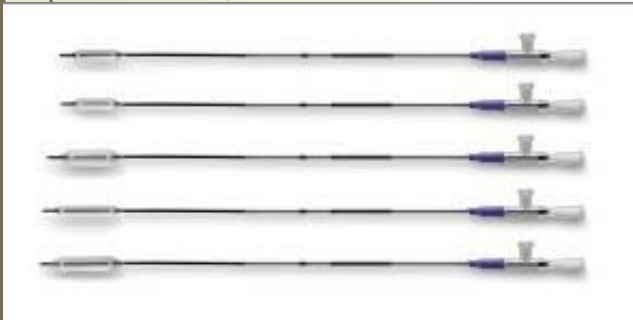
- ✗ Sinus Illumination System
- ✗ Sinus Guide Catheter

+ Engineered for sinus dilation

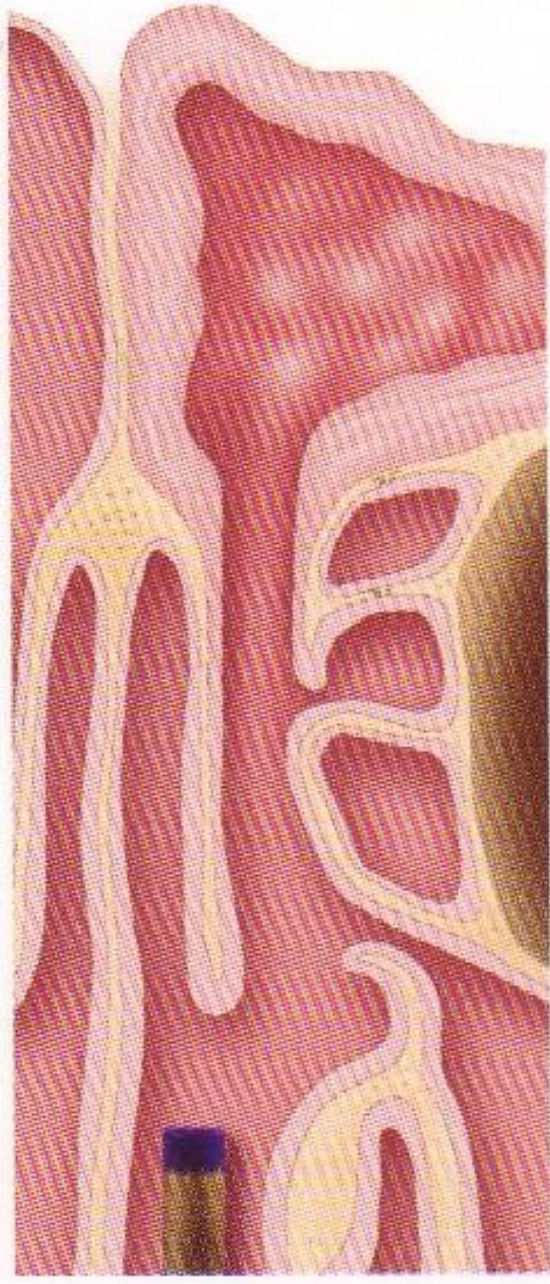
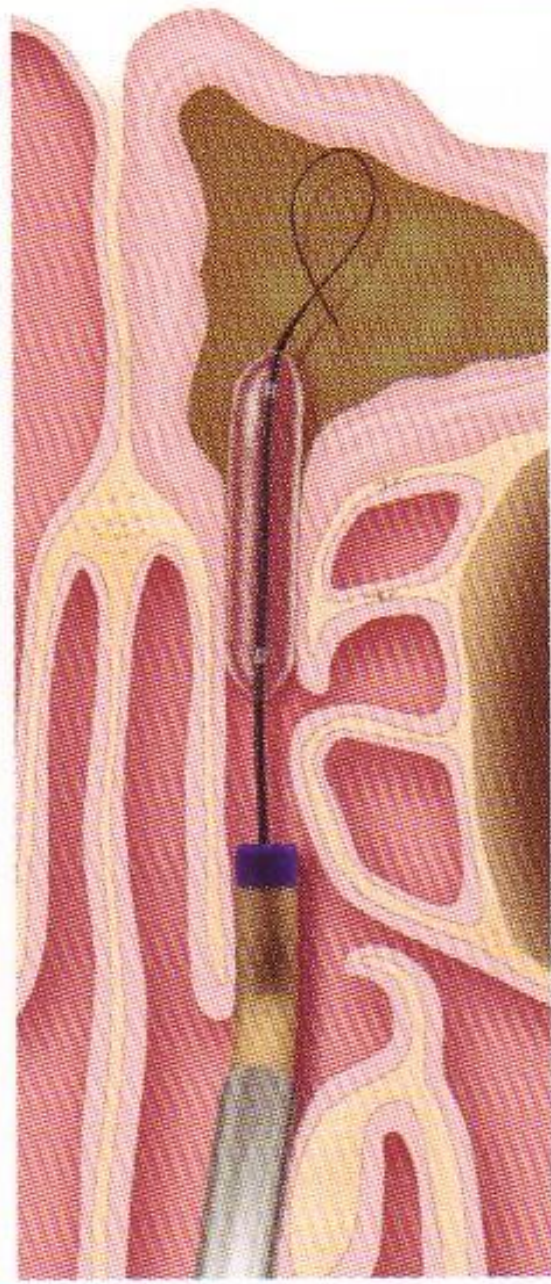
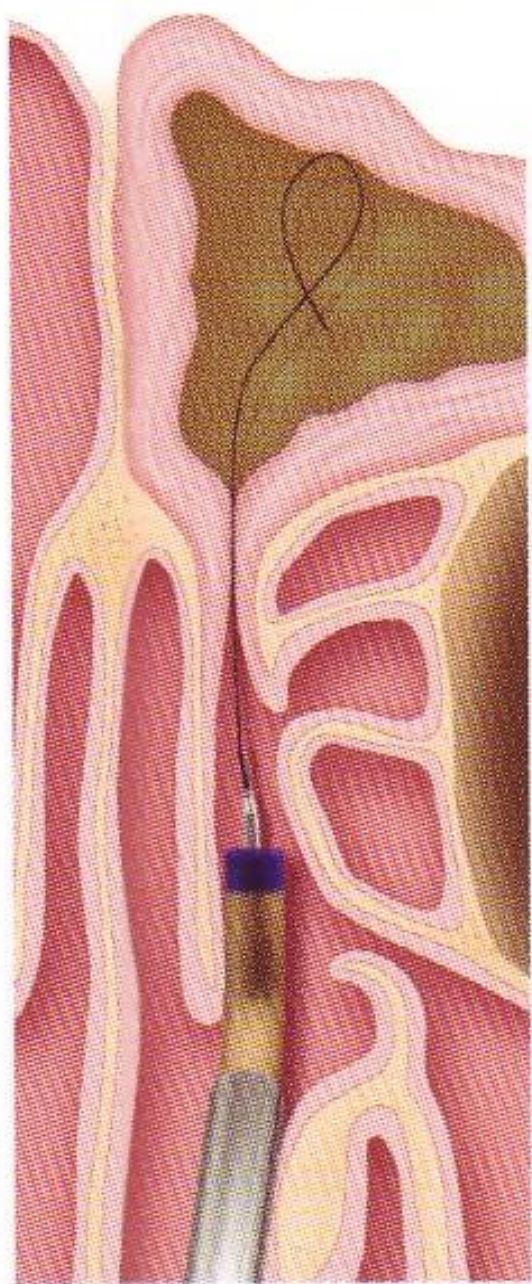
- ✗ Sinus Balloon Catheter

+ Developed for controlled inflation

- ✗ Sinus Balloon Inflation Device





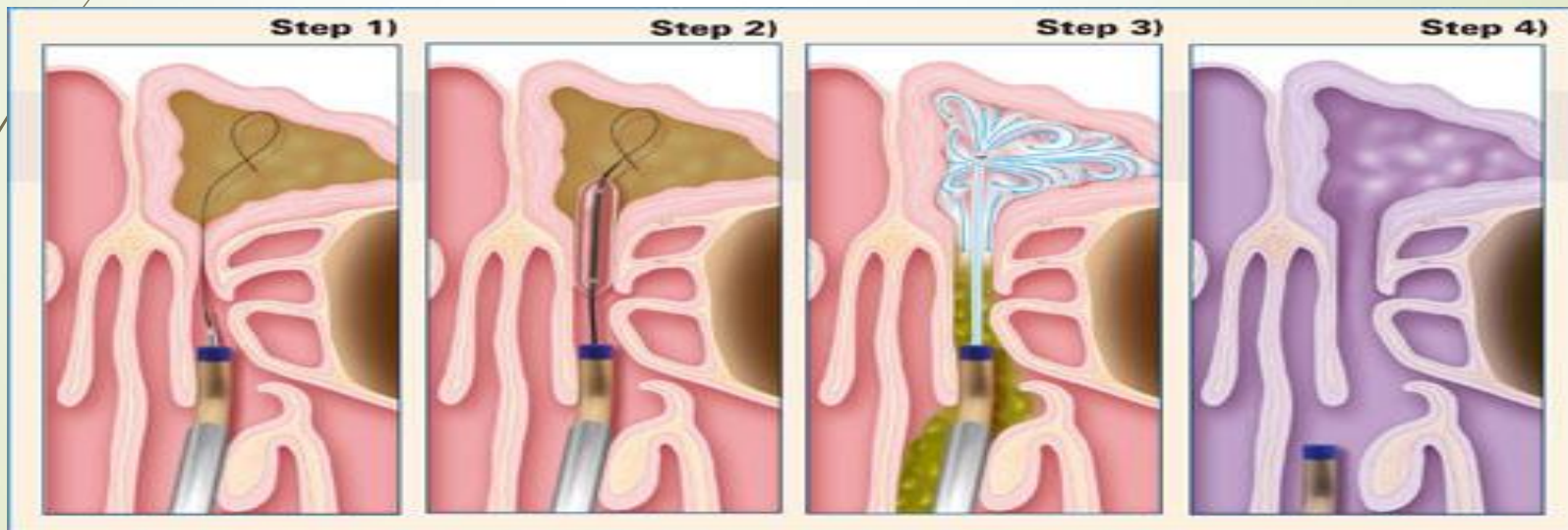




# Advanced Technologies:

## Balloon Treatment

- Procedure to open obstructed sinuses using balloon dilation
- An option to open peripheral sinuses like frontal, maxillary and sphenoid
- Can be performed under local anesthesia typically with minimal recovery period



1. Balloon is inserted in sinus over a wire

2. Balloon is inflated to dilate the sinus opening

3. Irrigation/  
flushing of sinus  
cavity

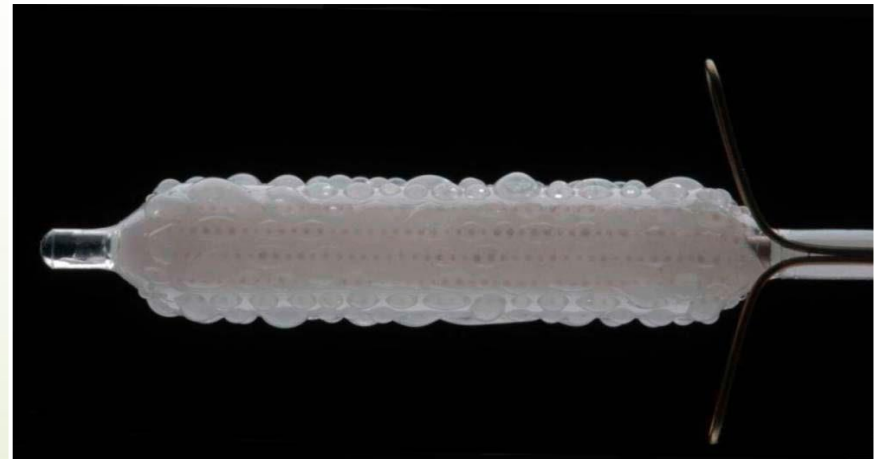
4. Device is removed  
leaving the opening  
dilated





# Drug-eluting stents

- Intraoperatively-placed stents
- Corticosteroid
- Designed for targeted local bathing of sinus cells
  - MicroFlow Spacer





# **CLEAR One-Year Study Trial Design**

## Clinical Study Objective:

- To evaluate the durability of ostial patency and patients' symptomatic improvement at one year following balloon catheter sinusotomy

## Methods:

- Prospective, multicenter evaluation (7 centers)
- Clinical assessment
  1. Nasal endoscopy
  2. CT Scan
  3. Sino-Nasal Outcomes Test (SNOT-20)

# CLEAR One-Year Study Efficacy Results

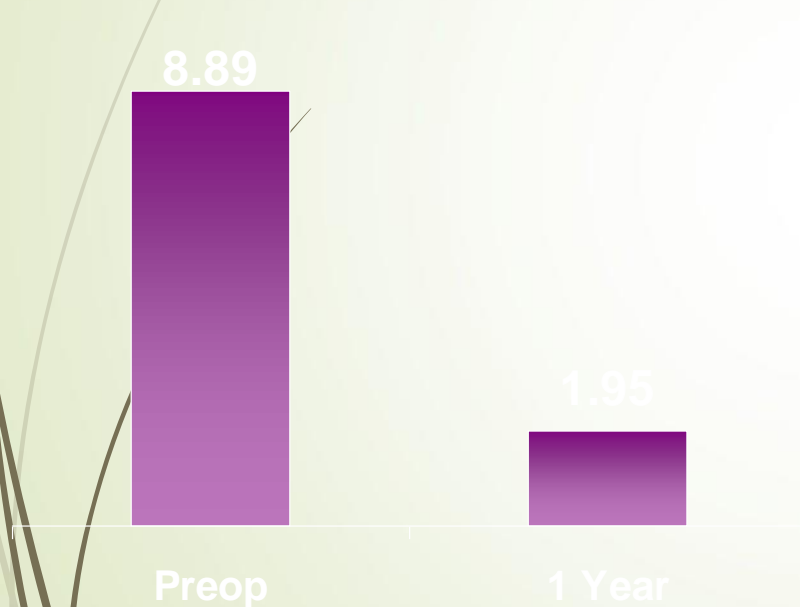
**Nasal Endoscopic Evaluation by Sinus  
(n = 202 sinuses)**

	Maxillary	Frontal	Sphenoid	Total
Endoscopic patency	90% (83/92)	85% (63/74)	72% (26/36)	85% (172/202)
Non-patent	0% (0/92)	3% (2/74)	0% (0/36)	1% (2/202)
Functional Patency (CT L/M Score = 0)	3/9	5/9	5/10	13/28
Overall functional patency	93.5% (86/92)	91.9% (63/74)	86.1% (31/36)	91.6% (185/202)

**91.6% functional patency of all ballooned sinuses**

# CLEAR One-Year Study L/M & SNOT-20 Results

**Lund-MacKay CT Score  
(n = 53)**



**(1) Statistically significant ( $p < 0.001$ )**

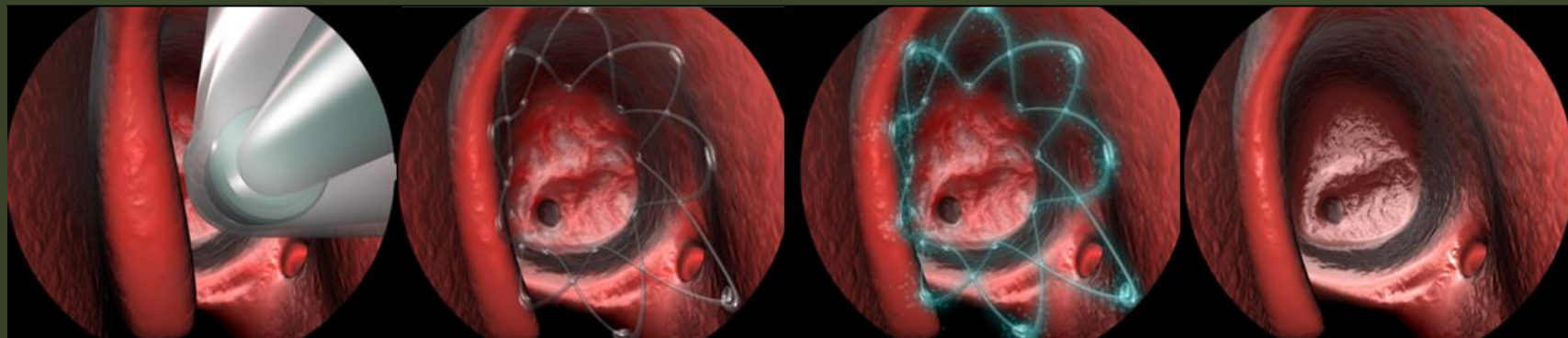
**Symptom Assessment SNOT-20 (n = 65)**



**(1) Statistically significant ( $p < 0.001$ )**

**(2) Clinically meaningful change ( $> 0.8$ )**

# Advanced Technologies: Steroid-Eluting, Dissolvable Sinus Stent (PROPEL<sup>®</sup>)



1. Delivery into ethmoid sinus

2. Spring-like action to maintain sinus opening

3. Localized delivery of Mometasone Furoate

4. Dissolves in place/ bioabsorbable

POST-OPERATIVE  
INTERVENTION

35%

p=0.0008

POLYPOSIS

46%

p<0.0001

NEED FOR  
ORAL STEROIDS

40%

p=0.002  
3

SCARRING  
(ADHESIONS)

70%

p=0.0013

MT  
LATERALIZATION

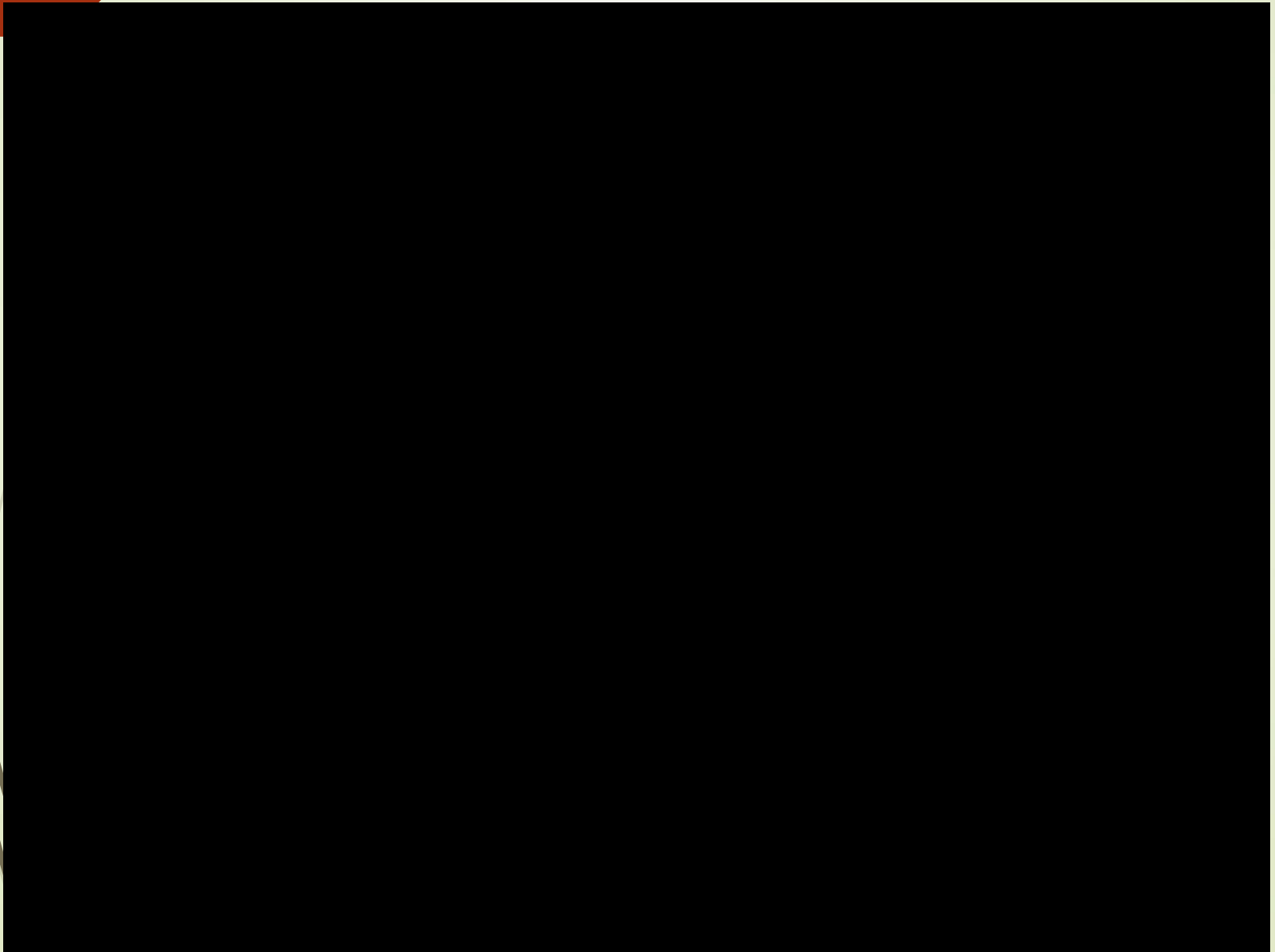
75%

p=0.0225

PROPEL vs. Control




# PROPEL Sinus Stent Animation\*





# Postoperative Care

- In-office debridements to clear clot, fibrinous debris, ensure sinus patency
  - Nasal saline irrigations
  - Resume medical therapy for rhinitis control
- 



# Summary

- Importance to delineate acute sinusitis, chronic sinusitis and acute recurrent on chronic sinusitis
- Maximal medical therapy
- Surgical Intervention is evolving:
  - Traditional FESS
  - Balloon Sinus Dilation Surgery
  - Hybrid Procedure
  - Drug Eluting Stents



**SONORAN**  
**Ear • Nose • Throat**

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