Concepts in Rhinosinusitis

Nick Jones

University of Nottingham

Definition of rhinosinusitis

Very broad and is based on clinical symptoms, CT and endoscopy

NOT on pathology

Definition of rhinosinusitis

Inflammation of the nose/paranasal sinuses with 2 or more:

- Blockage/congestion
- Anterior or postnasal discharge
- Facial pain/pressure (on own rarely due to rhinosinusitis)
- Reduction or loss of smell

and either

Endoscopic signs of polyps/mucopurulent discharge/oedema or mucosal obstruction of the middle meatus

and/or

CT mucosal changes within the ostiomeatal complex and/or sinuses

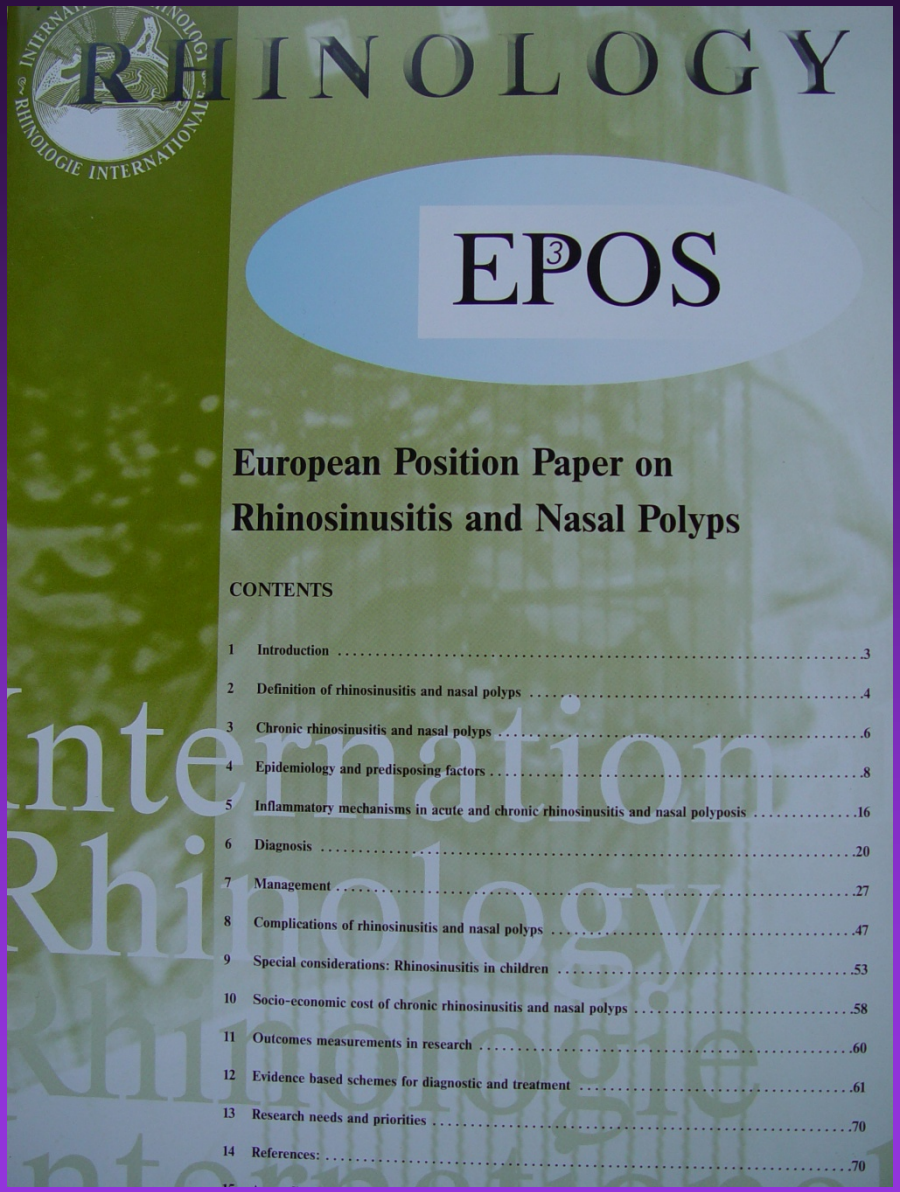
EPOS Rhinology Supplement 2007

Pathology of rhinosinusitis

Many theories

Many studies

Many different clinical/pathological populations studied


RHINOLOGY
EPOS 3
European Position Paper on
Rhinosinusitis and Nasal Polyps
CONTENTS
1 Introduction .3
2 Definition of rhinosinusitis and nasal polyps .4
3 Chronic rhinosinusitis and nasal polyps .6
4 Epidemiology and predisposing factors .8
5 Inflammatory mechanisms in acute and chronic rhinosinusitis and nasal polyposis .16
6 Diagnosis .20
7 Management .27
8 Complications of rhinosinusitis and nasal polyps .47
9 Special considerations: Rhinosinusitis in children .53
10 Socio-economic cost of chronic rhinosinusitis and nasal polyps .58
11 Outcomes measurements in research .60
12 Evidence based schemes for diagnostic and treatment .61
13 Research needs and priorities .70
14 References: .70

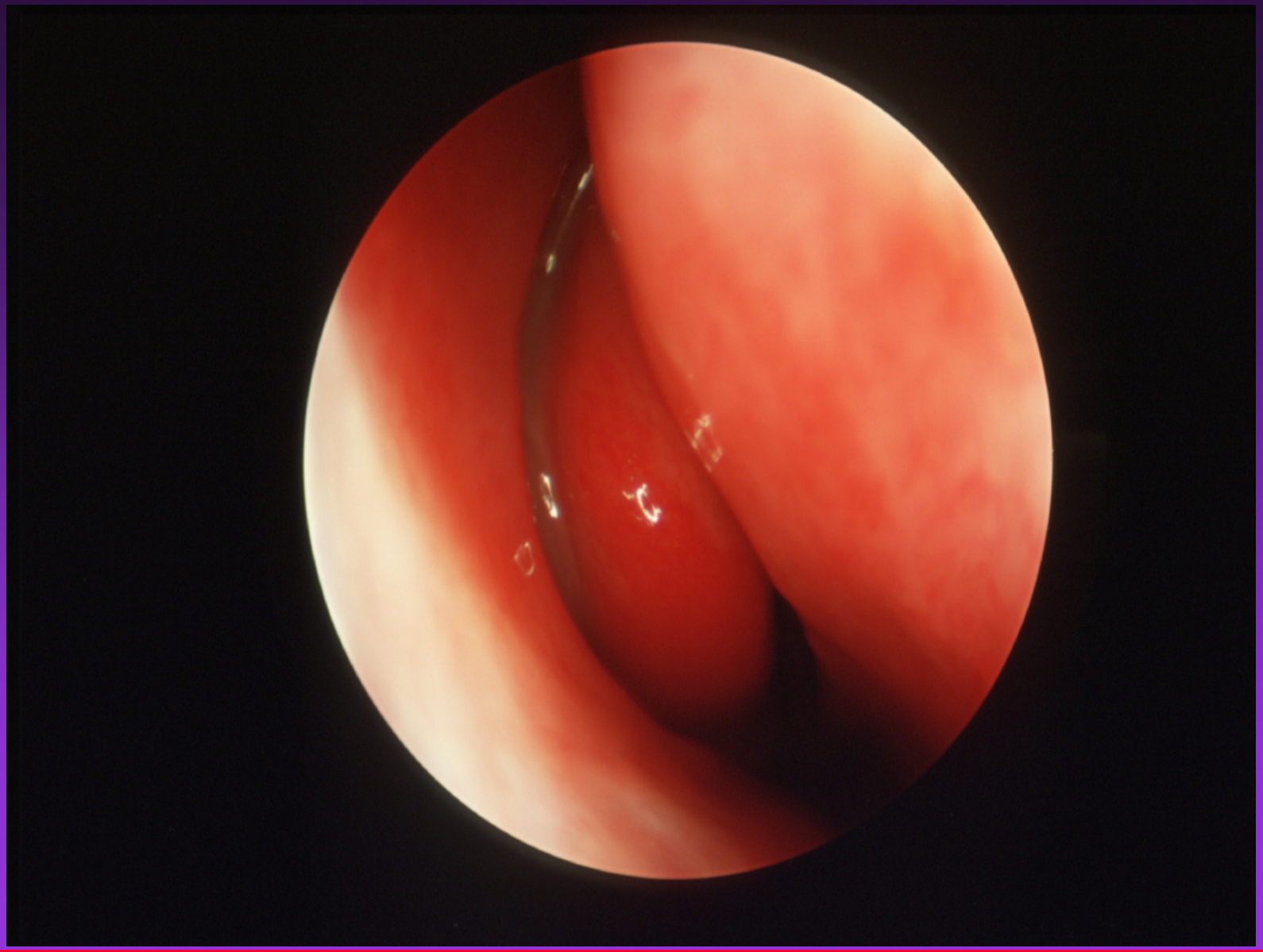
Bacteriology of acute rhinosinusitis

Streptococcus pneumoniae

Haemophilus influenzae

Moraxella catarrhalis

few anaerobes, streptococci, staphylococcus



Different theories about the pathology of chronic rhinosinusitis

Bacterial infection uncommon

Reaction to fungus

Staphylococcal superantigens

Biofilms

Osteitis

Primary ciliary dyskinesia, immunodeficiency, Cystic Fibrosis

Polyps association with late onset asthma +/- NSAI sensitivity

No clear association with atopy

No association with anatomical factors

Prevalence of chronic rhinosinusitis

15% in population based questionnaires

4-6% in several observational studies

2% doctor confirmed

Symptoms in chronic rhinosinusitis

Nasal obstruction

Hyposmia common

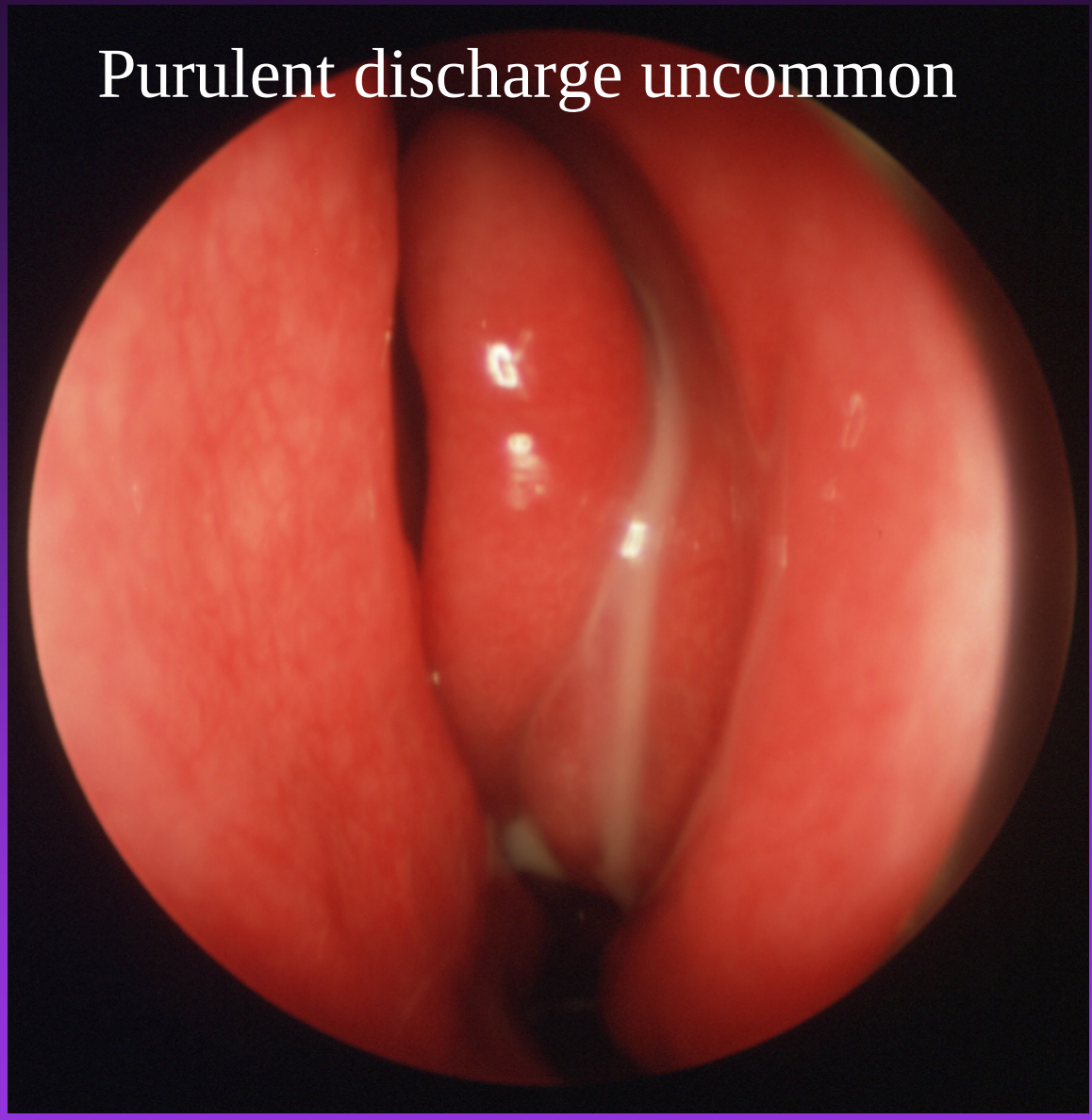
Anterior or postnasal discharge

(often discoloured yellow with eosinophils but green and infected uncommon)

Facial pain uncommon unless acute exacerbation

Late onset asthma common

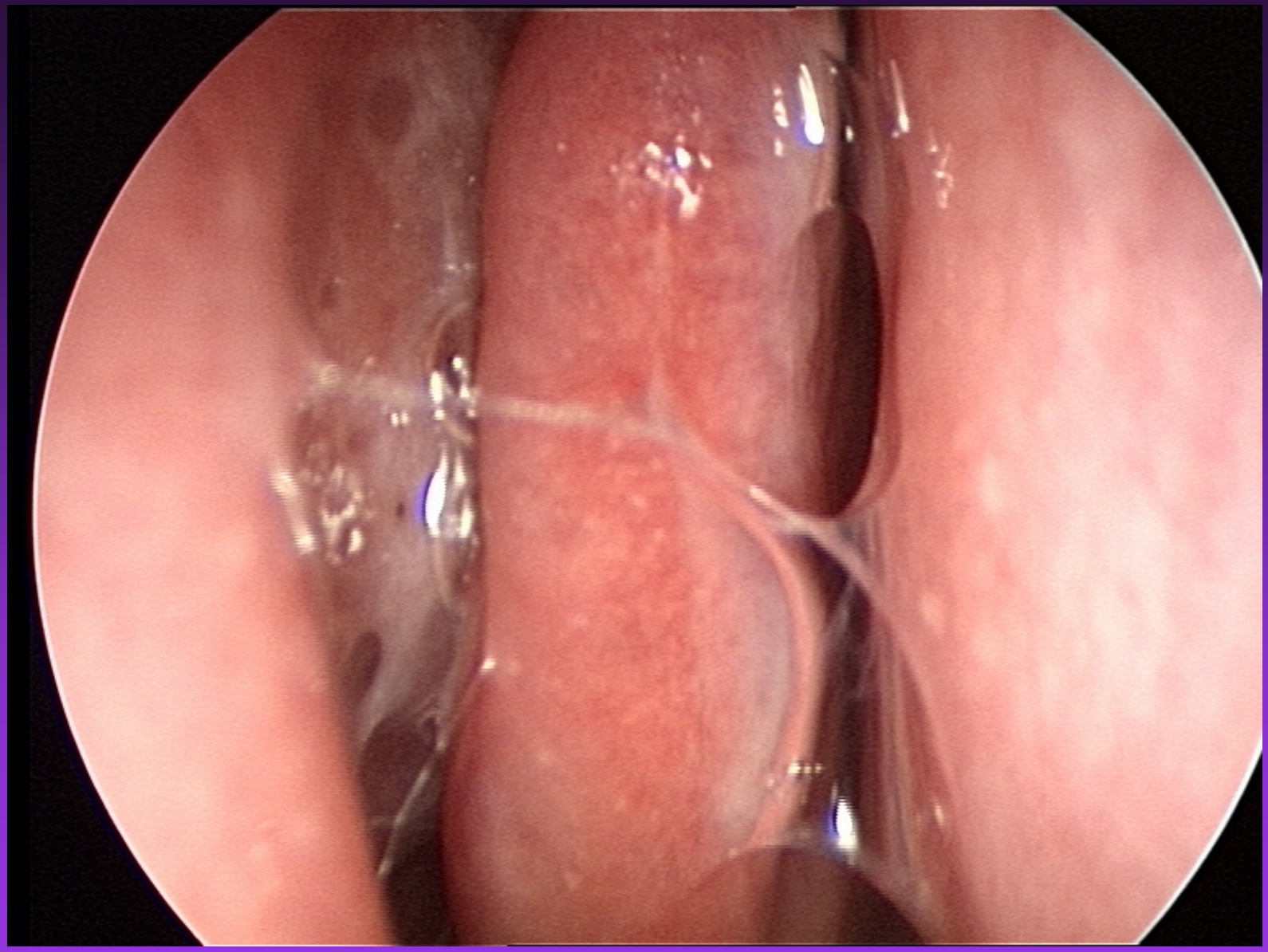
Purulent discharge uncommon

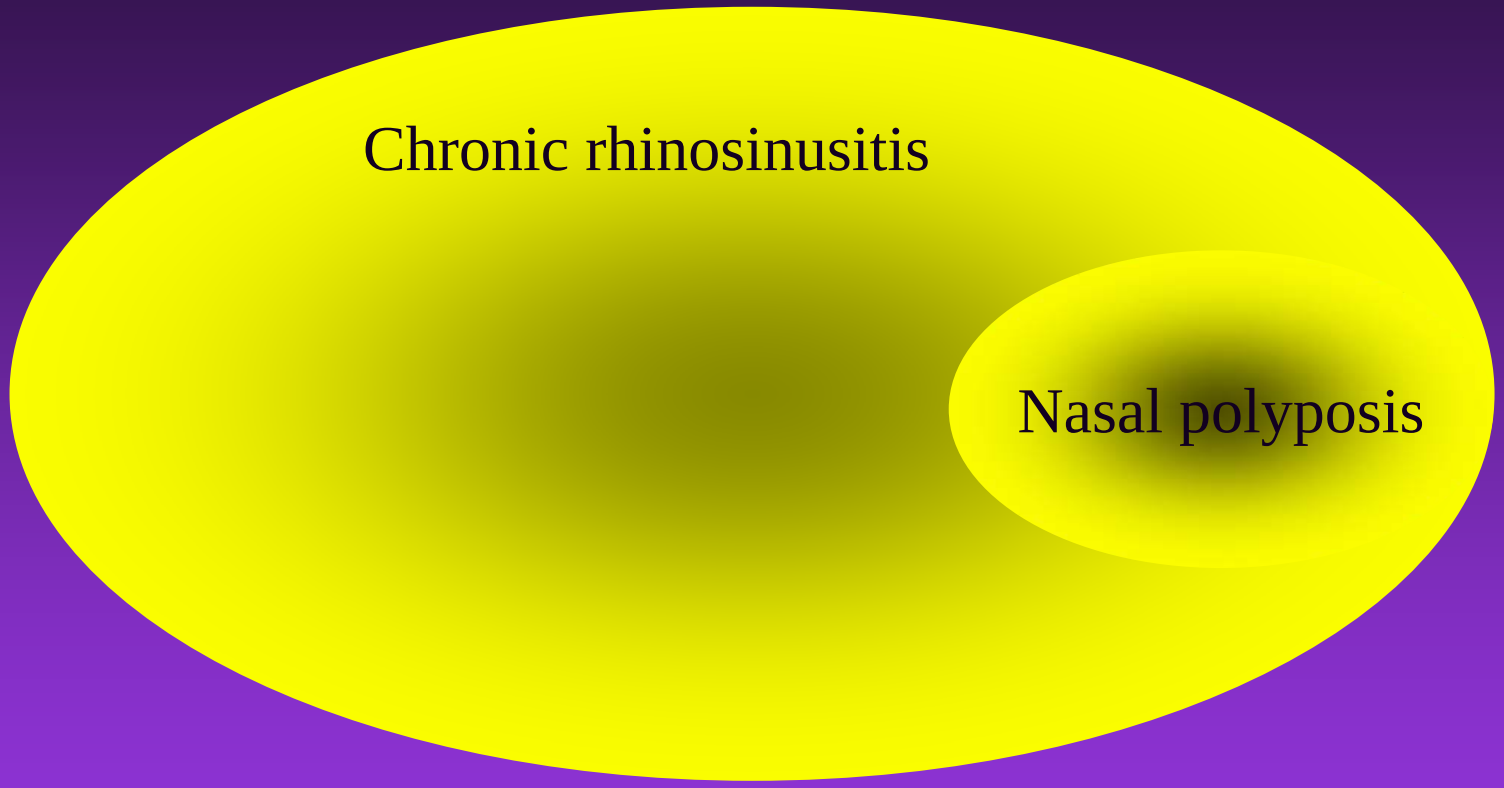


Pathology of chronic rhinosinusitis

"One of the most intriguing aspects of chronic rhinosinusitis is the growing appreciation that for most patients this is not an infectious disease".

Ferguson and Seiden at the start of the preface for volume 28 on Chronic rhinosinusitis, Otolaryngologic Clinics of North America Dec 2005.





EPOS Rhinology Supplement 2007

Chronic rhinosinusitis with nasal polyps

4% of the population have nasal polyps

7-15% of late onset asthmatics have nasal polyps

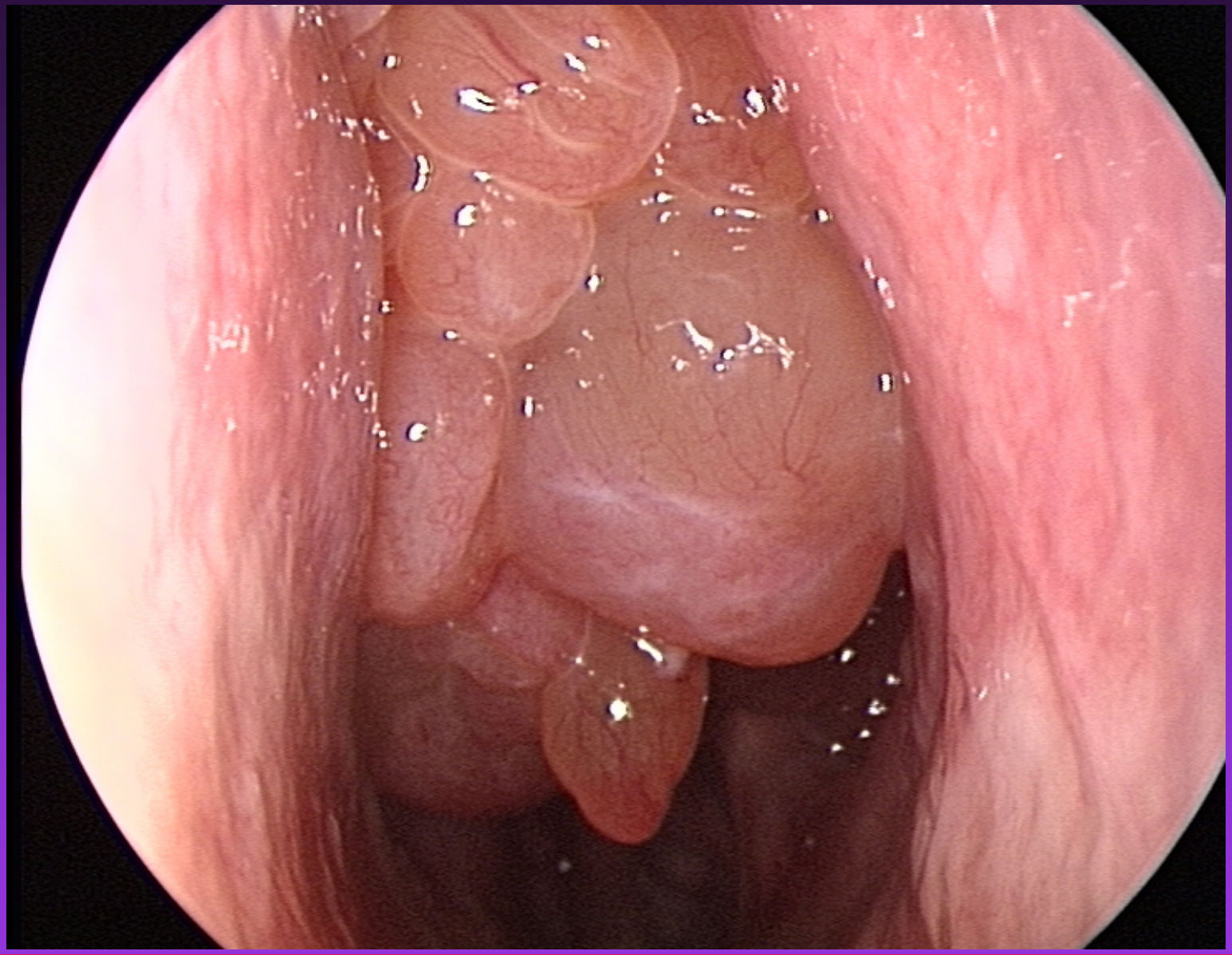
>40% of NSAI sensitive asthmatics have nasal polyps

2% of allergic rhinitics have nasal polyps

Twice as common in men

Asthma twice as common in women with nasal polyps


UNITED
AIR
WAYS



Nasal Polyposis

Not a diagnosis but a sign

Usually bilateral association with late onset asthma

Uncommon secondary to bacterial infection

Rarer associations:

allergic fungal sinusitis, cystic fibrosis, immunodeficiency

Unilateral need to exclude neoplasms and atypical infection

Bronchiectasis

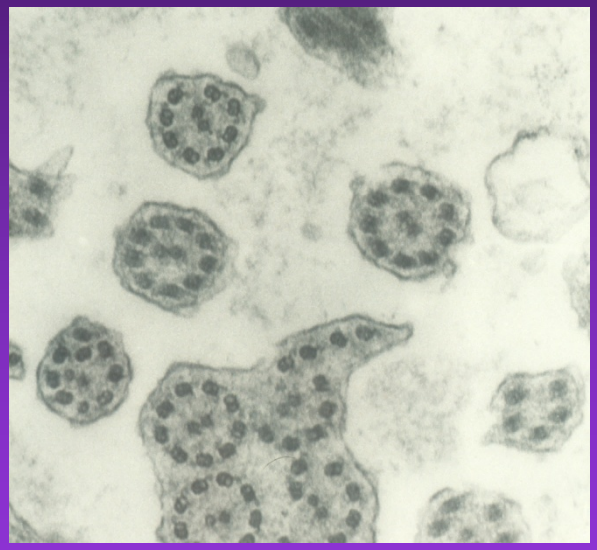
Infertility

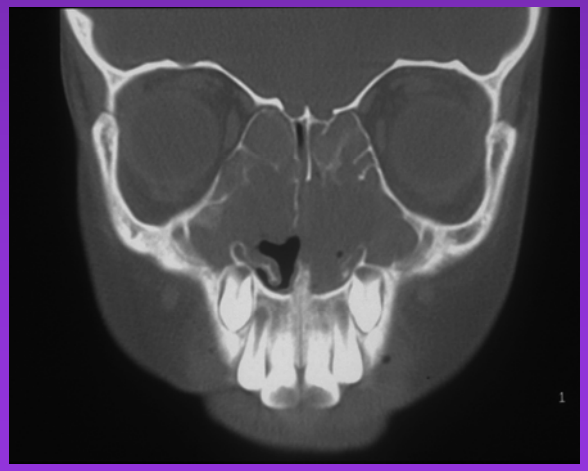
Multiple bacterial infections

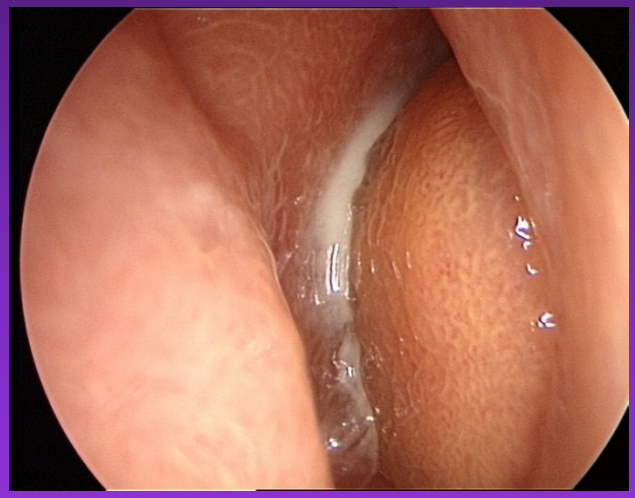
Ciliary dyskinesia

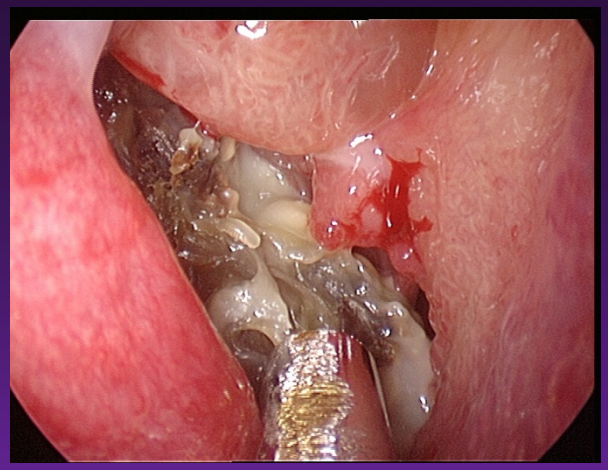
Immunodeficiency

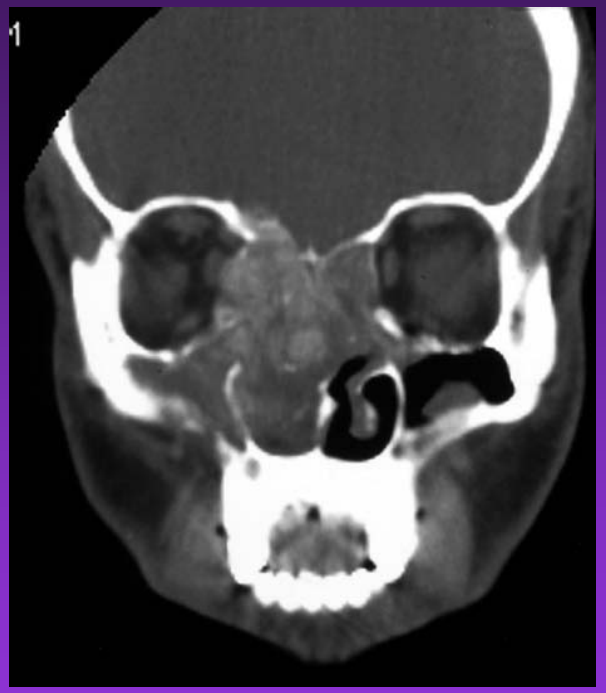
(Cystic fibrosis)

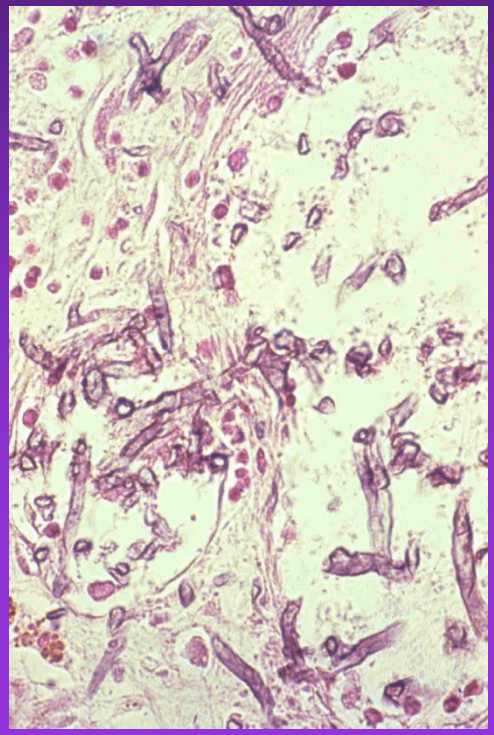








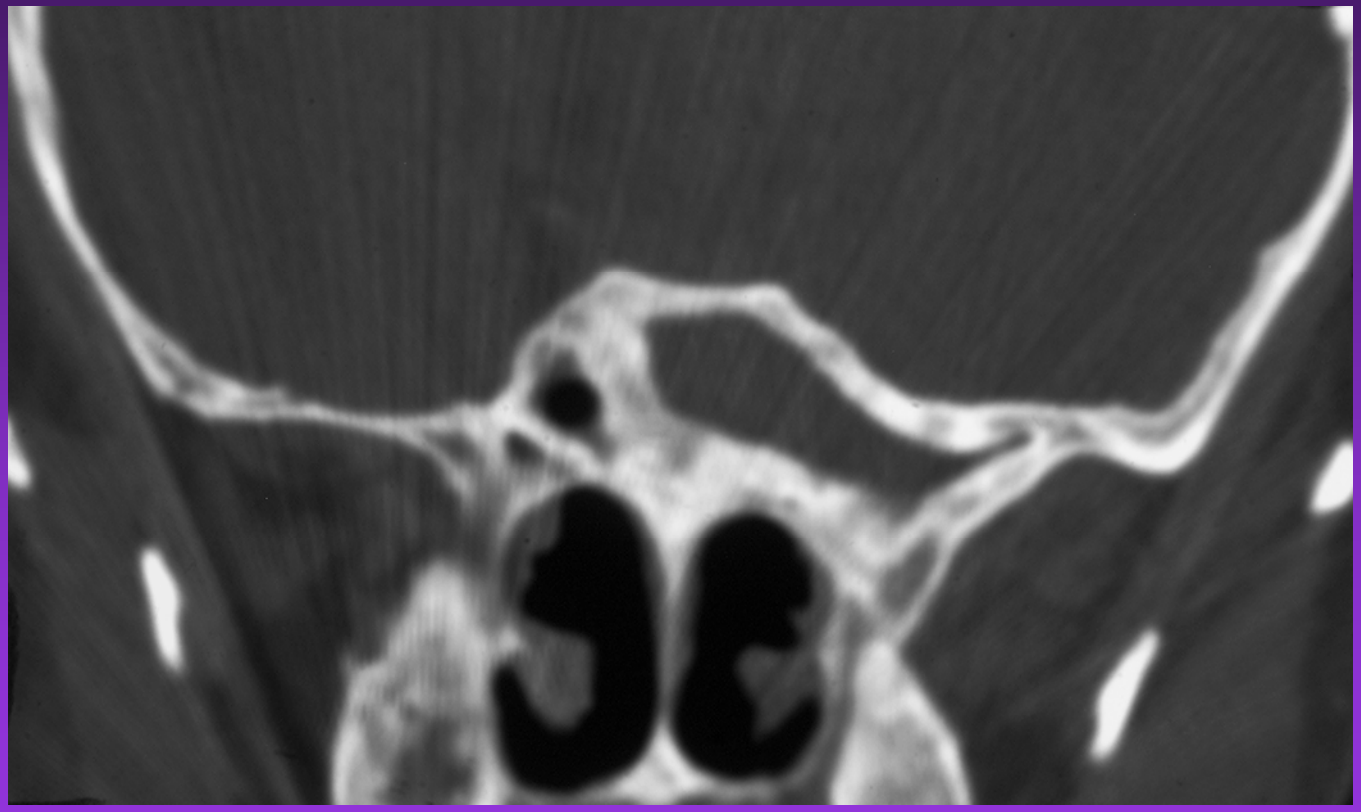




Allergic Aspergilllosis

- Eosinophil count raised
- Total serum IgE raised
- Antigen specific IgE/IgG raised
- Mucin – eosinophils, charcot leyden crystals, scanty fungal hyphae (Gomeri methenamine silver stain, PAS, Fontana Masson stain, Calcoflor white method)

OSTEITIS



Superantigen hypothesis

- Staphylococcus secrete superantigen toxins
- These stimulate T cells
- T cells produce cytokines and local polyclonal IgE
- Eosinophils are recruited
- ?produce CRS with polyposis

- Specific IgE directed against toxins in polyp tissue found in 50% (not found in CRS without polyposis)
- Staphylococcal superantigens favour TH2 cytokines

Fungal theories

- A 60-kDa component of Alternaria degranulates eosinophils
- T cells drive a non-IgE dependant hypersensitivity response
- Alternaria proteins recognised by APCs, presents them to T cells whose response attracts and activates eosinophils
- Eosinophils release major basic protein

- ? Non specific protease reaction
- Cytokines with a non-specific protease response are released
- Peripheral blood mononuclear cells in vitro have been shown to produce a TH1/2 response to fungal antigens

Fungal spores
are found in most people

CRS with nasal polyposis	CRS without polypsosis
TGF-beta 1 and 2 ↓	TGF-beta 1 and 2 ↑
IL-5 ↑	IL-5 ↓
Fox P3 cells ↓	Fox P cells present
Tend towards TH2 cytokines	Tend toward TH1 cytokines
B cell activation TNF family	Reduced TNF family activity
IgA ↑	IgA not increased
IL-17 ↑	
	CD3, CD25, CD68
	Neutrophils

Pattern recognition receptors

Innate immunity

Recognise patterns associated with foreign proteins

- Help maintain the immune barrier
- Release chemokines, cytokines
- Attracts cellular defences
- Damaged epithelium amplifies any response

Host response

A lack of genes related to epithelial defence and repair

- SPINKS5 a polyvalent antiprotease is reduced in CRS with polyposis and a trend in CRS, it protects gap junctions

- IL-6 role in inhibitory local innate immune responses is increased in nasal polyposis. Frees helper and effector T cells from the effect of IL-10, may increase the acquired response

CRS is not one uniform disease but may be the result of many different pathogens, allergens or foreign proteins on hosts with different genetics that result in differing immune responses, inflammatory mechanisms and regulation.

Need more holistic studies that identify a range of biomarkers that will allow better classification and studies