



The International Federation of Head and Neck Oncologic Societies

Current Concepts in Head and Neck Surgery and Oncology 2018



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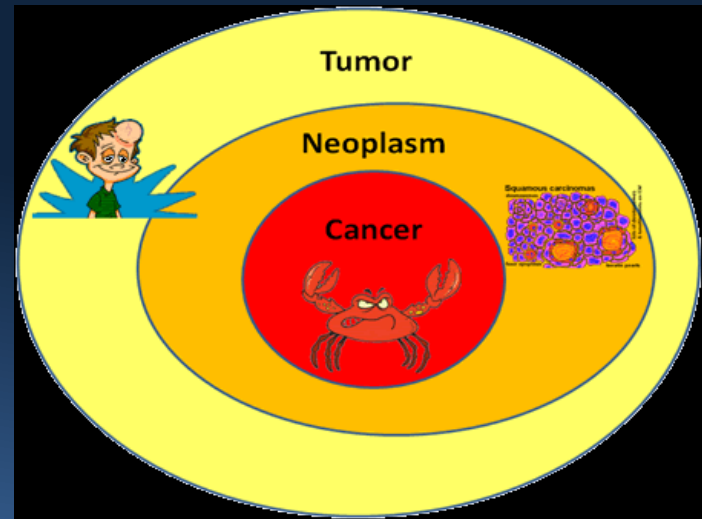
Skull Base Surgery

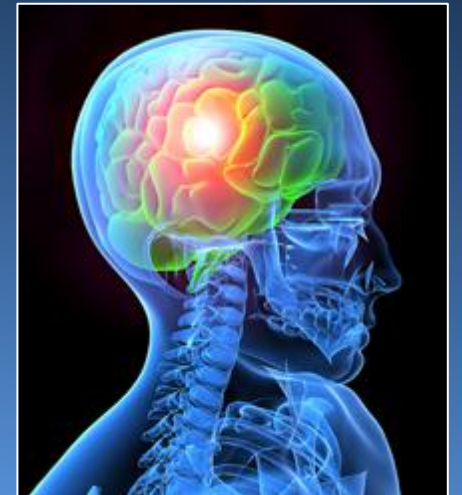
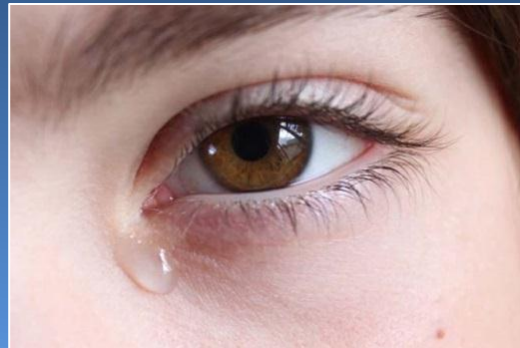
Ian J. Witterick MD
University of Toronto

Disclosures

- Proteocyte Diagnostics Inc.
 - Ownership interest

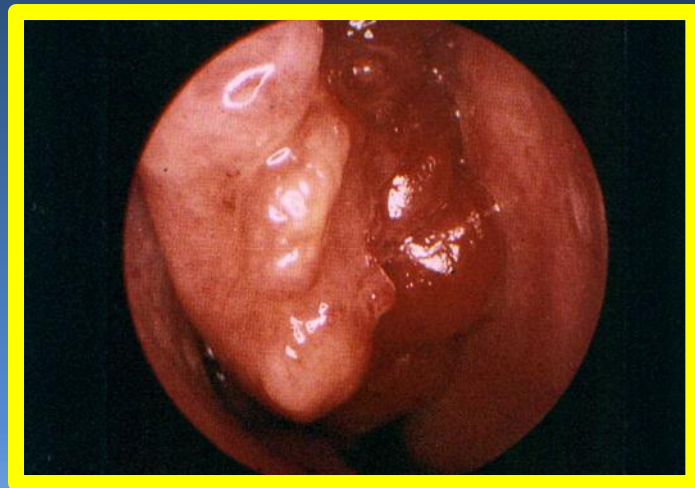
Unilateral Nasal Mass



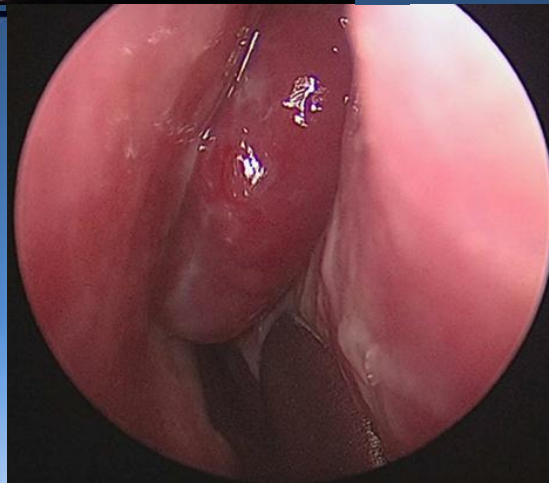
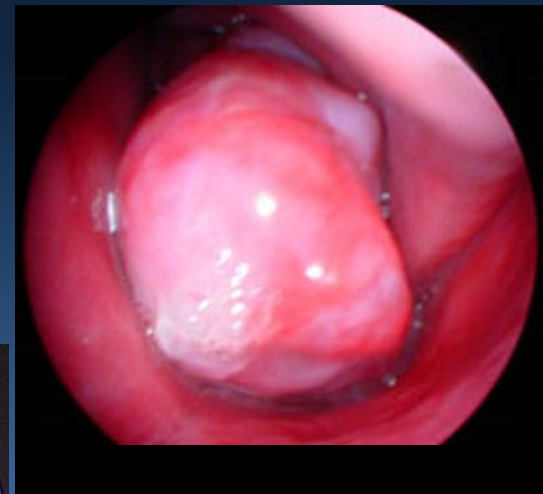
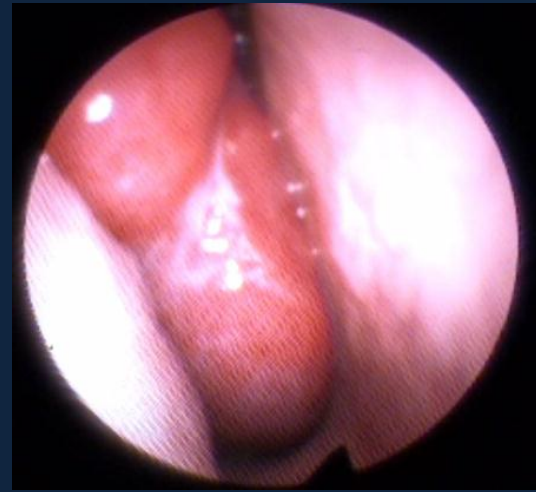
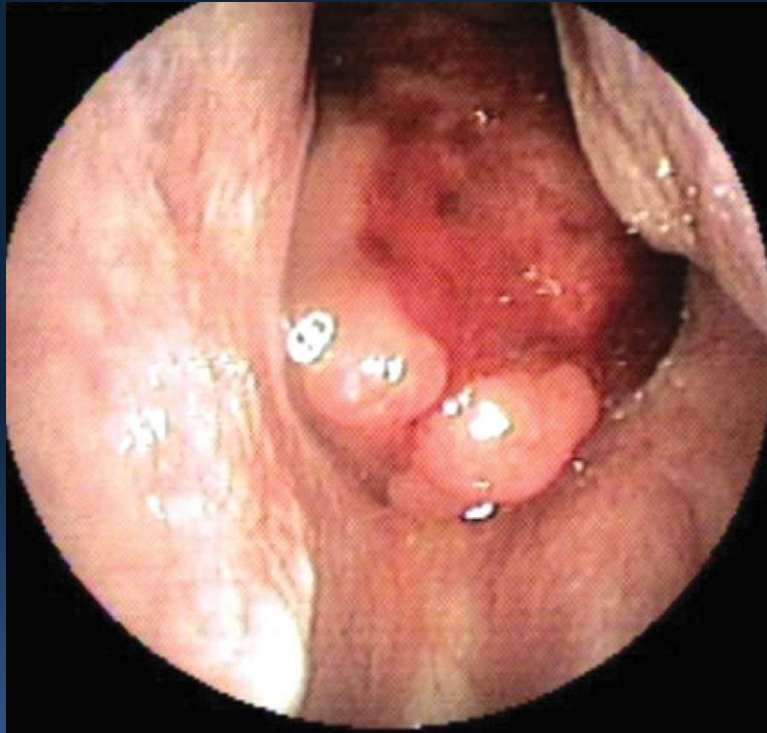


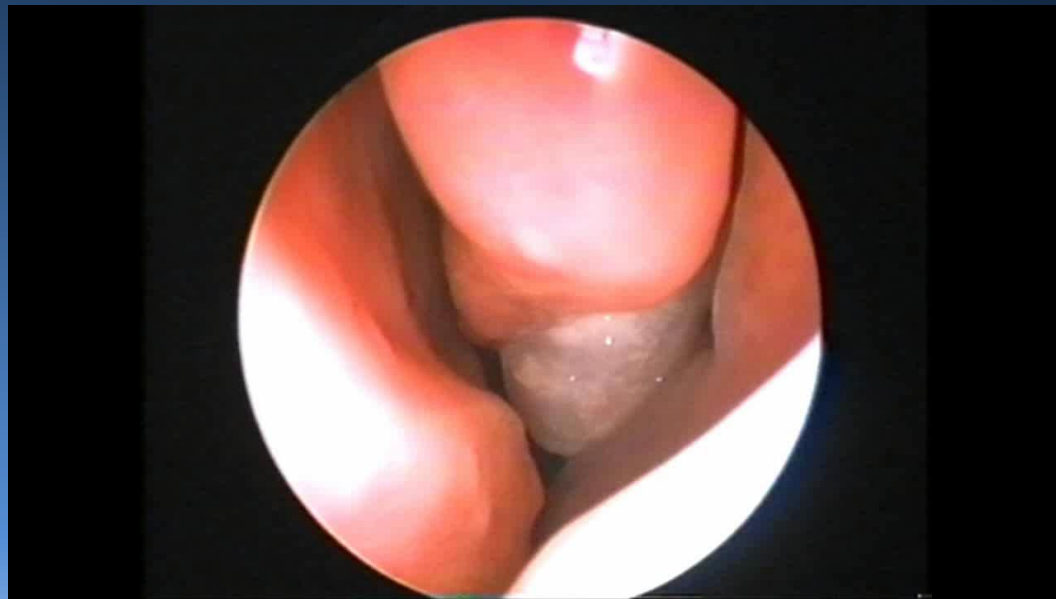
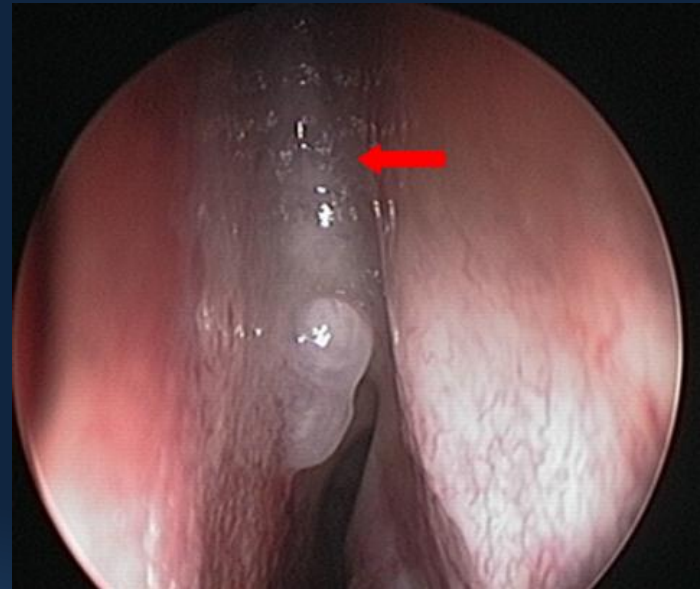


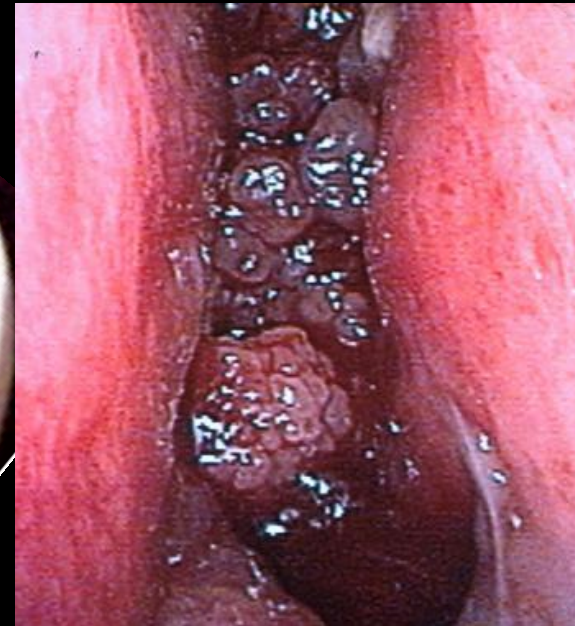
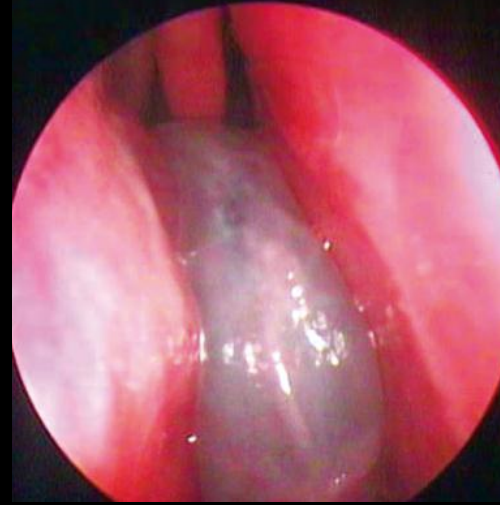












Histopathology

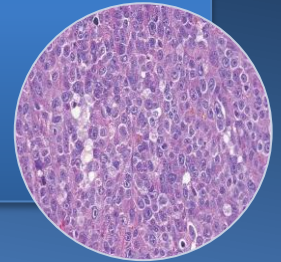
- Epithelial
 - IP
 - Squamous papilloma
- Fibro-osseous
- Vascular (JNA)

Benign

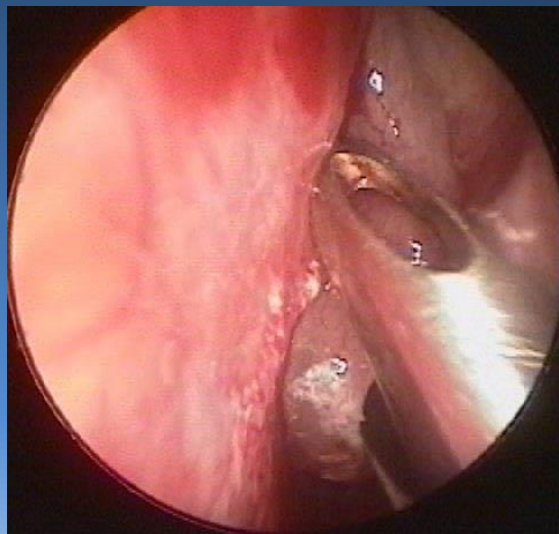
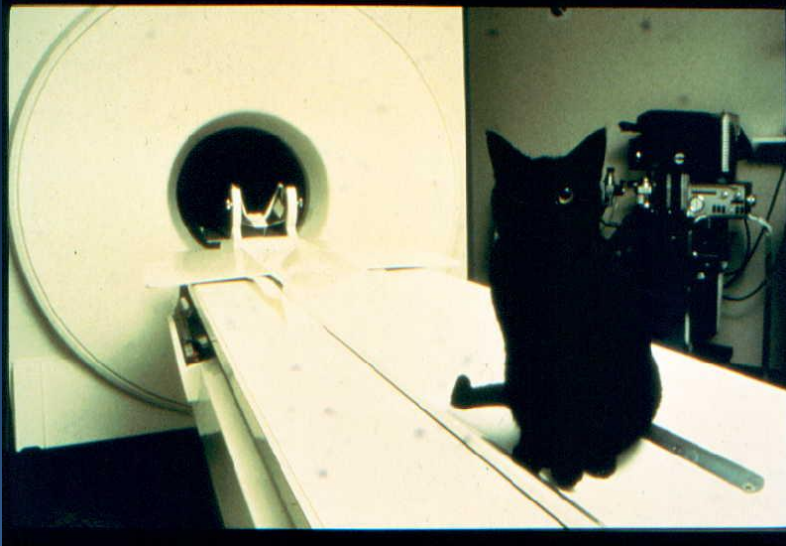


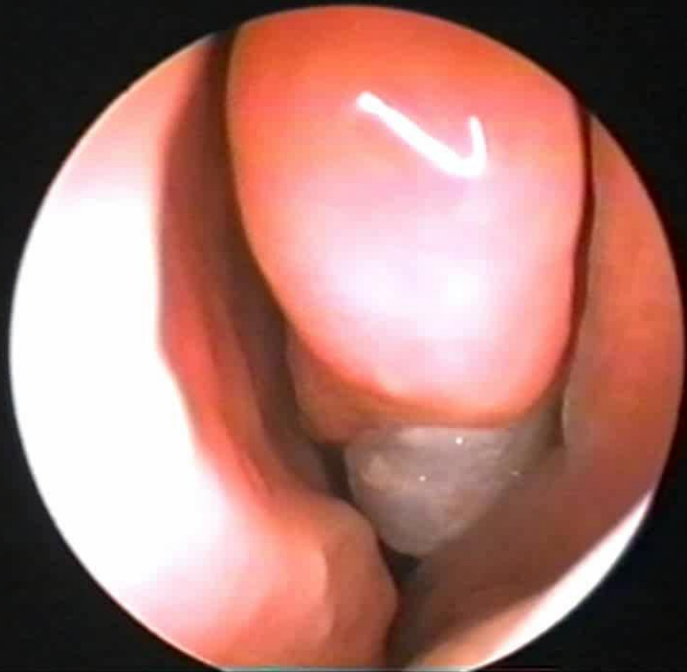
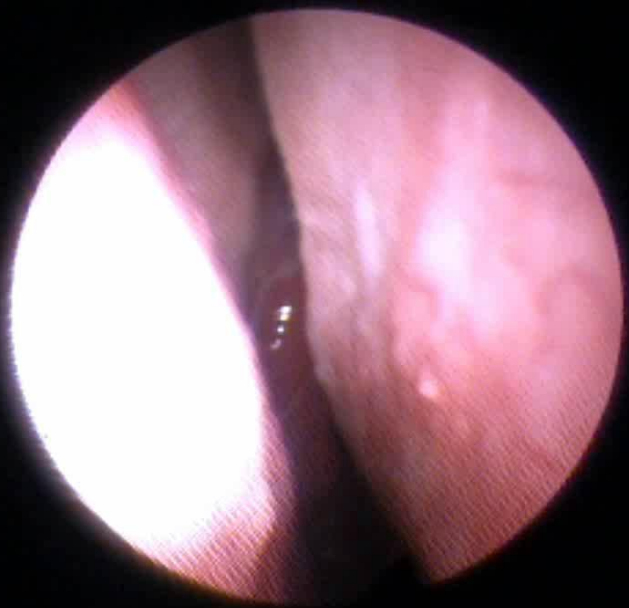
- Epithelial
 - SCC, AdenoCa, Adenoid cystic
- Neuroendocrine (esthesio, SNUC)
- Sarcomas
- Melanoma
- Lymphoma/plasmacytoma

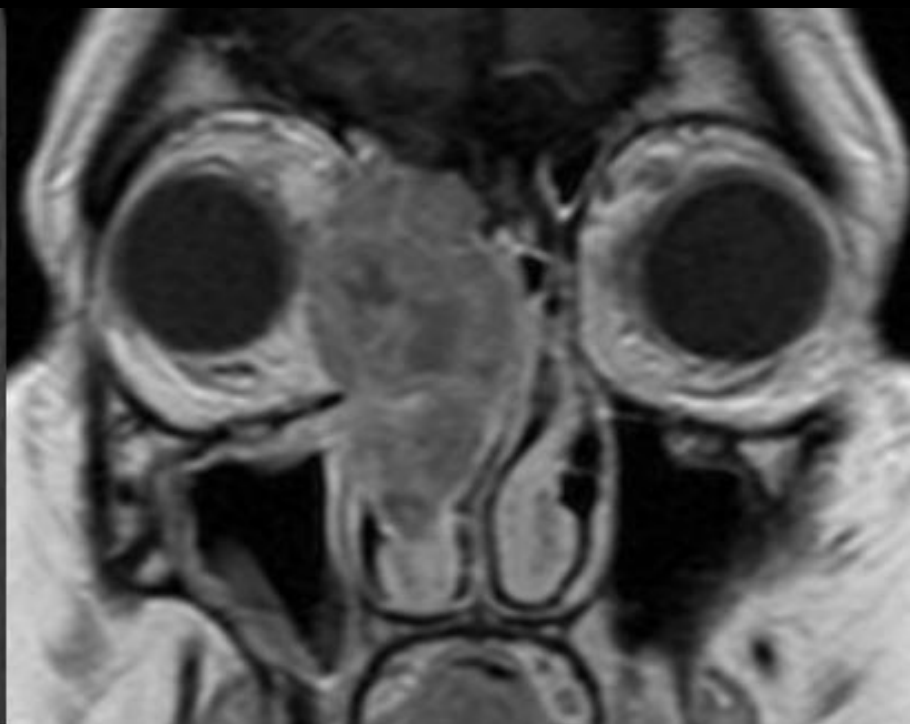
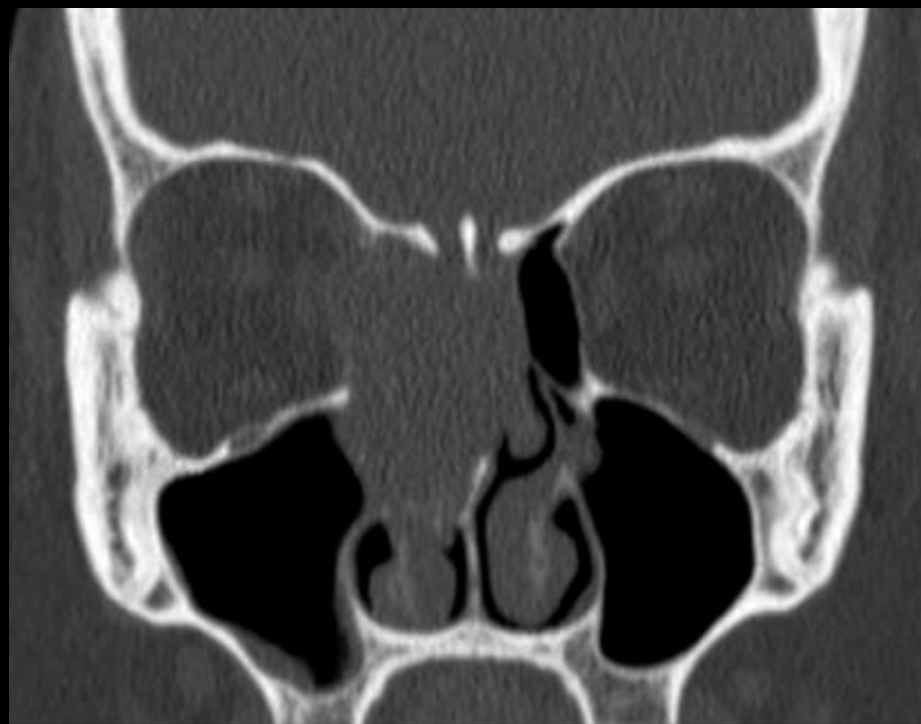
Malignant

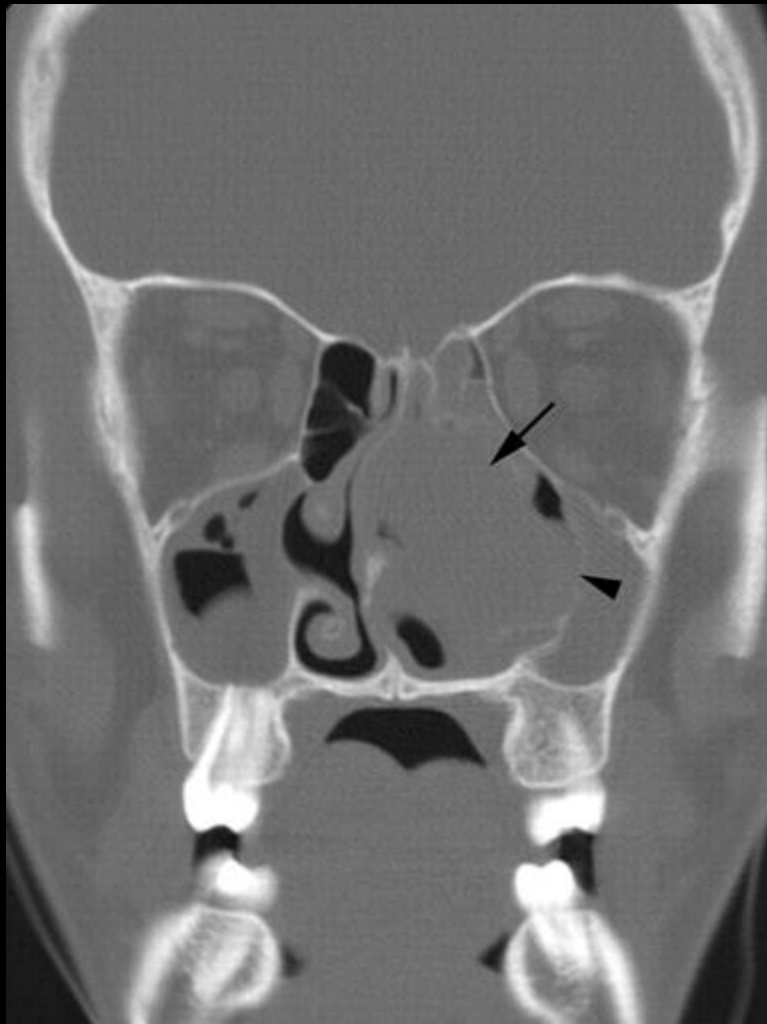


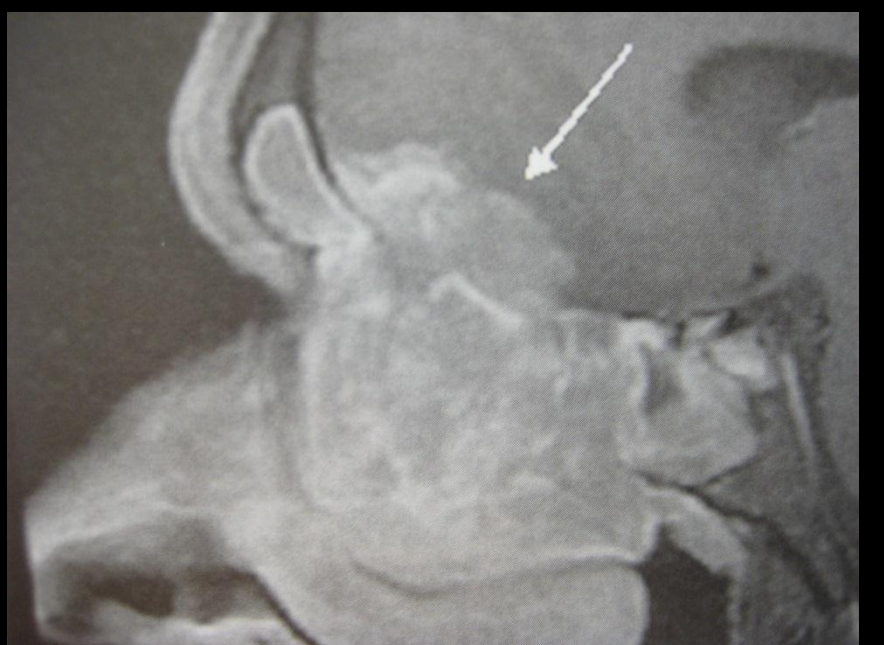
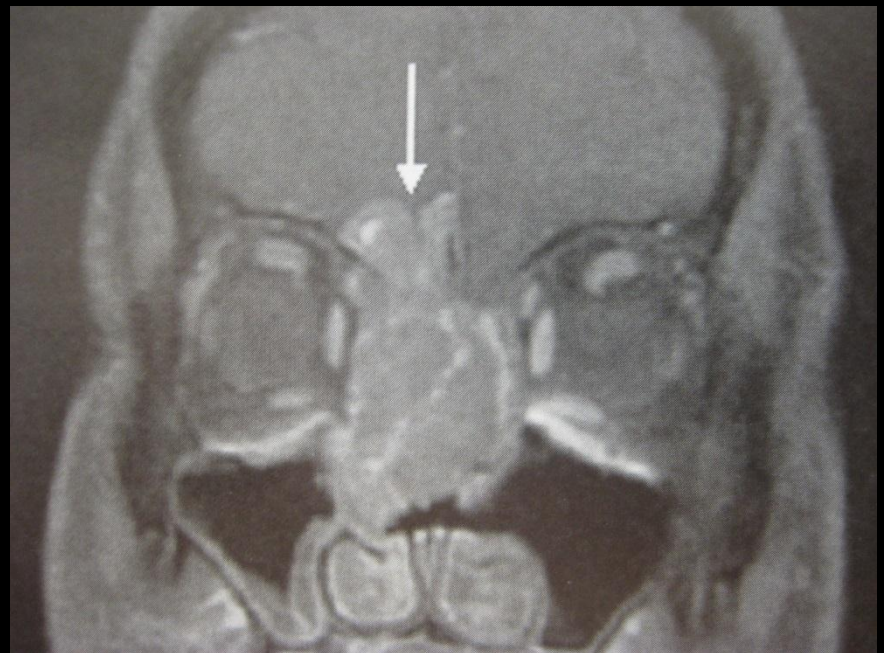
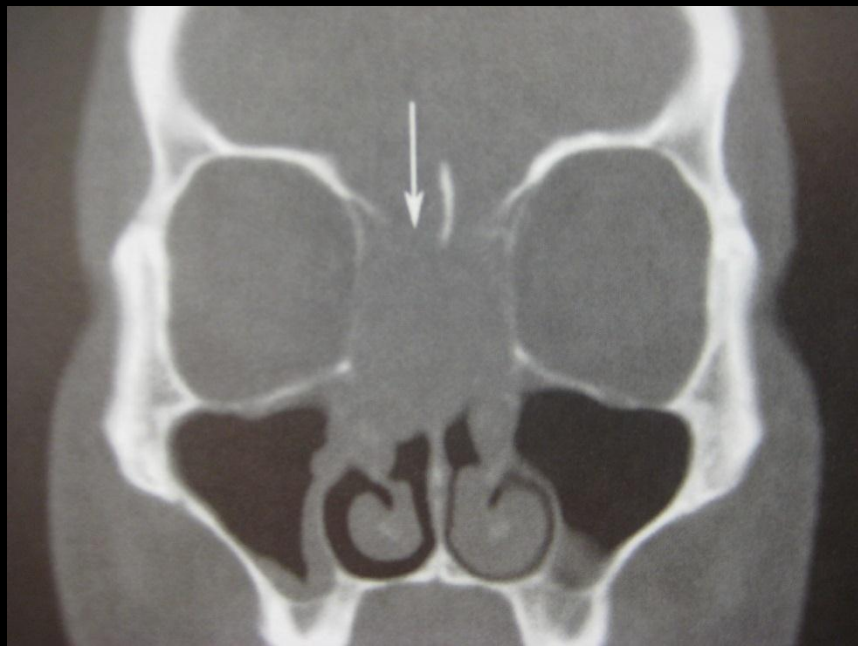
Investigations



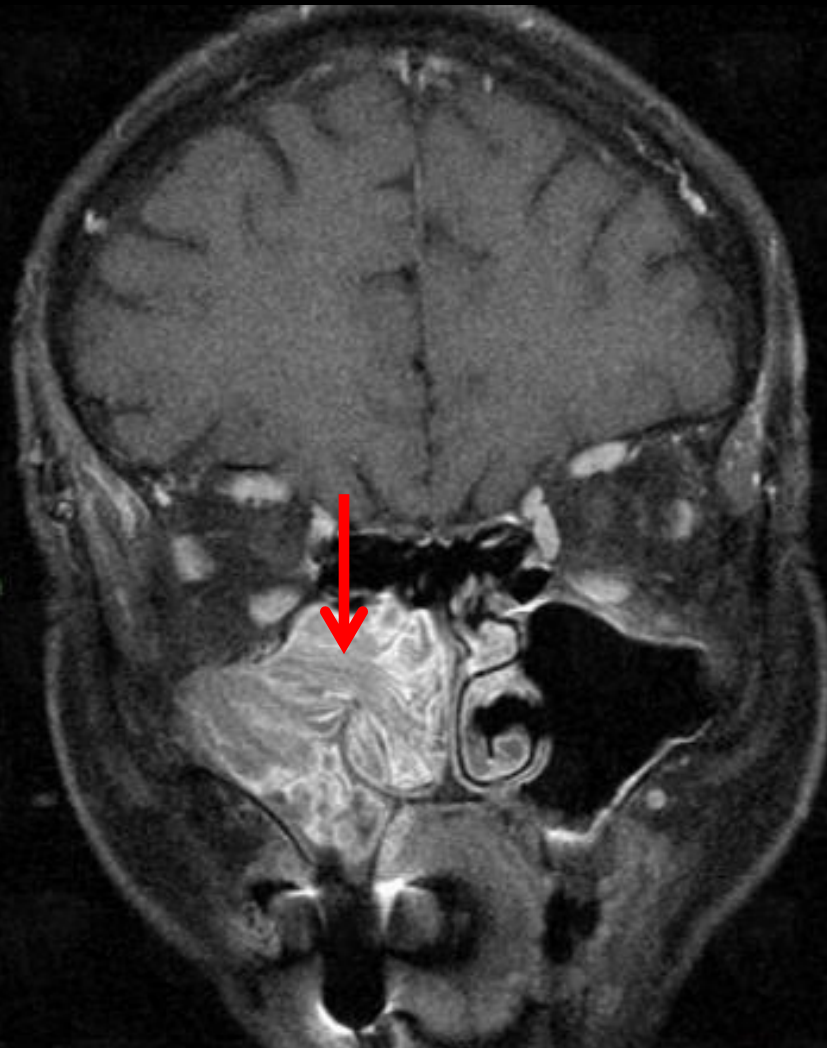
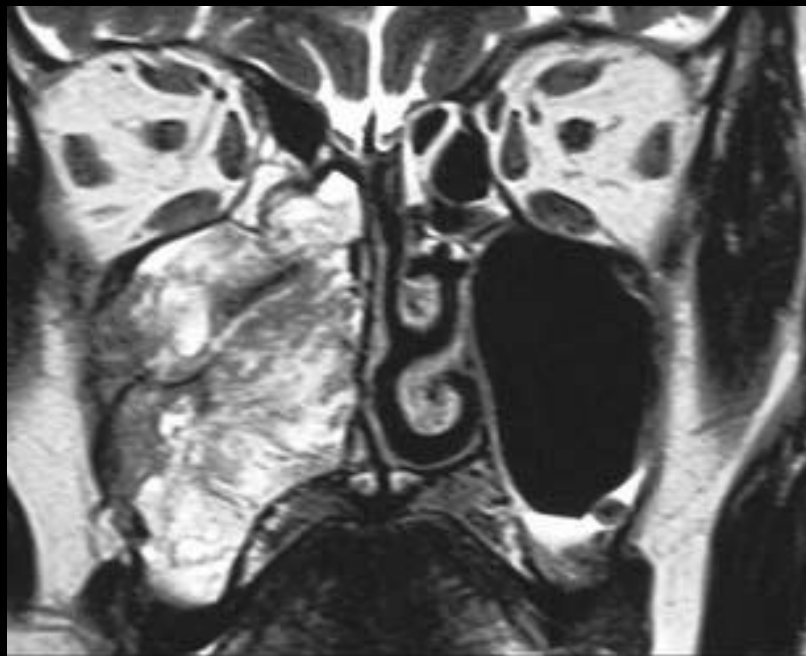












Benign Neoplasms

- Is removal indicated?
- Can you remove safely/completely?
- Exposure
- Equipment
- Control of bleeding, orbit, CSF



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Malignancy...

Epidemiology

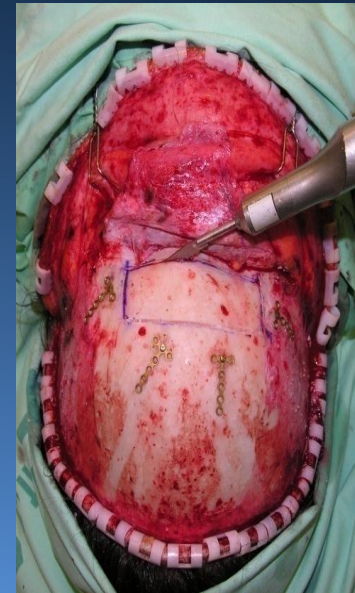
- Incidence 1:200,000 (USA)
- 3% of H&N malignancies
- Male predominance 1.8:1
- Age: 55-69 years
- Common histology: SCC
- Common sites:
 - nasal cavity (44%)
 - maxillary sinus (36%)

Risk Factors

- Environmental/occupational:
*aflatoxin, formaldehyde, chromium,
nickel, aluminum, mustard gas,
polycyclic hydrocarbons, mesothorium
(Thorotrast), wood dust*
- Smoking (SCC)
- Smoked food
- HPV (inverted papilloma)

Treatment

- Surgery
- XRT
- Chemotherapy
- Combinations



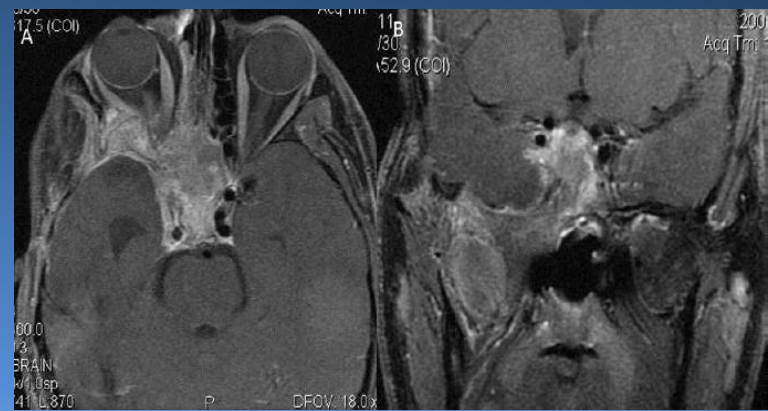
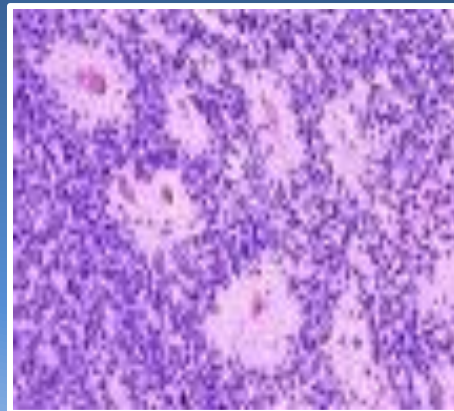


The Multidisciplinary Team



Principles of Treatment

- Primary site, stage
- Tumor biology
ENB, SNUC, SNEC, poorly diff. Ca, melanoma, ACC
- Patient characteristic – age, comorbidities
- Extension
lateral SB, PPS, PMF, dura, carotid, brain, local, distant mets



Radiation Therapy

- Most patients get XRT (64%)
- Definitive XRT (single modality):
 - 5y local control 43%*
- Better as an adjuvant to surgery

5y local control 84%

5y overall survival 67%



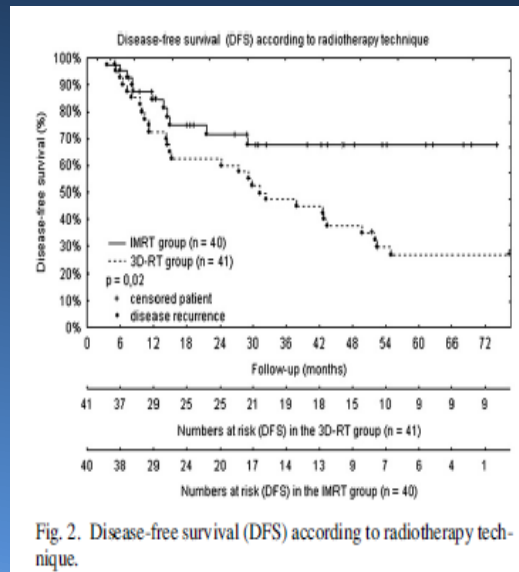
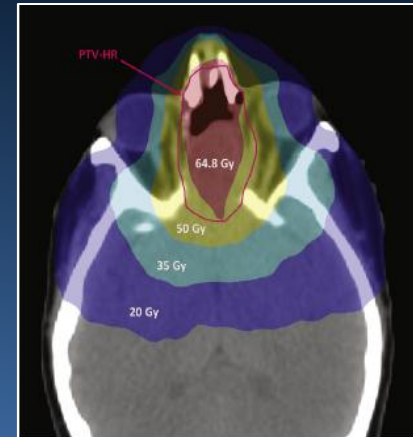
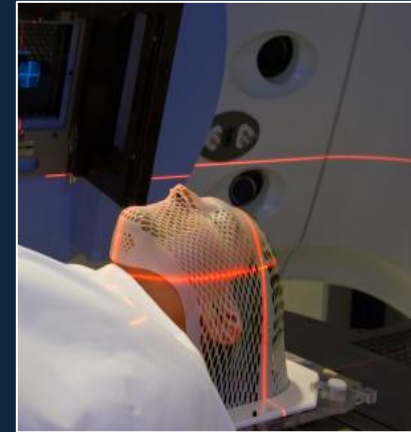
Mendenhall et al.
Laryngoscope 2009

Hoppe et al. Radiat
Oncol Biol Phys 2008

Radiation Therapy

The tradeoff:

- High dose required for disease control
- Sensitivity of adjacent structures



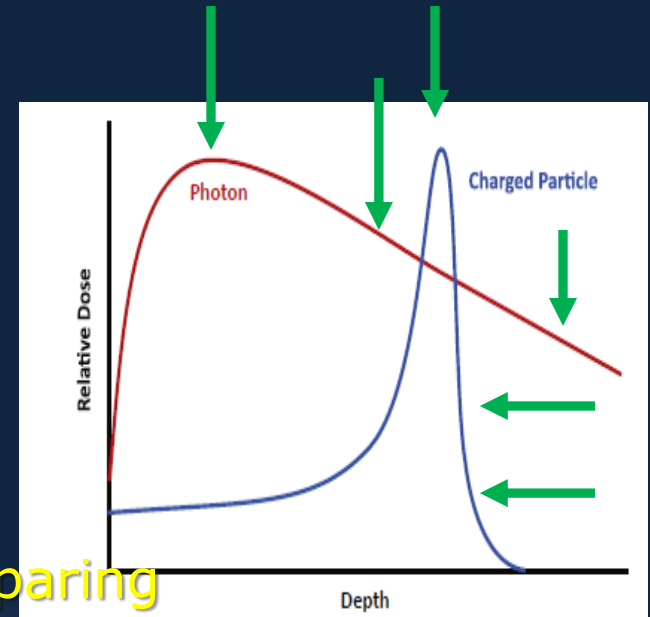
Dirix et al, Int J Rad Onc Biol Phys, 2010

Fossani et al, Reports of practical oncol. and radiothe., 2016

- Proton RT may be advantageous

Proton RT

- Most dose is deposited at a characteristic depth (“Bragg peak”)
- Potential to
 - Reduce toxicity – normal tissue sparing
 - Improve disease control – treatment intensification



Definitive proton radiation therapy and concurrent cisplatin for unresectable head and neck adenoid cystic carcinoma: A series of 9 cases and a critical review of the literature

Onita Bhattasali, MD, MPH,¹ Emma Holliday, MD,² Merrill S. Kies, MD,³ Ehab Y. Hanna, MD,⁴ Adam S. Garden, MD,² David I. Rosenthal, MD,² William H. Morrison, MD,² G. Brandon Gunn, MD, PhD,² C. David Fuller, MD, PhD,² X. Ronald Zhu, PhD,⁵ Steven J. Frank, MD^{2*}

Head and Neck Cancers

Long-Term Outcomes After Proton Beam Therapy for Sinonasal Squamous Cell Carcinoma



Andrea L. Russo, MD,* Judith A. Adams, CMD,*
Elizabeth A. Weyman, BA,* Paul M. Busse, MD,*
Saveli I. Goldberg, PhD,* Mark Varvares, MD,† Daniel D. Deschler, MD,†
Derrick T. Lin, MD,† Thomas F. Delaney, MD,* and Annie W. Chan, MD*

Head and Neck Cancers

Outcomes of Sinonasal Cancer Treated With Proton Therapy

International Journal of
Radiation Oncology
biology • physics

www.redjournal.org



Roi Dagan, MD, MS,*† Curtis Bryant, MD,*† Zuofeng Li, DSC,*†
Daniel Yeung, PhD,*† Jeb Justice, MD,† Peter Dzieglewski, MD,‡
John Werning, MD,‡ Rui Fernandes, MD, DMD,§
Phil Pargousis, MD, DDS,§ Donald C. Lanza, MD,||
Christopher G. Morris, MS,*† and William M. Mendenhall, MD*†

Proton RT

- Meta-analysis, 41 cohorts
- Charged particle RT (CPRT) vs photon RT
- n=1472, 286 for CPRT

Patel et al, Lancet Oncology, 2014

CPRT confers better

- 5y OS (RR 1.51, p=0.0038)
- 5y DFS (RR 1.93, p=0.0003)
- LRC at 5 yrs (RR 1.06, p=0.79)

Subgroup analysis: proton RT vs IMRT

- Better 5y OS for proton RT (RR 1.44, p=0.045)
- Better LRC* for proton RT (RR 1.26, p=0.011)

Timing of Radiation

The Laryngoscope
© 2018 The American Laryngological,
Rhinological and Otological Society, Inc.

Impact of Neoadjuvant Radiation on Margins for Non-Squamous Cell Carcinoma Sinonasal Malignancies

Fu T, Chin CJ, Xu W, Che J, Huang SJ, Monteiro E, Alghonaim Y, Ringash J, Witterick IJ.

- 23 neoadjuvant and 61 adjuvant RT
- A higher proportion of patients receiving neoadjuvant RT achieved negative/close resection margins compared to those receiving adjuvant RT
 - 83% vs. 41%, $p = .003$

Chemotherapy

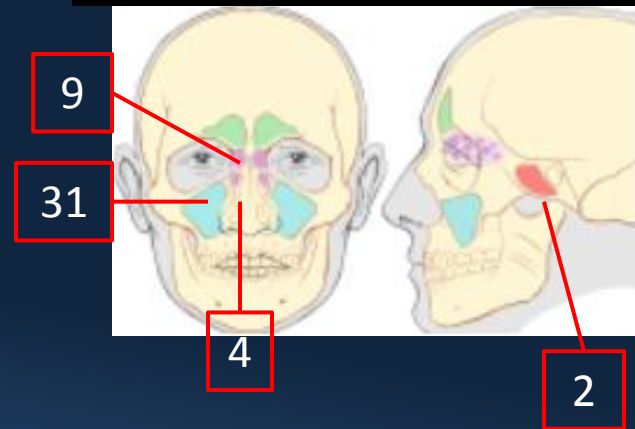
- Adjuvant chemotherapy
- Neoadjuvant chemotherapy
- Maintenance
- Palliative treatment
- Combined with XRT
 - Sequential
 - Concurrent



Induction chemotherapy for advanced squamous cell carcinoma of the paranasal sinuses.

Hanna EY¹, Cardenas AD, DeMonte F, Roberts D, Kupferman M, Weber R, Rosenthal D, Kies M.

- N=46, stage III/IV SCC
- 12 N+
- Induction chemo
 - Taxane/platinum 80%
- Response
 - Partial 67%
 - Stable 24%
 - Progression 9%



24/46 surgery

+/- PORT or chemoRT

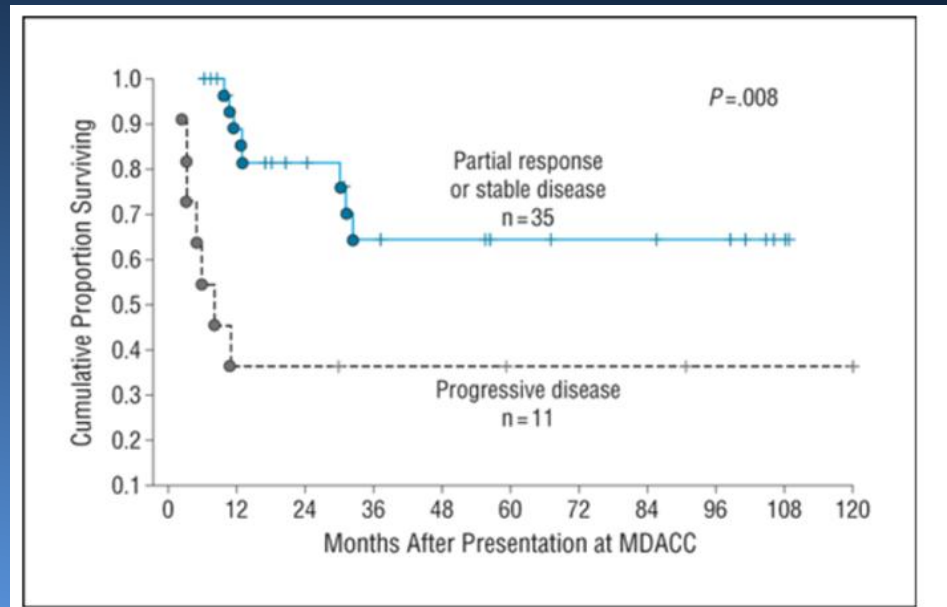
2 year OS

Progressive Disease

36%

Partial/Stable

77%



Disease specific survival

Trends in Survival and Demographics

IMPROVEMENT IN SURVIVAL DURING THE PAST 4 DECADES AMONG PATIENTS WITH ANTERIOR SKULL BASE CANCER

Ziv Gil, MD, PhD,^{1,2} Dan M. Fliss, MD,² Oren Cavel, MD,² Jatin P. Shah,³ Dennis H. Kraus³

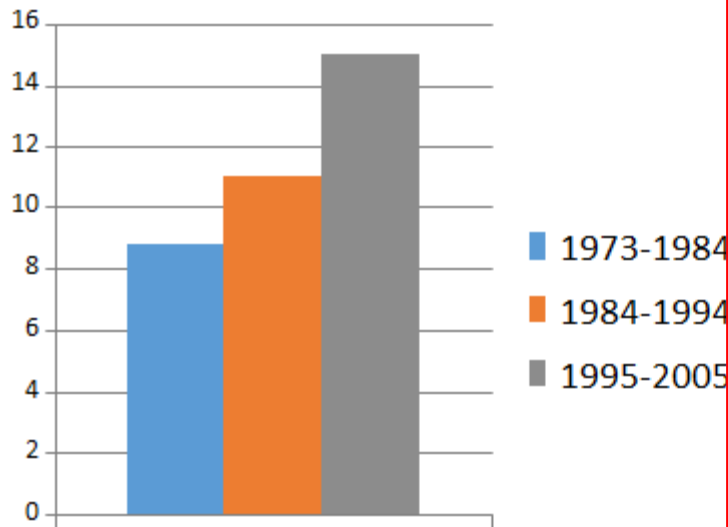
Head & Neck 2011

- Pooled data from two cancer centers
- n=282

Demographics

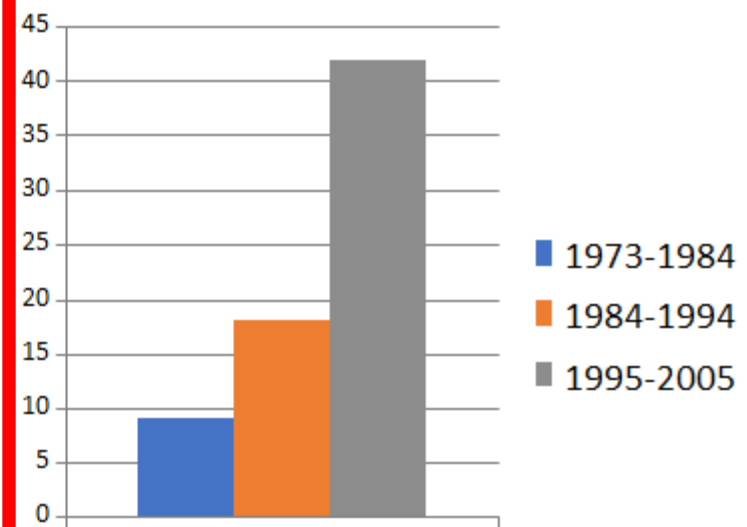
Changes in *Patient* Characteristics

↑ Age $p=0.08$



>70 Years Old

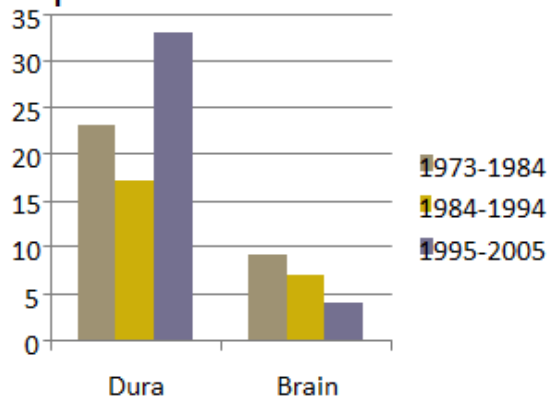
↑ Comorbidities $p<0.001$



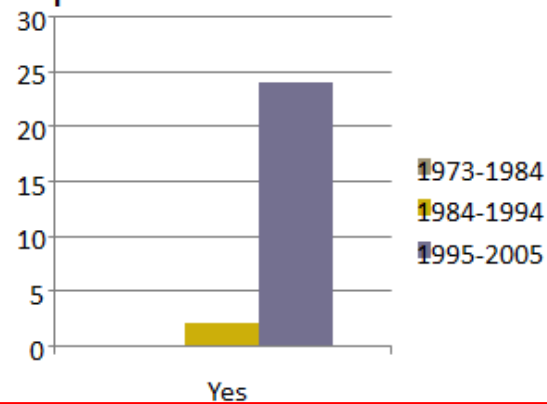
Yes

Changes in *Tumour* Characteristics

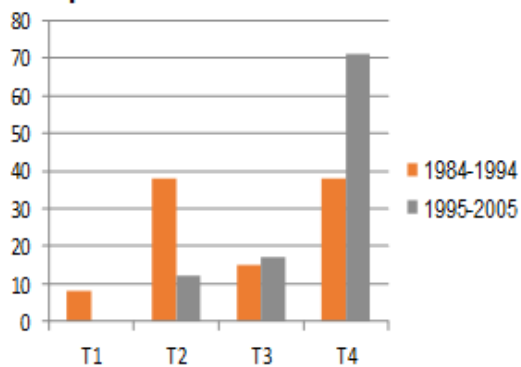
↑ Intracranial involvement
 $p=0.02$



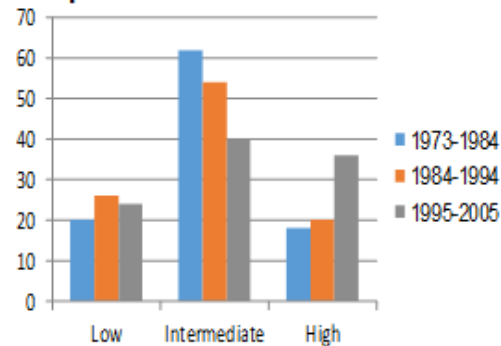
↑ Pterygopalatine extension
 $p<0.001$



↑ T Stage
 $p=0.04$

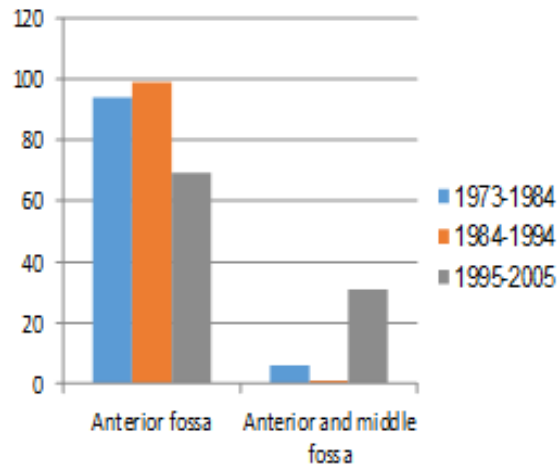


↑ Histological grade
 $p=0.03$

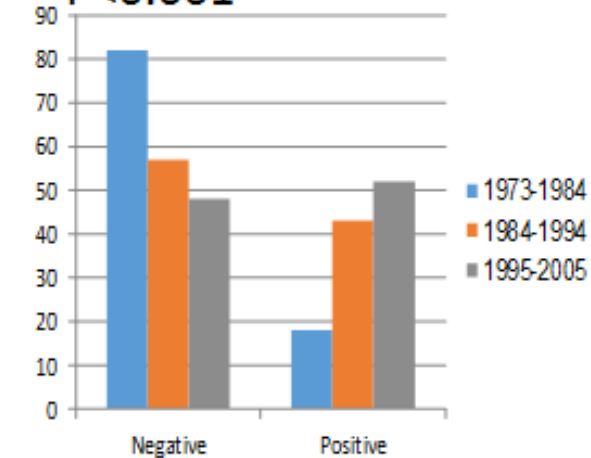


Changes in Treatment

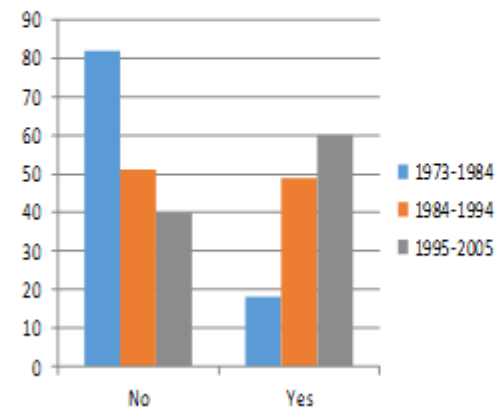
↑ Extent of surgery
 $P < 0.001$



↑ Positive margins
 $P < 0.001$



↑ Adjuvant radiotherapy
 $P < 0.001$



Trends in Survival and Demographics

1. Patients operated on today: older with more comorbidities
2. Surgery performed for more advanced stage and higher grade tumors
3. As a result - a higher rate of positive margins
4. More adjuvant therapy

Trends in Survival and Demographics

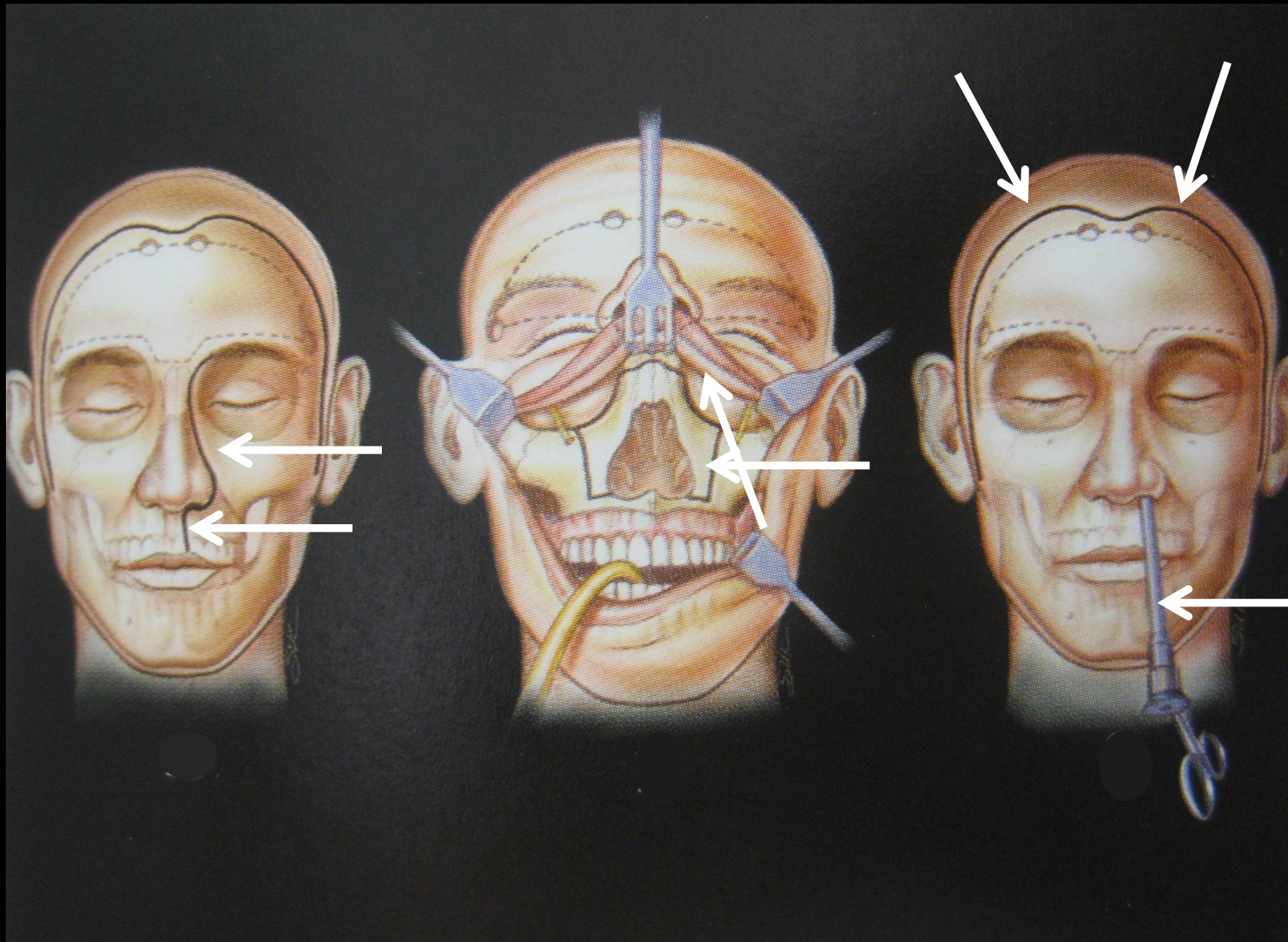
5. Survival is improving (from 58% to 72% 5-years OS)

6. Independent risk factors for poor prognosis:

- Positive margins
- High grade tumor

7. Independent factors for a favorable prognosis:

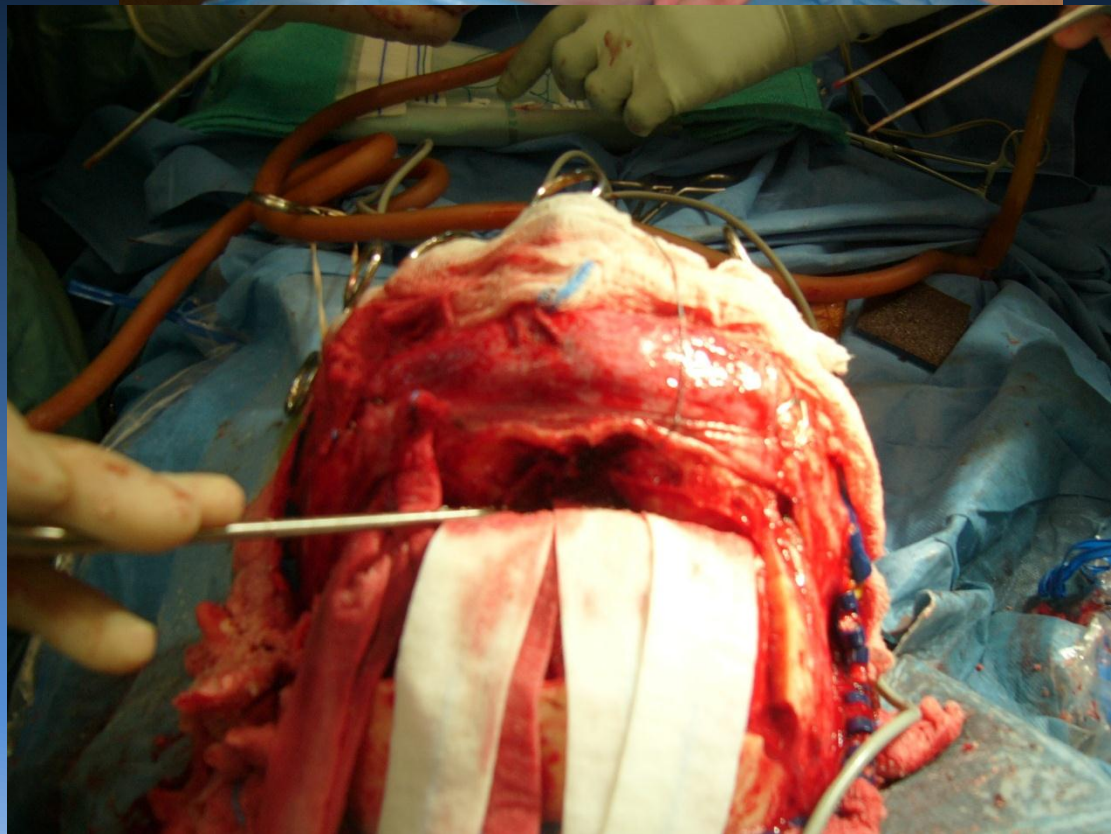
- The use of adjuvant radiotherapy
- Surgery after 1995

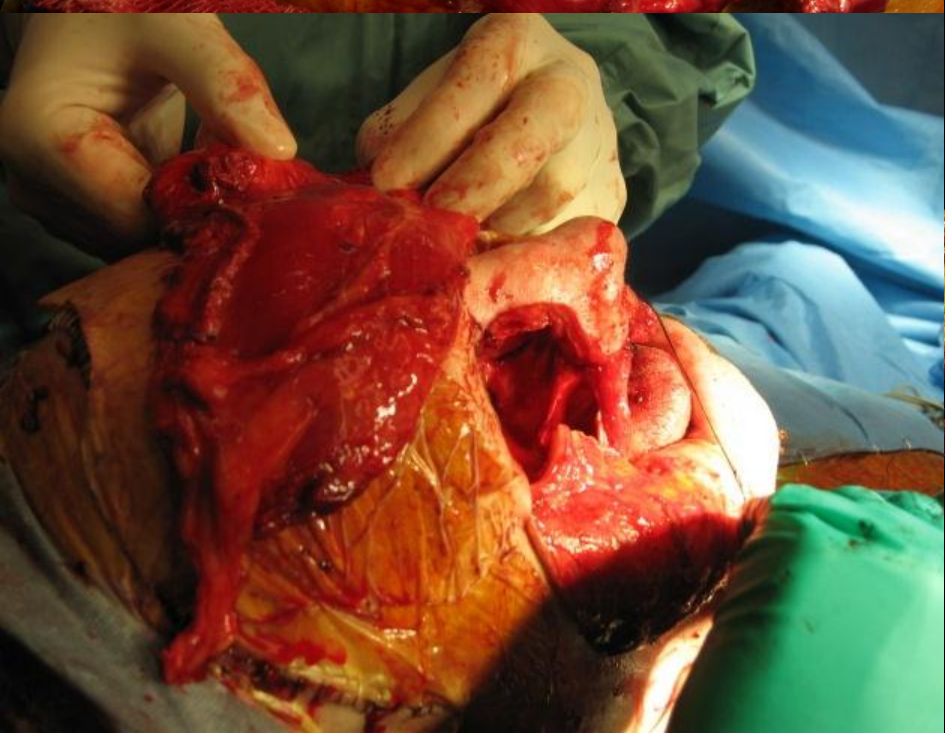
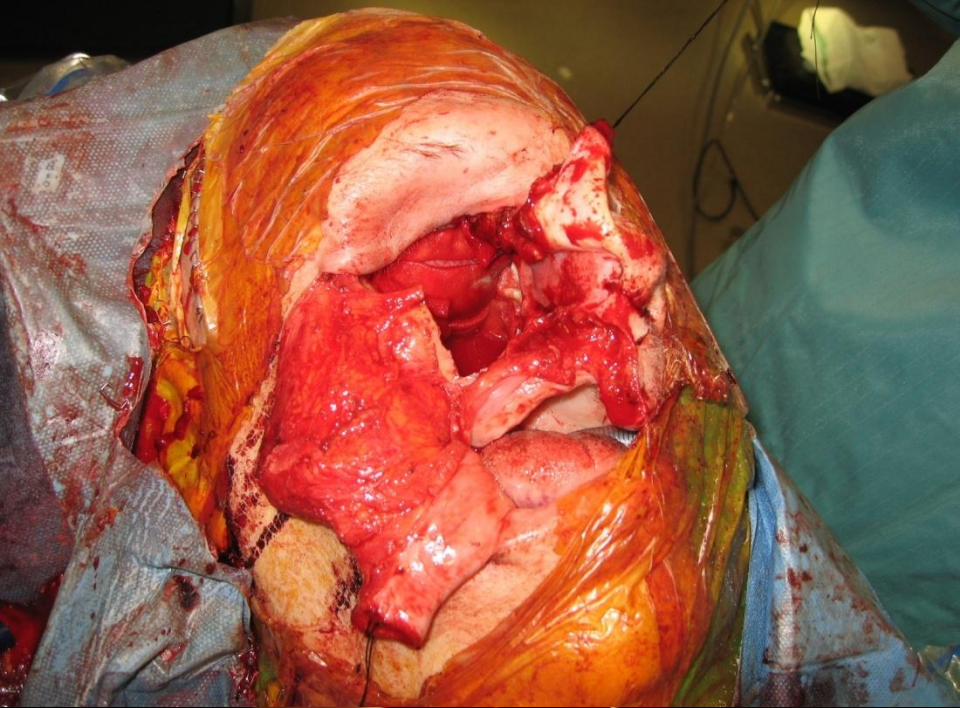
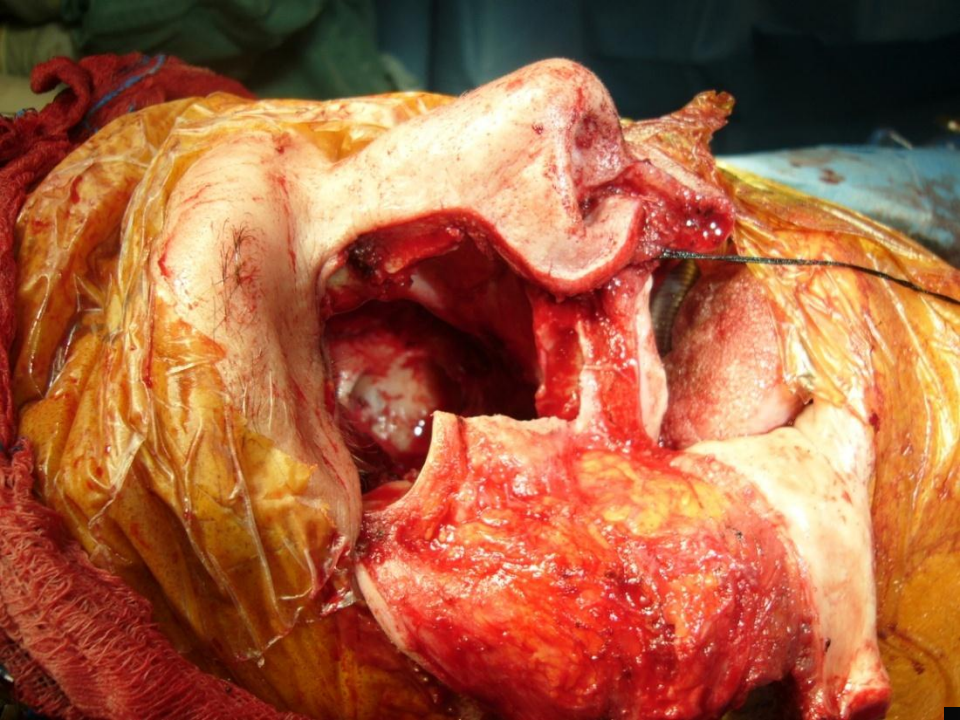


Open Skull Base Approaches

“Craniofacial resection is the **‘gold standard’** in the management of malignancy and extensive benign pathology affecting the anterior skull base when surgery is indicated”

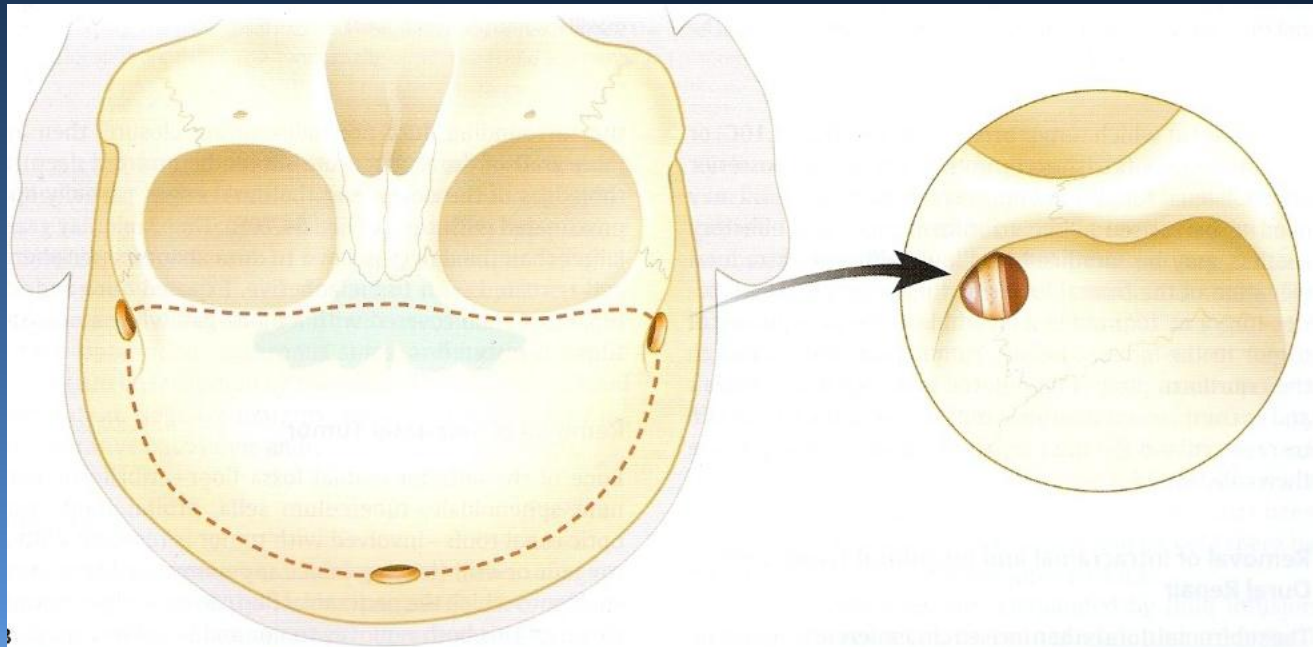
Howard and Lund, *Head and Neck*, 2006



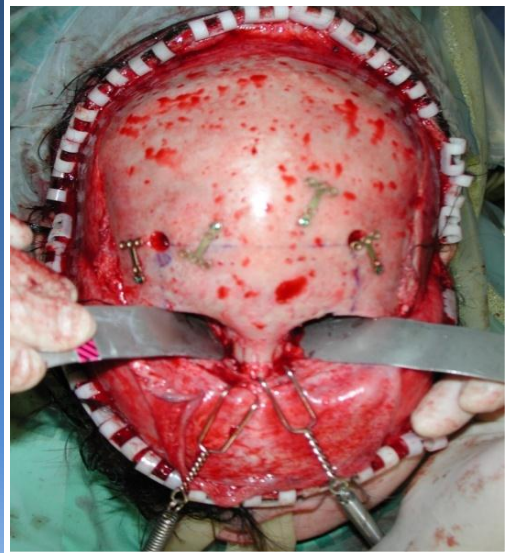
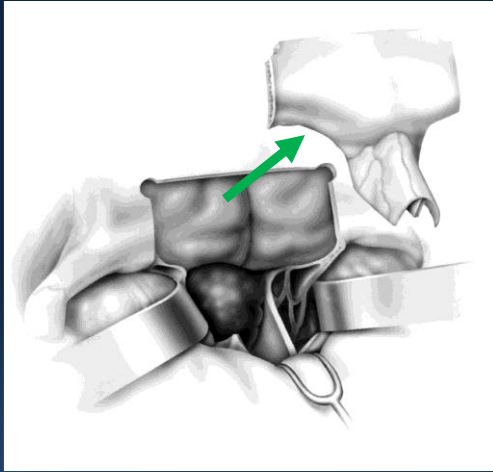
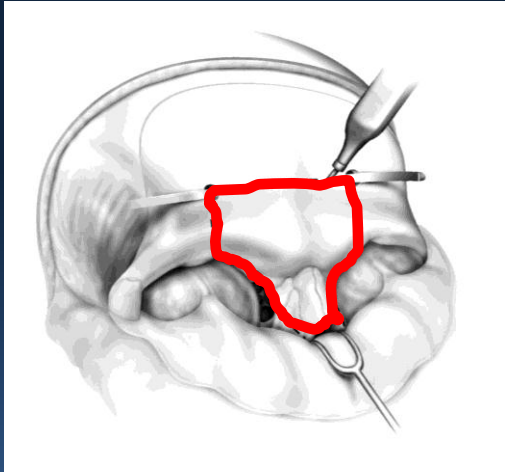


Bifrontal Craniotomy Approach

- Excellent exposure from the frontal sinuses to the perichiasmatal region

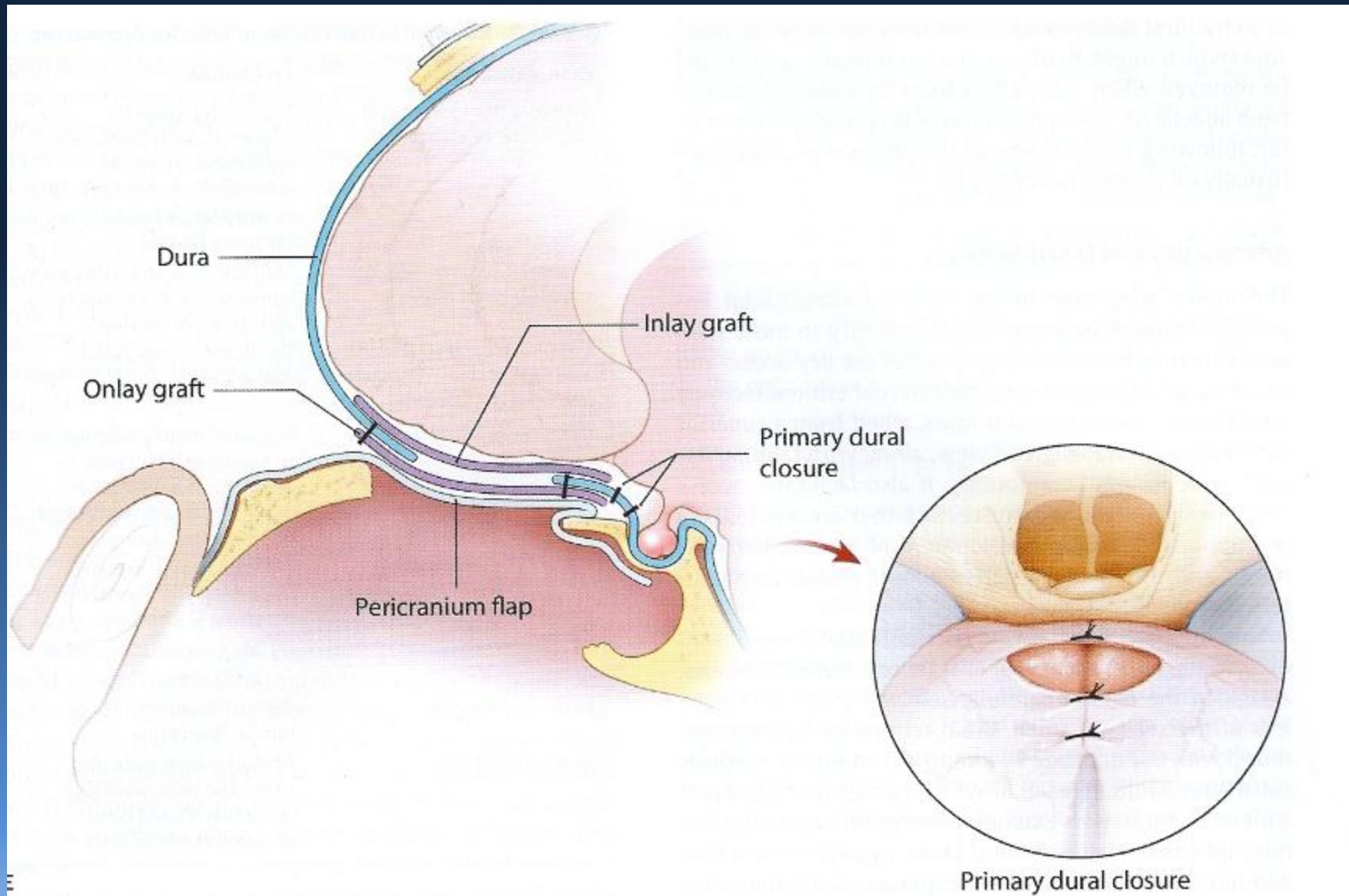


The Subcranial Approach



Raveh et al. Arch Otol H&N Surg 1993

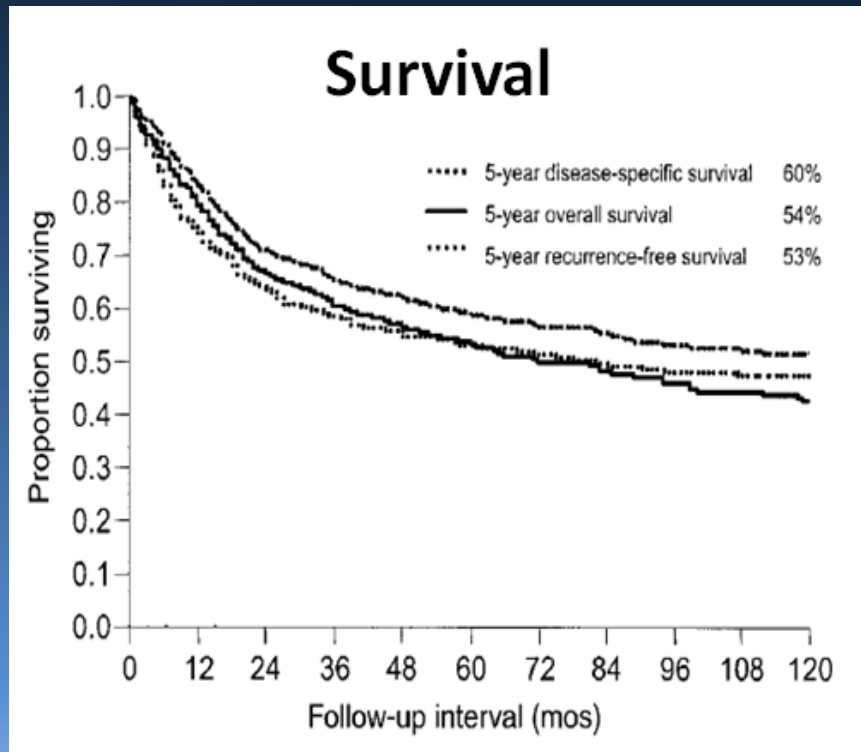
Fliss et al. Laryngoscope 1999



EBM in SB Surgery

Craniofacial Surgery for Malignant Skull Base Tumors

Report of an International Collaborative Study



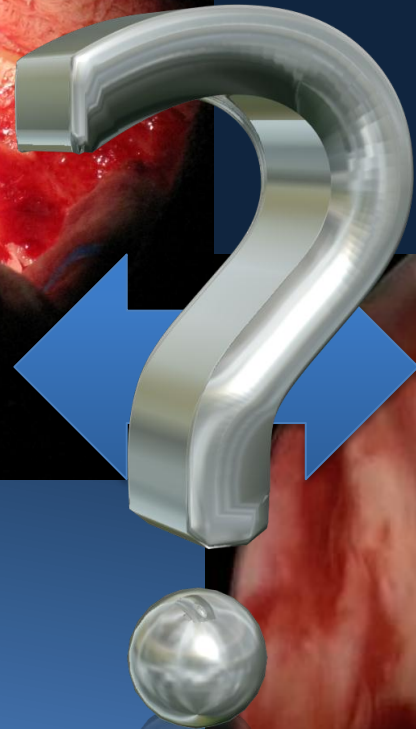
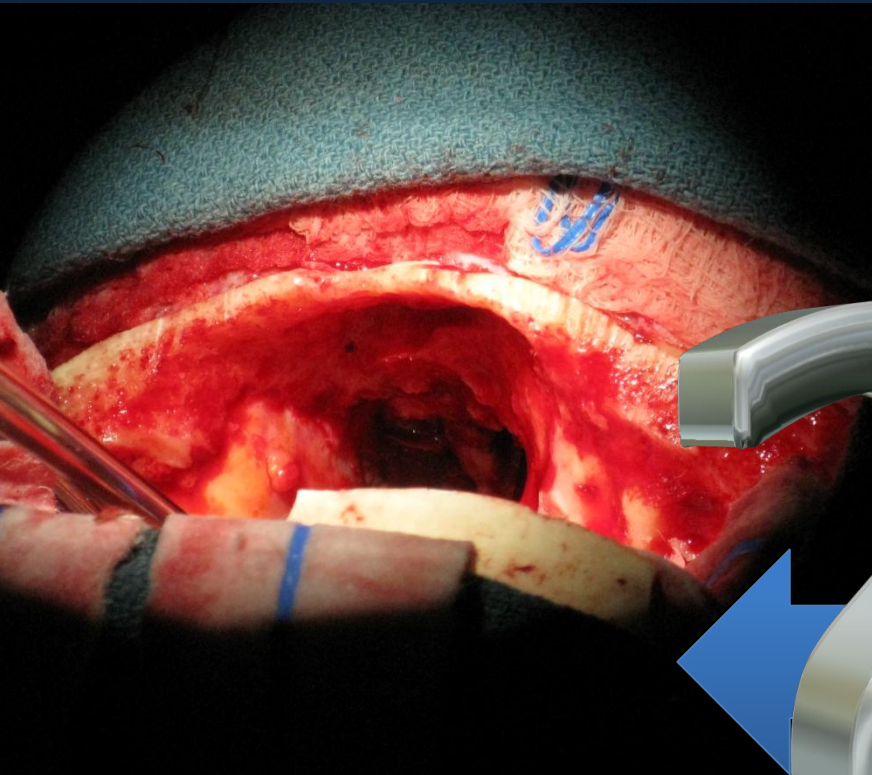
- Post operative mortality – 4%
- Post operative complications – 33%

Prognostic Factors

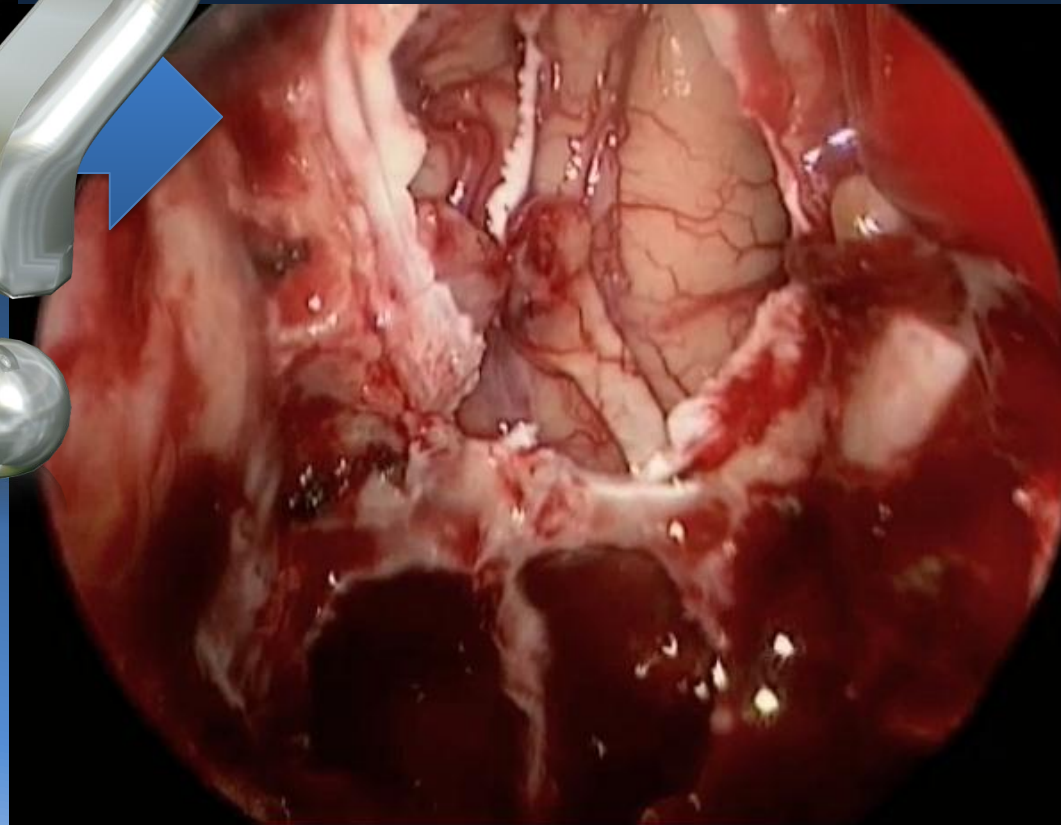
- Status of surgical margins
- Histology of the primary tumor
- Intracranial involvement

Independent factors on multivariate analysis (OS, DFS, RFS)

OPEN
CRANIOTOMY



ENDOSCOPIC



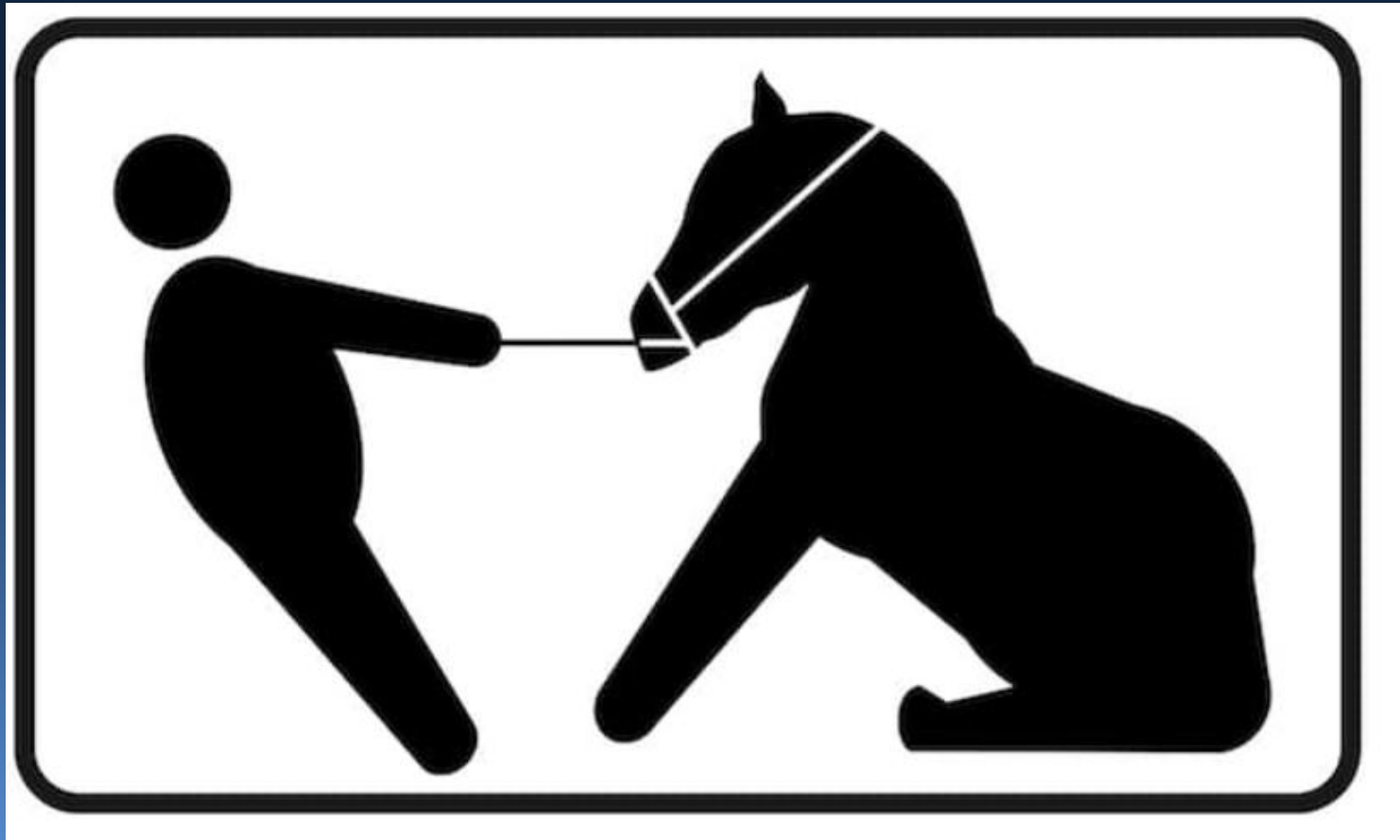


Change Management



Denial

Change Management



Resistance

Change Management



Exploration

Change Management



Acceptance

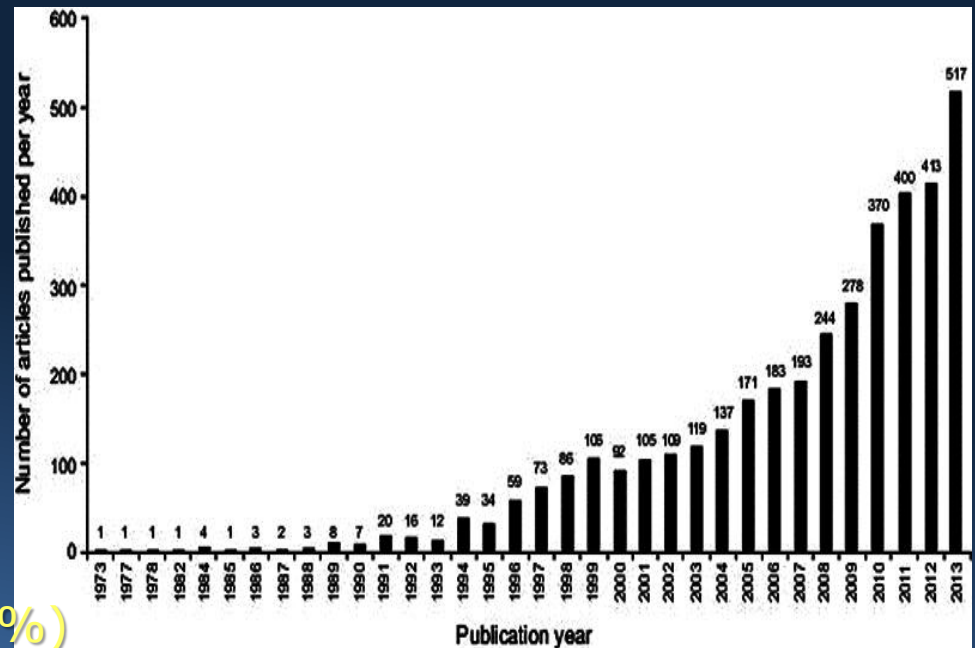
Expanded Endonasal Approach

- A paradigm shift
- Piecemeal vs. en block resection
- Oncologic mindset



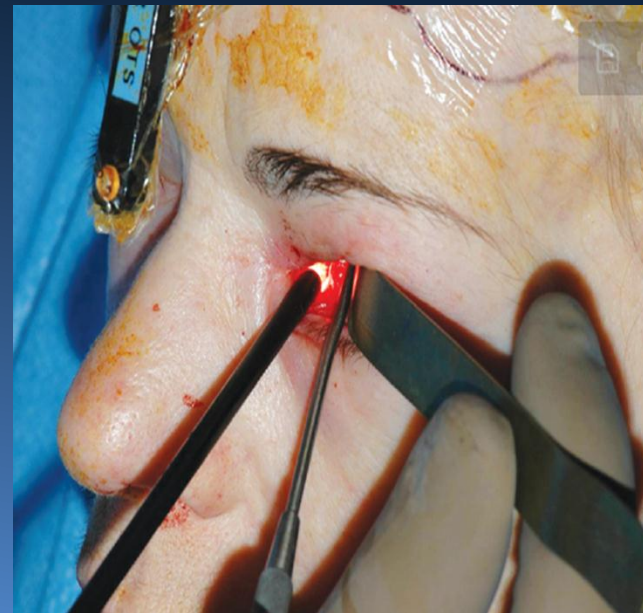
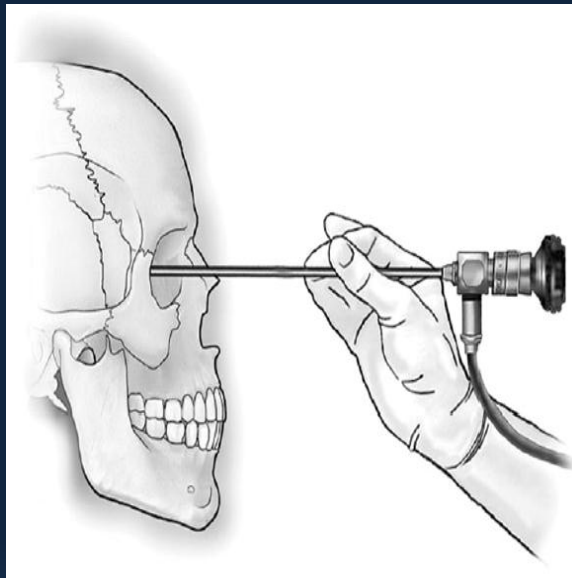
EEA to the Anterior Skull Base

- Dramatic increase in publications/year
 - 1973-1993: <30/year
 - 2011-2013: >400/year
- 50 *most cited* pubs:
 - Clinical case series (37%)
 - Novel surgical technique (24%)



Hardesty et al, J Neurol Surg 2016

No RCTs, QOL surveys or cost-effectiveness analyses within 50 most cited





Operative Techniques in Otolaryngology, Vol 25, No 3, September 2014

Endoscopic management of:

- ✓ Most inverted papillomas
- ✓ Some angiofibromas (I/II)
- ✓ Selected fibroosseous tumours

Learning Curve Issues



It's a long way up, and a long fall down...

Endoscopic transnasal craniectomy in the management of selected sinonasal malignancies

Andrea Bolzoni Villaret, M.D.,¹ Arkadi Yakirevitch, M.D.,² Andrea Bizzoni, M.D.,¹
Roberta Bosio, M.D.,¹, Maurizio Bignami, M.D.,³, Andrea Pistochini, M.D.,³ Paolo Battaglia, 1
Paolo Castelnuovo, M.D.,³ and Piero Nicolai, M.D.¹

Am J Rhinol Allergy 2010

Endoscopic Resection of Sinonasal Cancers With and Without Craniotomy

Oncologic Results

Ehab Hanna, MD; Franco DeMonte, MD; Samer Ibrahim, MD;
Diana Roberts, PhD; Nicholas Levine, MD; Michael Kupferman, MD

Arch Otolaryngol Head Neck Surg 2009

EEA Summary - Malignancy

- Endoscopic oncologic outcomes no worse than open in selected cases
- Shorter follow-up in endo series
- Issues of different disease burden, heterogeneous pathology and eras for comparison

- No pathology specific survival data
- Equivalent rate of positive resection margins
 - Open 15.6-17%
 - Endo 10-19%
- Margin status more important than en bloc resection

Treatment of Esthesioneuroblastoma: A 16-Year Meta-Analysis of 361 Patients

Anand K. Devaiah, MD; Michael T. Andreoli, BA

Laryngoscope 2009

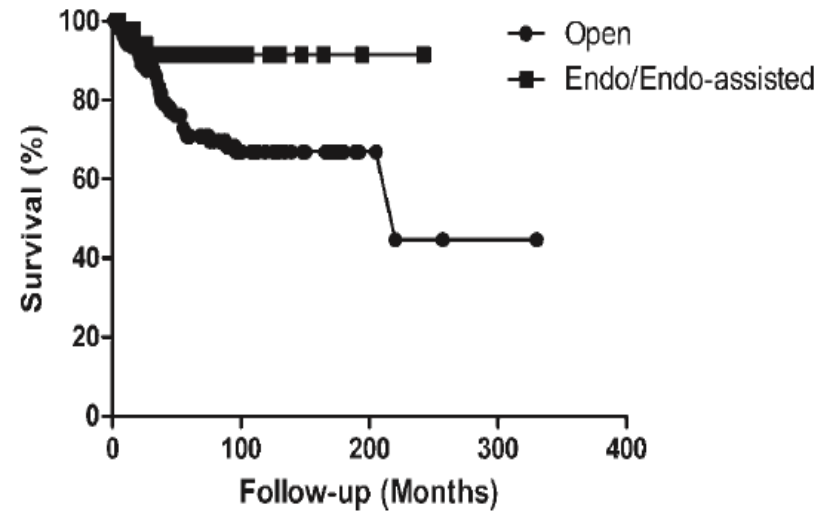
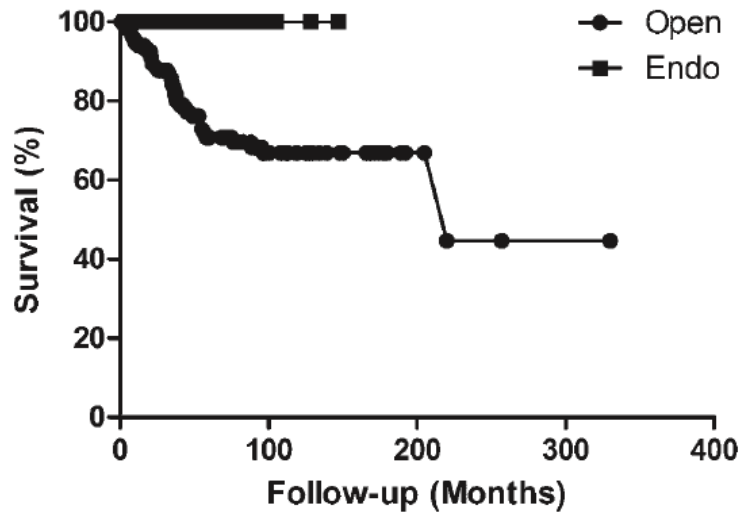
- 1992-2008
- 361 cases of Esthesio

TABLE V.
Kadish Staging.

	Kadish Stage			
	A	B	C	D
Open	11	47	95	4
Endoscopic	11	11	16	1
Endoscopic and endoscopically assisted	15	19	21	1
Nonsurgical	3	6	33	2

TABLE VI.
Median Follow-up Times (2002–2008).

	Follow-up (mo)
Open	51.0
Endoscopic	54.5
Endoscopically assisted	44.0
Nonsurgical	17.0



Greater survival rates for endoscopic c/w open surgery (even when stratifying for publication year)

Issue:

Not stage matched comparison

Evidence-based practice: endoscopic skull base resection for malignancy.

Rawal RB¹, [Gore MR](#), Harvey RJ, Zanation AM.

Otolaryngol Clin North Am. 2012 Oct;45(5):1127-42.

- Heterogeneity and rarity of sinonasal malignancy
- Evidence for clinical outcomes of endoscopic approaches versus traditional craniofacial resection is low

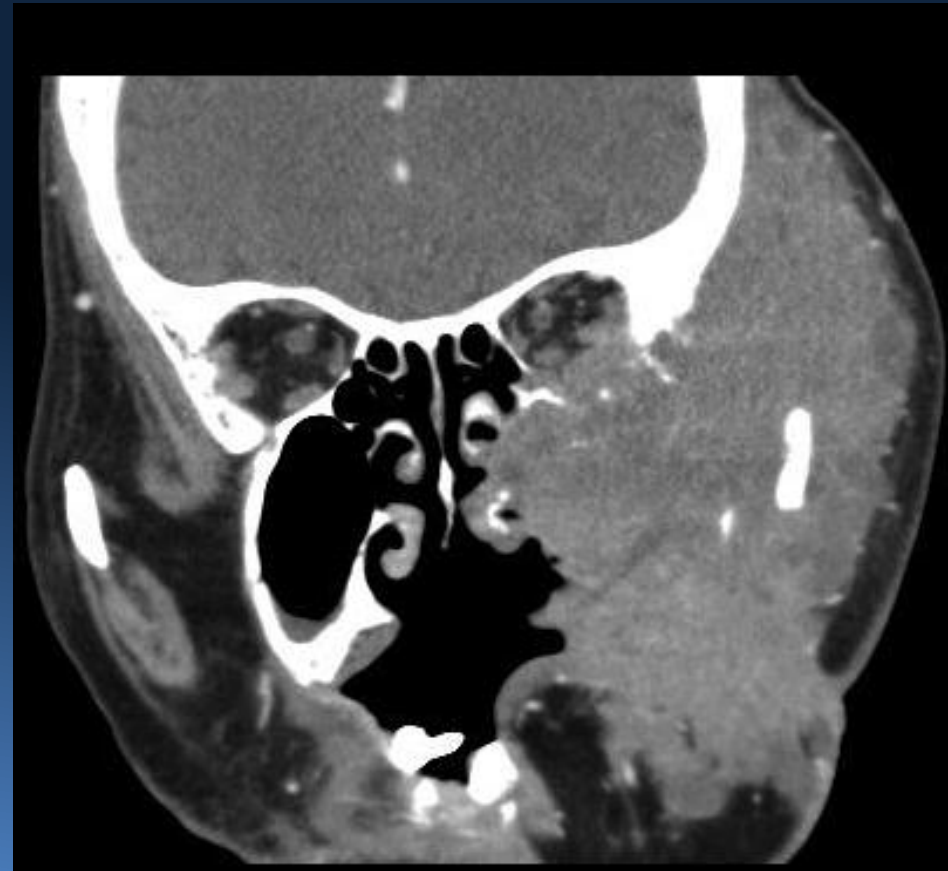
Benign tumors

Selected
malignant
tumors

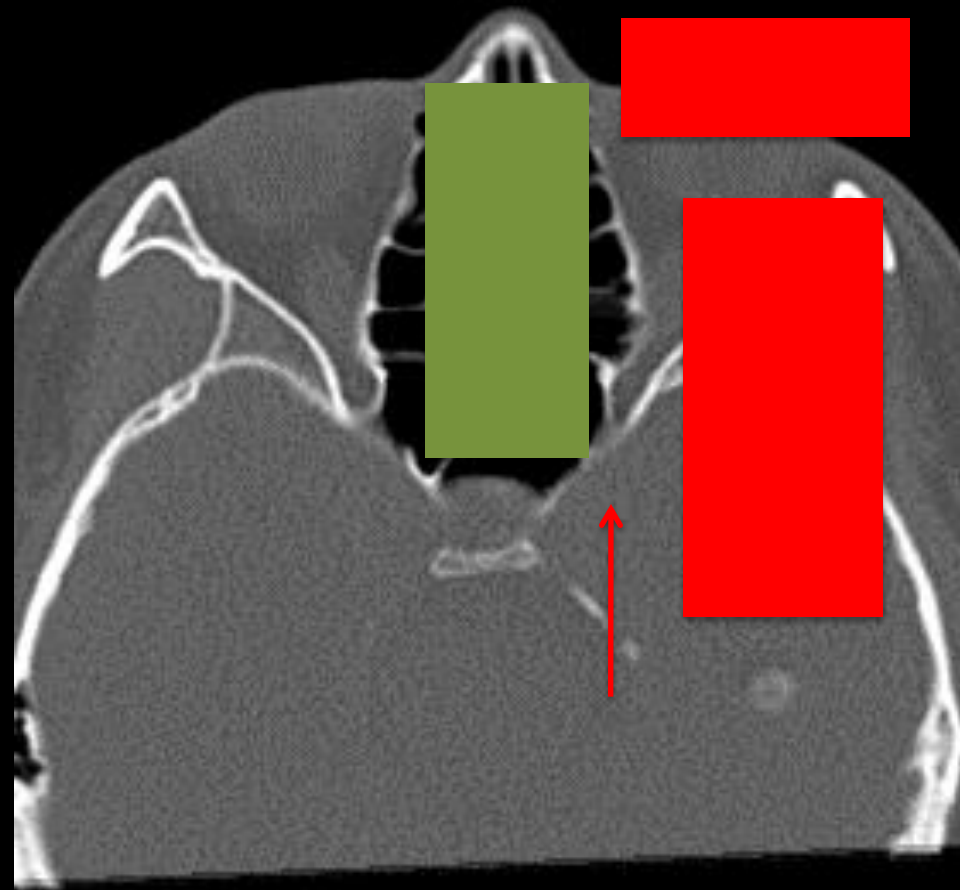
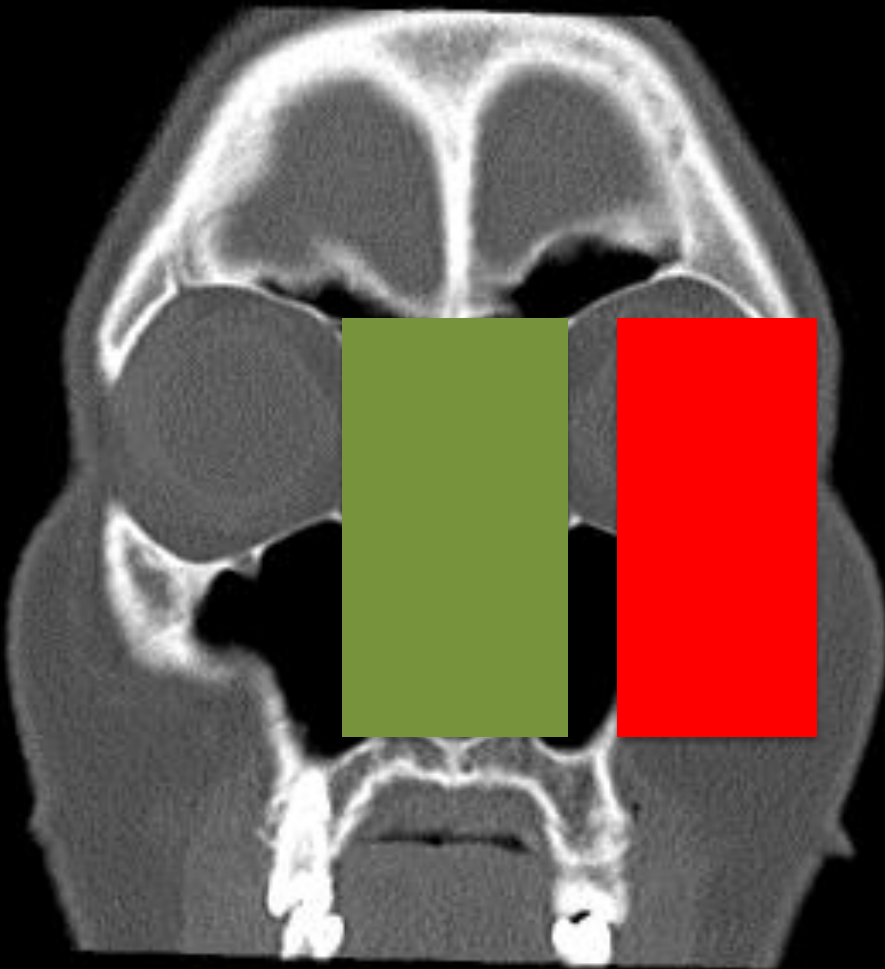
Malignant tumors involving:

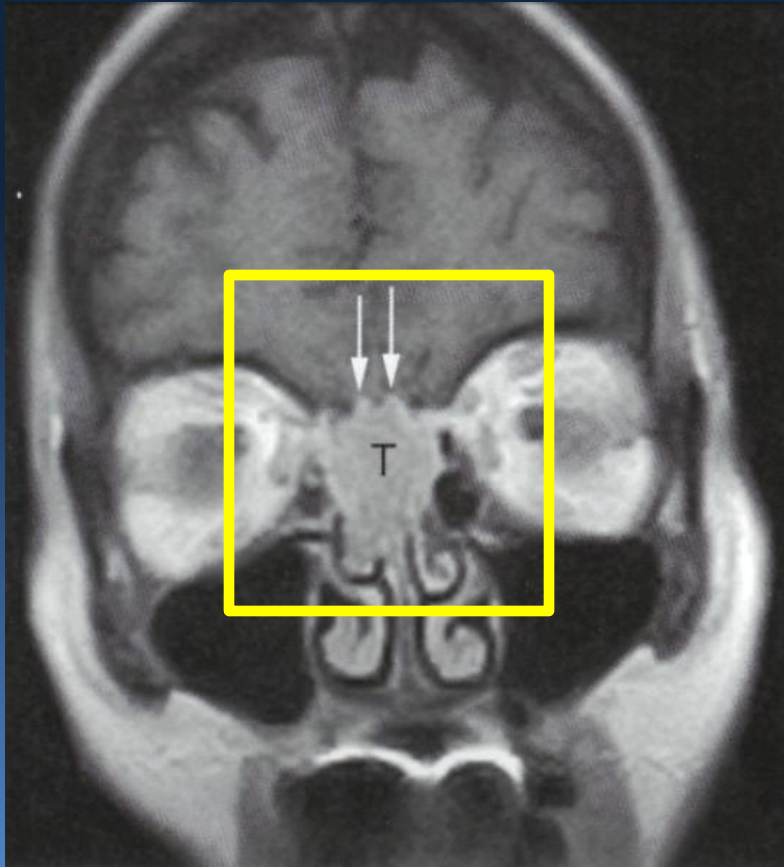
- Orbit and extraocular muscles
- Lateral to the orbit
- neurovascular structures

Not open or endoscopic



Indications and Contraindications

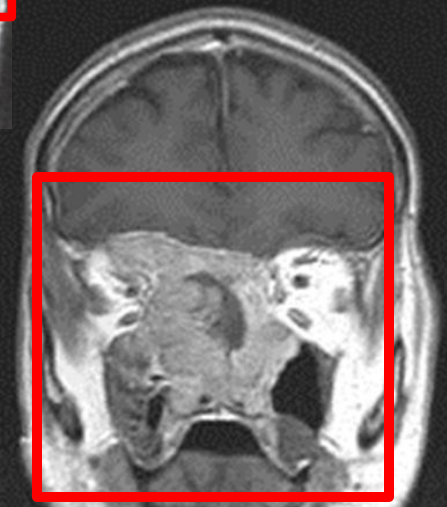
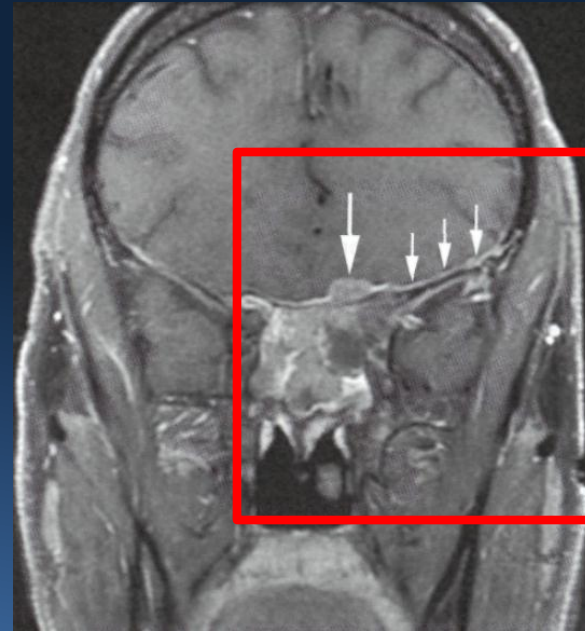




Contraindications for Endoscopic Resection

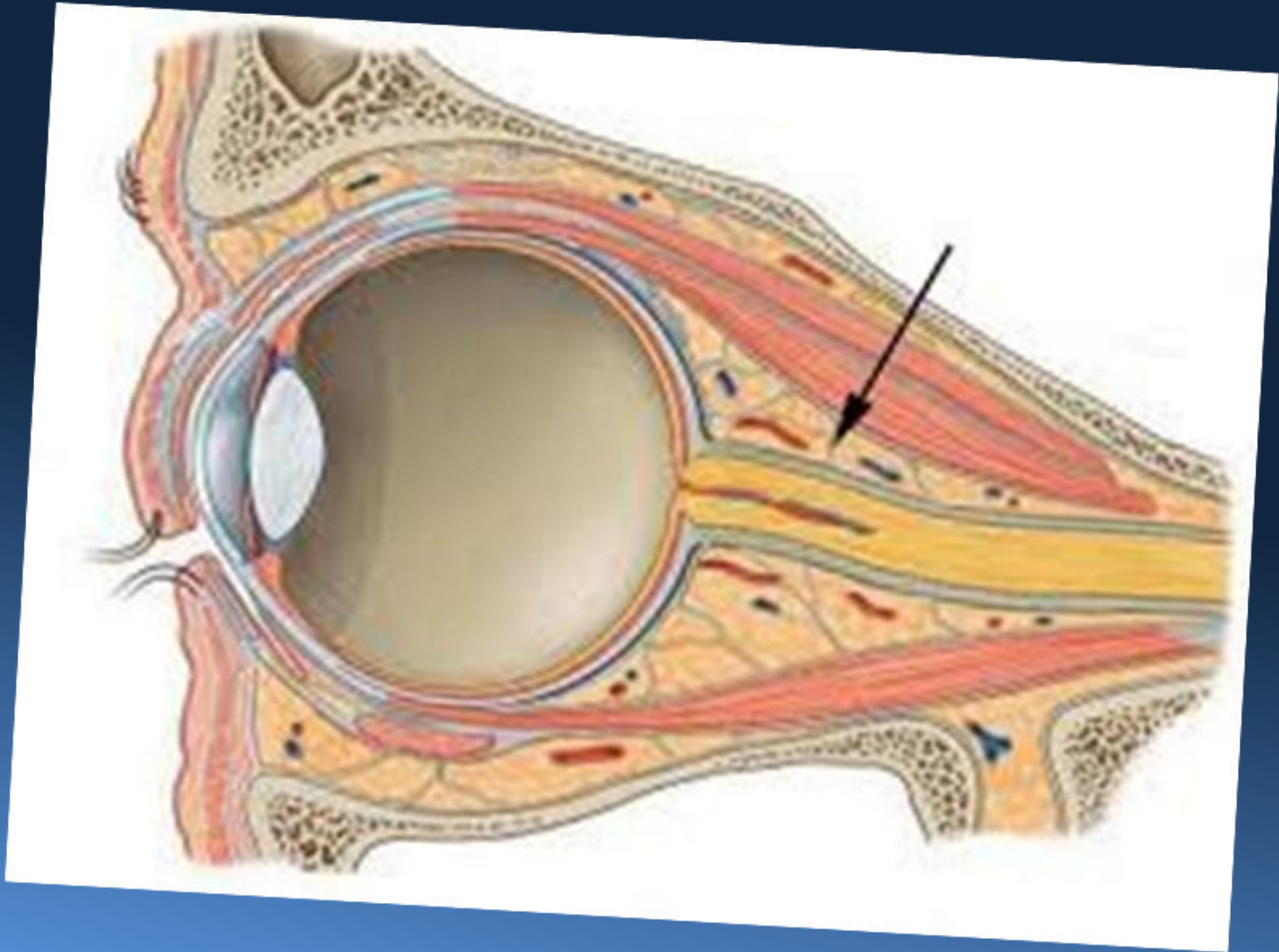
Involvement:

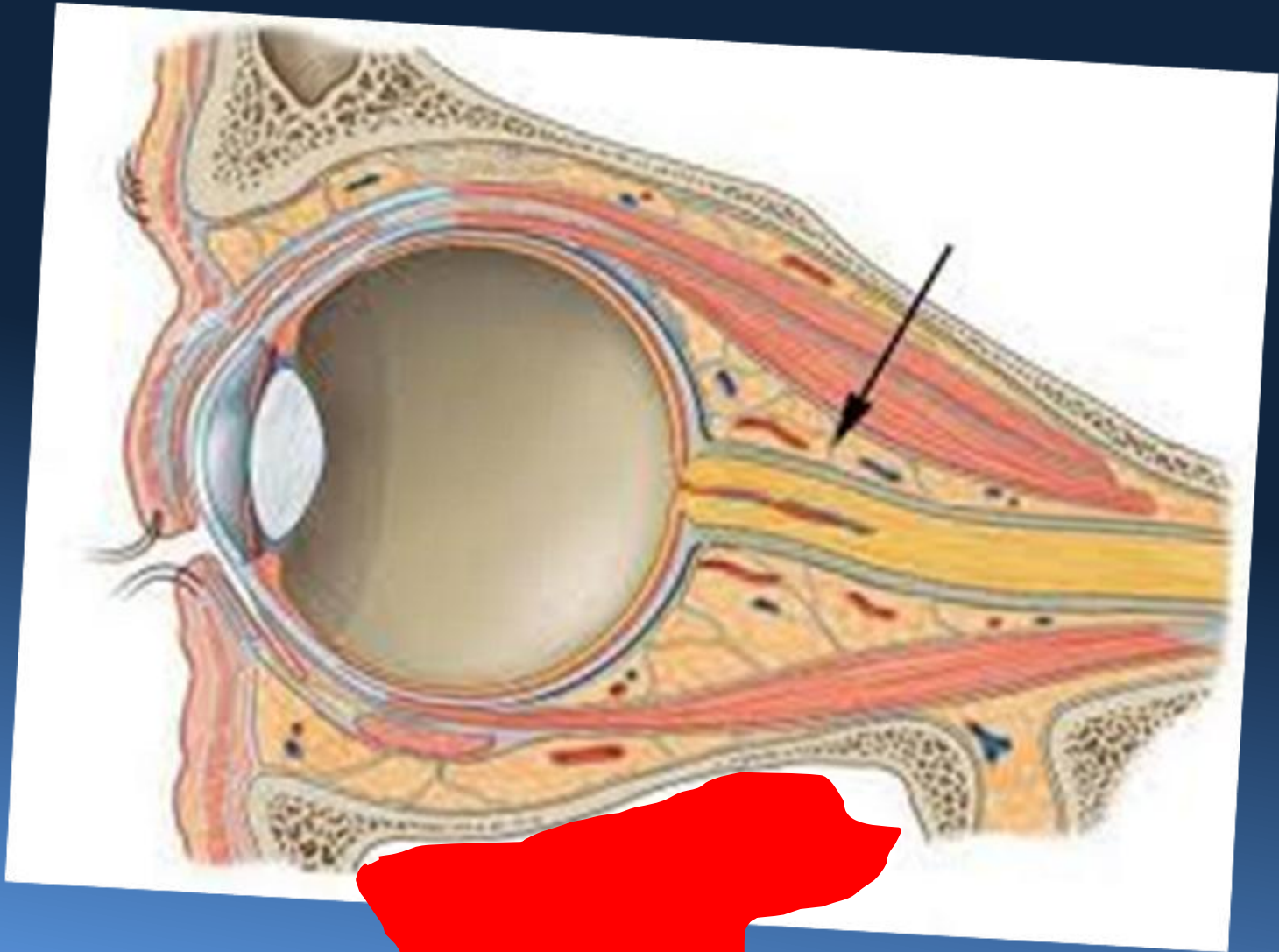
- Dura lateral over orbit
- Frontal sinus
- Nasal bones
- Skin
- Orbit
- Brain

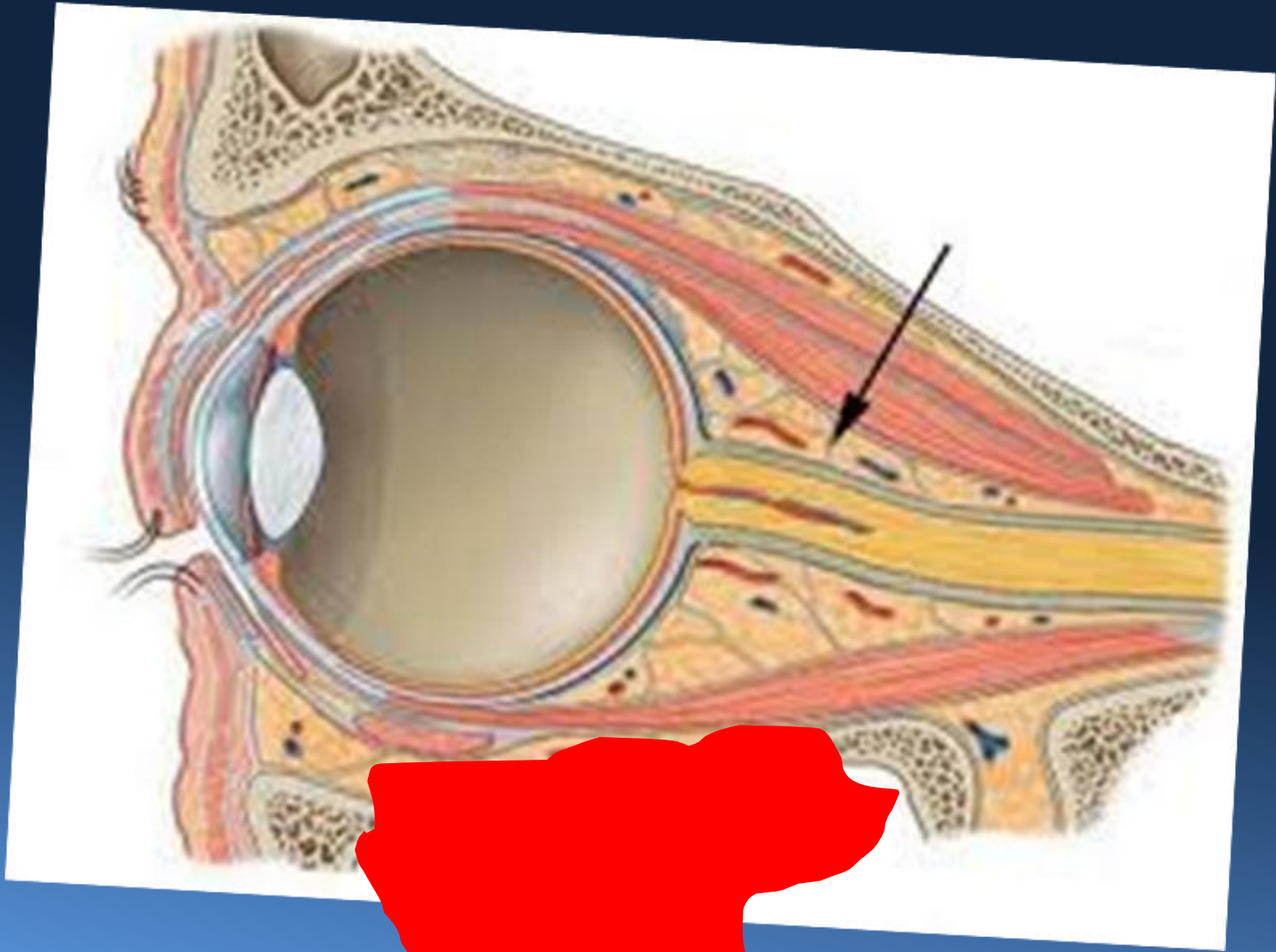


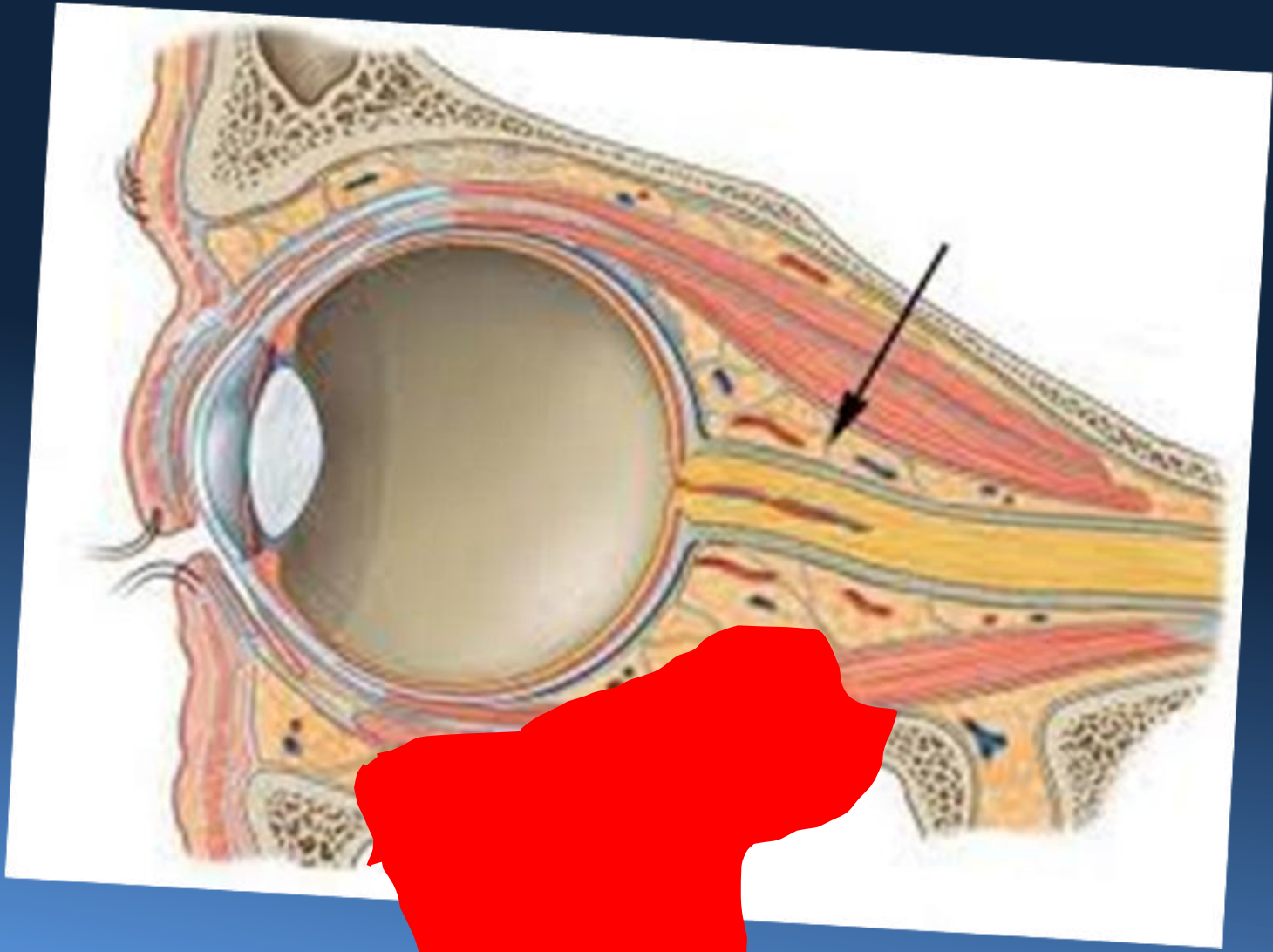
Orbital Involvement

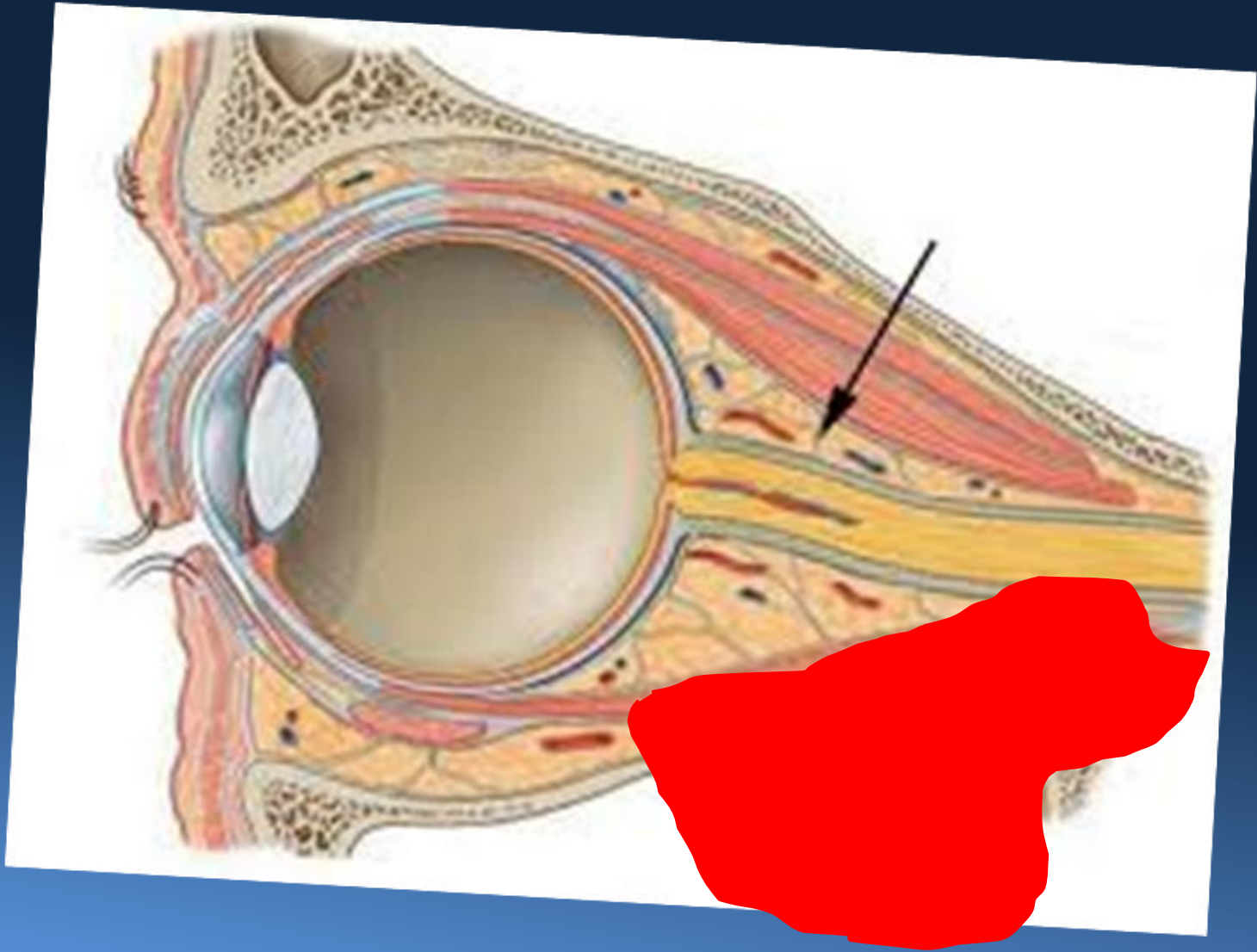
- Suspected from Hx, physical and imaging
- Gold standard is intraoperative frozen section









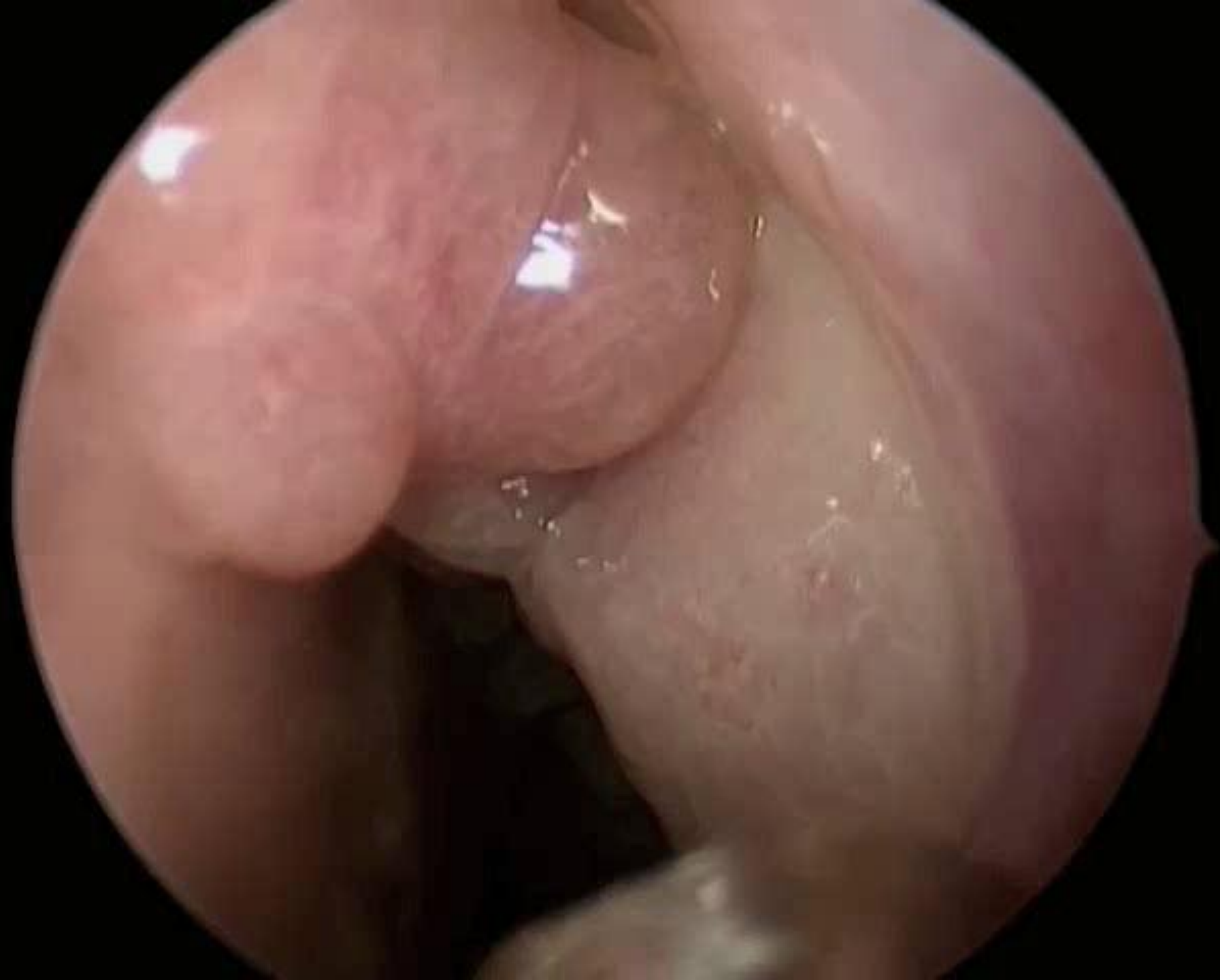


Principles of endoscopic resection

- Complete excision of the tumor
- Debulking tumor to find attachments
- En bloc excision of the skull base and dura
- Frozen sections to ensure clear margins

Think...

- Can it be resected with clear margins?
- Adjunctive therapies – XRT +/- chemo?
- Reconstruction options?
 - Flaps
 - Fascia
 - Allogenic

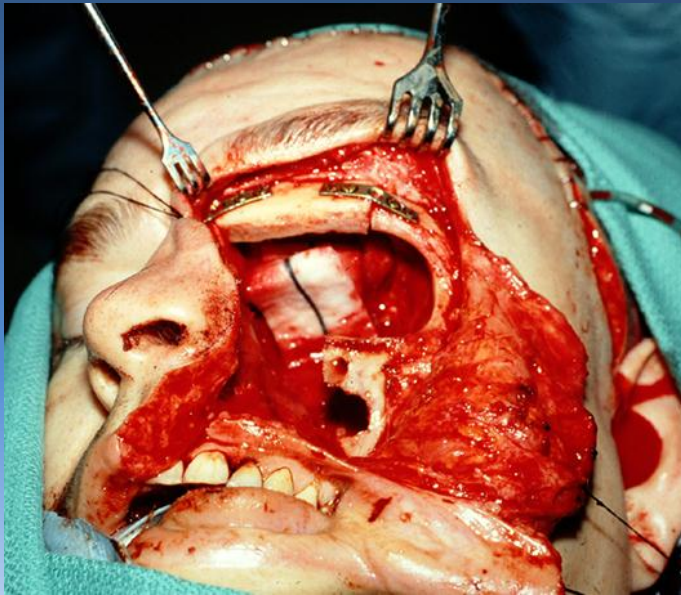


Important Prerequisites

- Team
- Instrumentation
- Ability to:
 - Control bleeding
 - Control CSF leaks
 - Convert to open procedure

Issues

- Centres of excellence/volume
- Rhinologist vs. head & neck oncologist
- Diminishing open cases and skill set



- I got most of it...
- Excisional biopsy/ESS biopsy
- Quality-of-life

What to think about...

- Can it be resected with clear margins?
- Intracranial/orbital extension?
- Adjunctive therapies – XRT +/- chemo?
- Reconstruction options?
 - Will a nasoseptal flap be available?

Summary

- Endoscopic oncologic outcomes no worse than open in selected cases
- Shorter follow-up in endo series
- Issues of different disease burden, heterogeneous pathology and eras for comparison
- We still have work to do!