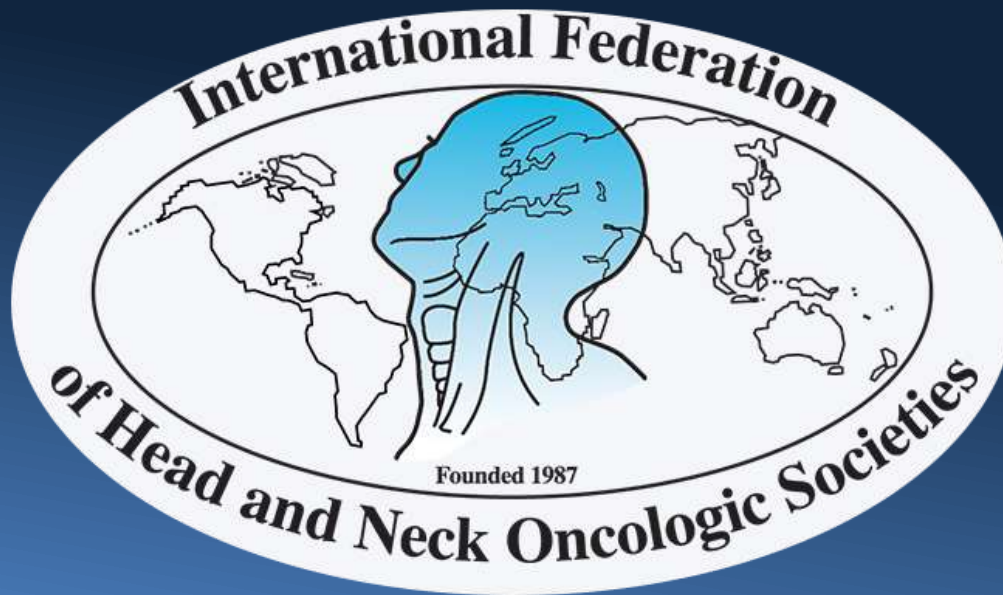




The International Federation of Head and Neck Oncologic Societies

Current Concepts in Head and Neck Surgery and Oncology 2017



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Current Concepts in Head and Neck Surgery and Oncology 2017

Sinonasal Cancers: Contemporary Standards of Management and Outcomes

Ehab Hanna

Context

- Advances in Diagnosis
 - Office endoscopy
 - High Resolution Imaging
 - Better Histopathologic Classification
- Advances in Treatment
 - Surgery
 - Craniofacial and skull base surgery
 - Endoscopic and Robotic surgery
 - Conformal Radiation: IMRT and Proton
 - Active chemotherapeutic agents and treatment intensification

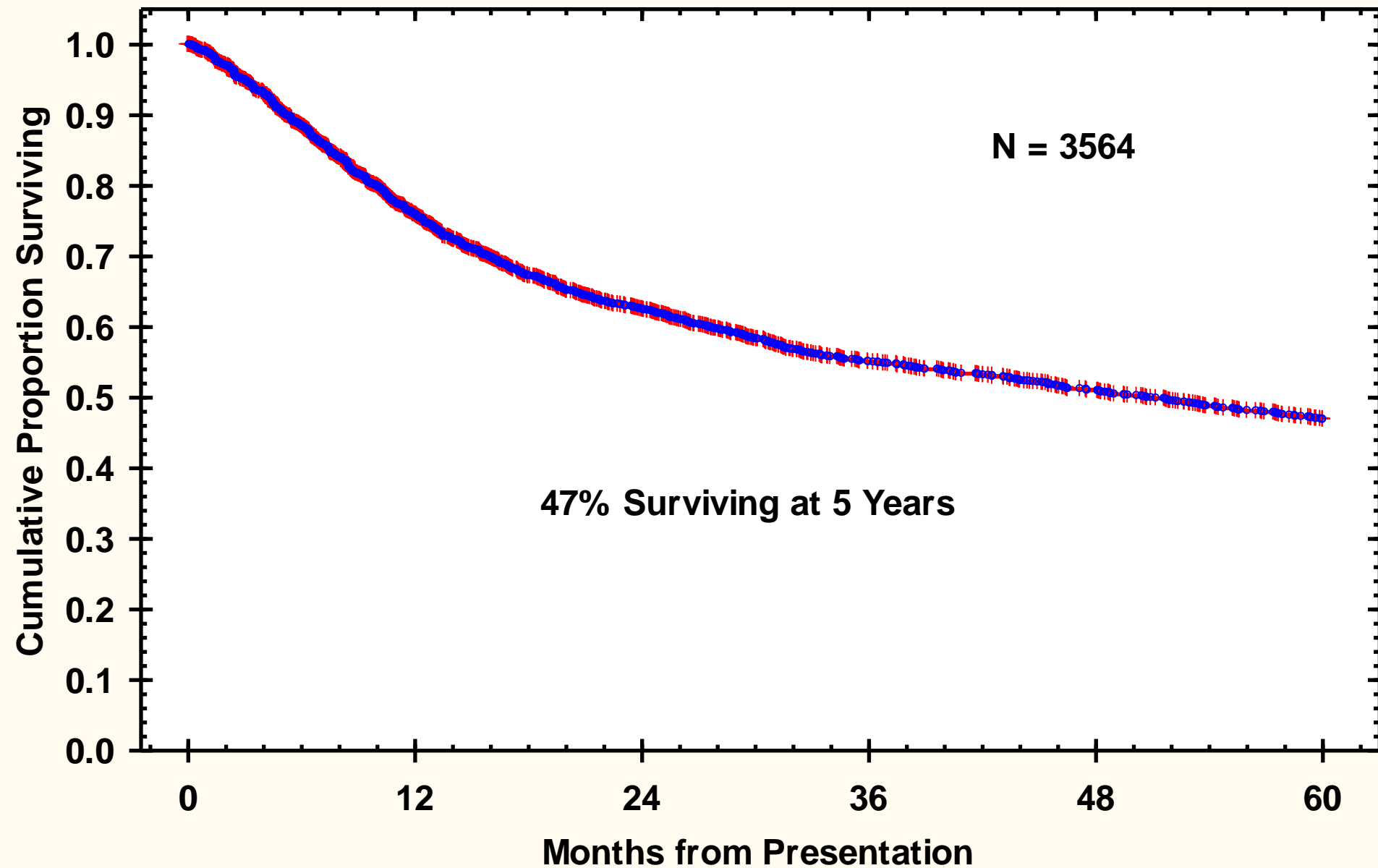
Are we making progress?

Sinonasal Cancer MDACC Experience

- Department Database
 - 3564 patients with sinonasal cancer
 - 1944-May 2015

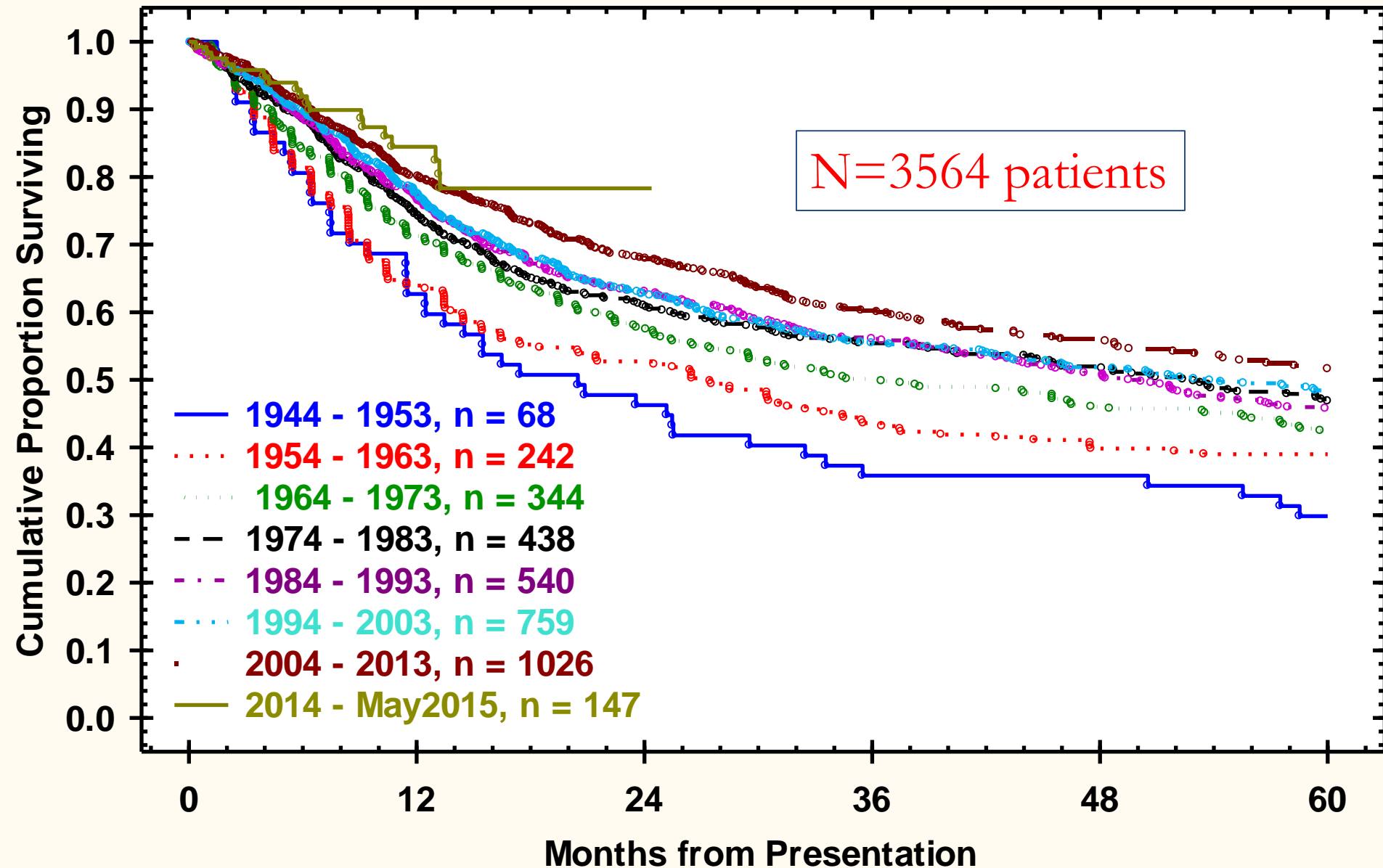
Overall Survival at 5 Years of Patients with Sinonasal Malignancies Seen at MDACC from 1944 - May, 2015

○ Died Last Contact

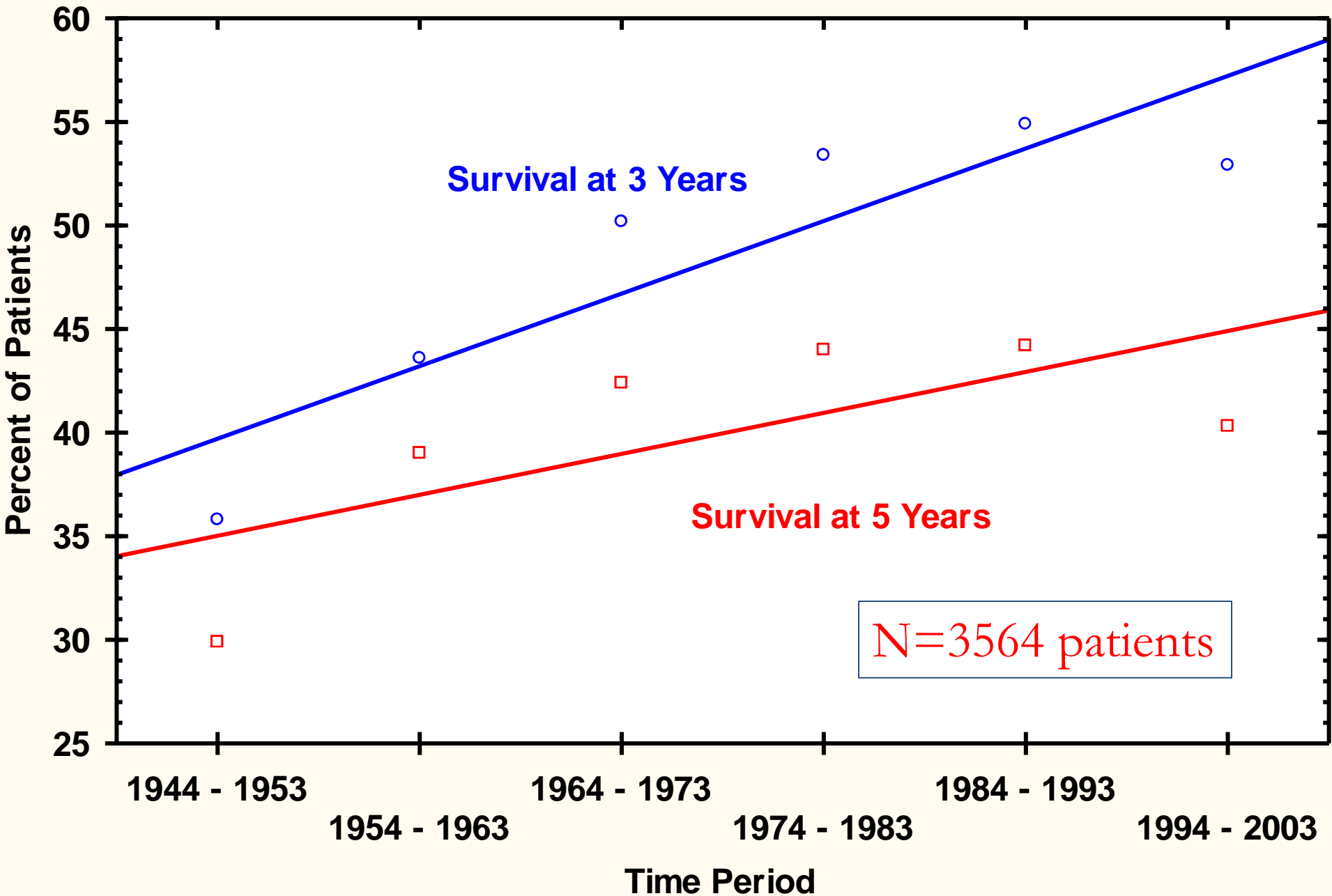


Overall Survival at 5 Years of Patients with Sinonasal Malignancies By Year of Presentation at MDACC

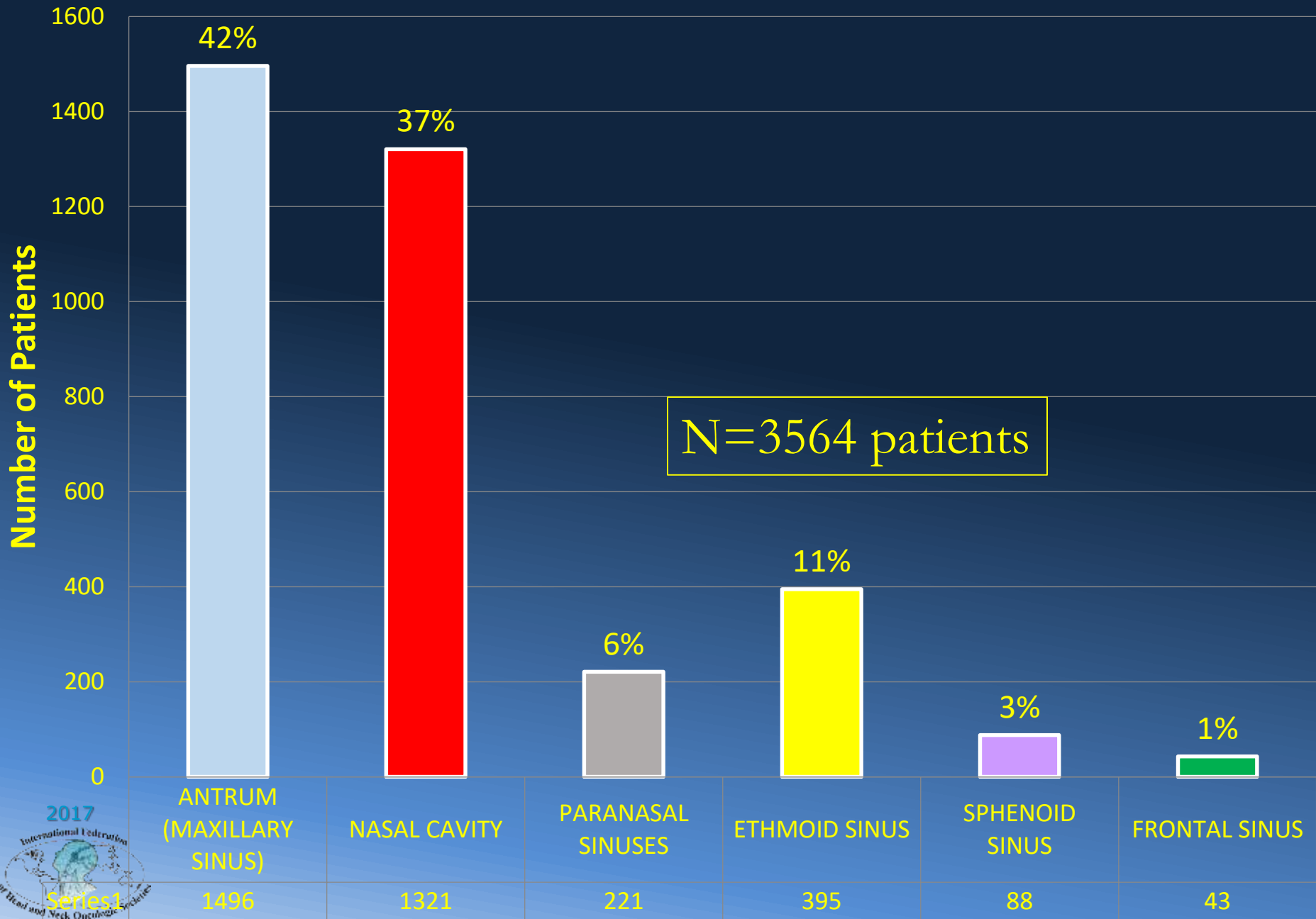
○ Died Last Contact



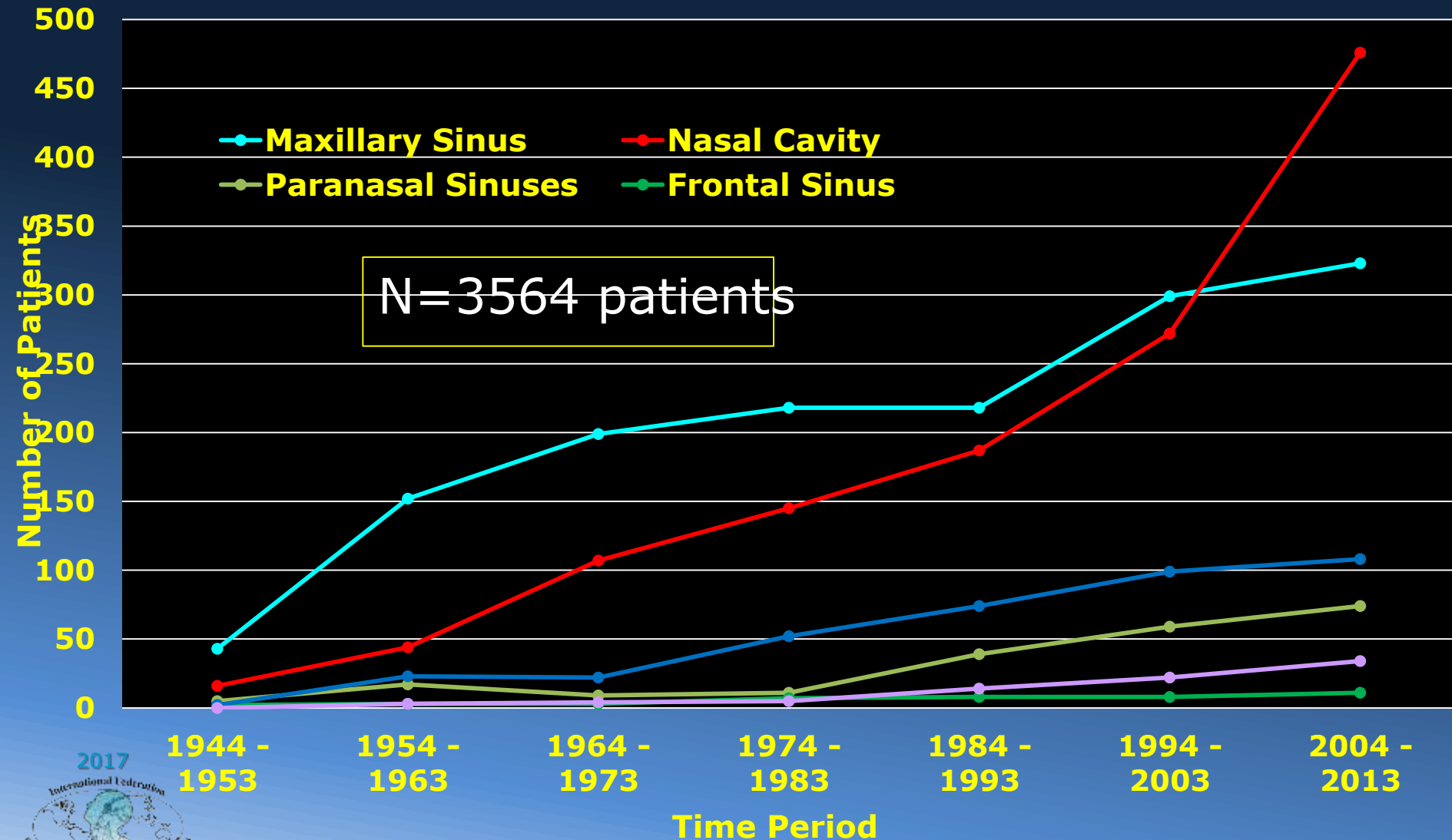
Overall Survival at Three and Five Years of Patients with Sinonasal Malignancies Seen at MDACC Over Time



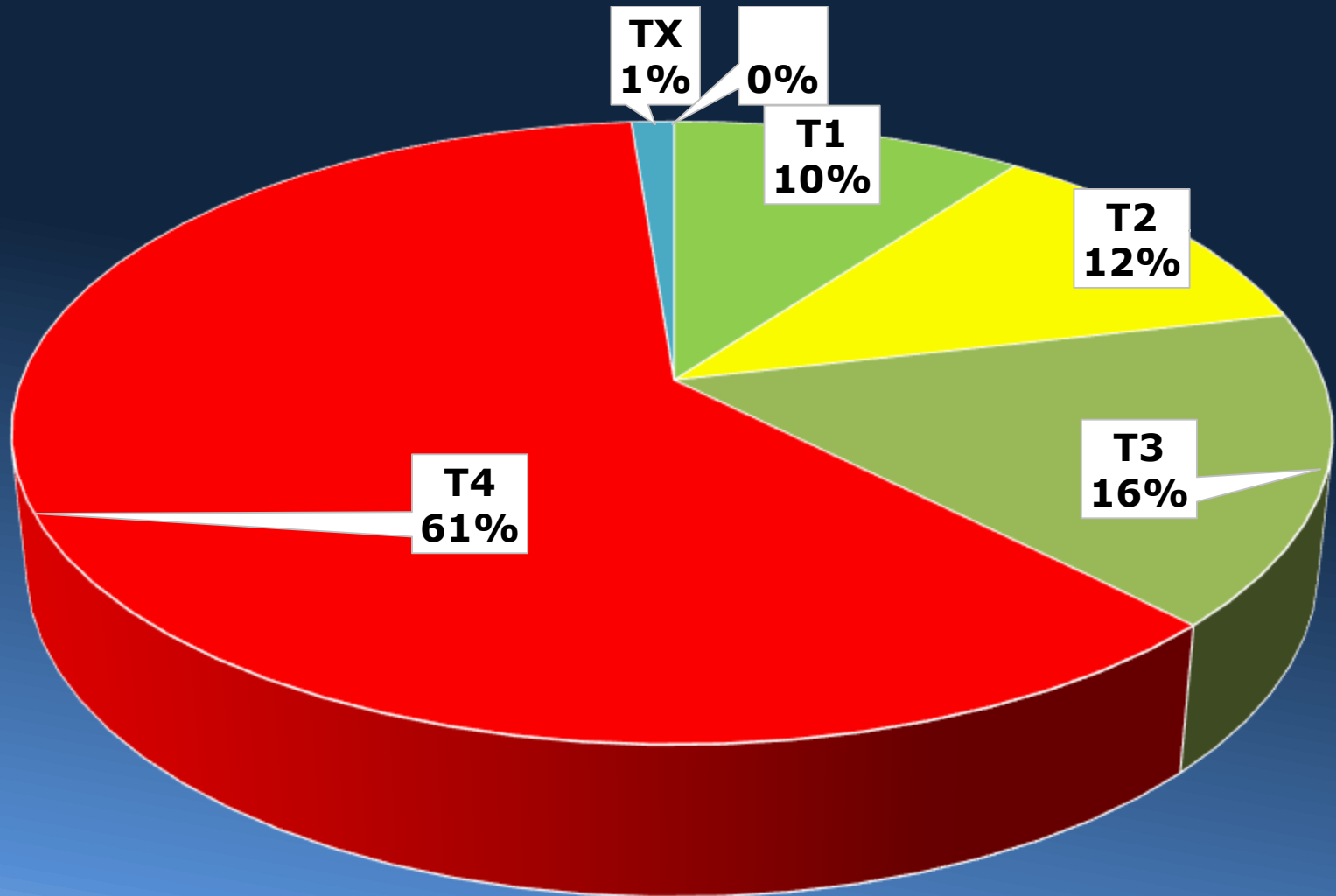
Site



Site Distribution of Sinonasal Malignancies Seen at MDACC over Time

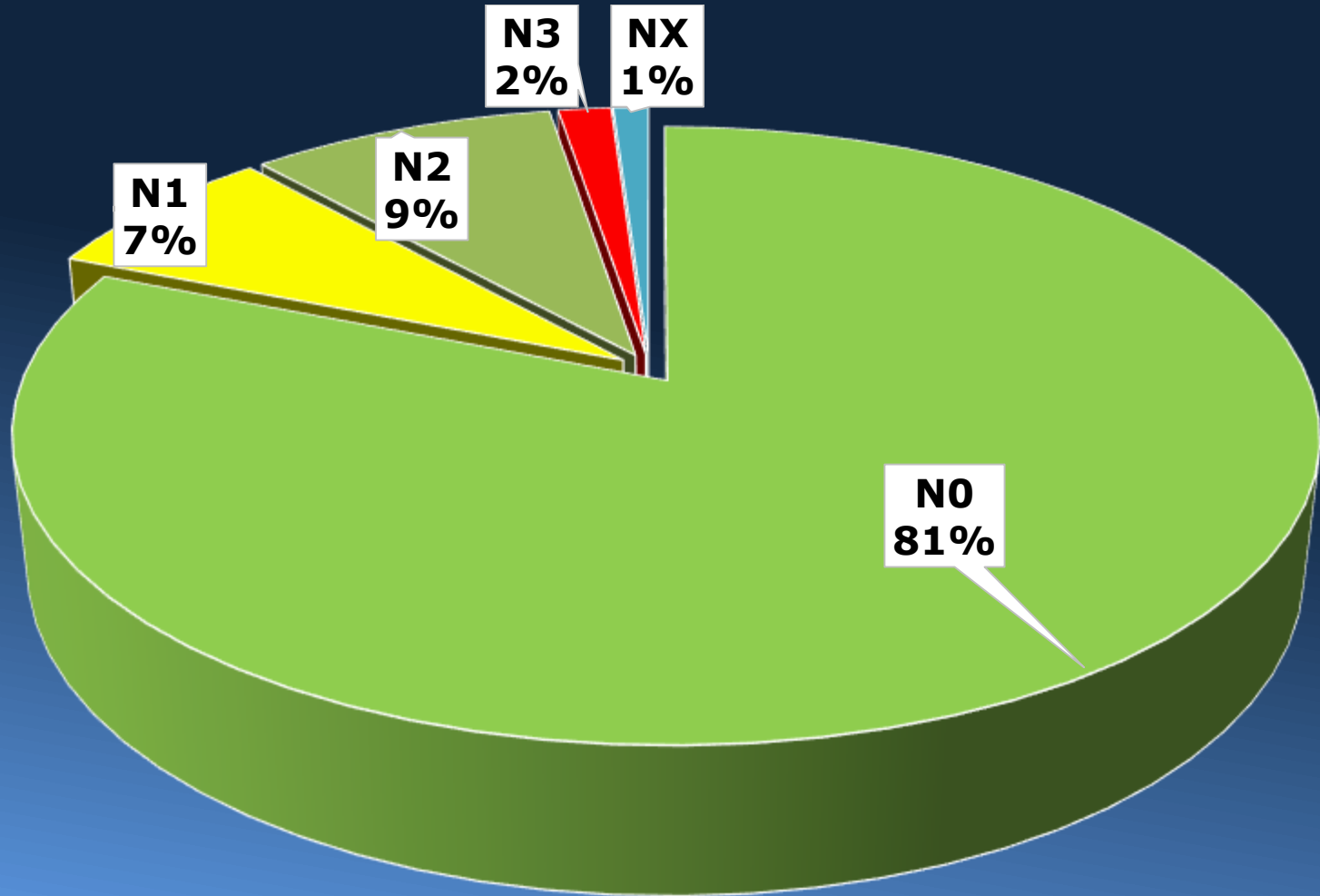


T Stages of Sinonasal Tumors Seen at MDACC



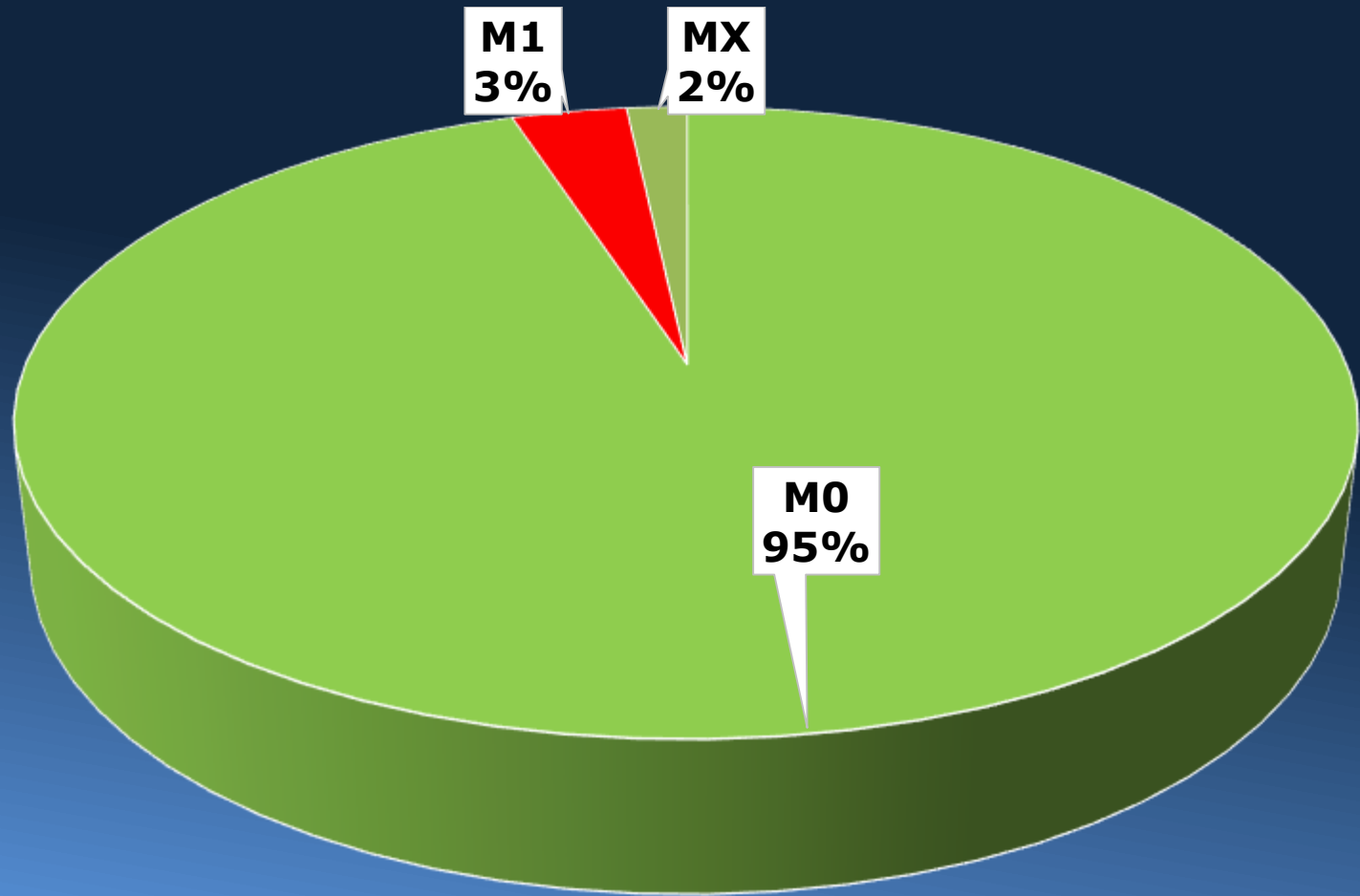
N=3564 patients

Neck Stages of Sinonasal Malignancies Seen at MDACC



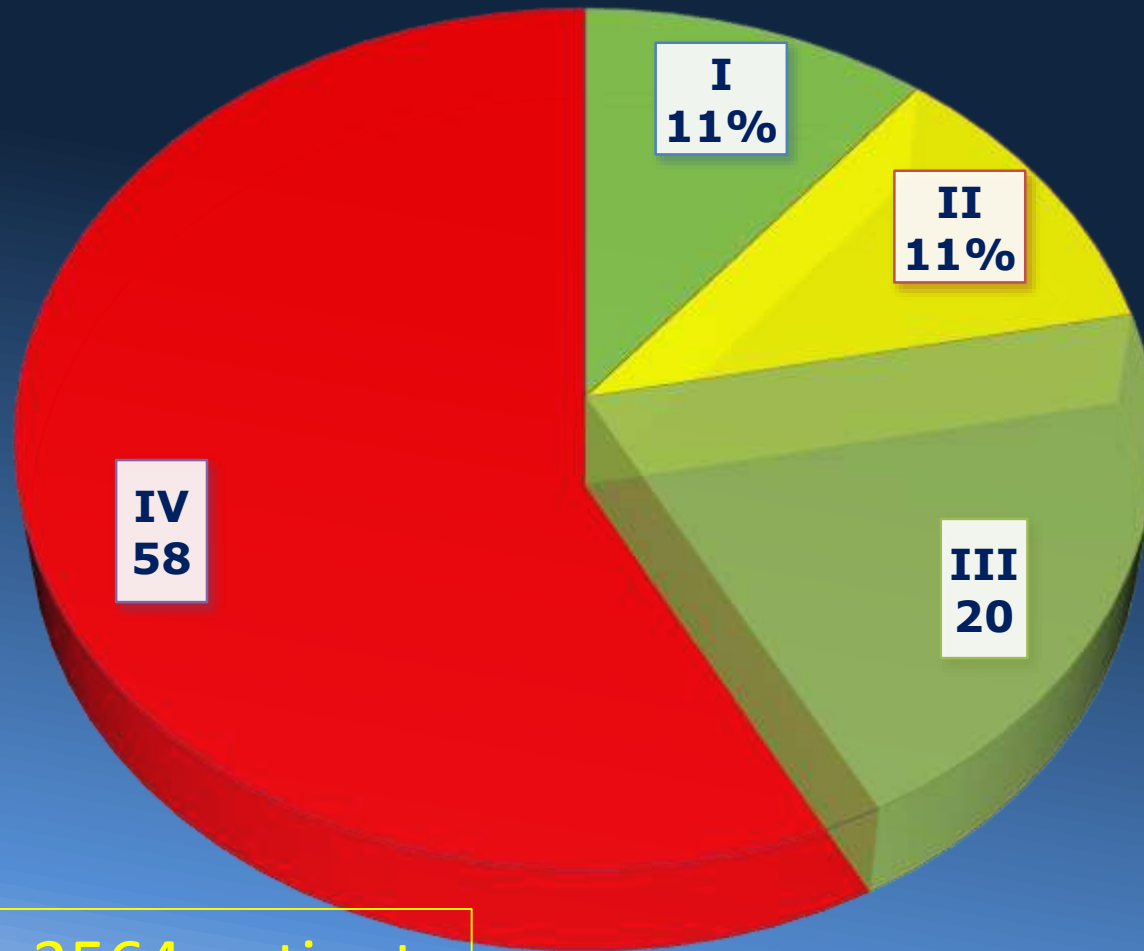
N=3564 patients

M Stages of Patients with Sinonasal Malignancies Seen at MDACC



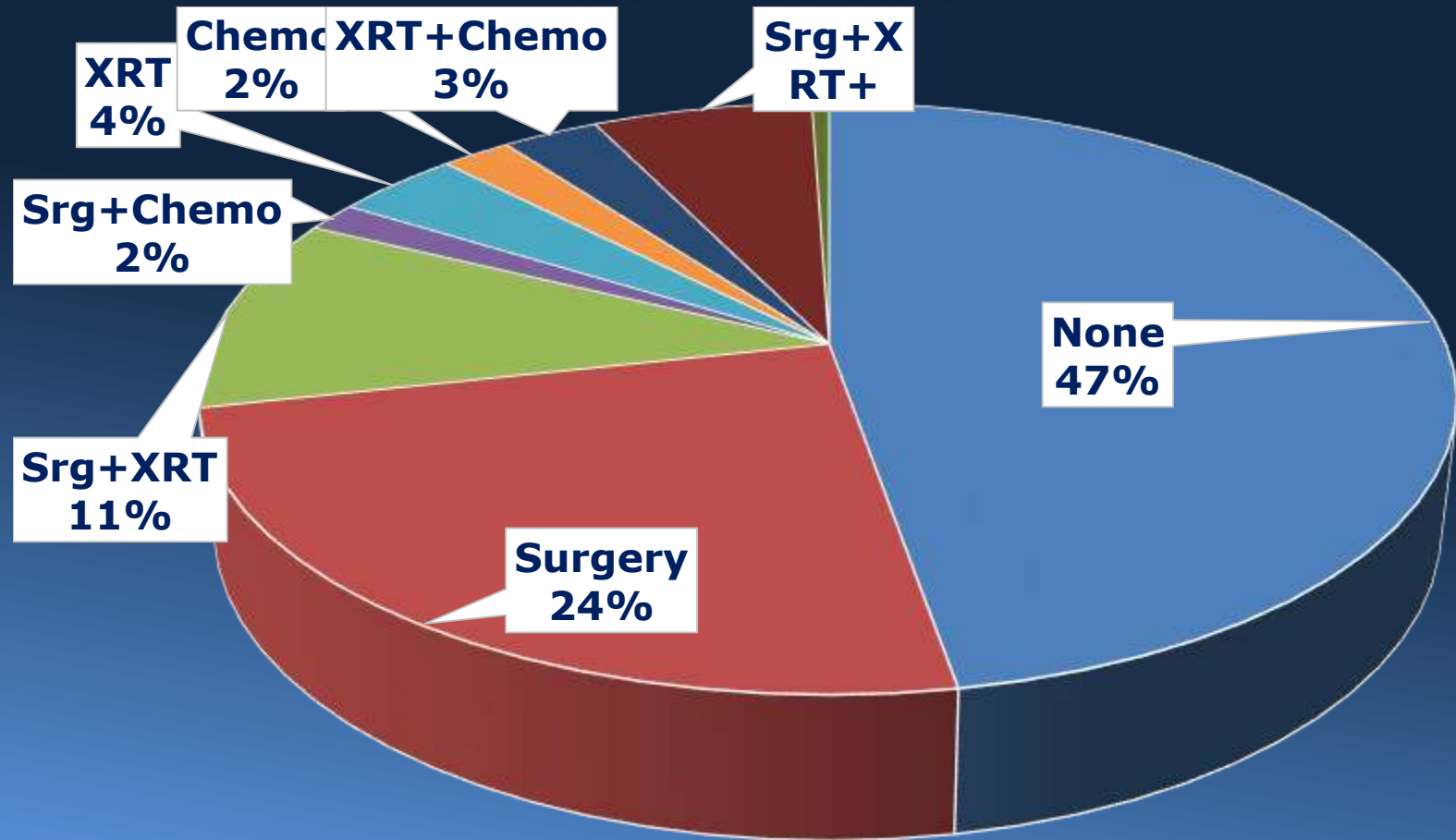
N=3564 patients

AJCC Stages of Sinonasal Malignancies Seen at MDACC



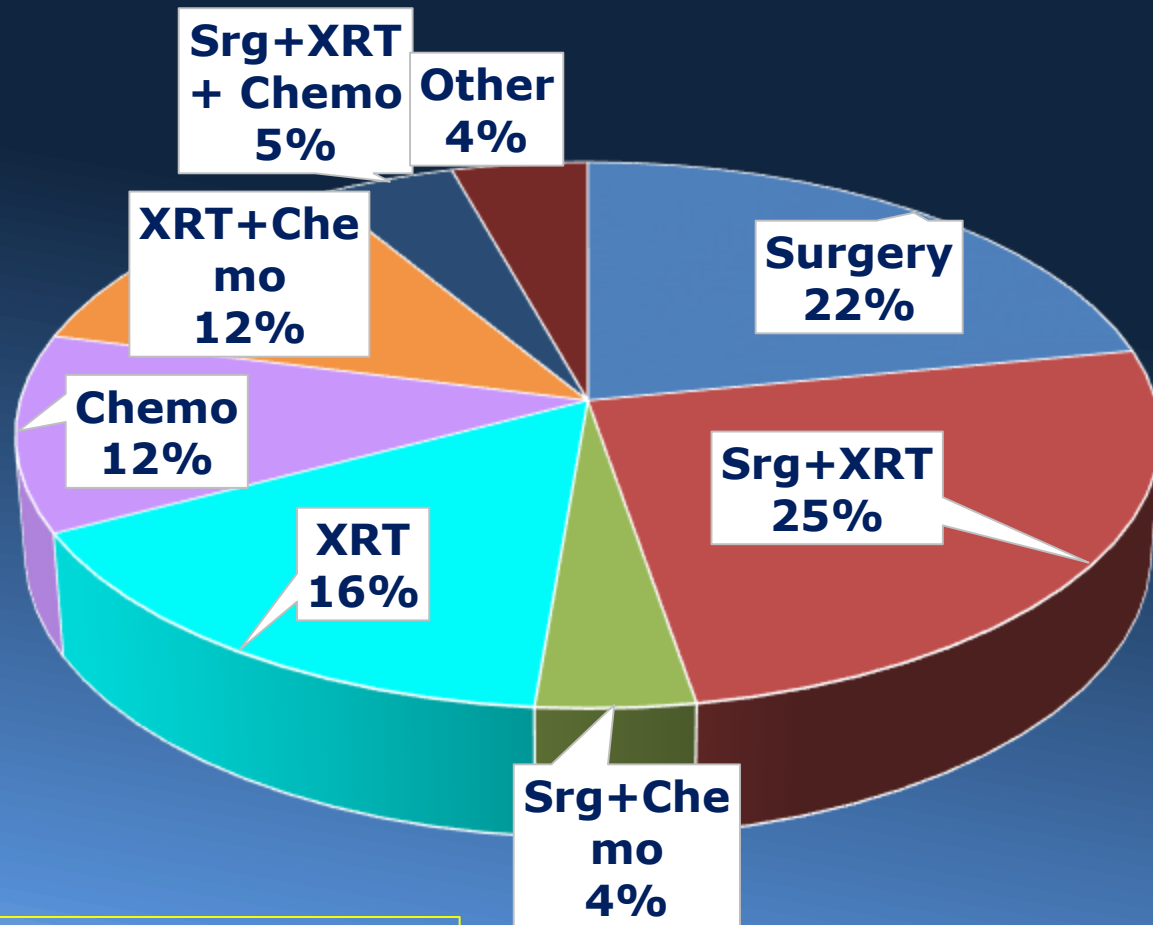
N=3564 patients

Treatment Modalities of Patients with Sinonasal Malignancies before Presentation at MDACC



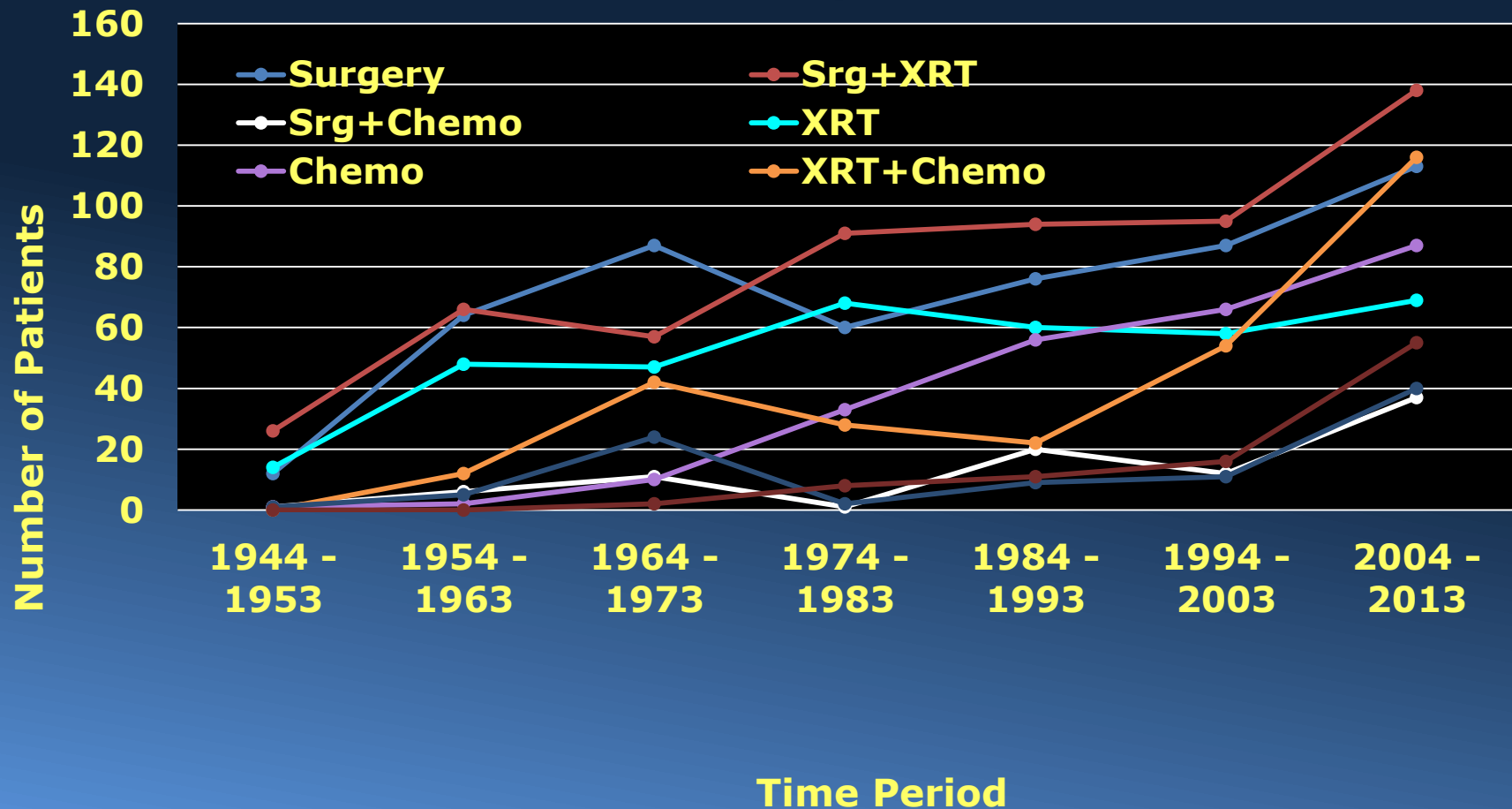
N=3564 patients

Treatment Modalities of Patients with Sinonasal Malignancies at MDACC



N=3564 patients

Treatment Modalities for Patients with Sinonasal Malignancies at MDACC over Time



N=3564 patients

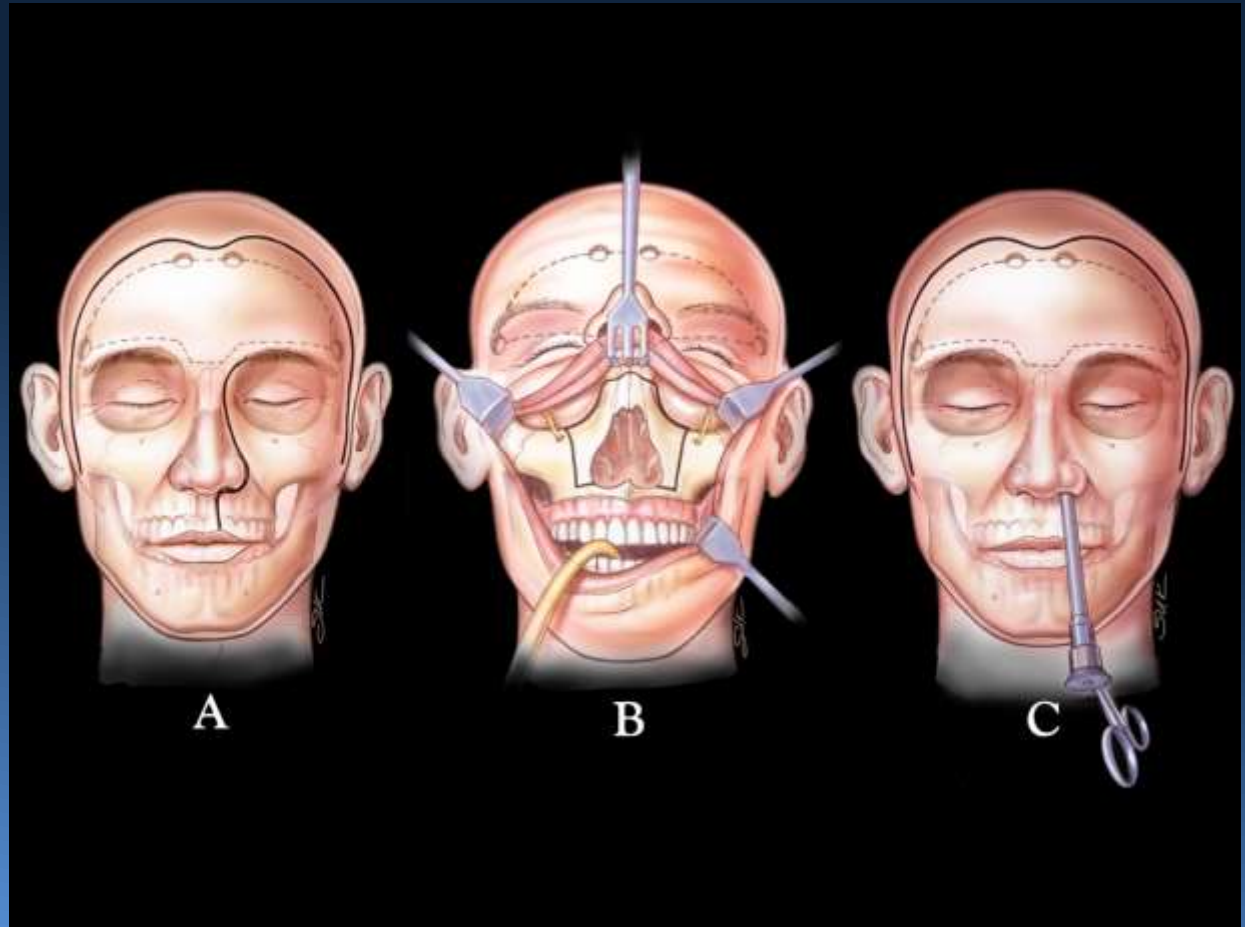
Cranial Base Resection for Malignancy

SURGICAL PRINCIPLES

- Adequate oncologic resection
- Minimal brain retraction
- Protection of critical neurovascular structures
- Meticulous reconstruction of the anterior skull base
- Optimal esthetic outcome

Surgical Approach

- A. Transfacial
- B. Sublabial
- C. Endoscopic



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 ks Imaging-Willowbrook
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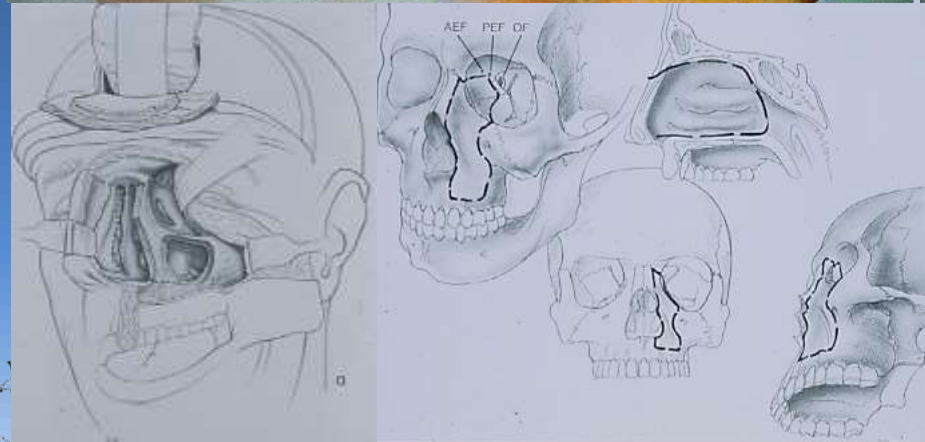
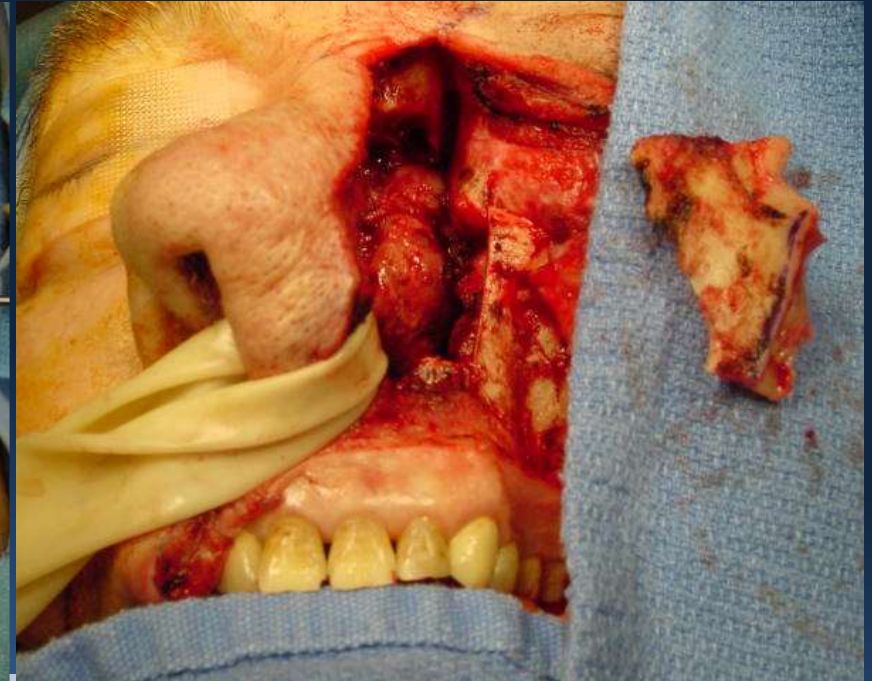
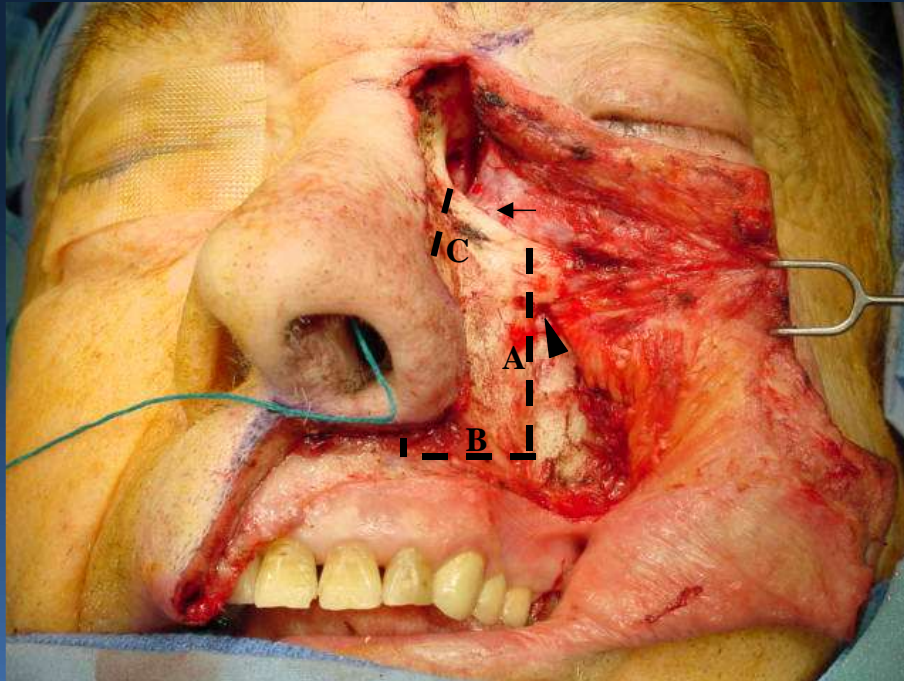


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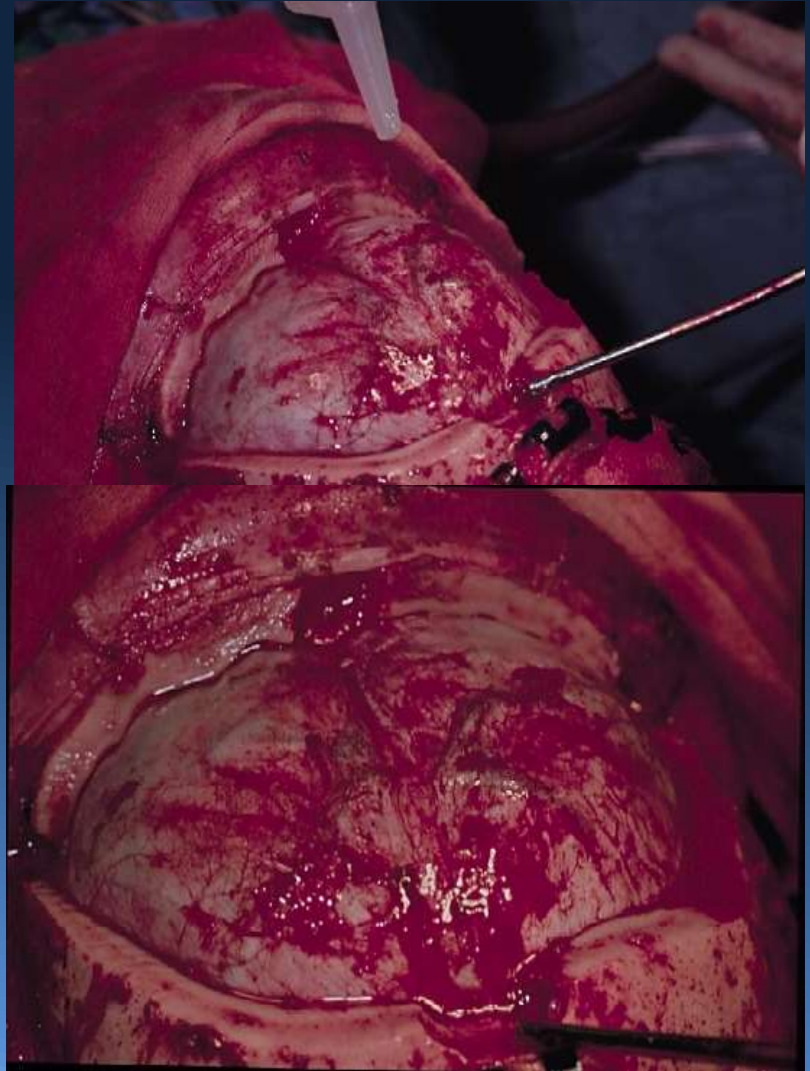
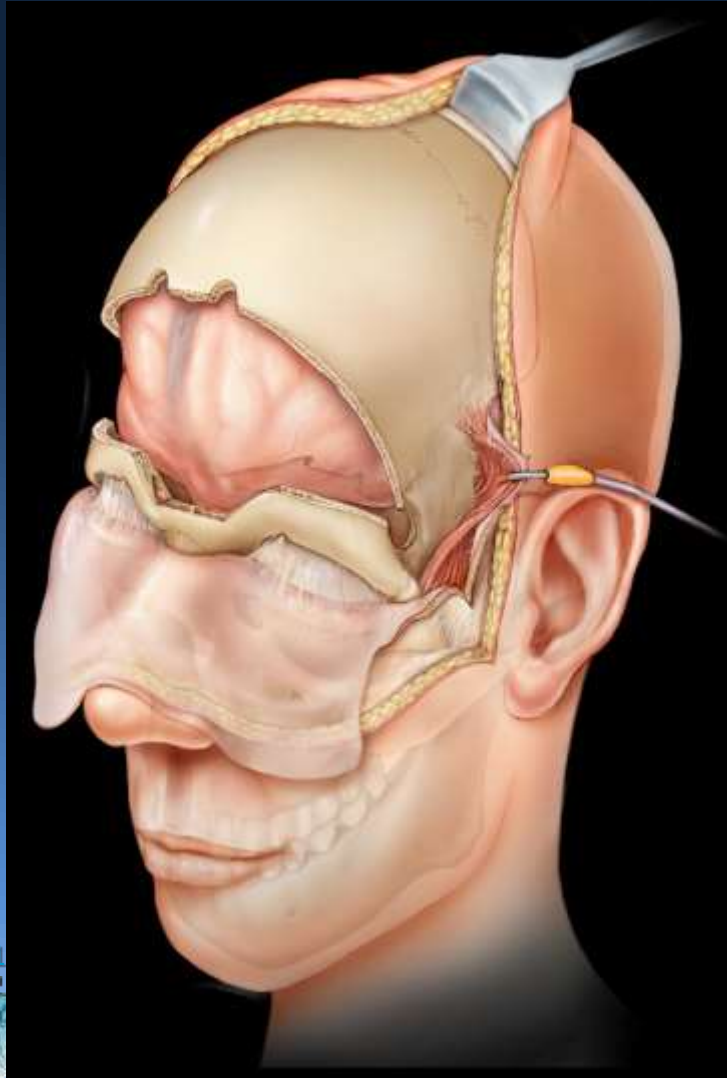
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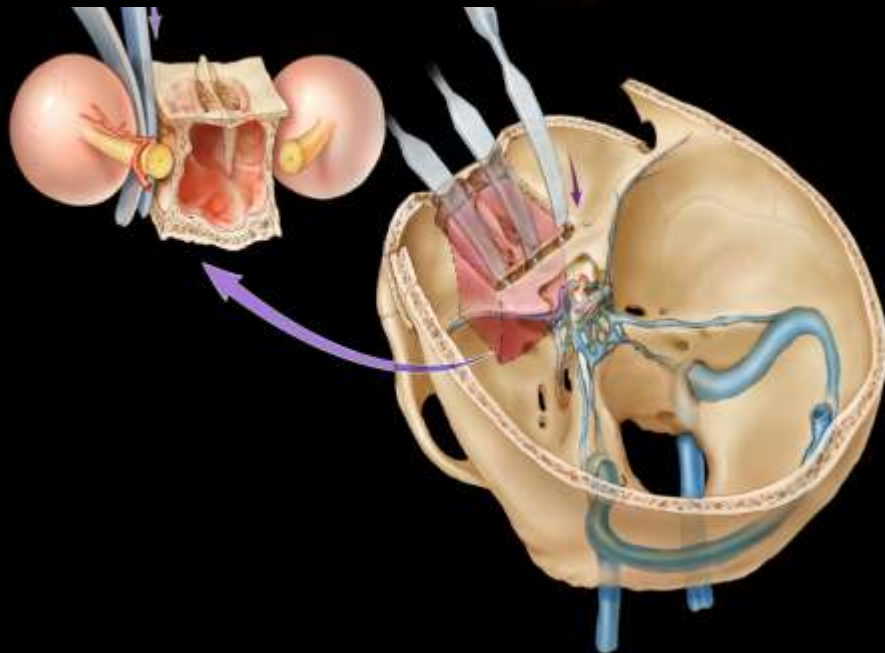
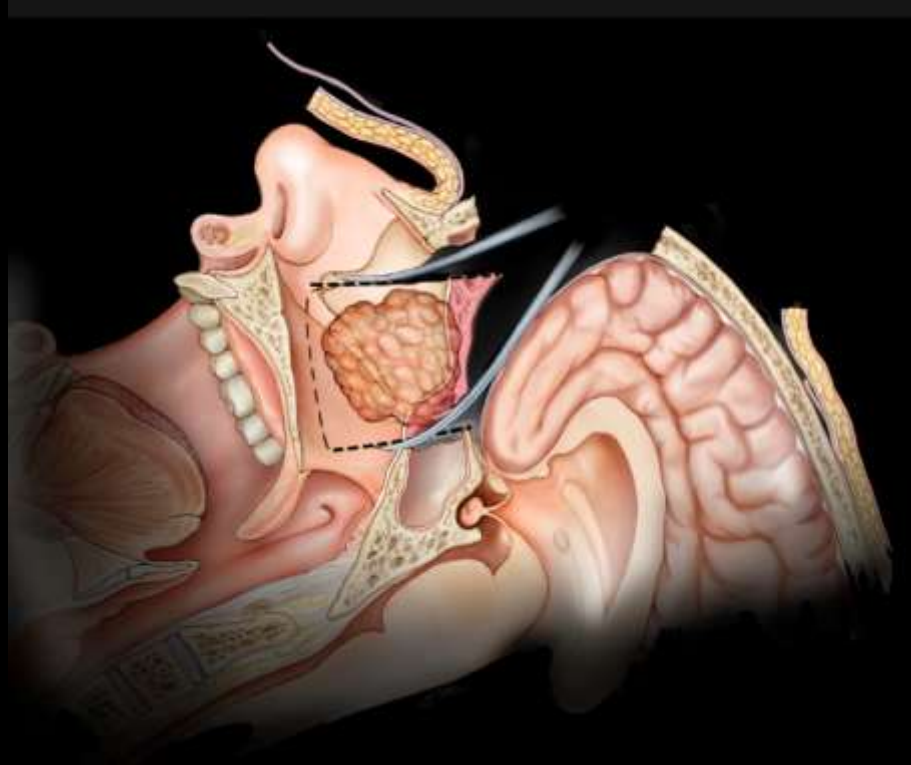
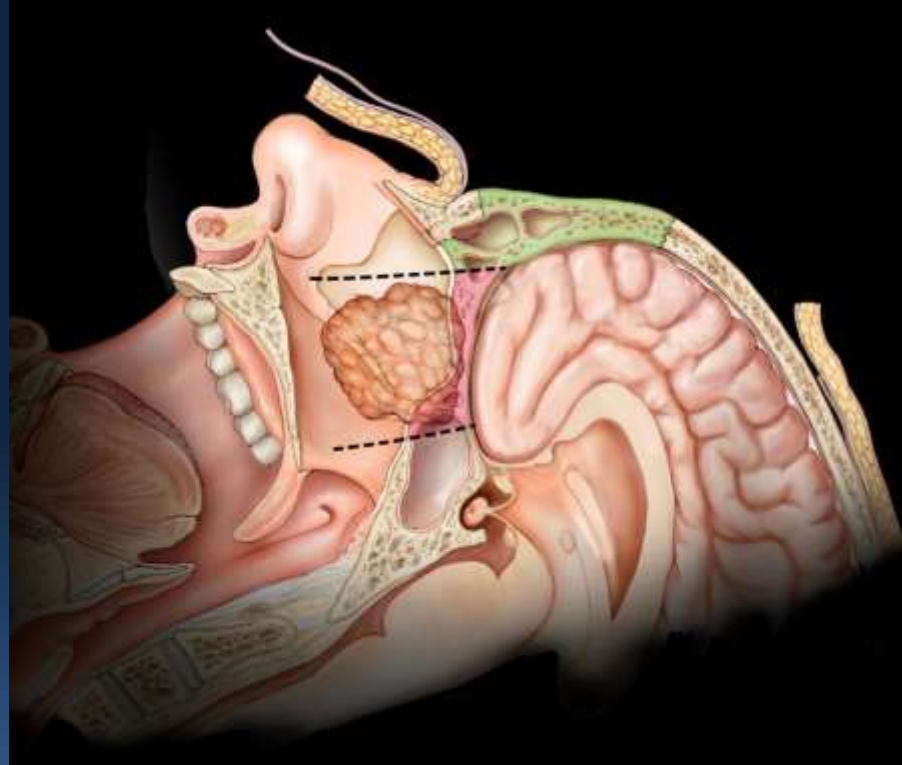
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Transfacial Approach



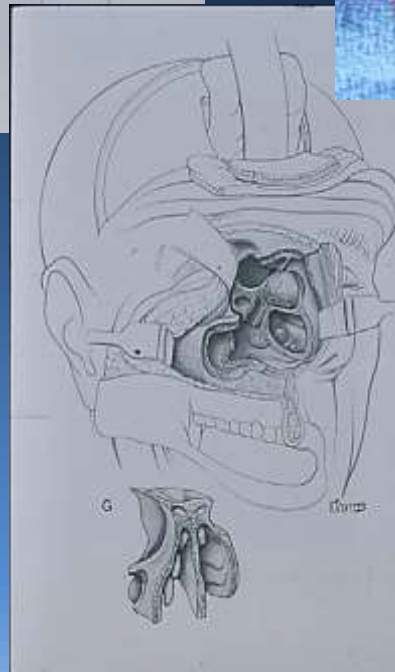
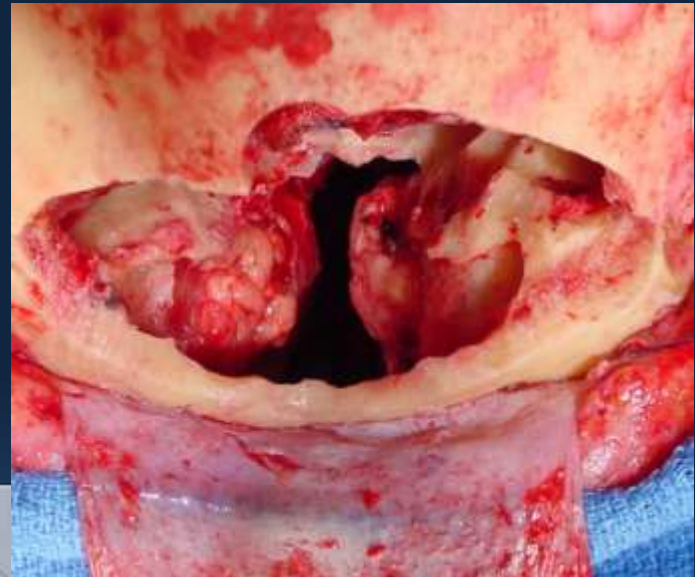
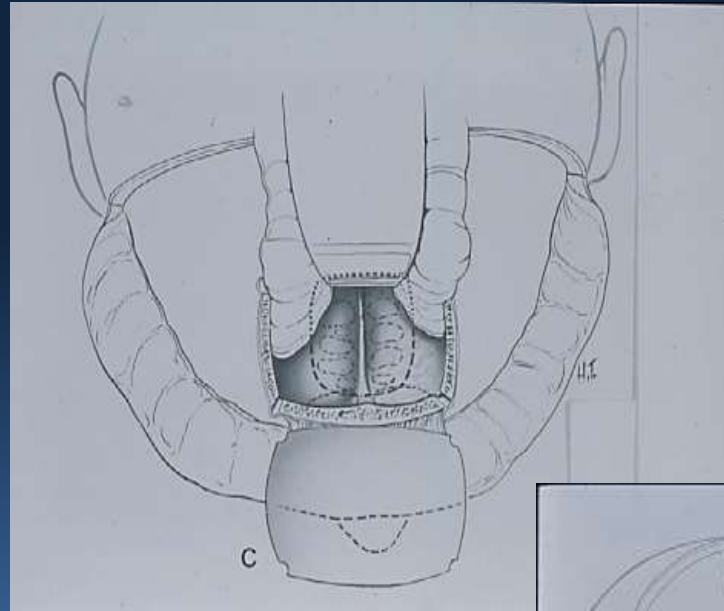
Frontal Craniotomy



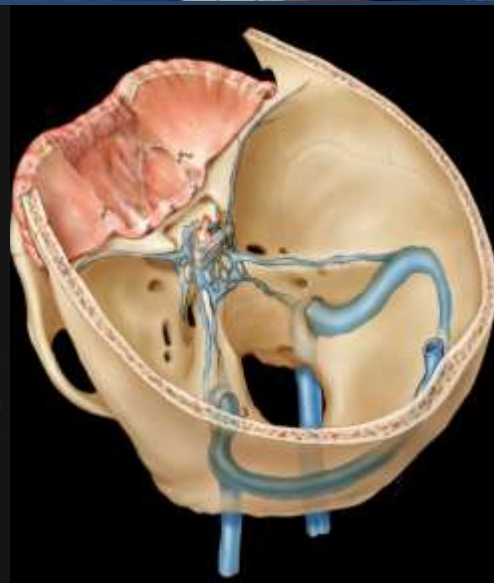
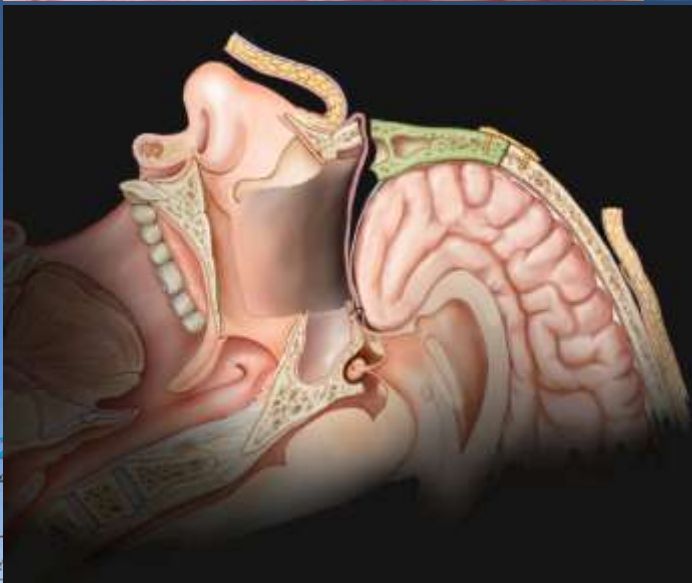
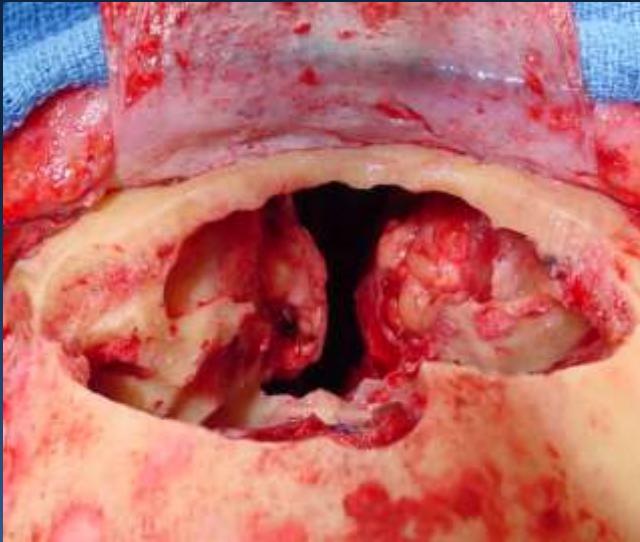


Osteotomies

Tumor Resection



Reconstruction of the Cranial Base Pericranial Flap



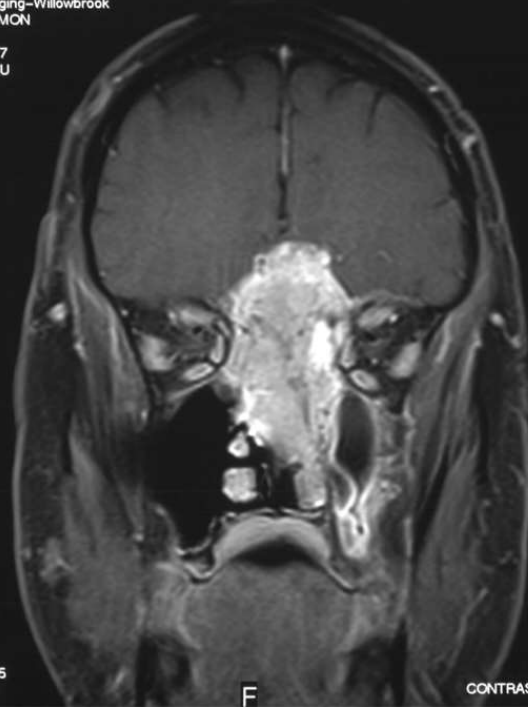
Closure



Postoperative Appearance



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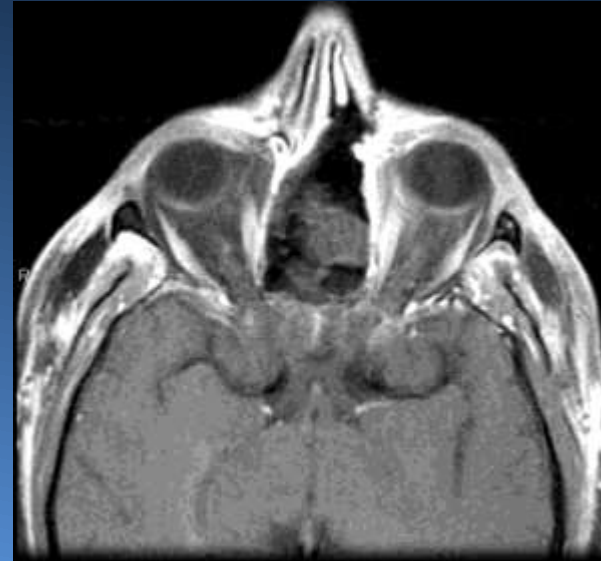
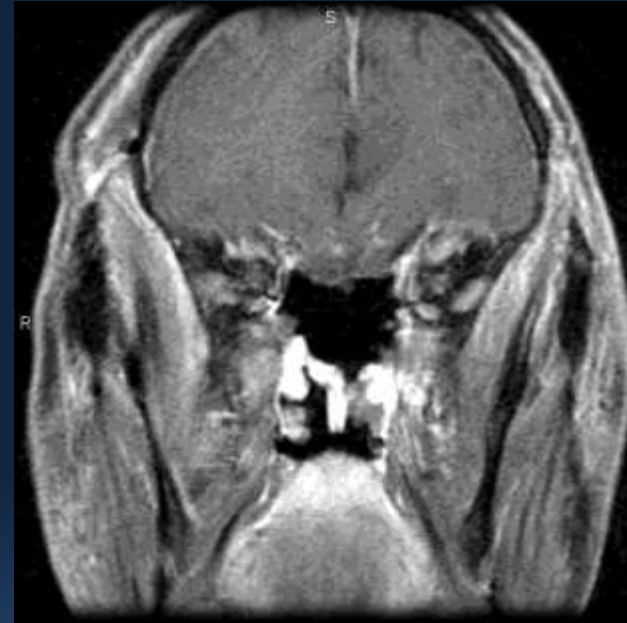


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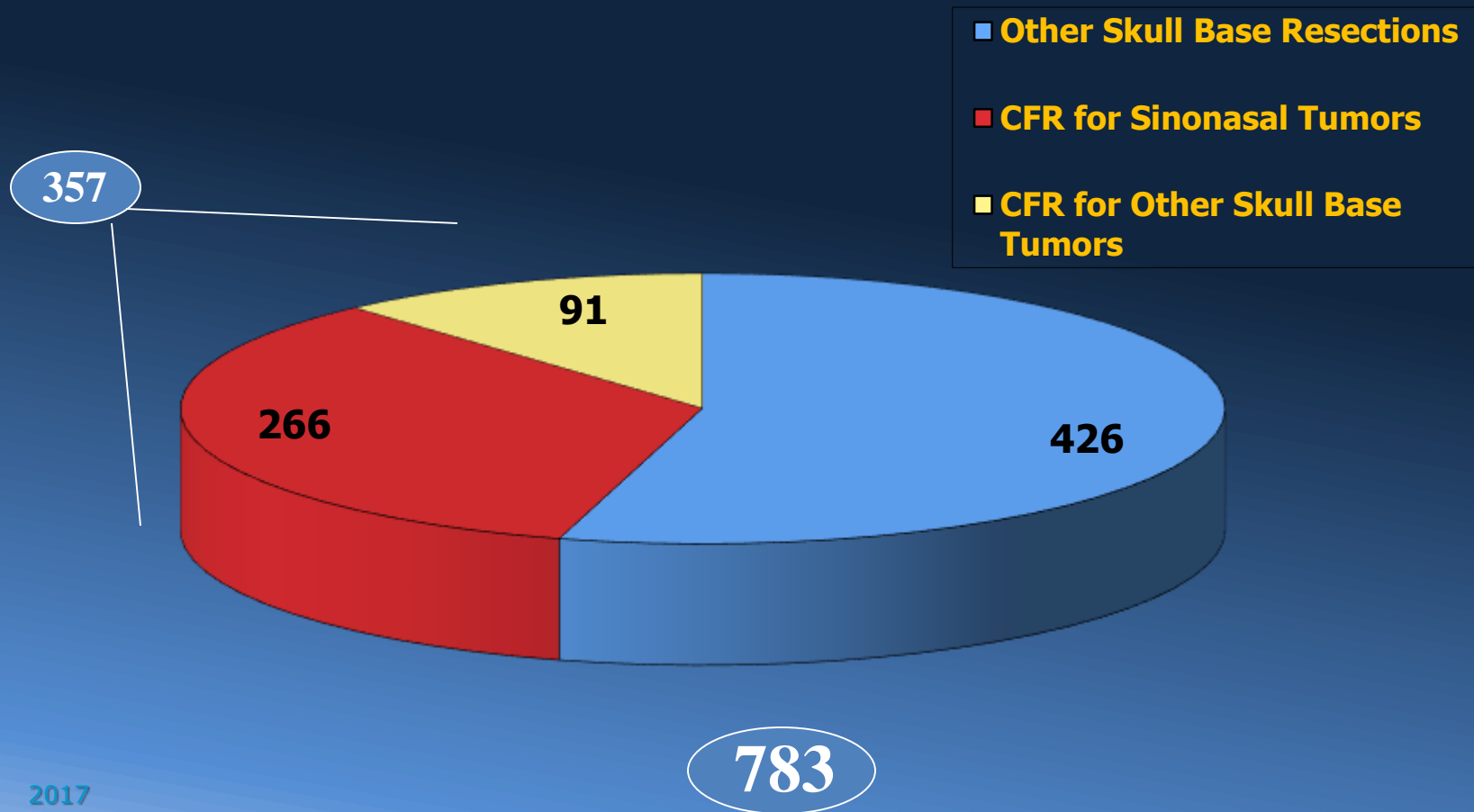
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Before surgery

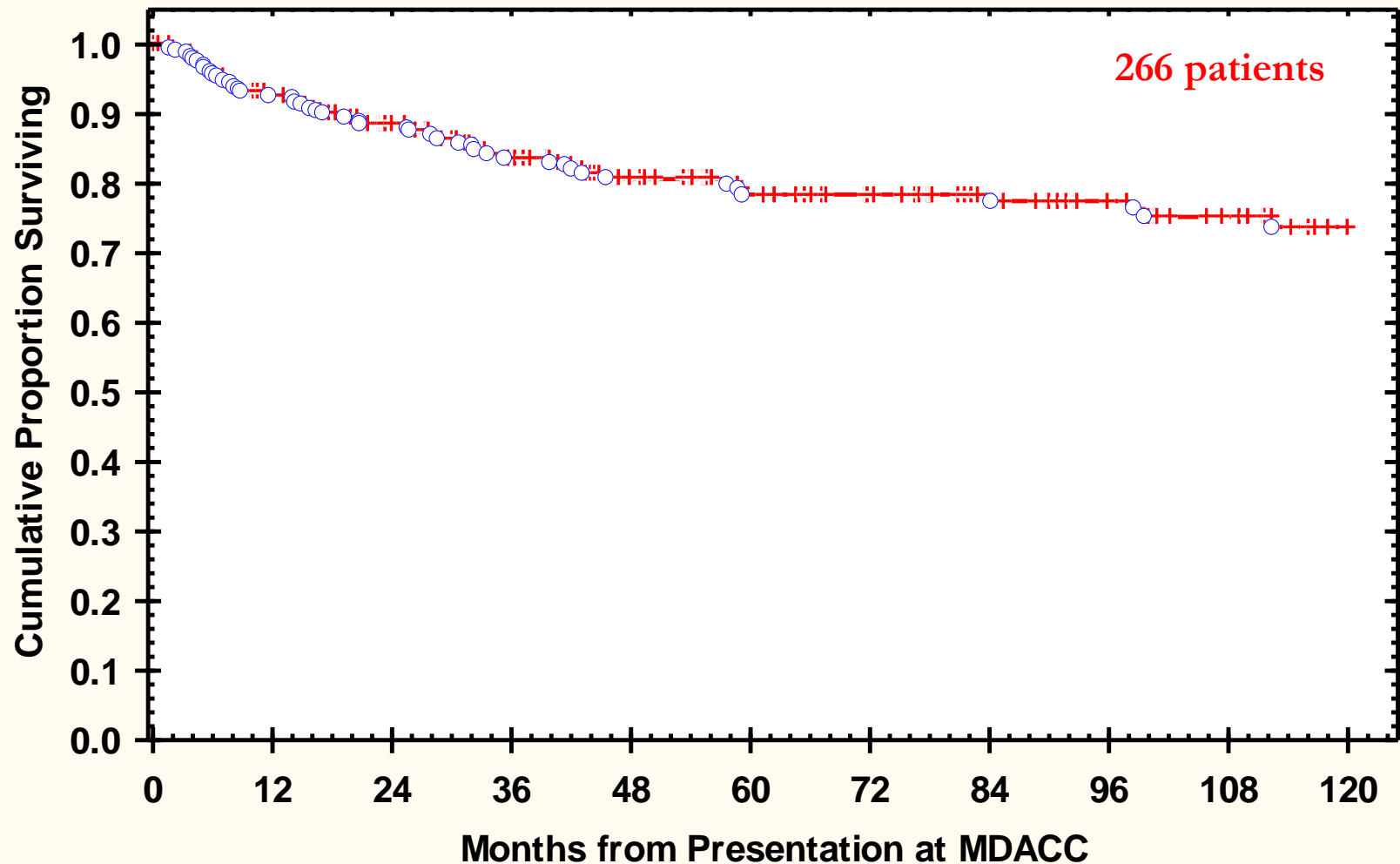
7 yr FU

Craniofacial Resections MD Anderson Experience



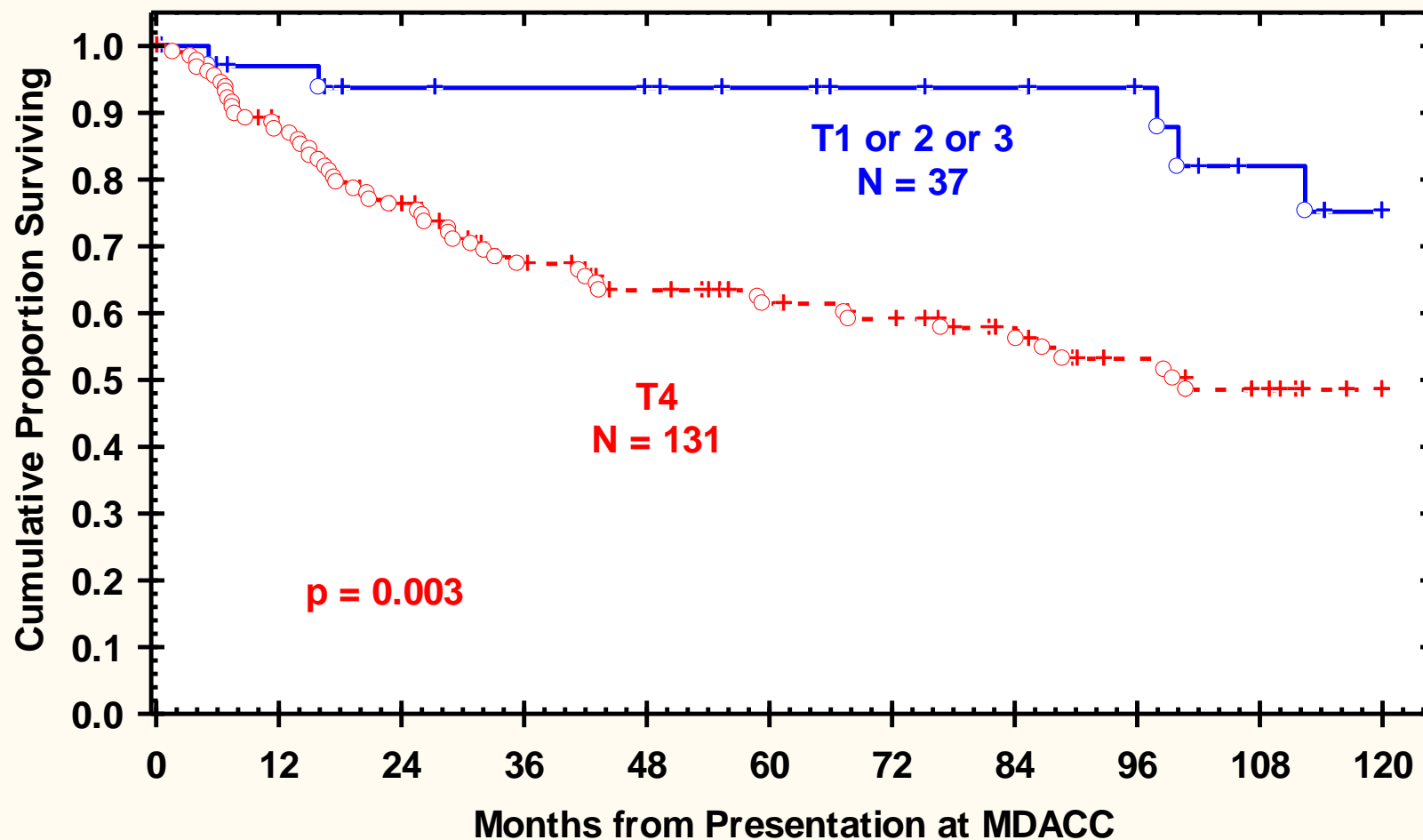
Disease-Specific Survival of Sinonasal Cancer Patients Who Had Craniofacial Resections

○ Died of Disease + Last Contact



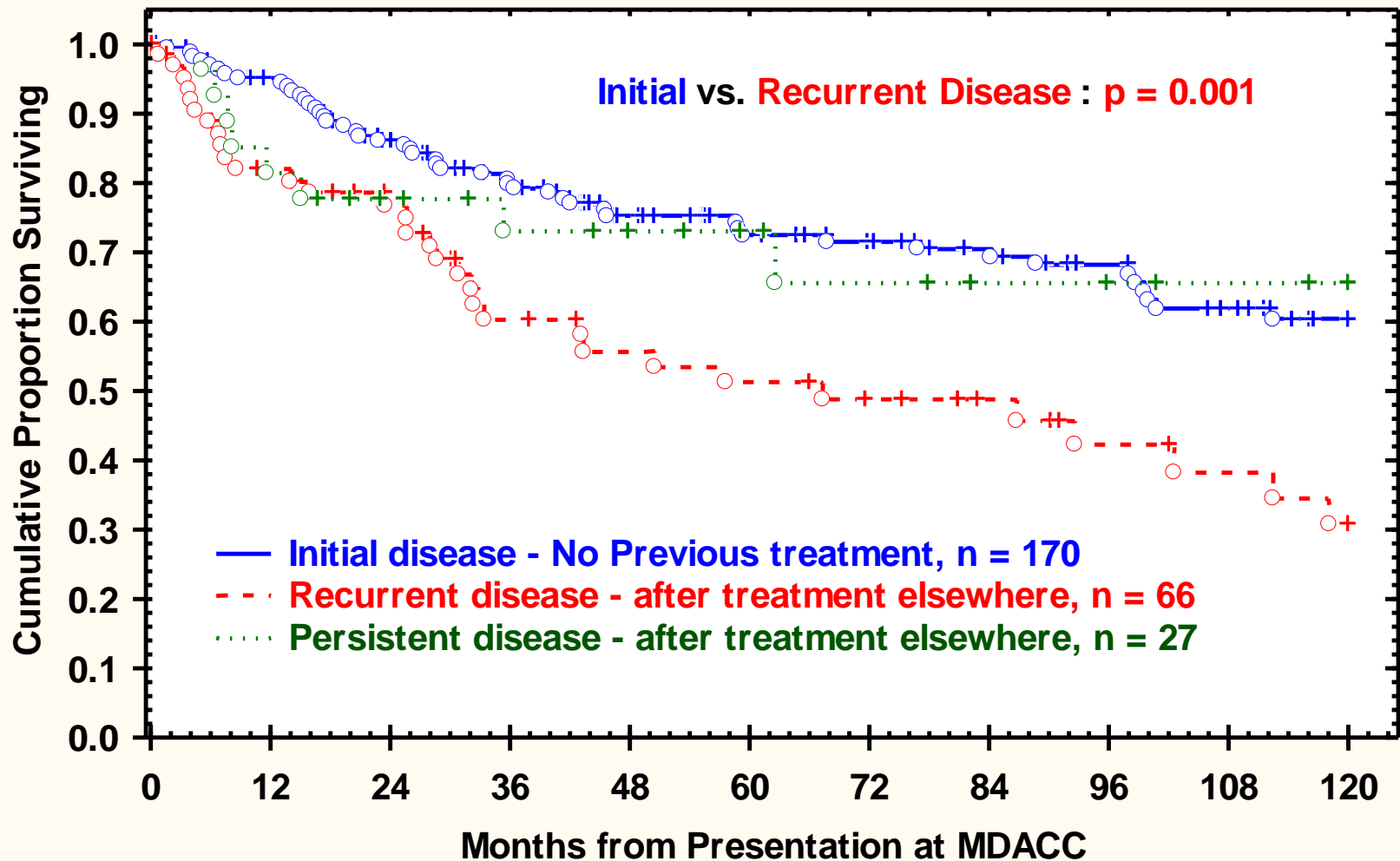
Overall Survival of Sinonasal Cancer Patients Who Had Craniofacial Resections by Tumor Stage

○ Died + Last Contact



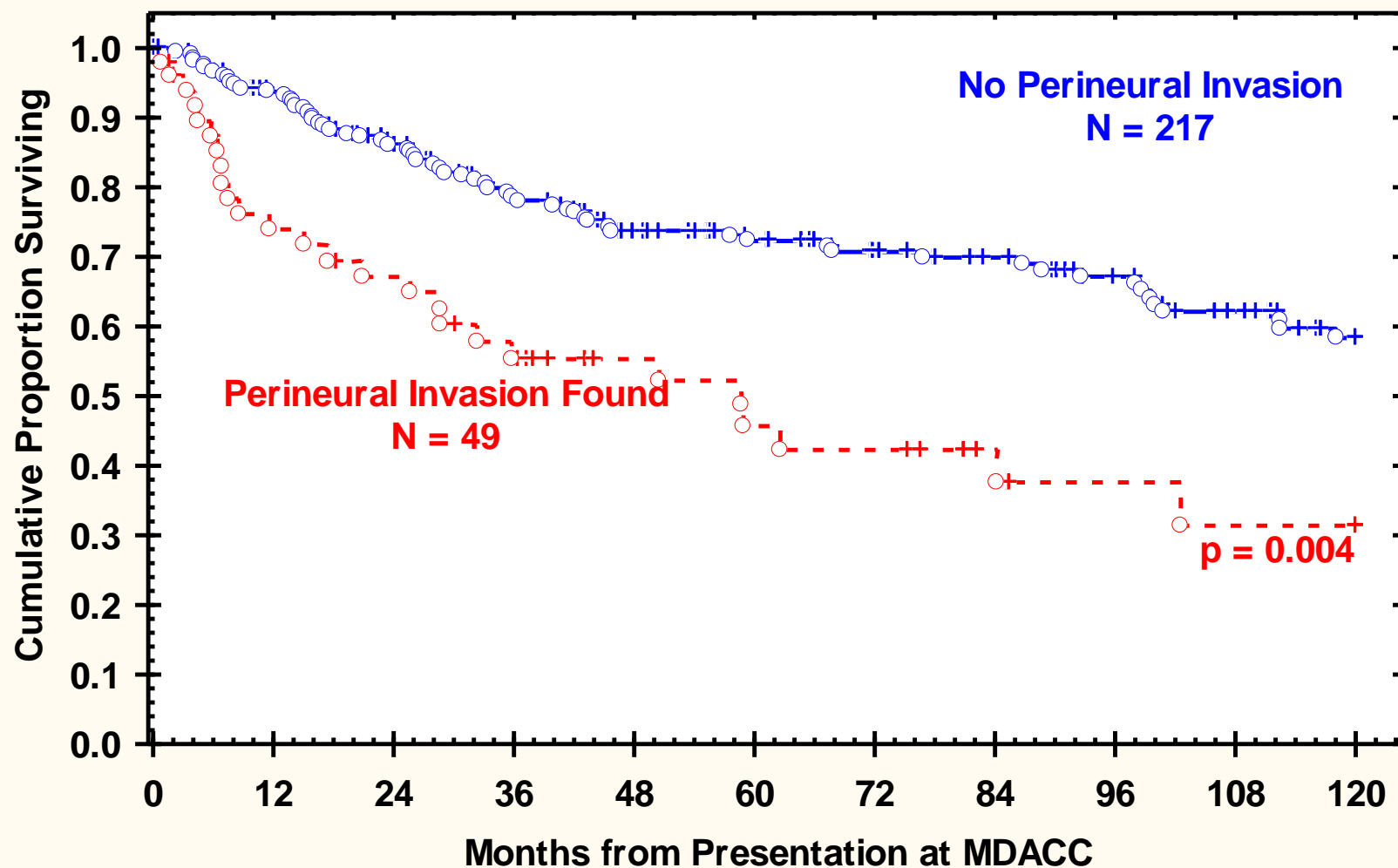
Overall Survival of Sinonasal Cancer Patients Who Had Craniofacial Resections by Disease Status at Presentation

○ Died + Last Contact



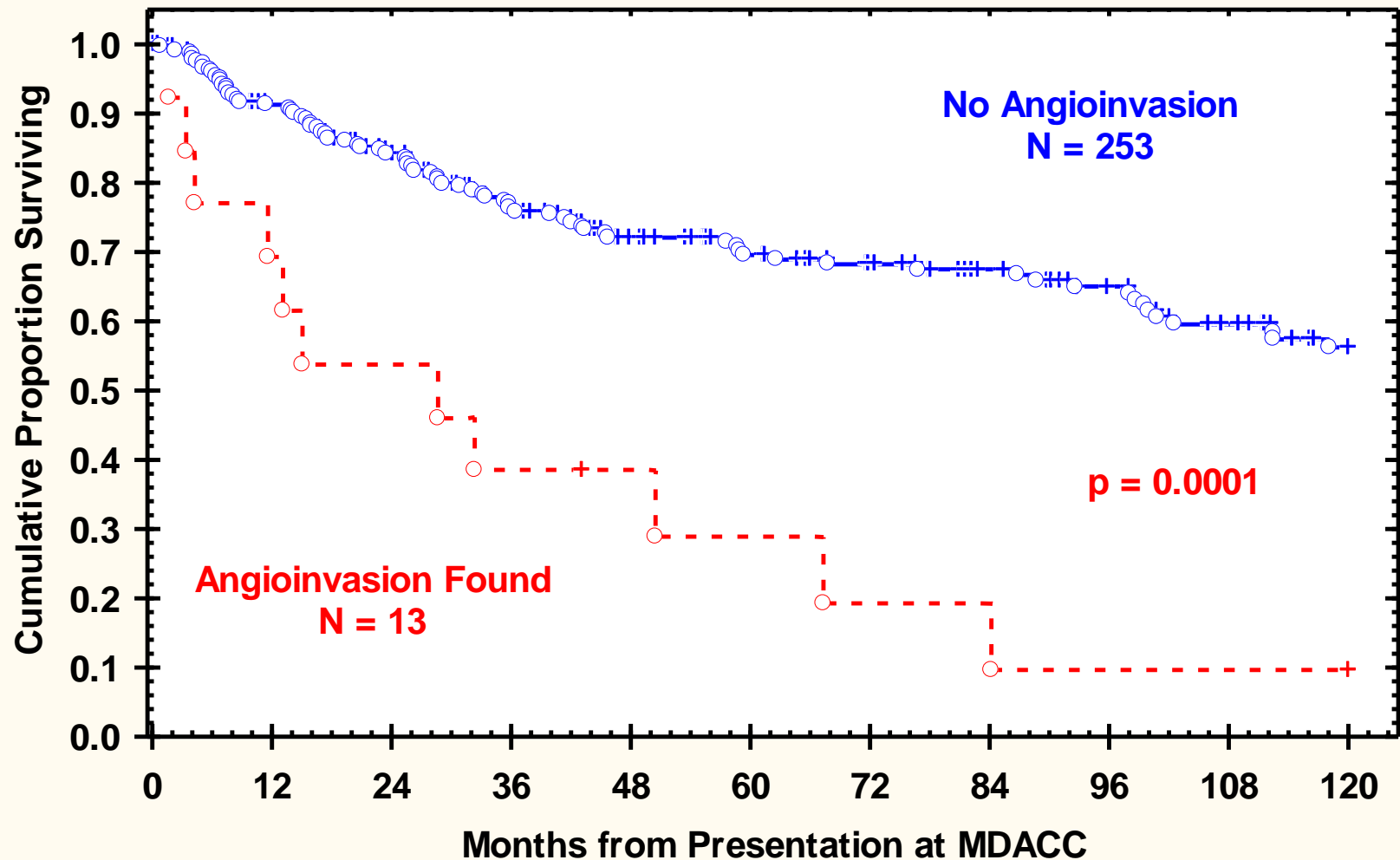
Overall Survival of Sinonasal Cancer Patients Who Had Craniofacial Resections by Finding of Perineural Invasion

○ Died + Last Contact



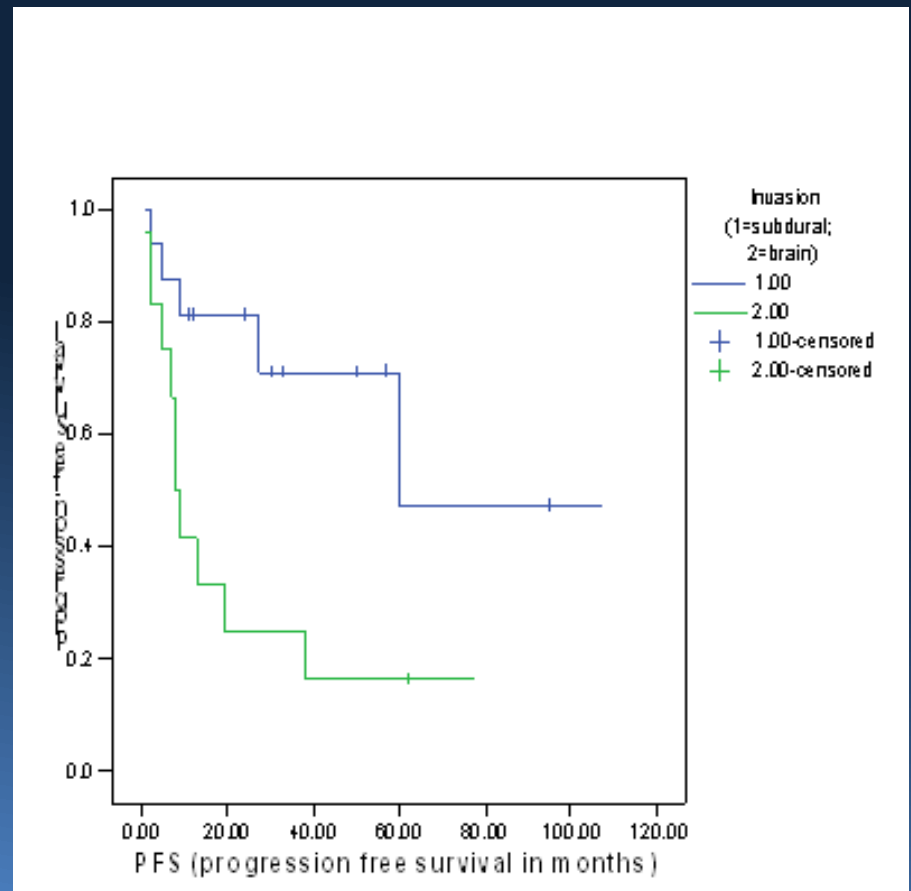
Overall Survival of Sinonasal Cancer Patients Who Had Craniofacial Resections by Finding of Angioinvasion

○ Died + Last Contact



Progression-Free Survival subdural vs brain

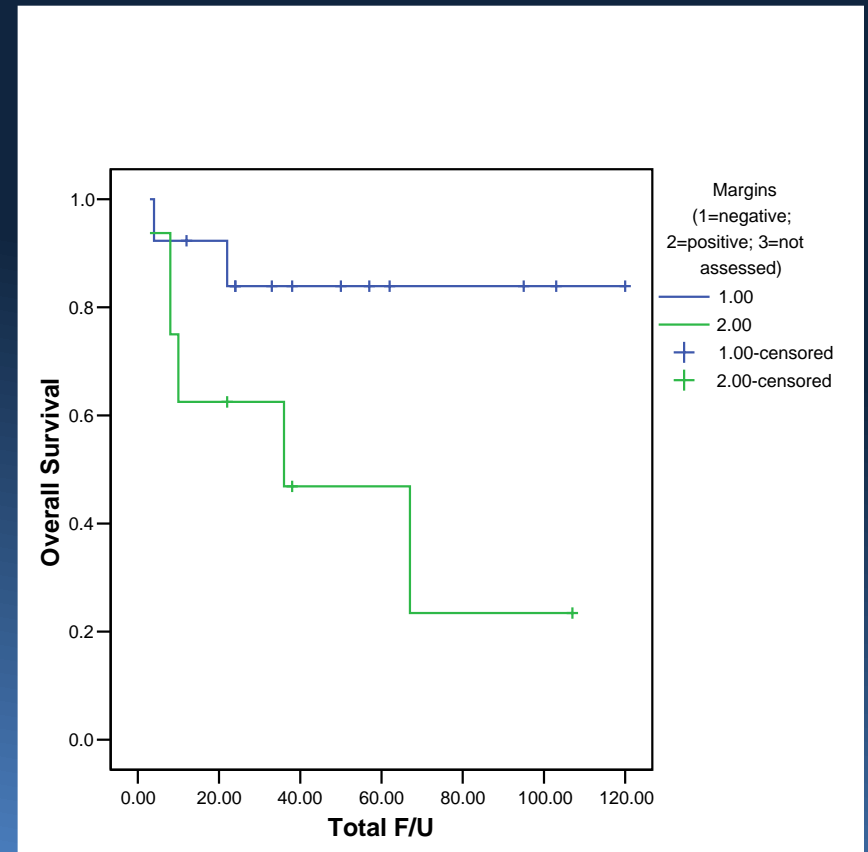
- Subdural spread
 - Mean PFS 68.7 months
- Brain invasion
 - Mean PFS 22.3 months
- $p=0.005$



Feiz-Erfan I, Suki D, Hanna EY, DeMonte F. Prognostic significance of transdural invasion of skull base malignancies in patients undergoing craniofacial resection. *Neurosurgery* 61:1178-85, 2007.

Overall Survival – Surgical Margins

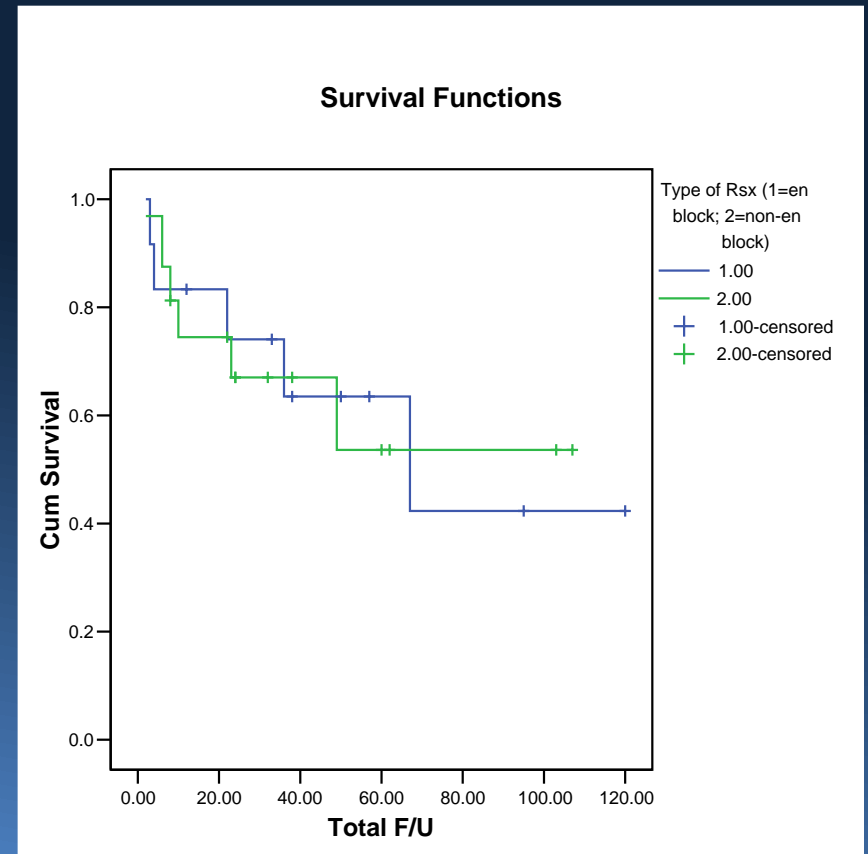
- Negative margins
 - Mean 102.9 months
- Positive margins
 - Mean 49.3 months
- $p=0.049$



Feiz-Erfan I, Suki D, Hanna EY, DeMonte F. Prognostic significance of transdural invasion of skull base malignancies in patients undergoing craniofacial resection. *Neurosurgery* 61:1178-85, 2007.

Overall Survival – Resection method

- En bloc resection
 - Mean 71.4 months
- Piecemeal resection
 - Mean 67.3 months
- NS ($p=0.951$)



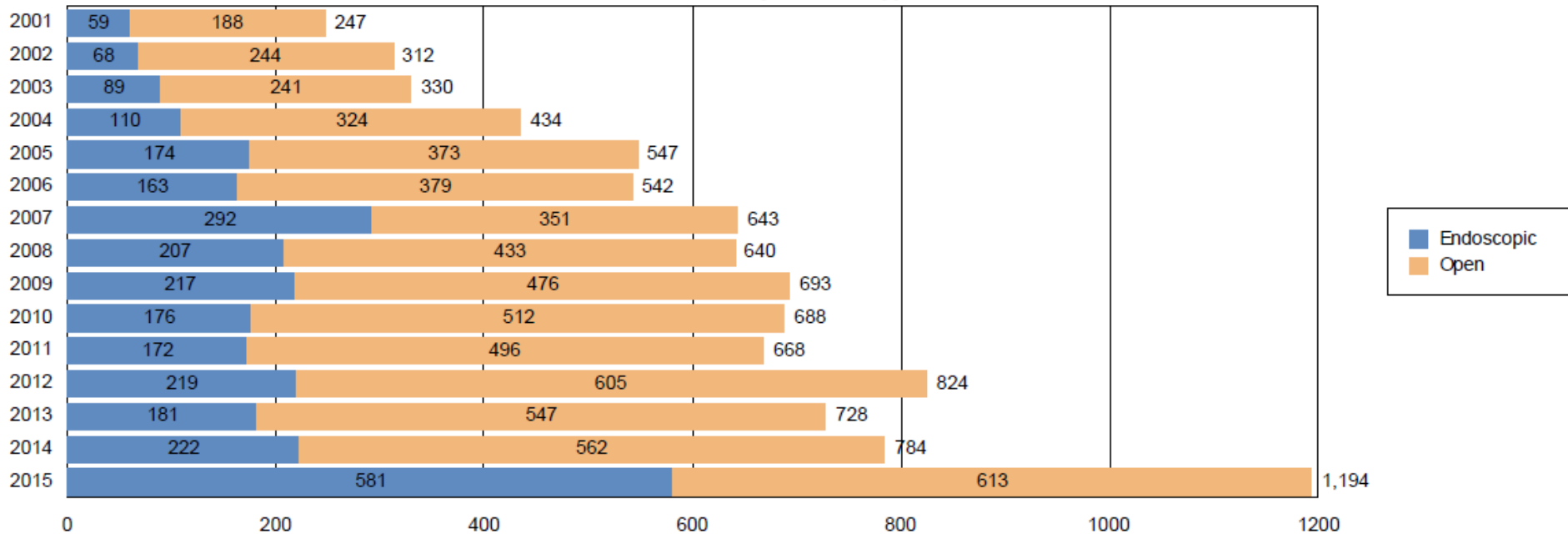
Feiz-Erfan I, Suki D, Hanna EY, DeMonte F. Prognostic significance of transdural invasion of skull base malignancies in patients undergoing craniofacial resection. *Neurosurgery* 61:1178-85, 2007.

Improvements/Limitations/Future Directions

- **Craniofacial skull base surgery**
- **Endoscopic and Robotic Approaches**
- Conformal Radiation
- Active chemotherapeutic agents
- Treatment intensification

Skull Base Surgery Open and Endoscopic MDACC

Number by FY and Type



Endoscopic Resection Advantages

- Direct access to the anterior and central skull base with no brain retraction
- Avoiding craniofacial incisions and extensive bone removal commonly used in open surgical approaches.
- Wider angle of vision and angled lenses
 - increases the range of the endoscopic visual surgical field
 - “seeing around corners” compared to the “line of sight” visual field gained by surgical loupes or microscopes.

Endoscopic Resection Technical Steps

- Debulking the tumor
- Mapping out the epicenter
- Vascular control
- Bony dissection
- Dural exposure/resection
- Intracranial exposure/resection
- Margin Control
- Reconstruction

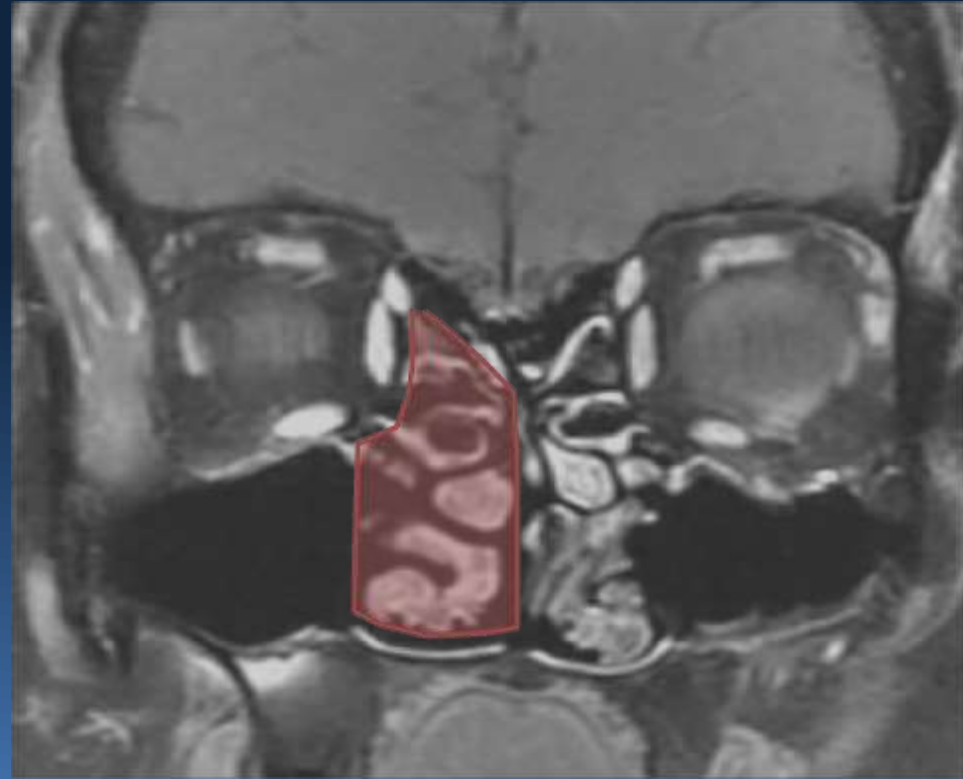
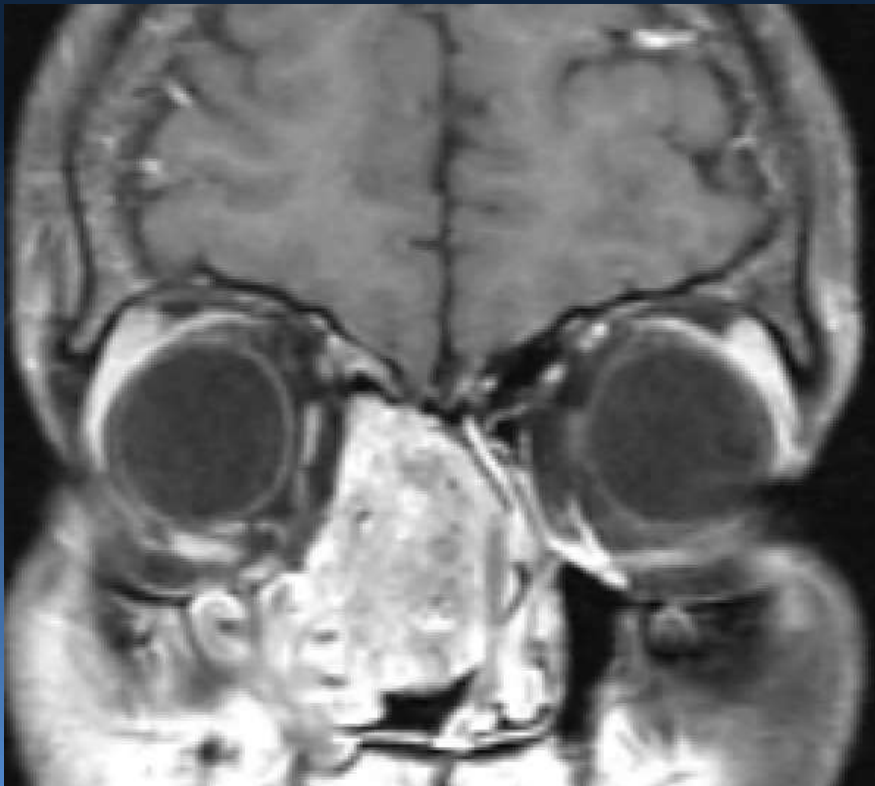
Endoscopic Resection of Sinonasal Tumors

Classification Based on Extent of Resection

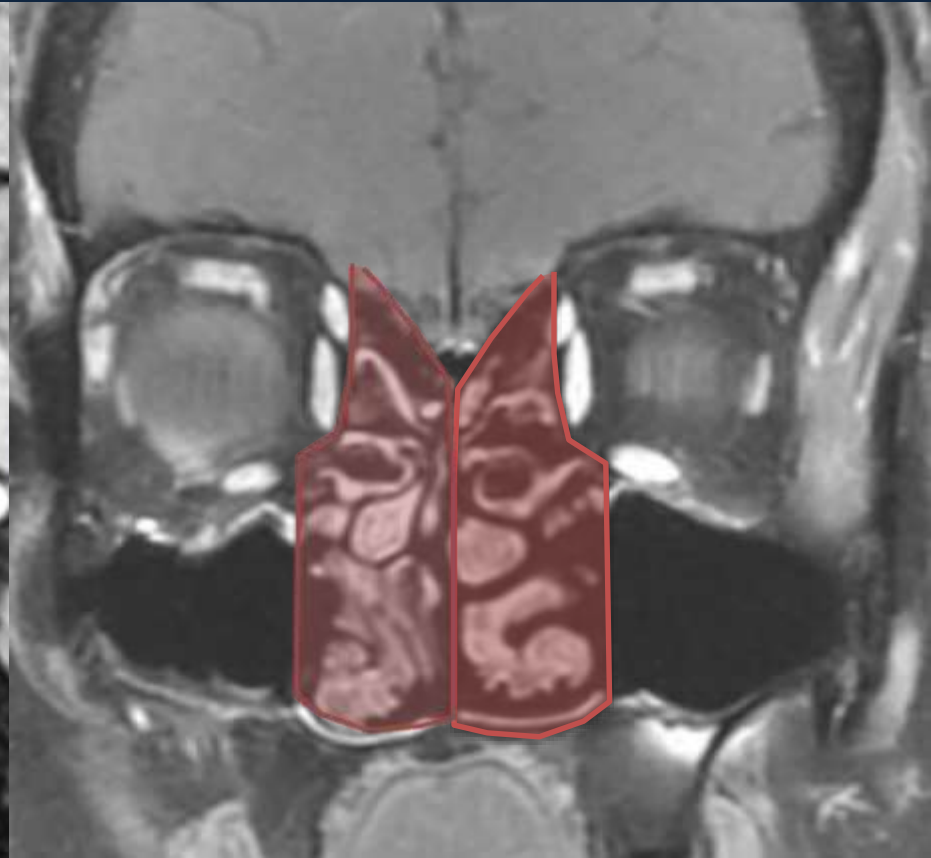
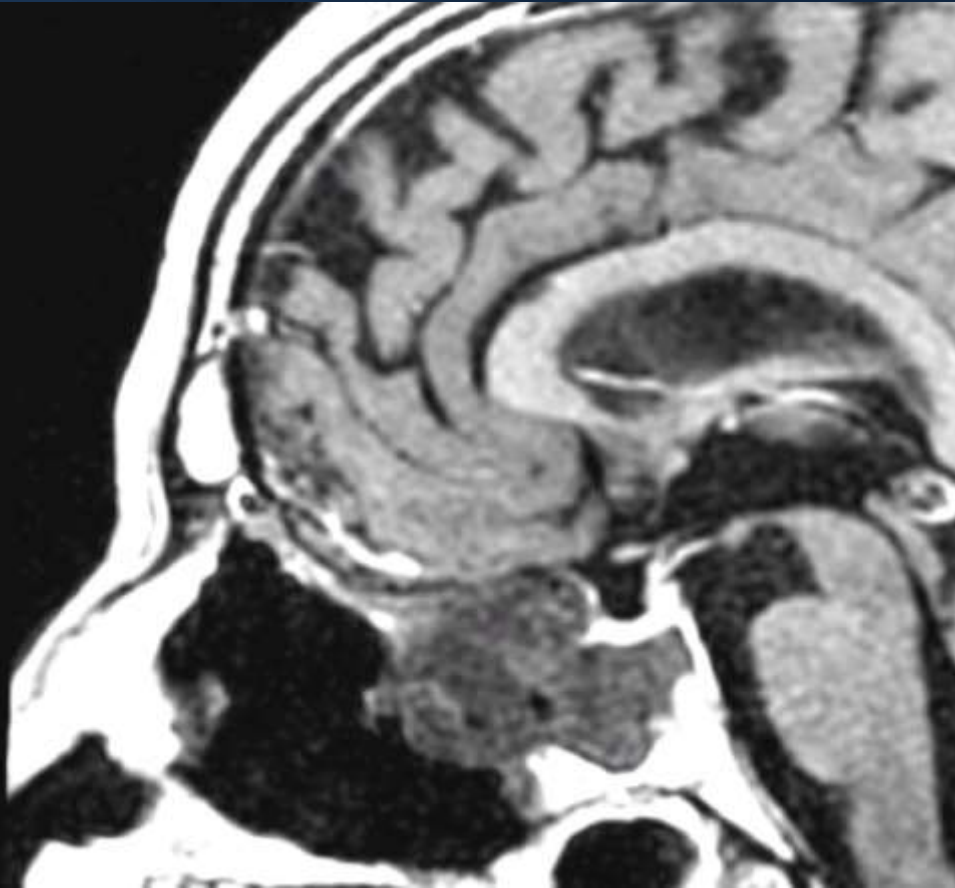
Proposed Classification

- Type I
 - Extracranial (Sinonasal)
 - N,E,M,F,S,NP
- Type II
 - Skull Base Bone
 - CP,FE
- Type III
 - Dural Resection
- Type IV
 - Brain Resection
- Unilateral or Bilateral
- Lateral Extension
 - a. Pterygopalatine Fossa
 - b. Pterygoid Plates
 - c. Infratemporal fossa
- Orbital Extension
 - O1: Lamina Papyracea
 - O2: Peri-orbita
 - O3: Orbital Contents

Type I Extracranial (Sino-nasal) Resection



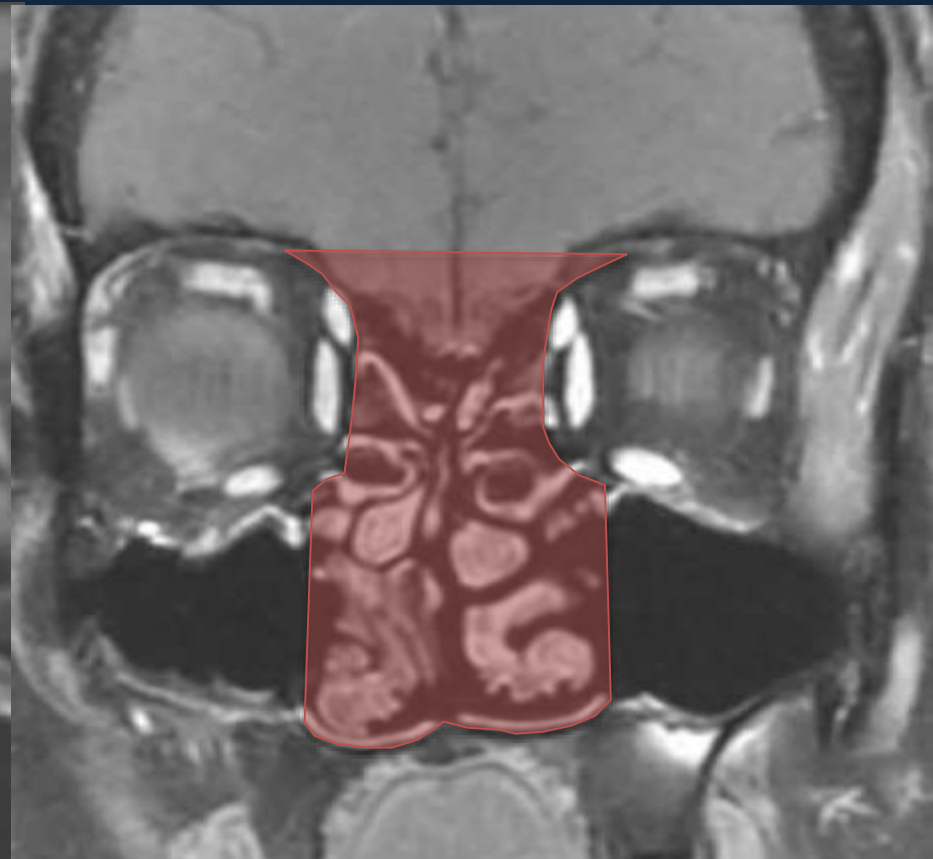
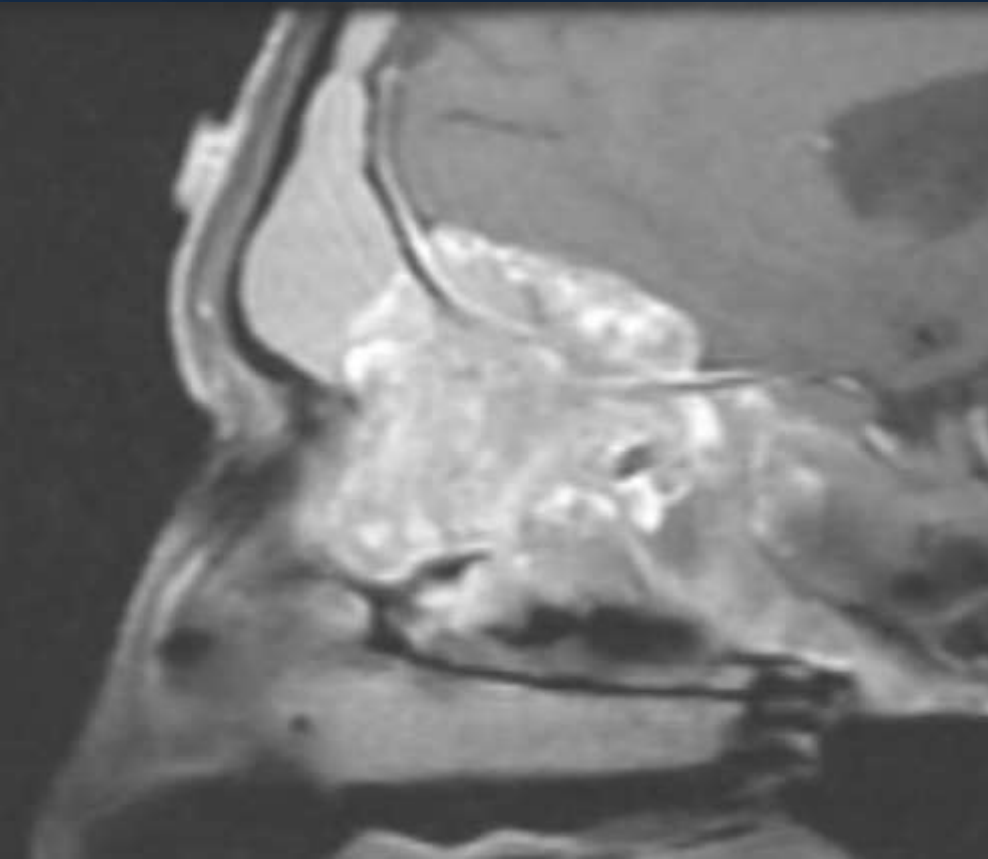
Type II Skull Base Bone Resection



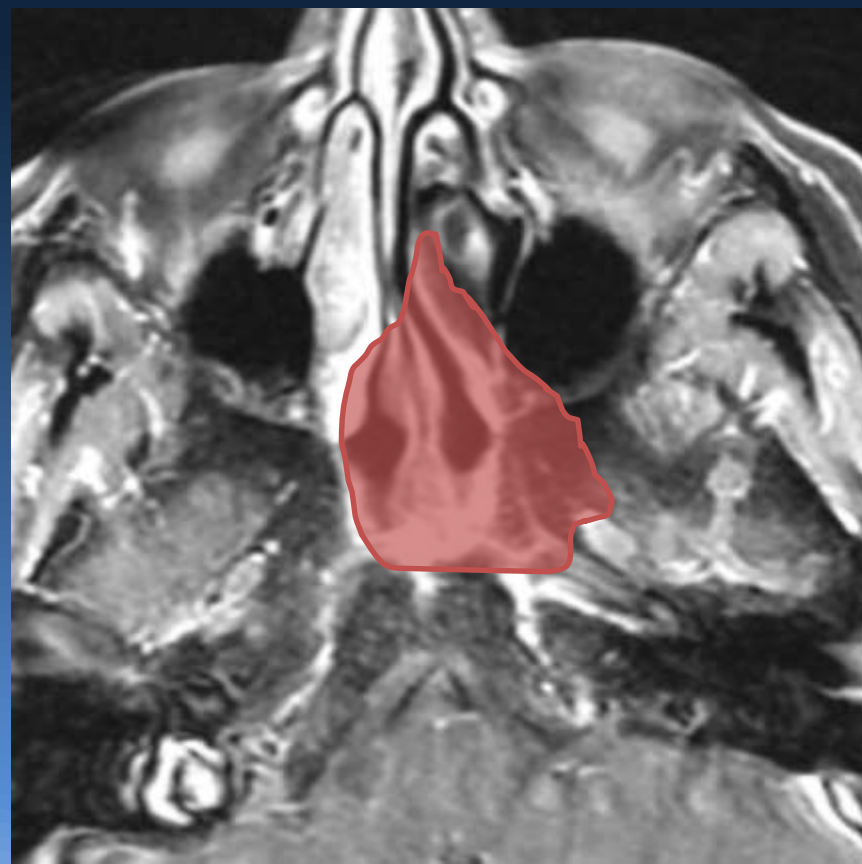
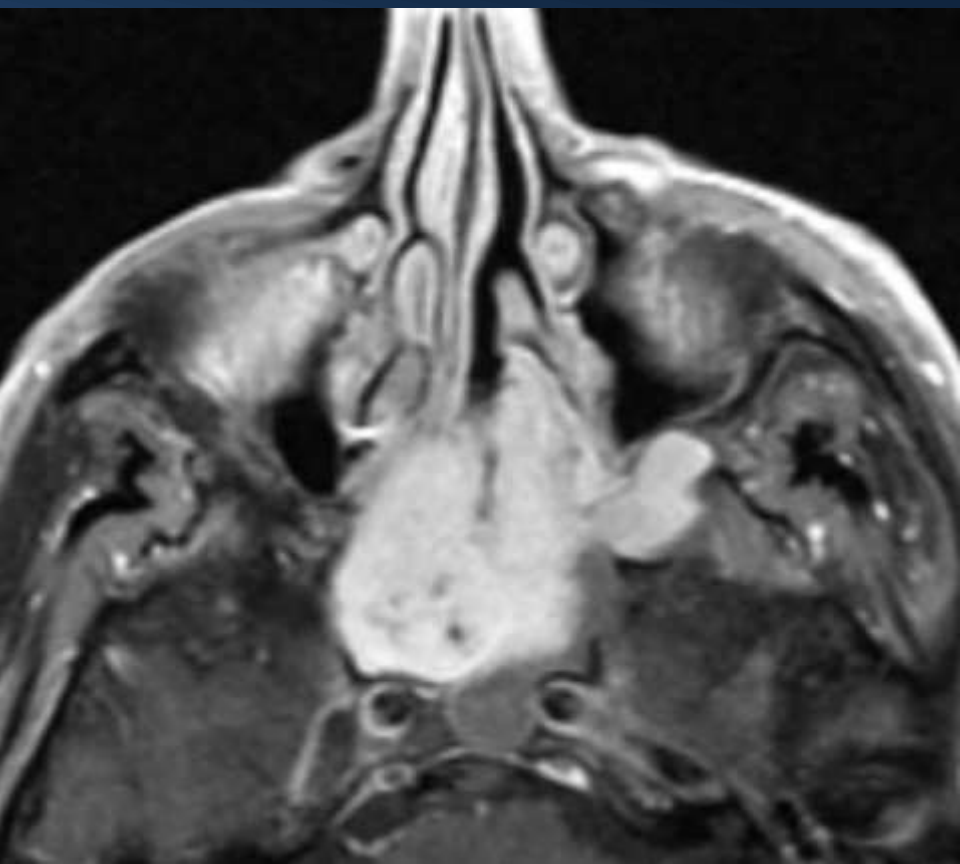
Type III Dural Resection



Type IV Brain Resection



Lateral Extension PTF

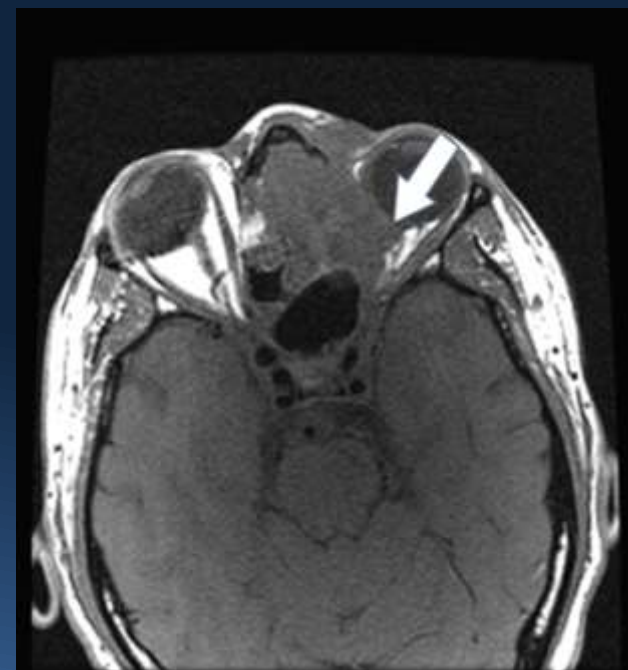




O1: Lamina Papyracea

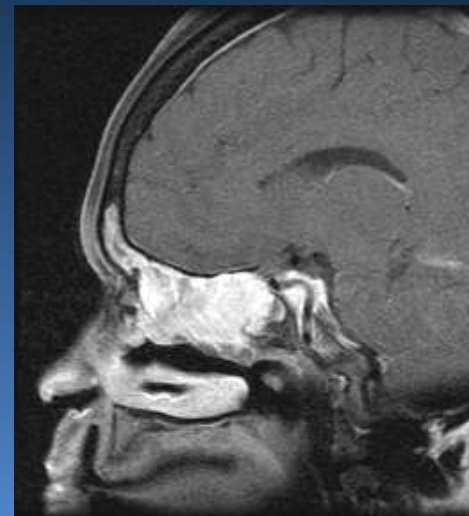
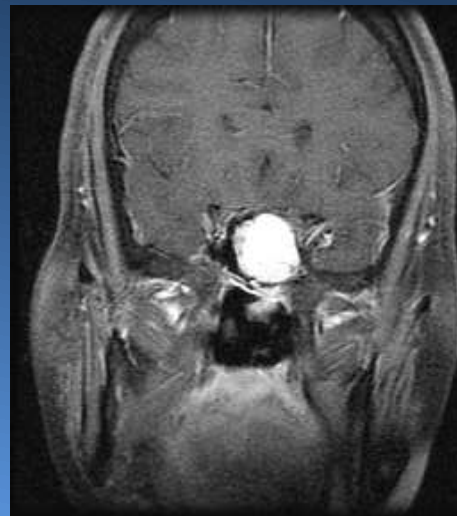
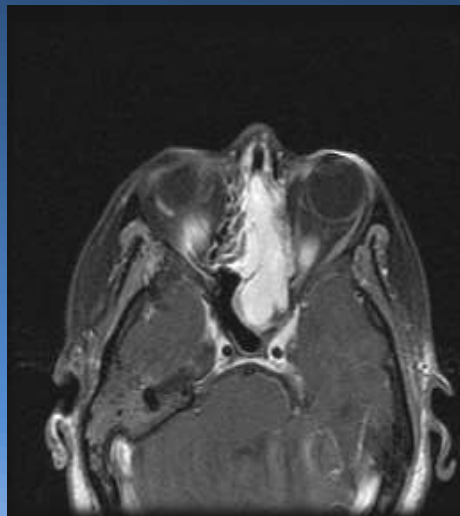
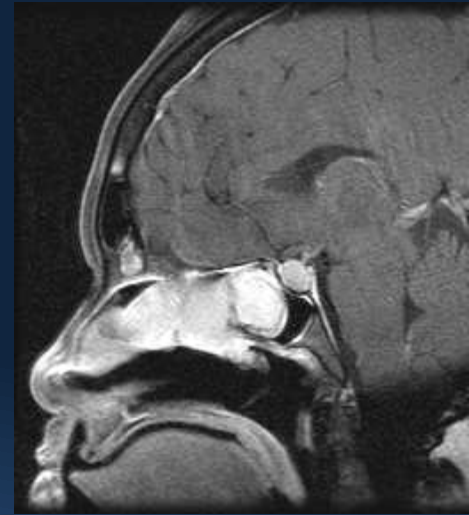


O2: Periorbita



O3:Orbital contents

Hemangiopericytoma

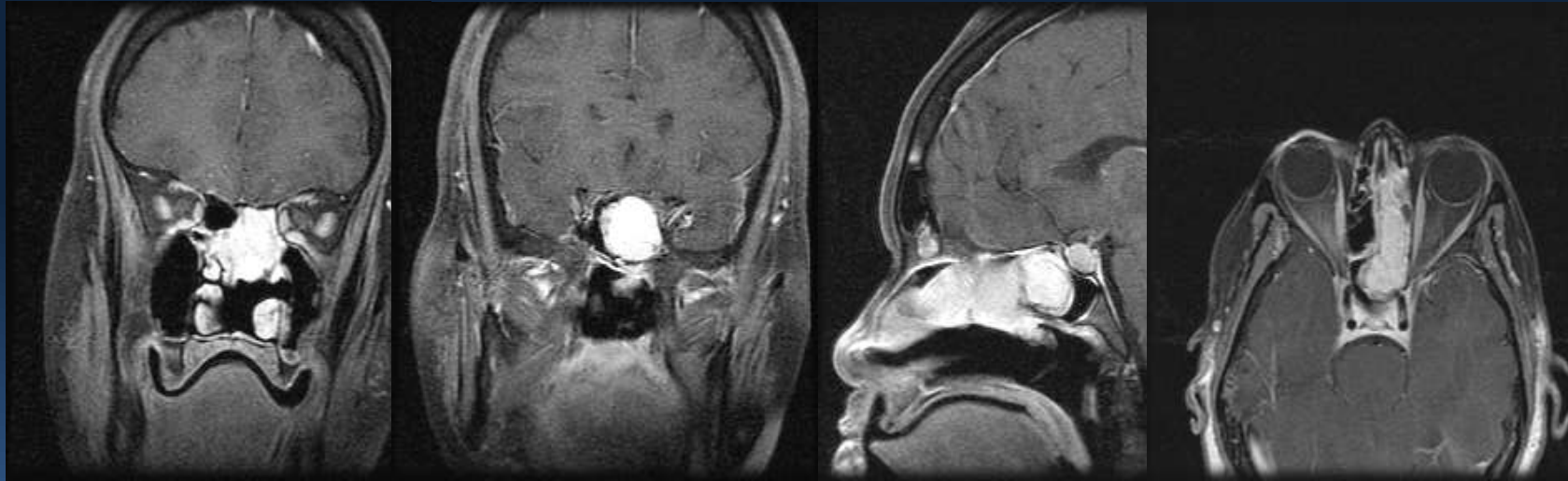


Endoscopic Resection



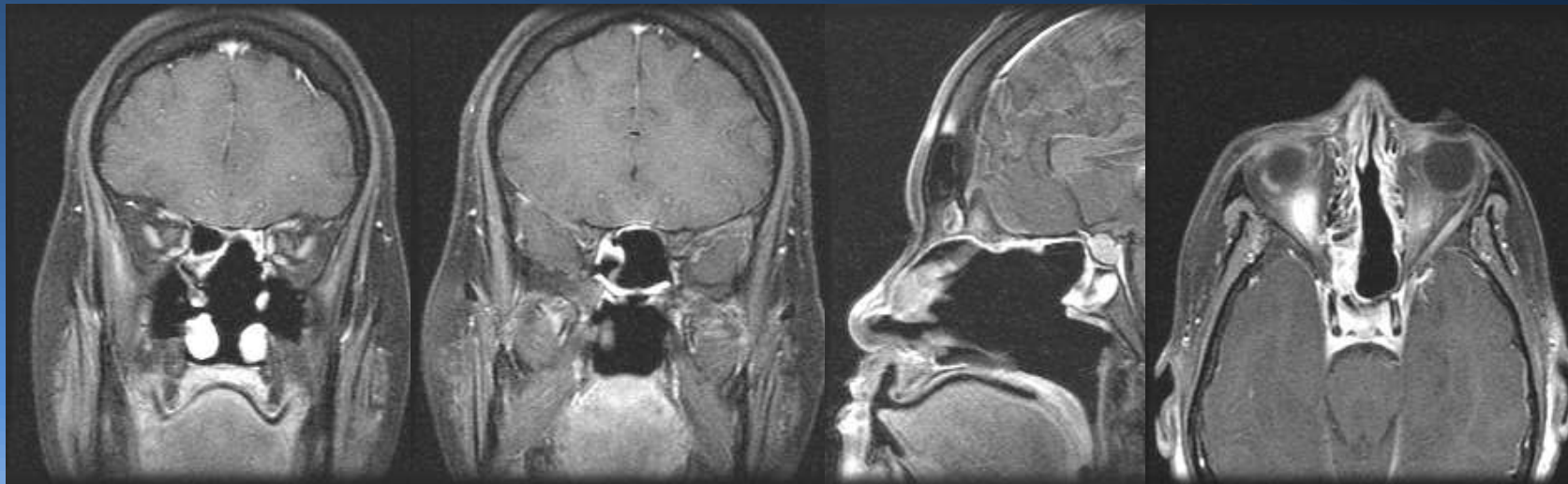
Hemangiopericytoma

Preop



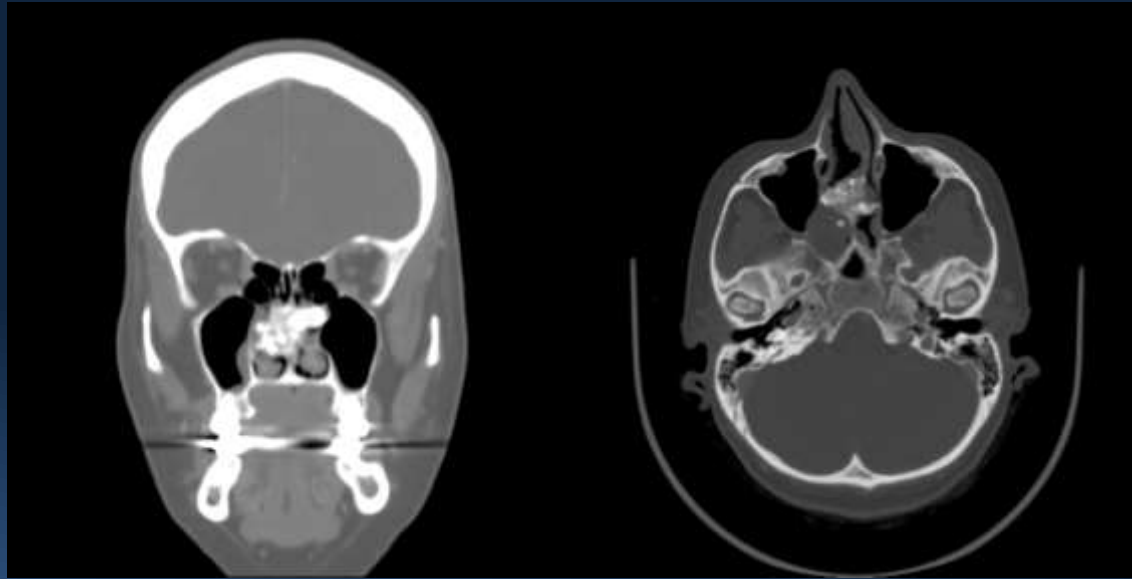
3 yr.

Postop

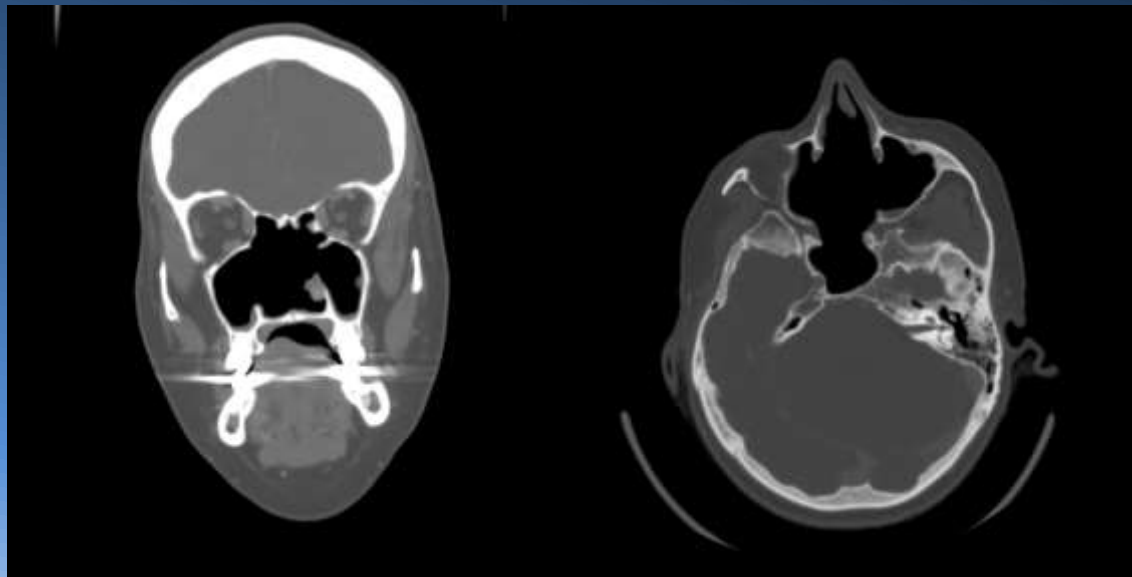


Low Grade Chondrosarcoma

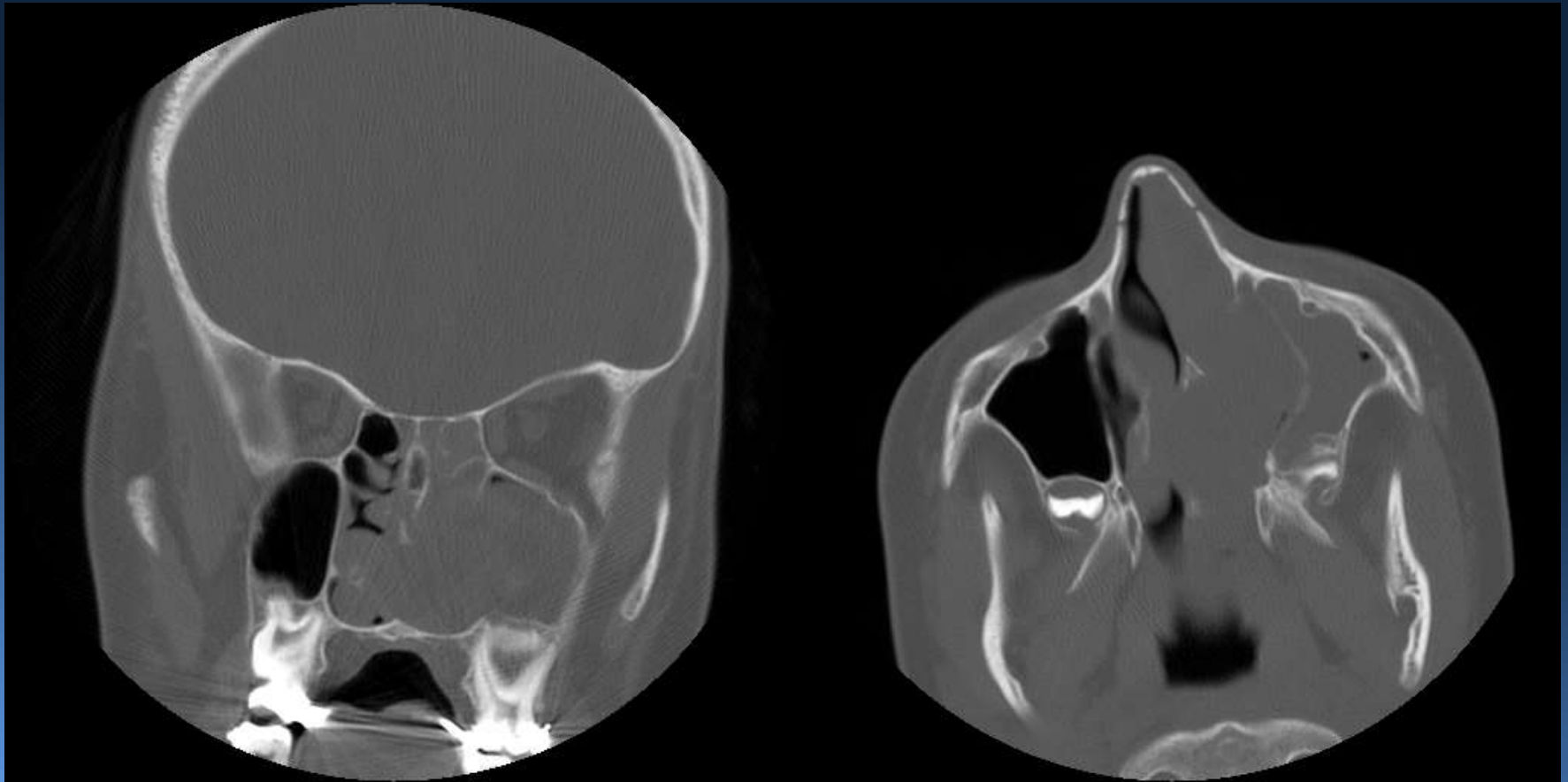
Preop



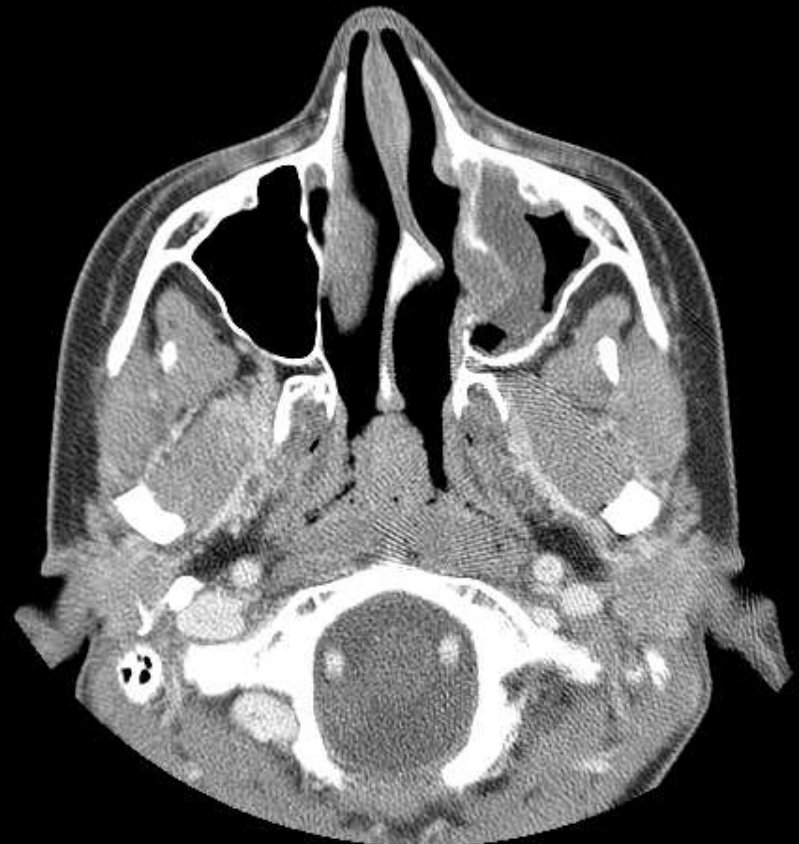
7 yr.
Postop.



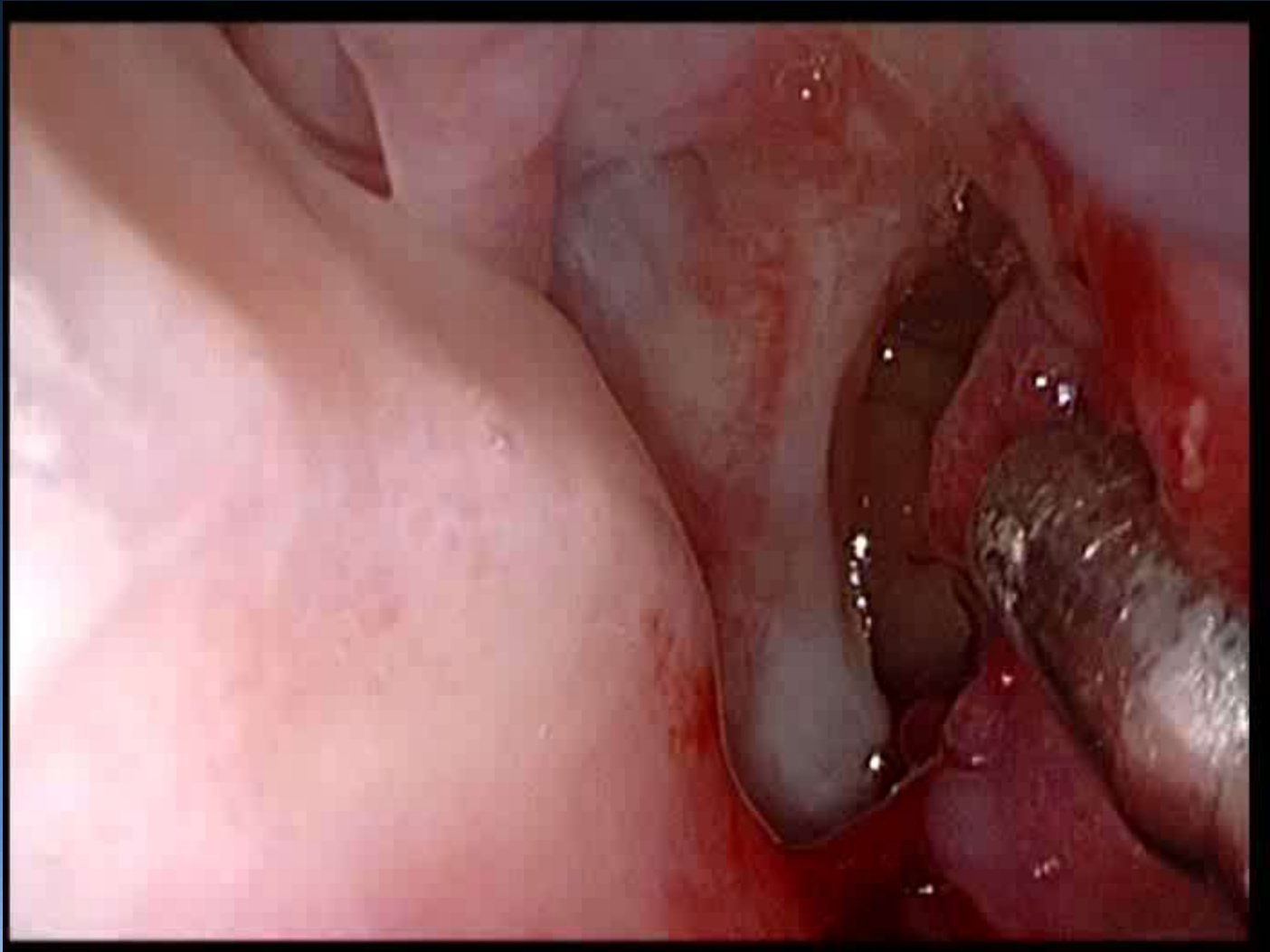
Lateral Nasal Wall High Grade Sarcoma



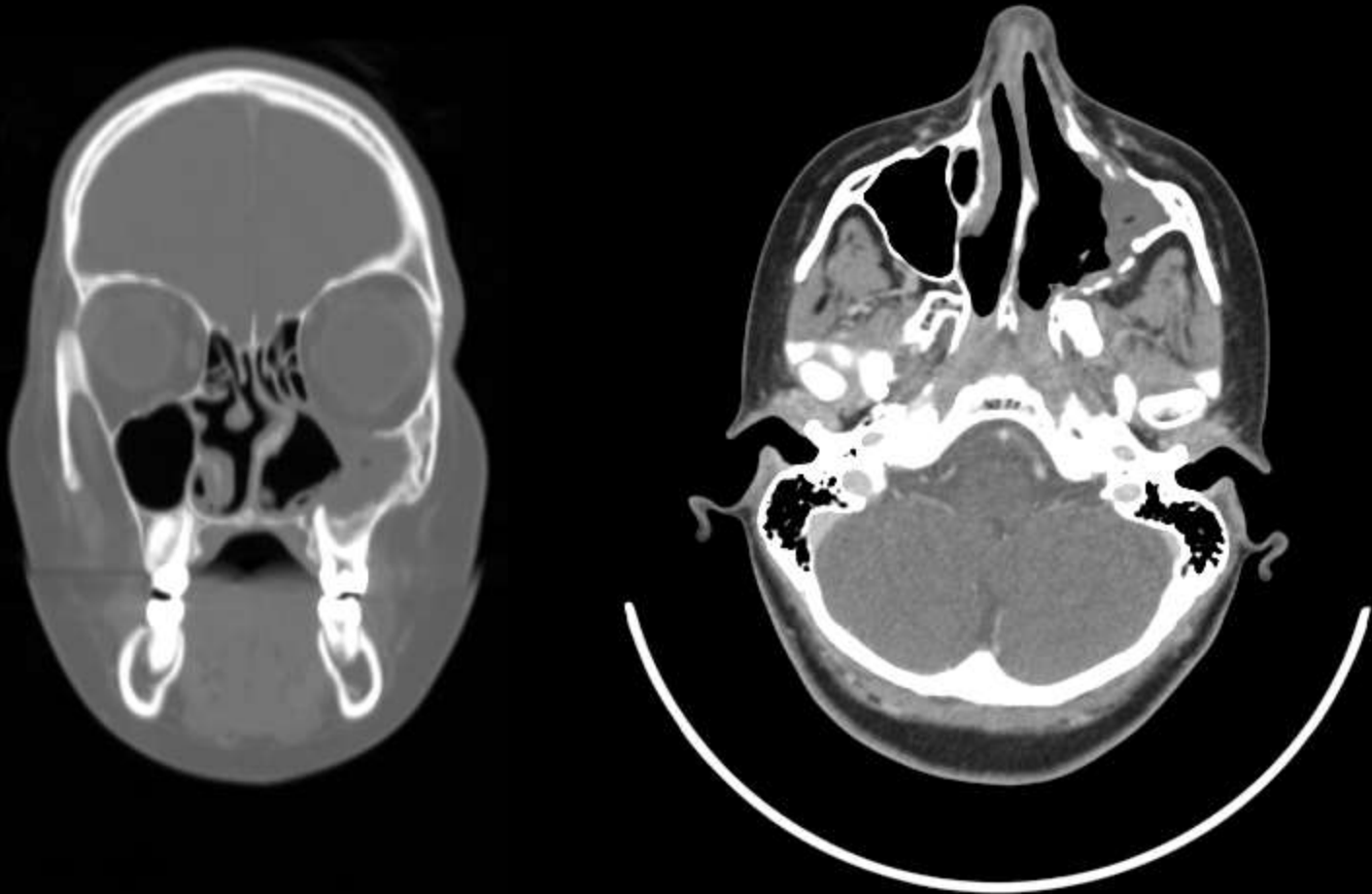
Lateral Nasal Wall High Grade Sarcoma



Endoscopic-assisted Medial Maxillectomy

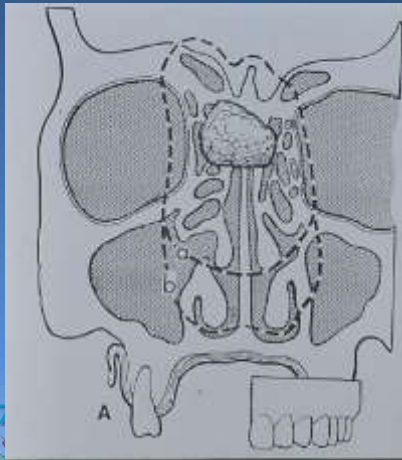
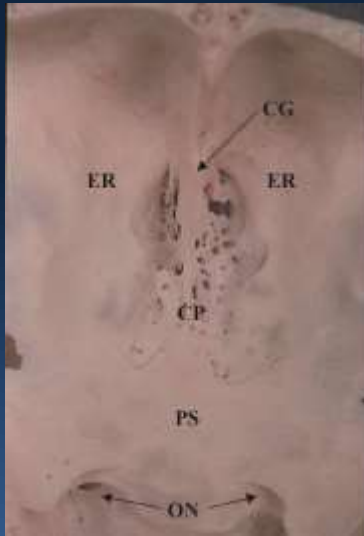


Lateral Nasal Wall High Grade Sarcoma



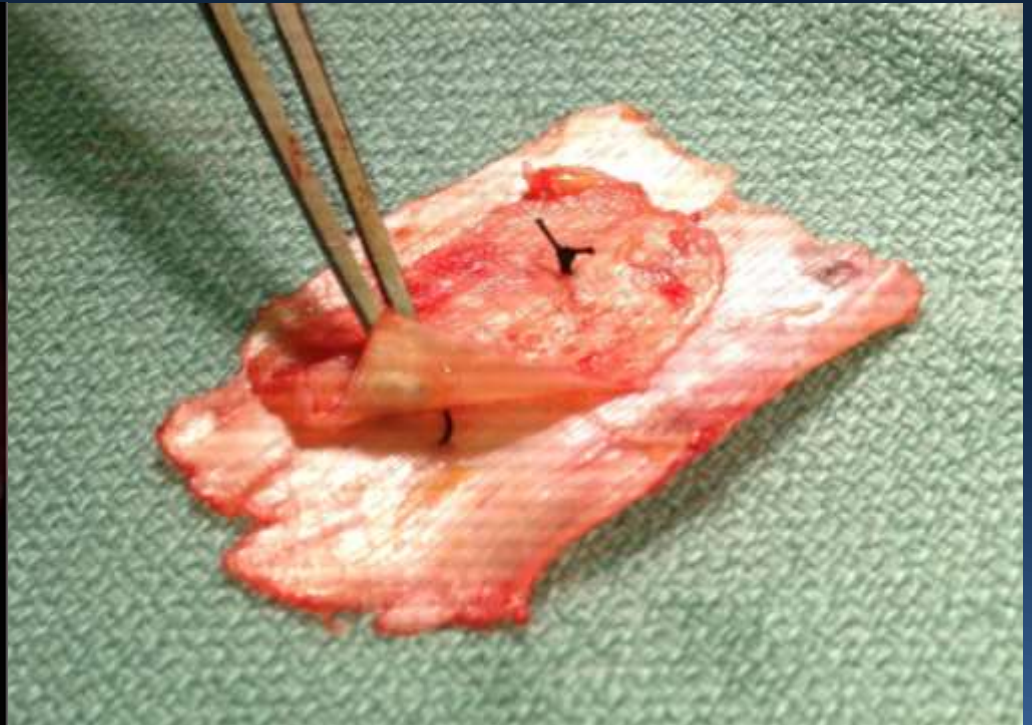
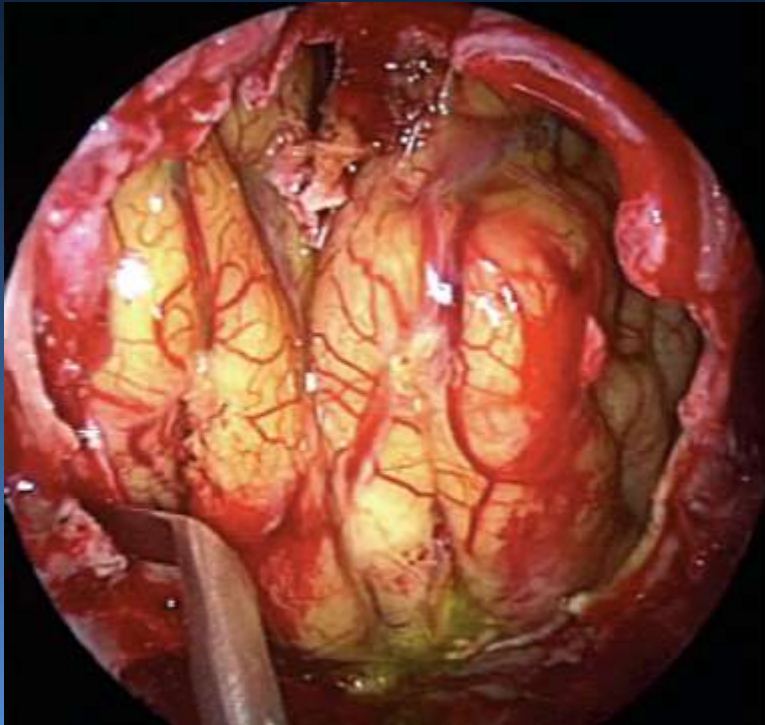
Open Vs. Endoscopic Approaches?

- Is it the right question?



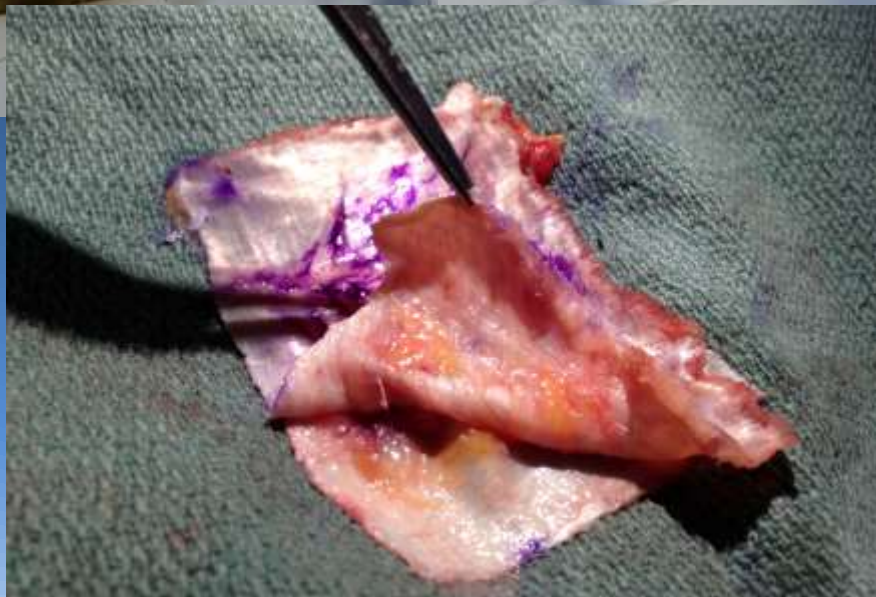
Endoscopic Resection Intracranial

Endoscopic Resection Intracranial Reconstruction



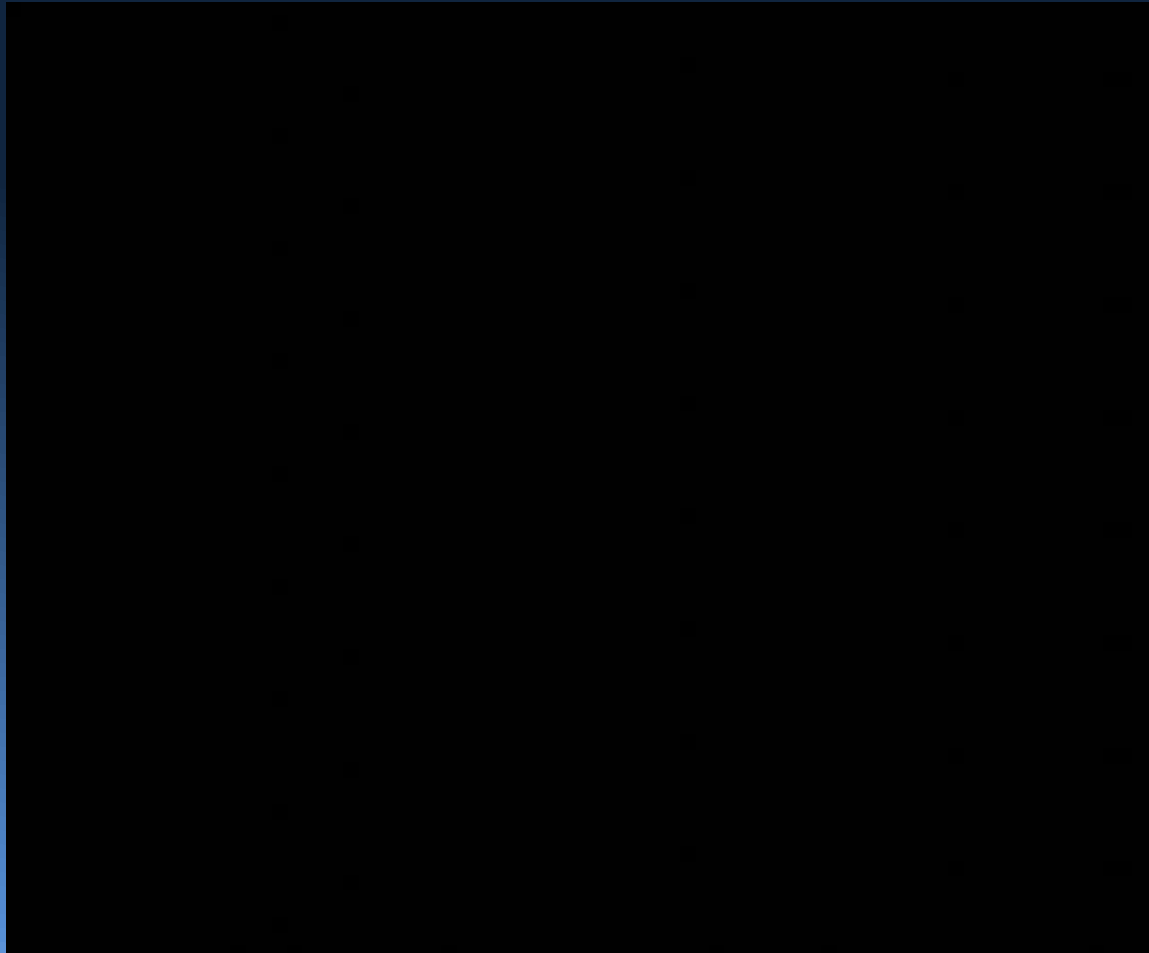
Fascia Lata

Fascia Lata Graft

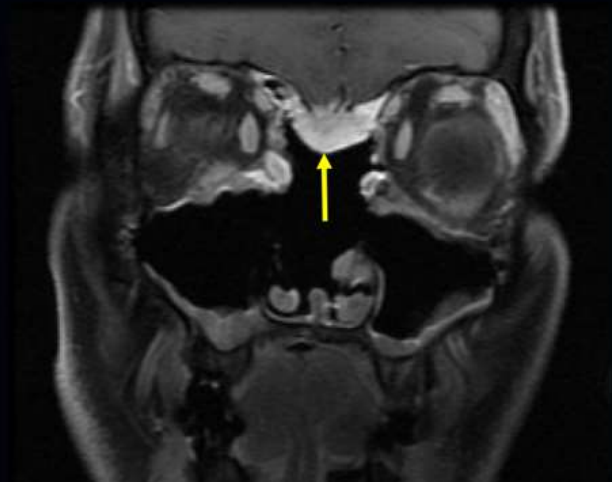
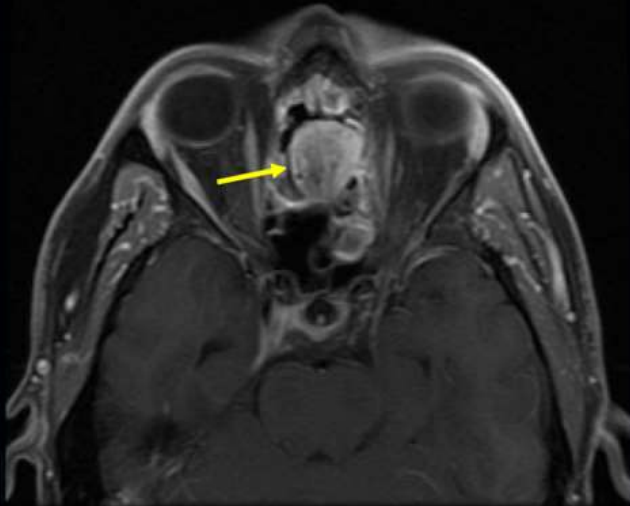
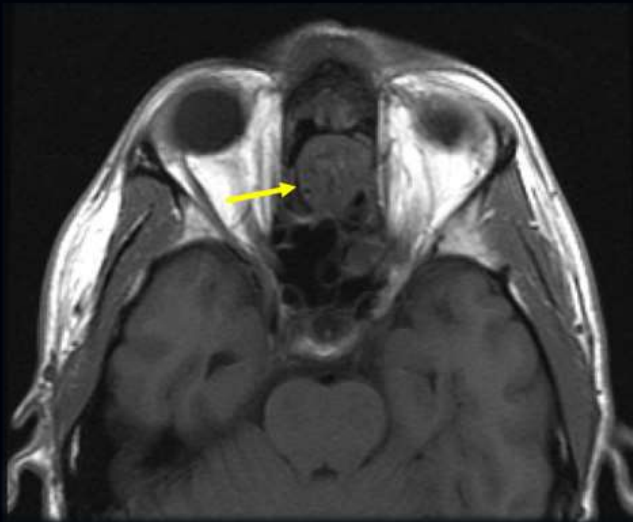


Endoscopic Craniectomy Reconstruction

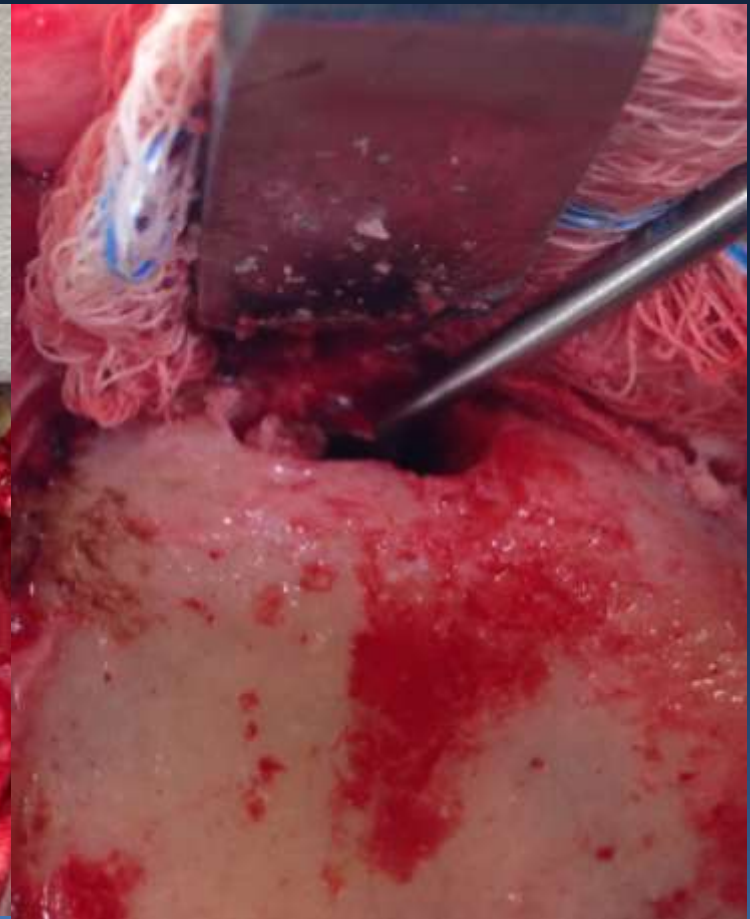
Postoperative Endoscopy



Postoperative Imaging

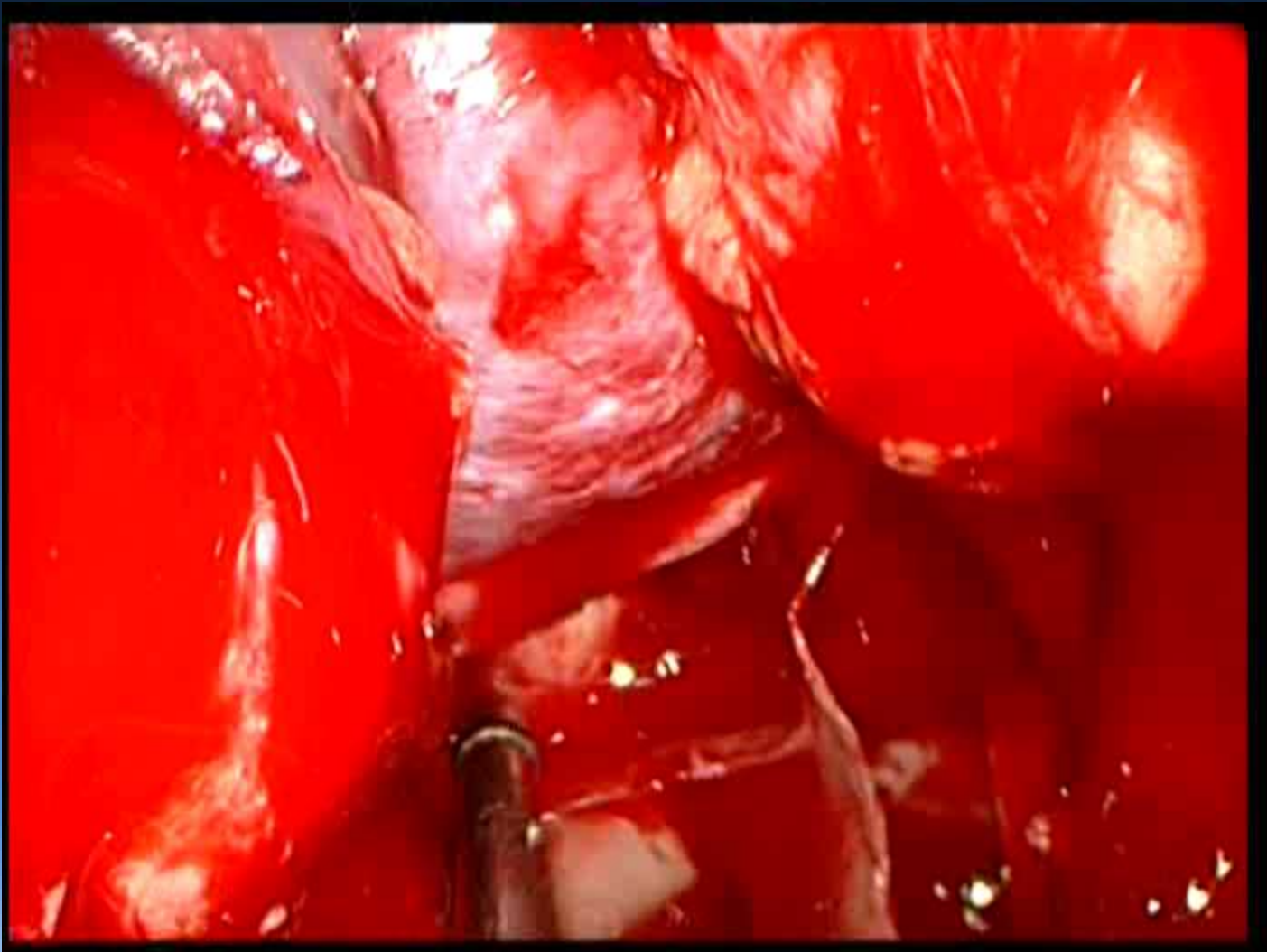


Endoscopic Assisted Anterior Craniofacial Resection

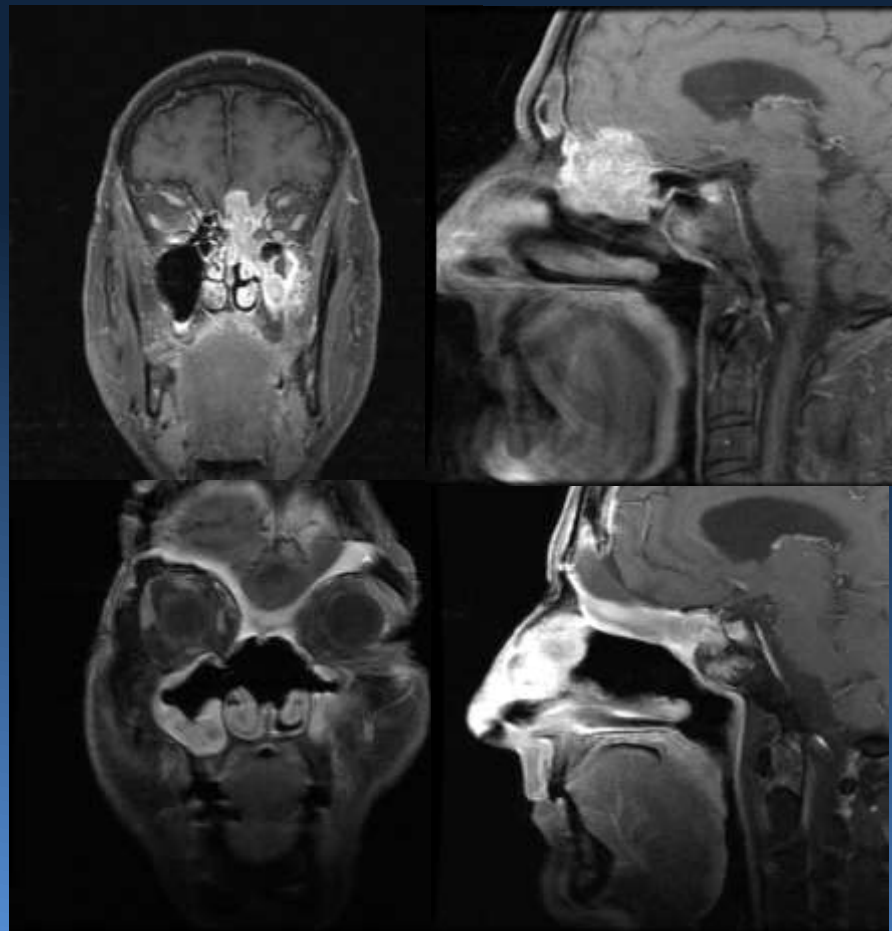




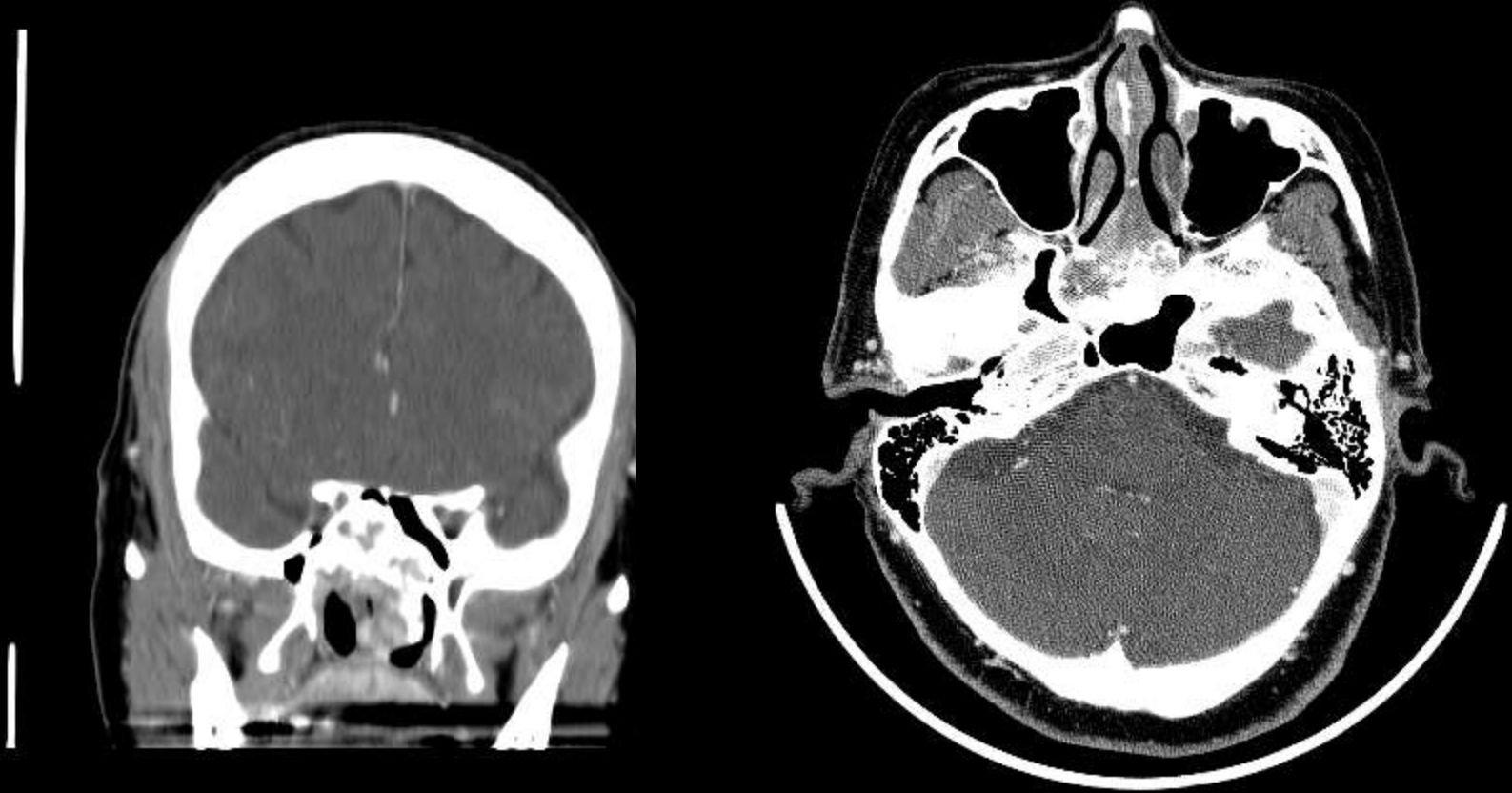
Endoscopic Assisted Anterior Craniofacial Resection



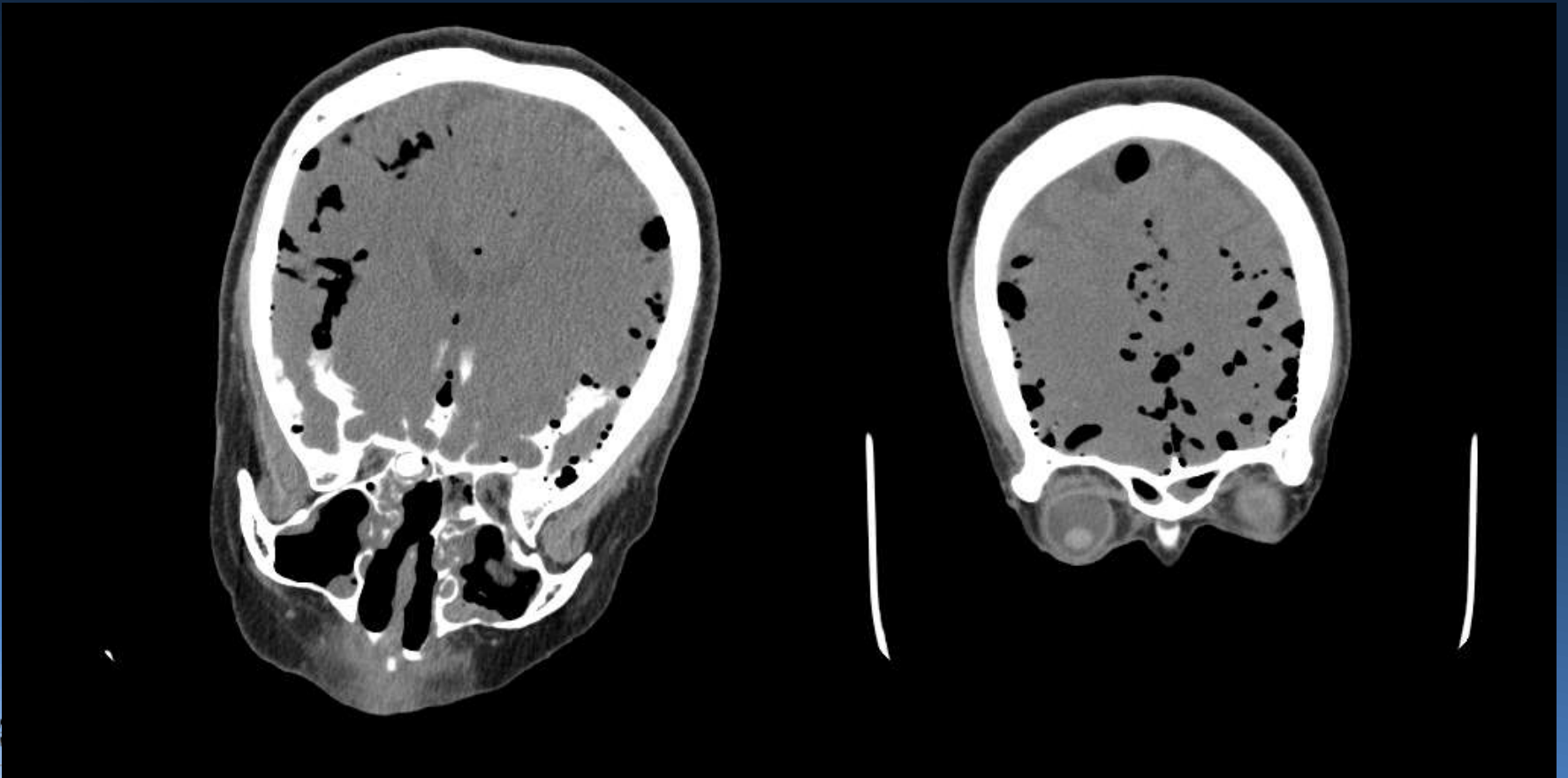
Endoscopic Assisted CFR Pericranial Flap



ADENOCARCINOMA WITH PAPILLARY FEATURES



Postop. Pneumocephalus



Vascularized Turbinate Flap



Skull Base Reconstruction Turbinate Flap



Endoscopic Resection

- Oncologic Outcomes

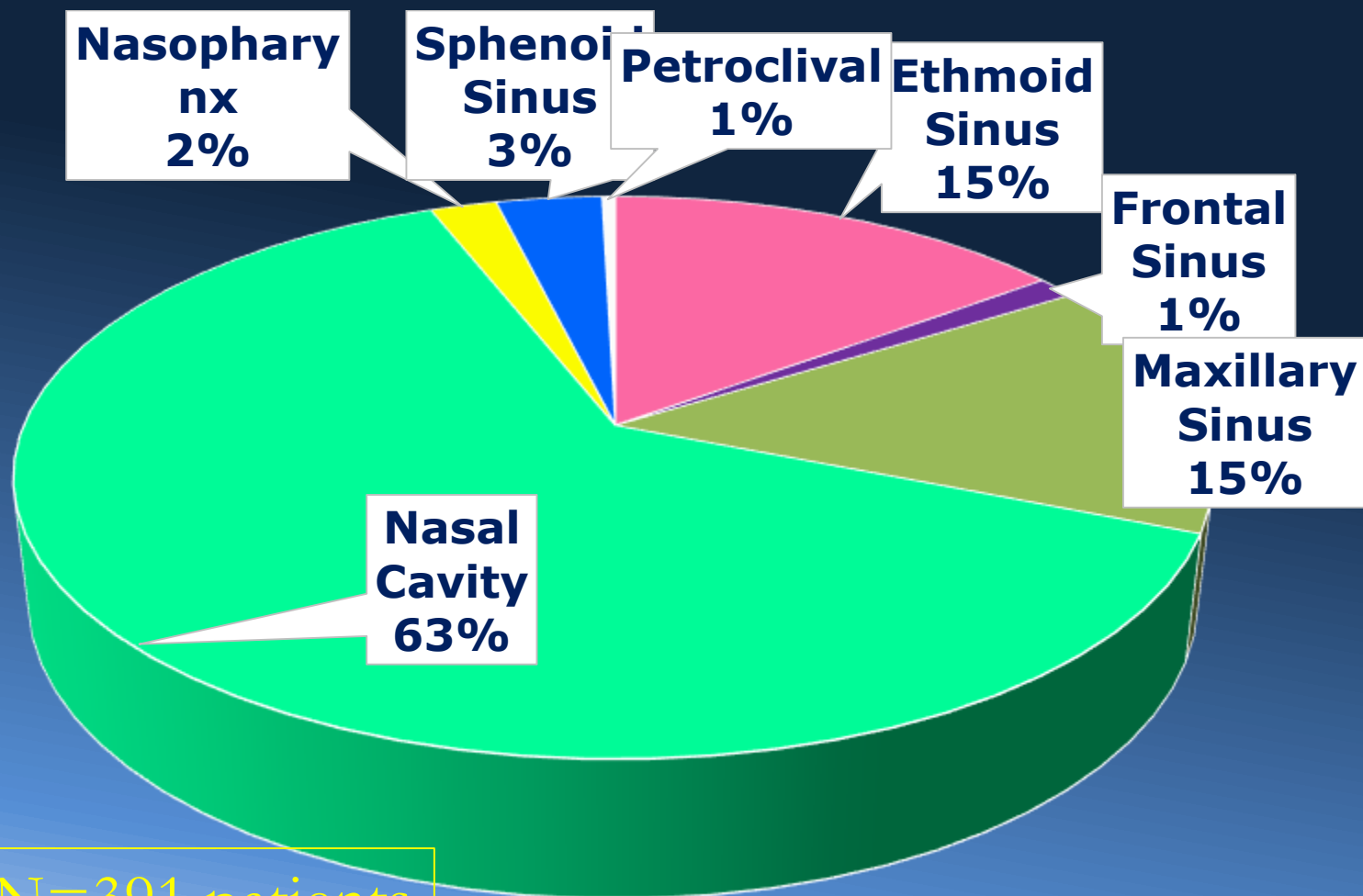
Endoscopic Resection of Sinonasal Tumors

Updated Database

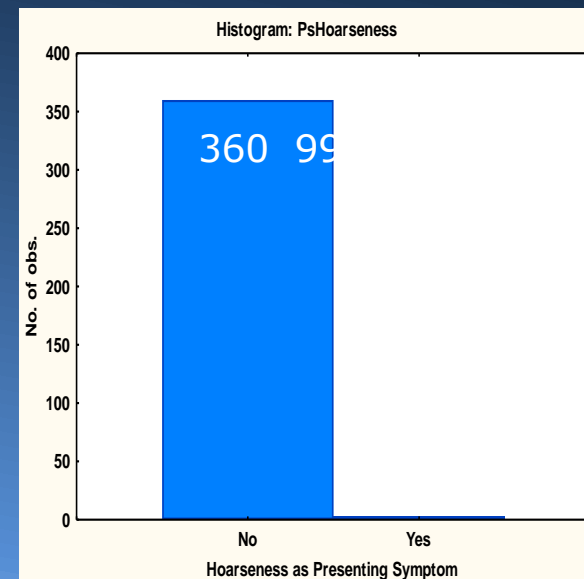
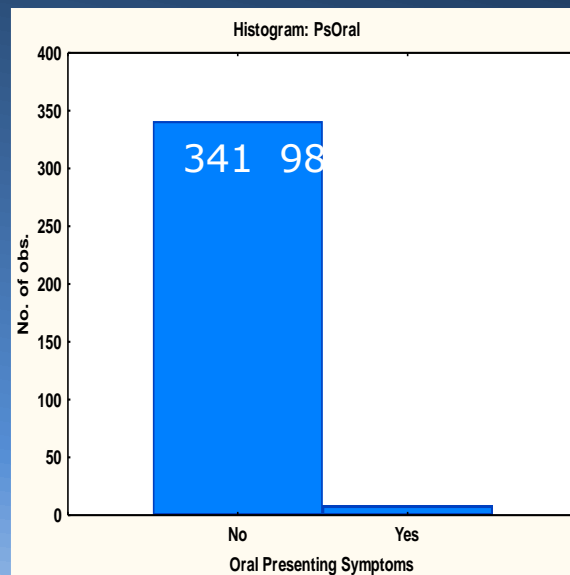
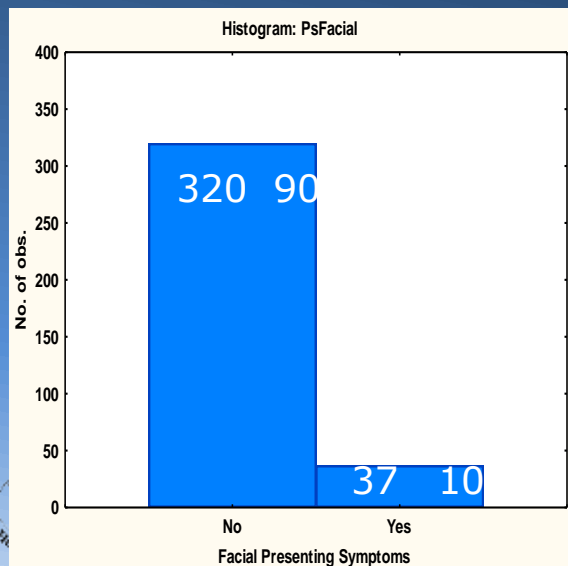
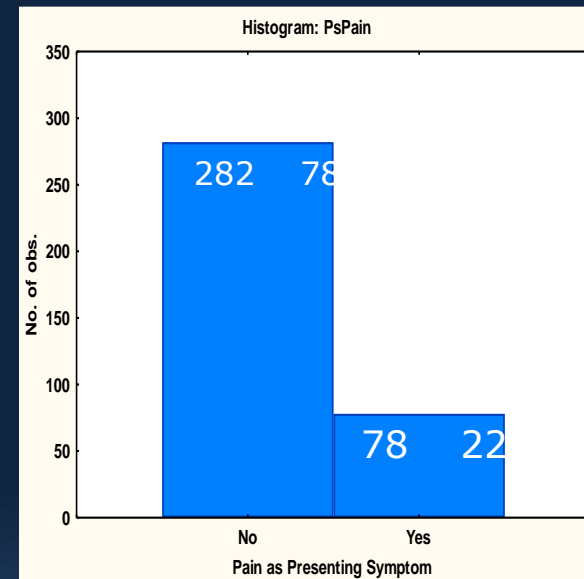
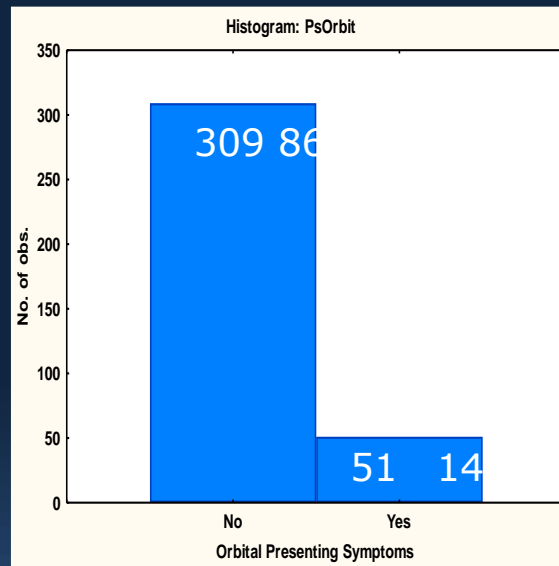
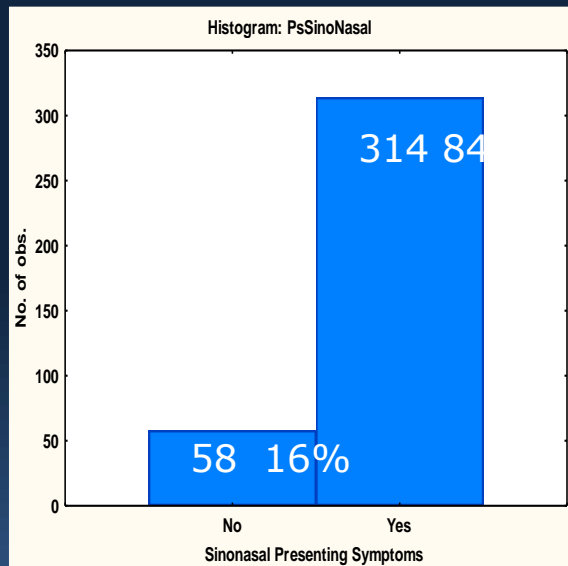
391 patients



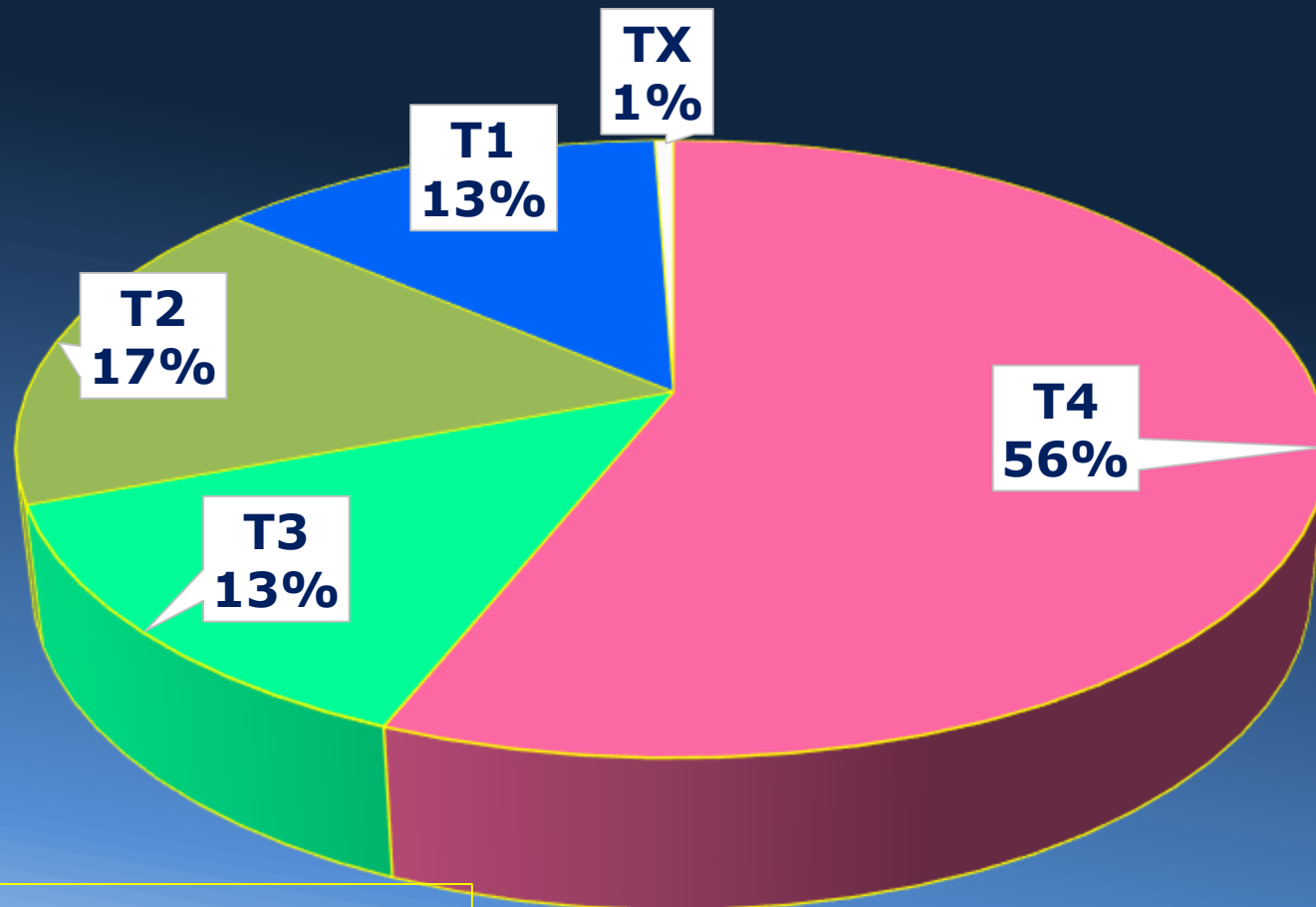
Epacenters of Sinonasal Malignancies Treated with Endoscopic Surgery



N=391 patients

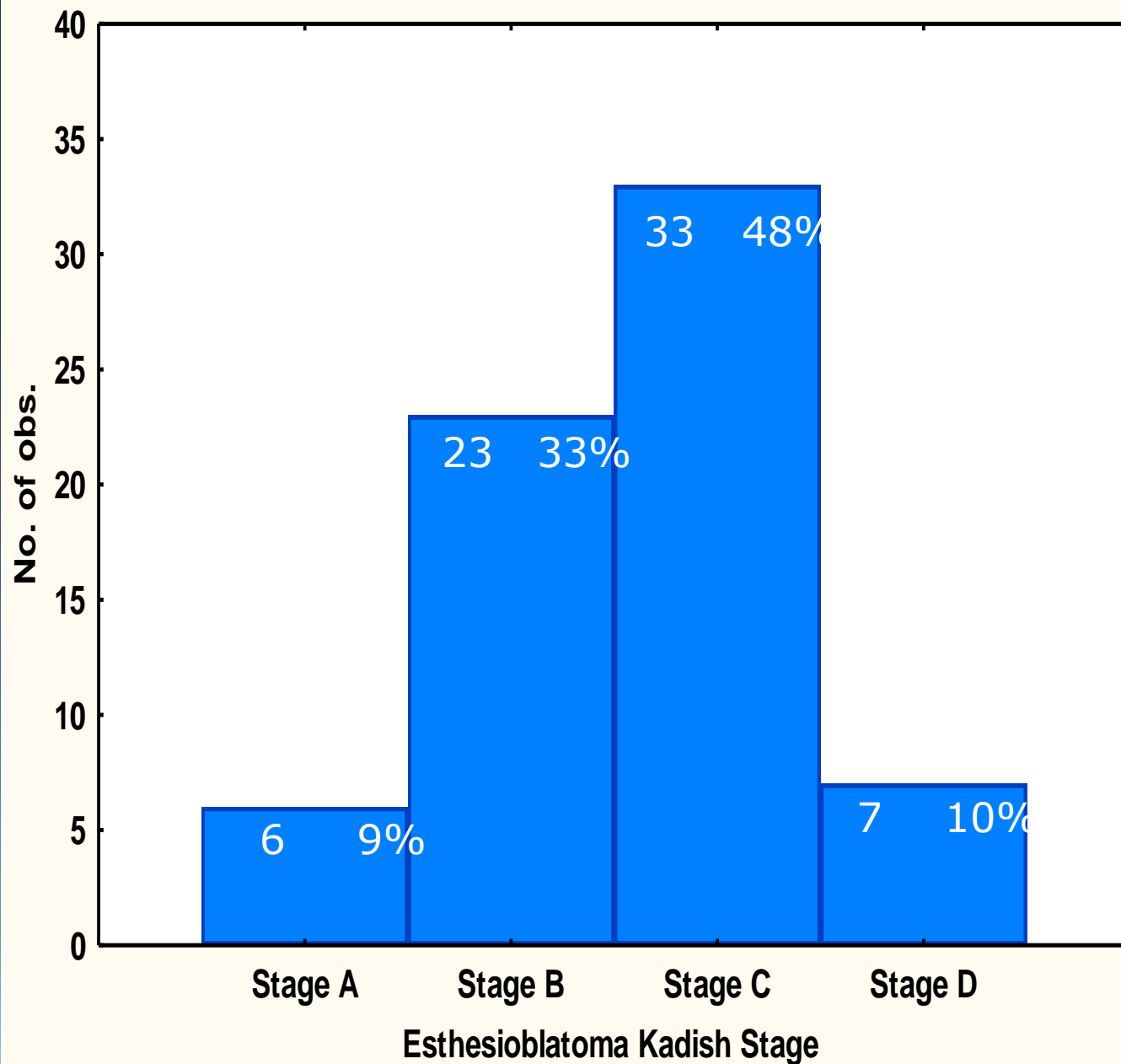


Clinical T Stages of Sinonasal Malignancies Treated with Endoscopic Surgery

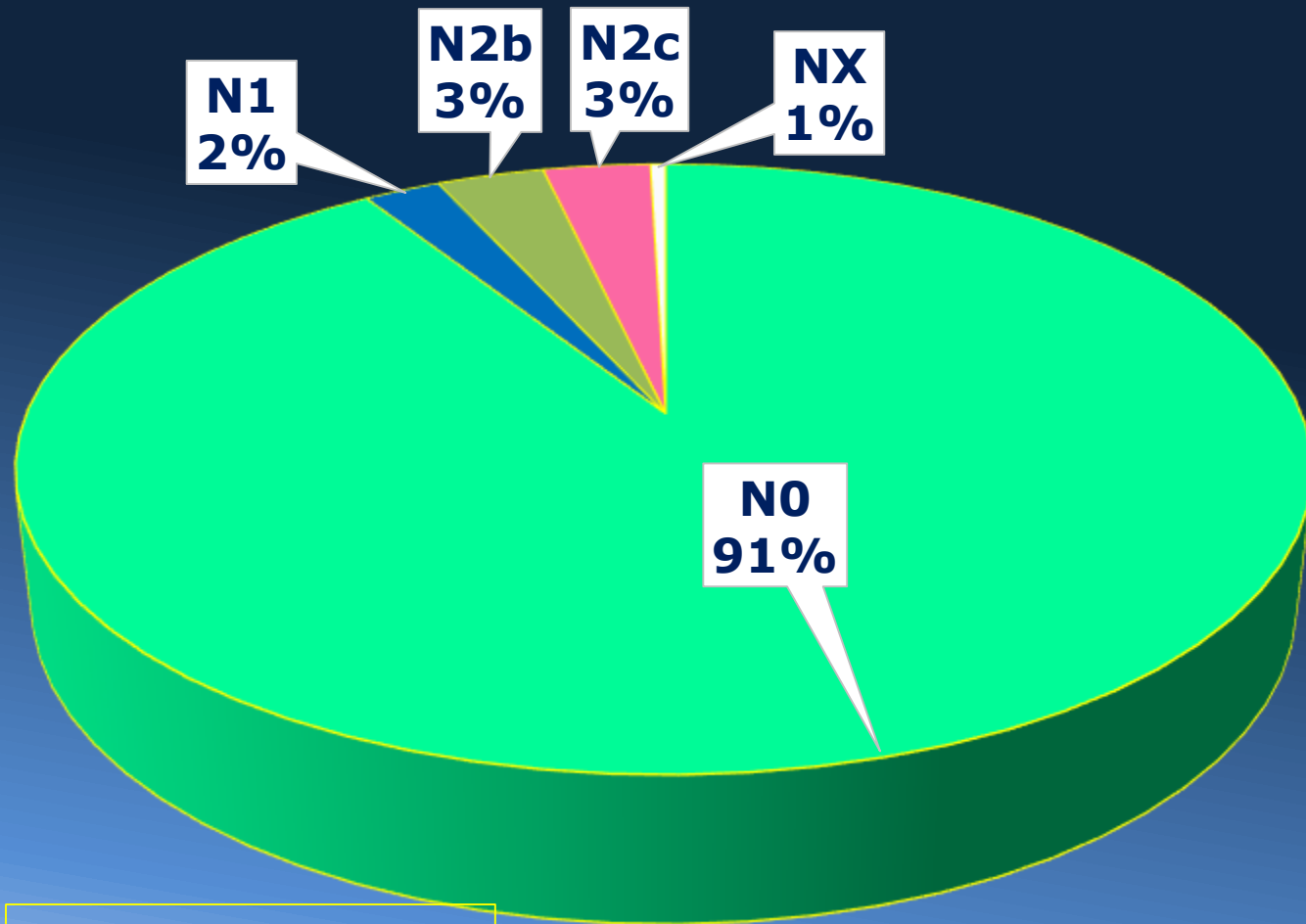


N=391 patients

Histogram: StCEsthStg

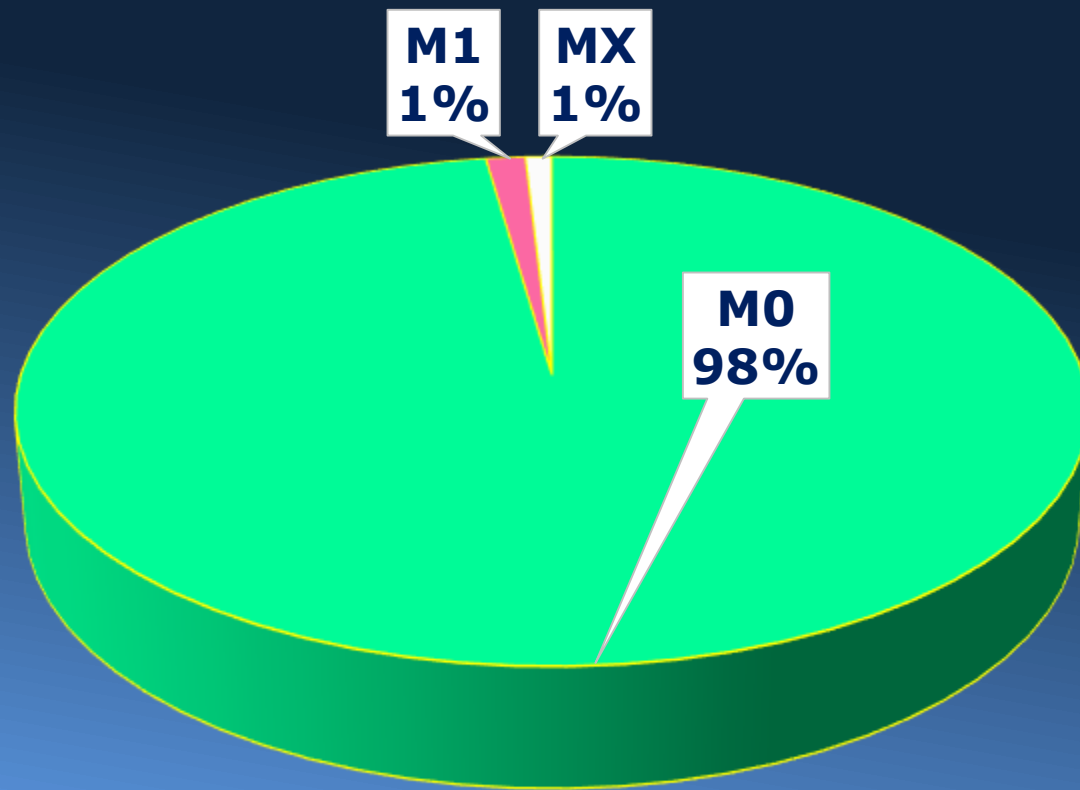


Clinical N Stages of Sinonasal Malignancies Treated with Endoscopic Surgery



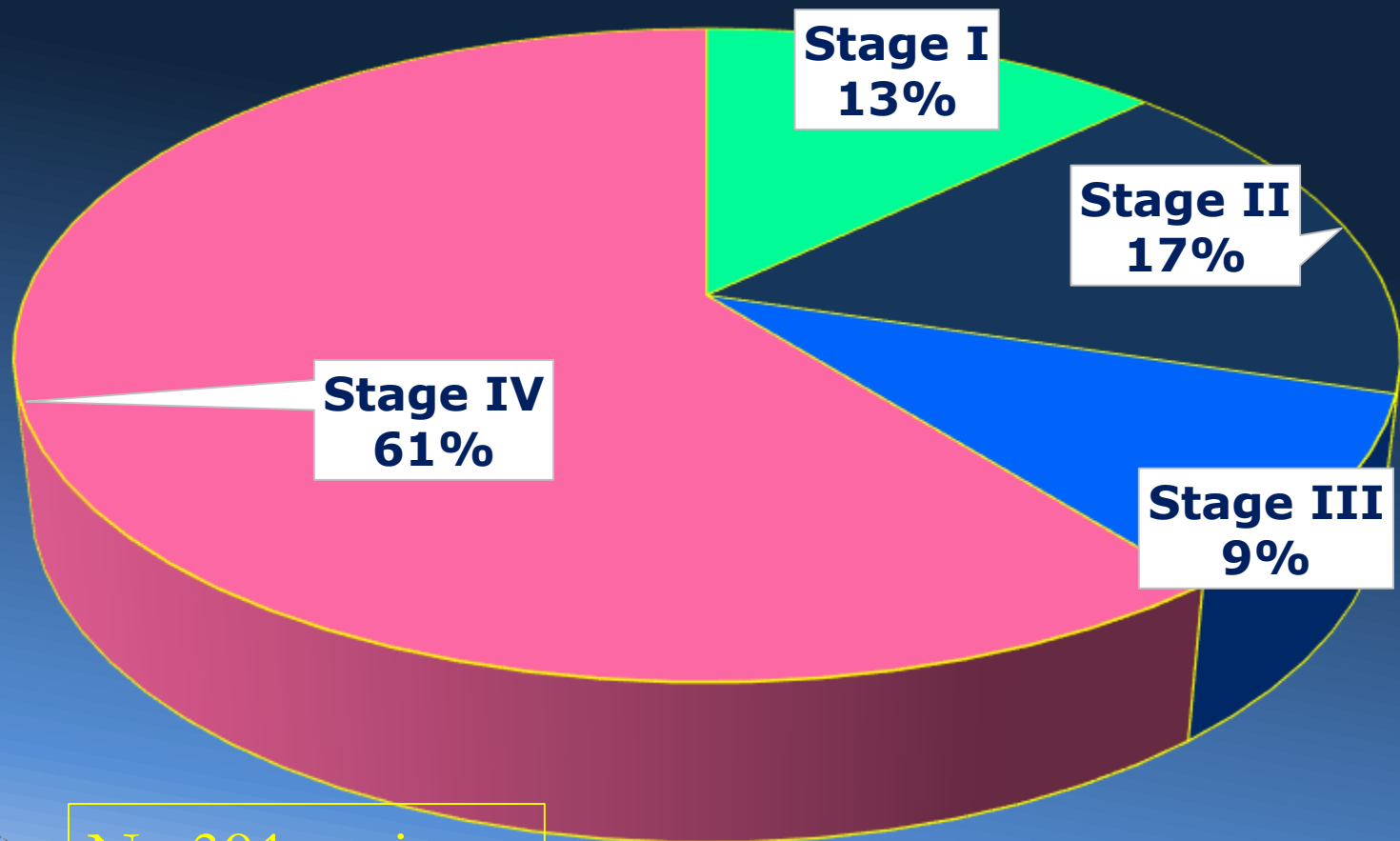
N=391 patients

Clinical M Stages of Sinonasal Malignancies Treated with Endoscopic Surgery



N=391 patients

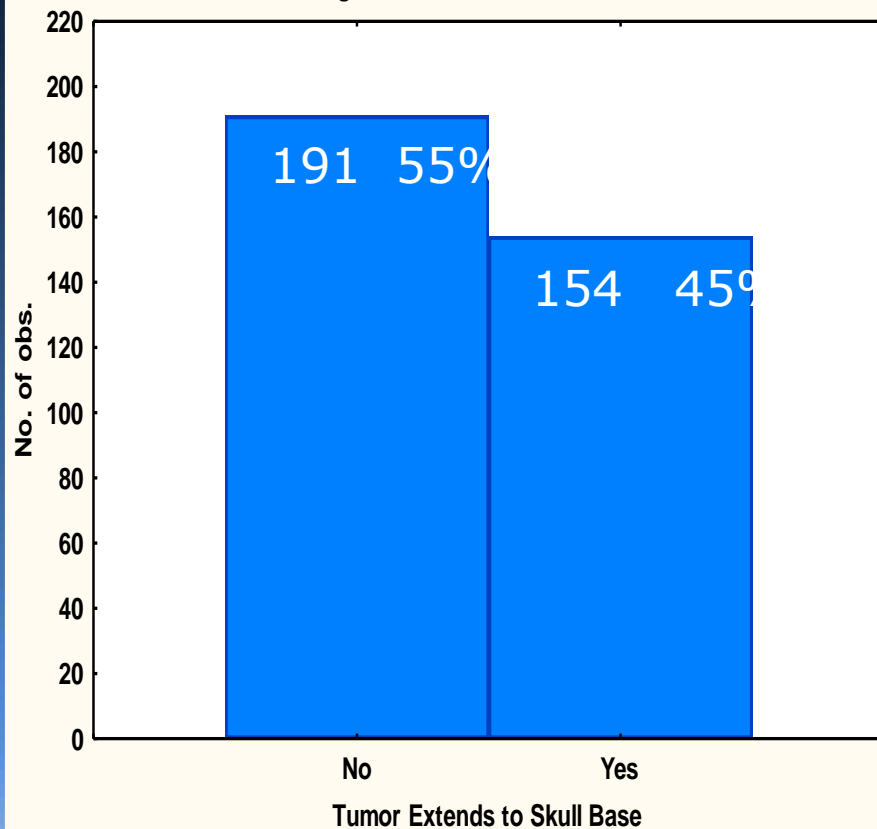
Clinical AJCC Disease Stages of Sinonasal Malignancies Treated with Endoscopic Surgery



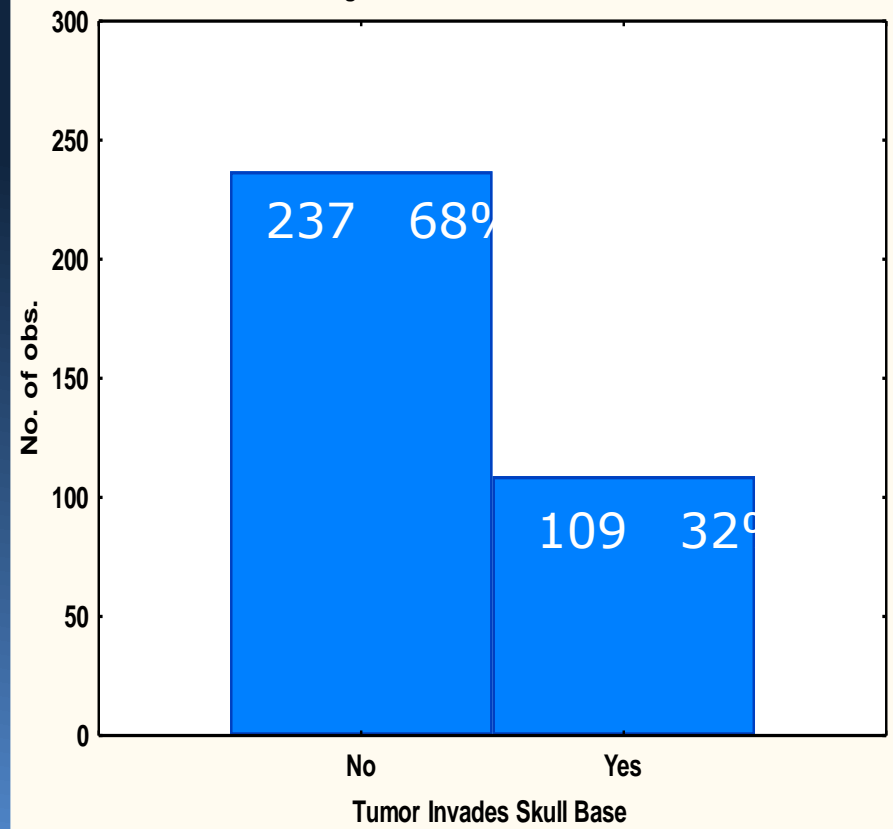
N=391 patients

Skull Base Involvement

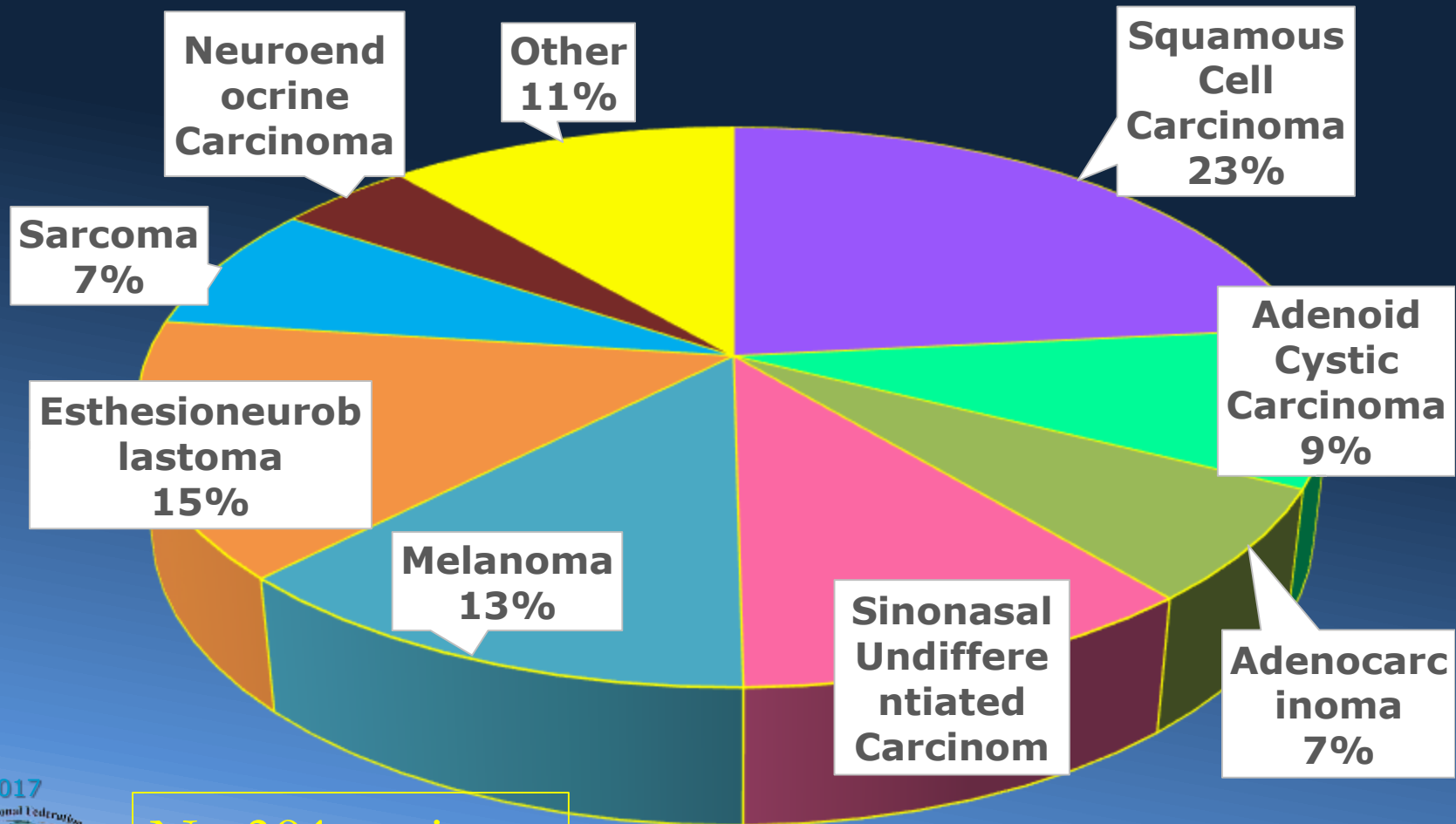
Histogram: TcExtendSkullBase



Histogram: TcInvadeSkullBase

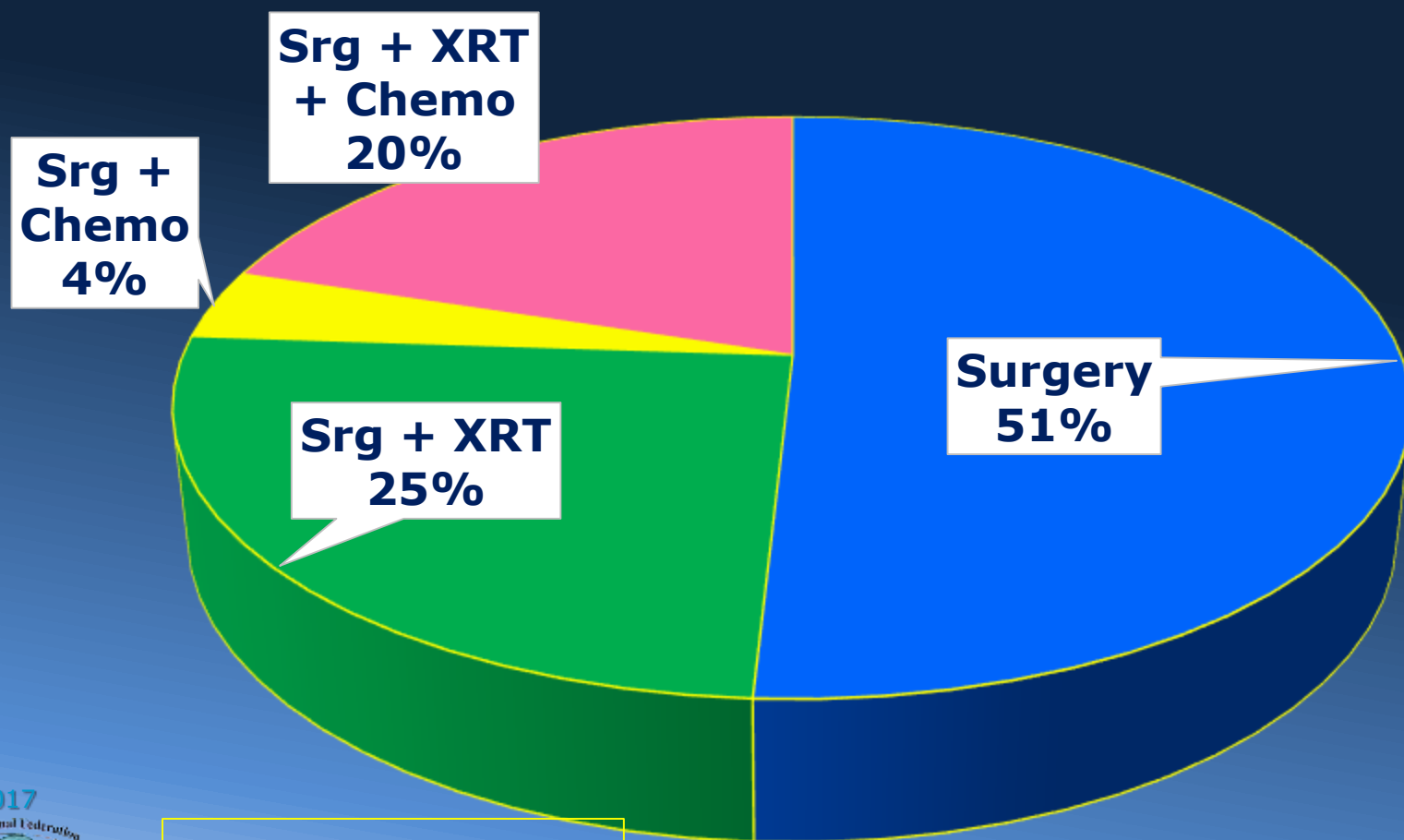


Histologies of Sinonasal Malignancies Treated with Endoscopic Surgery



N=391 patients

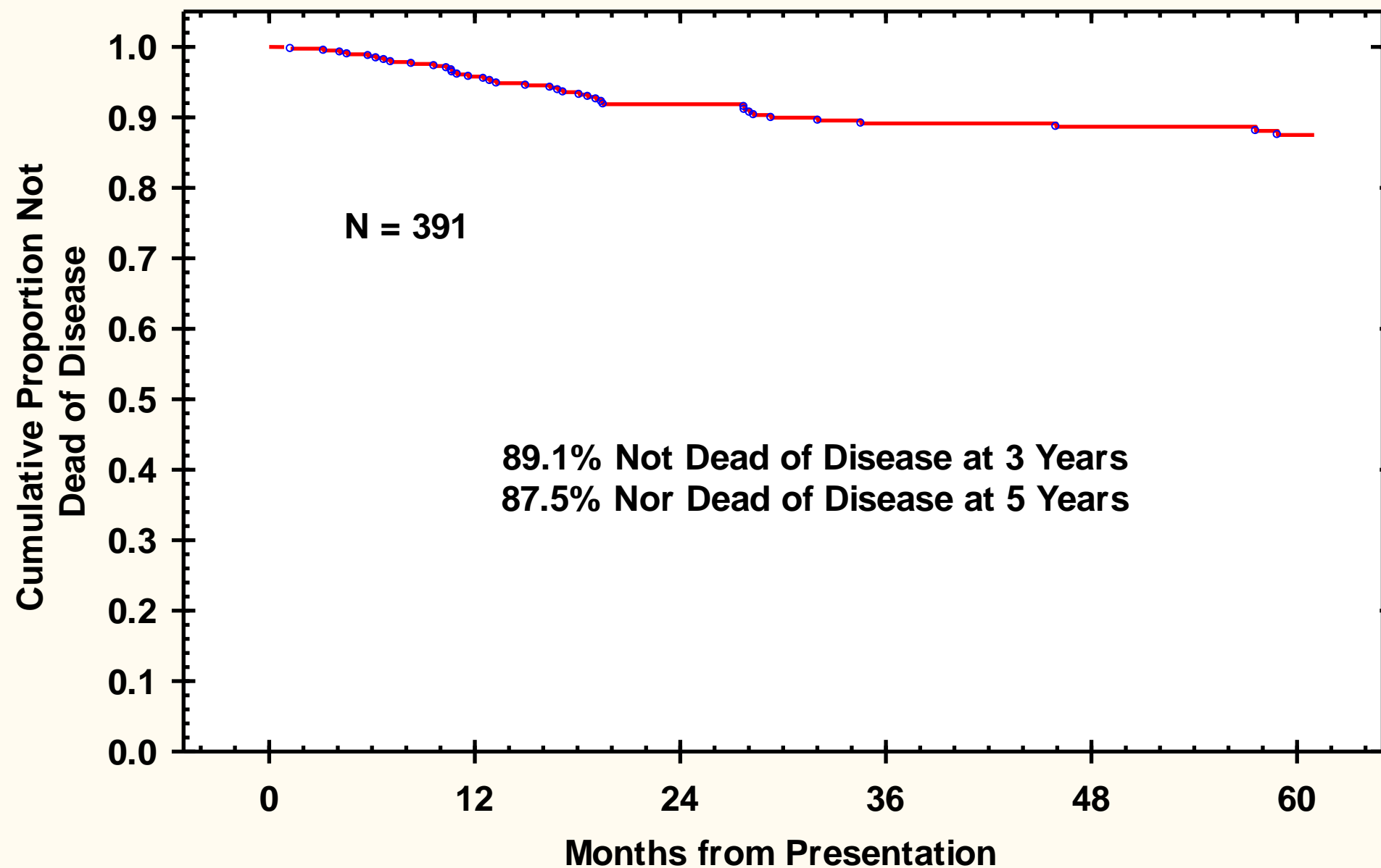
Overall Treatment for Original Disease of Sinonasal Malignancies Treated with Endoscopic Surgery



N=391 patients

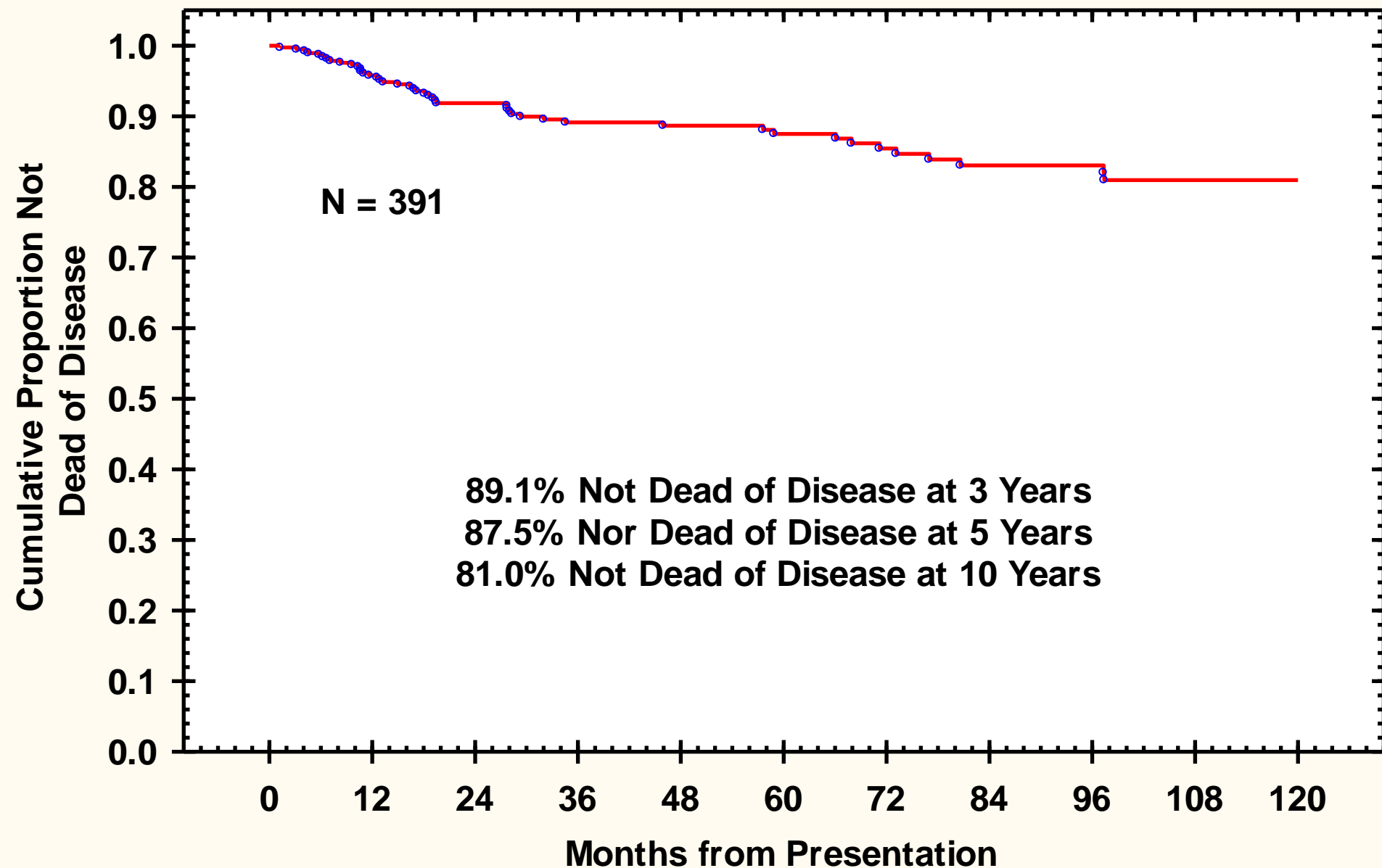
5-Year Disease-Specific Survival of Sinonasal/Skull Base Cancer Patients Who Had Endoscopic Surgery

○ Died of Disease Last Contact



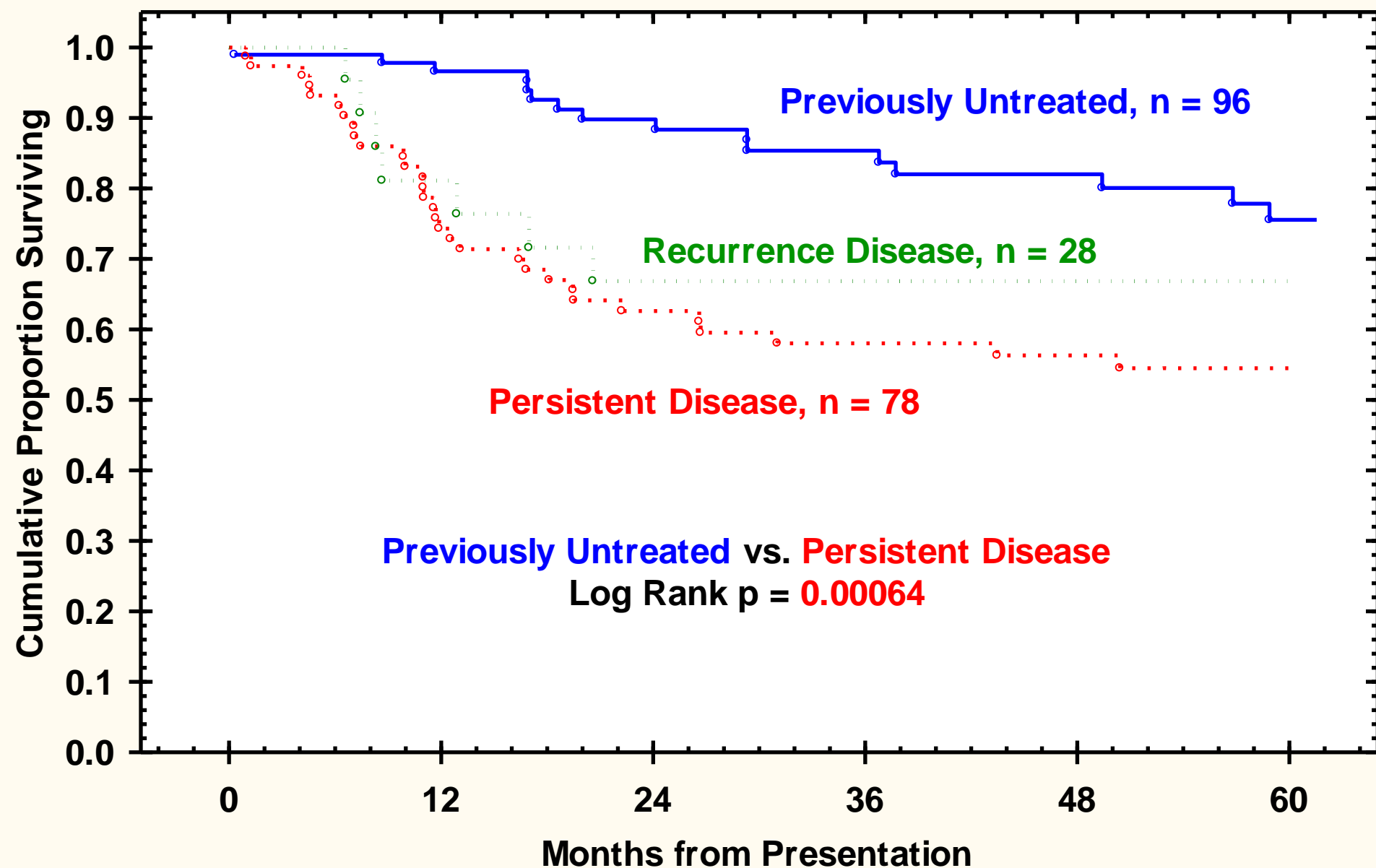
10-Year Disease-Specific Survival of Sinonasal/Skull Base Cancer Patients Who Had Endoscopic Surgery

○ Died of Disease Last Contact

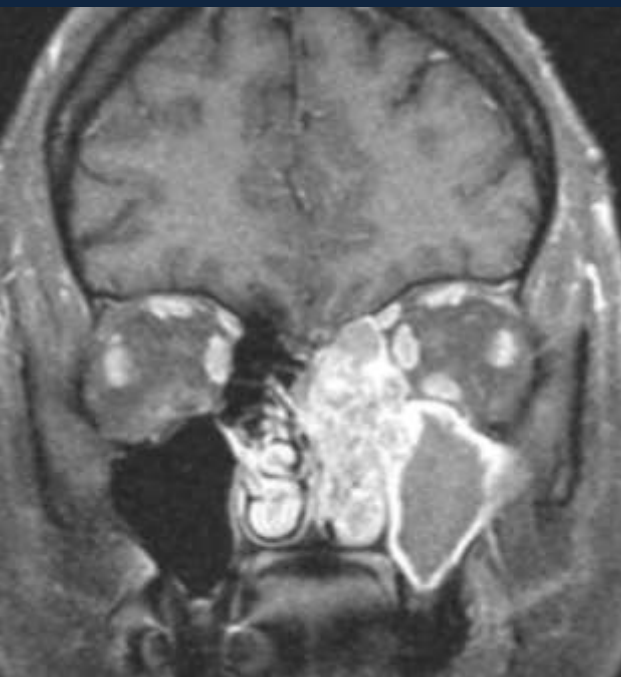


Overall Survival of Patients with Sinonasal Malignancies Treated with Endoscopic Surgery for Original Disease by Status of Disease at Presentation

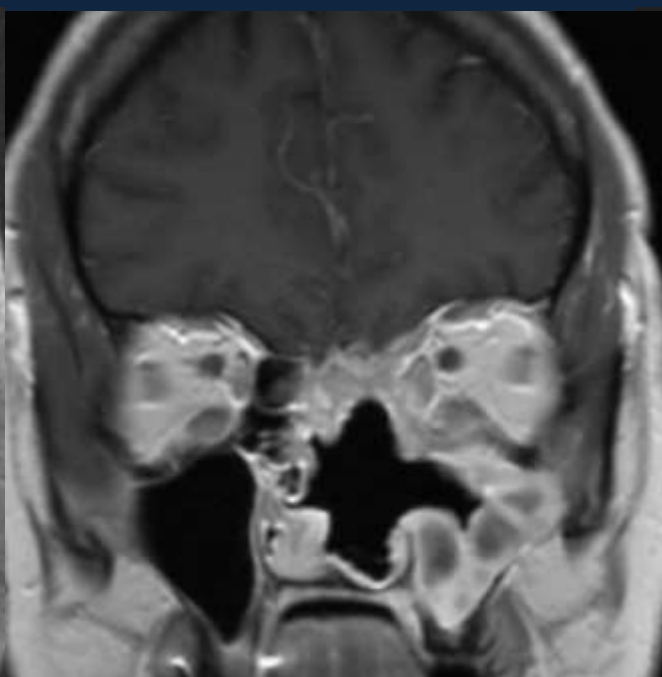
○ Died Last Contact



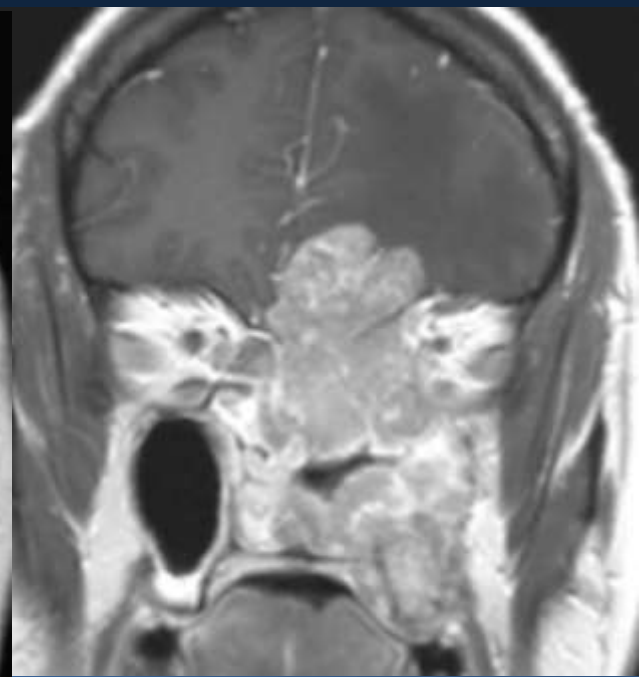
Importance of Adequate Initial Treatment



Diagnosis Scan



Status Post Endoscopic
Debulking with Subtotal
Resection/Positive Margins

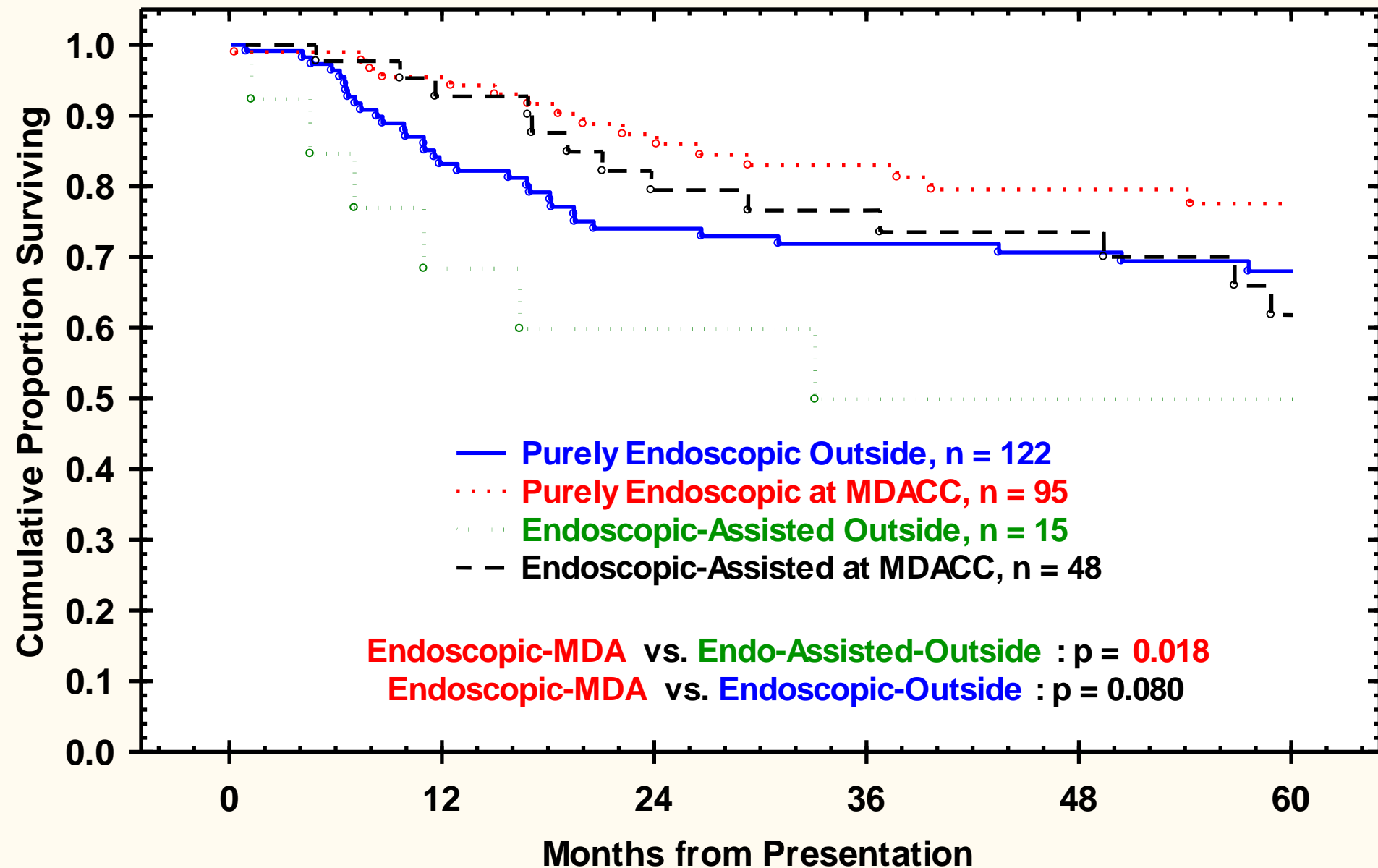


3 Months Status Post IMRT
(54 Gy)

Adenoid Cystic Carcinoma with Orbital/Anterior Skull Base Involvement

Overall Survival of Sinonasal Malignancy Patients Treated with Endoscopic Surgery by Site and Type of Surgery

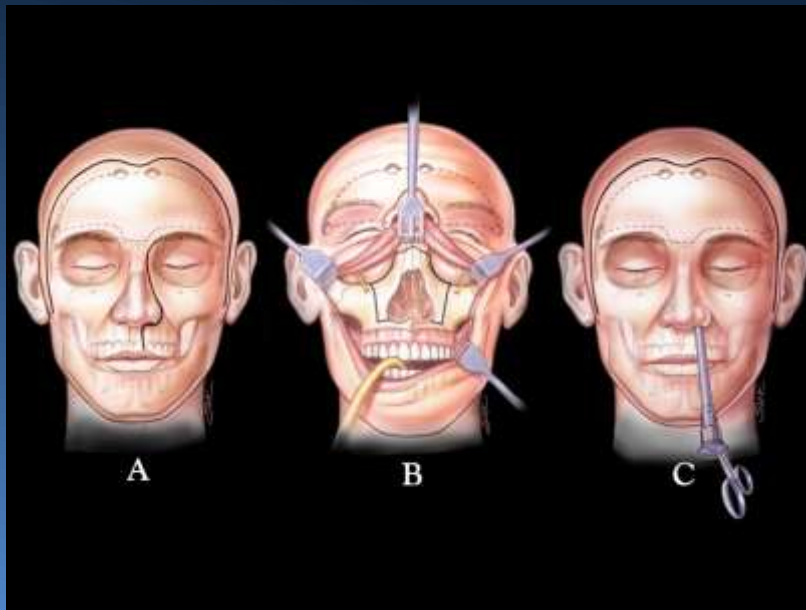
○ Died Last Contact



Training and Expertise

The right approach?

**Complete Resection
Adequate Reconstruction**



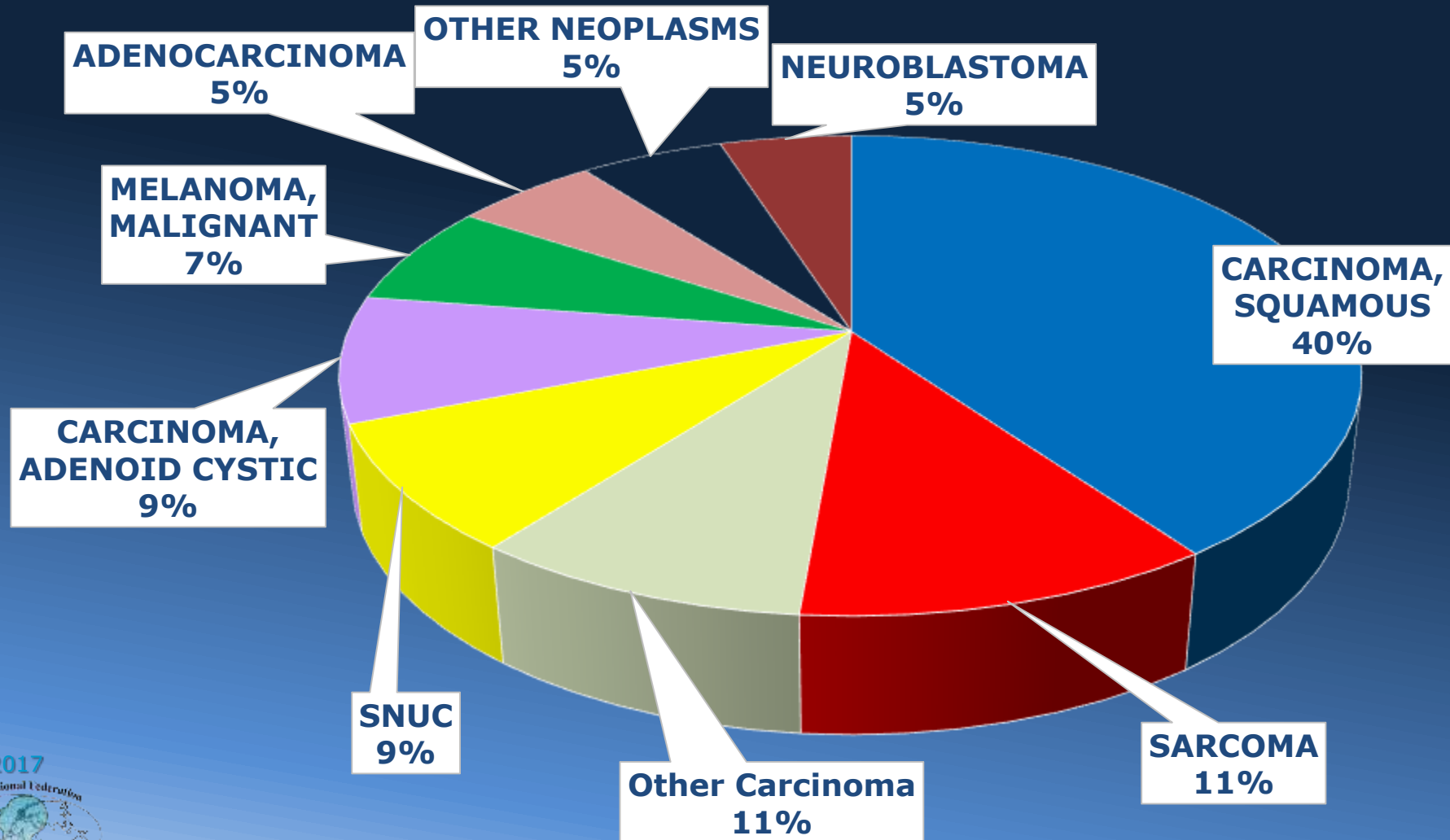
Limits of endoscopic approach

- Facial Soft Tissue
- Deep Orbital Invasion
- Lateral supraorbital extension
- Anterior wall of frontal sinus
- Brain parynchemal invasion

Extent of disease

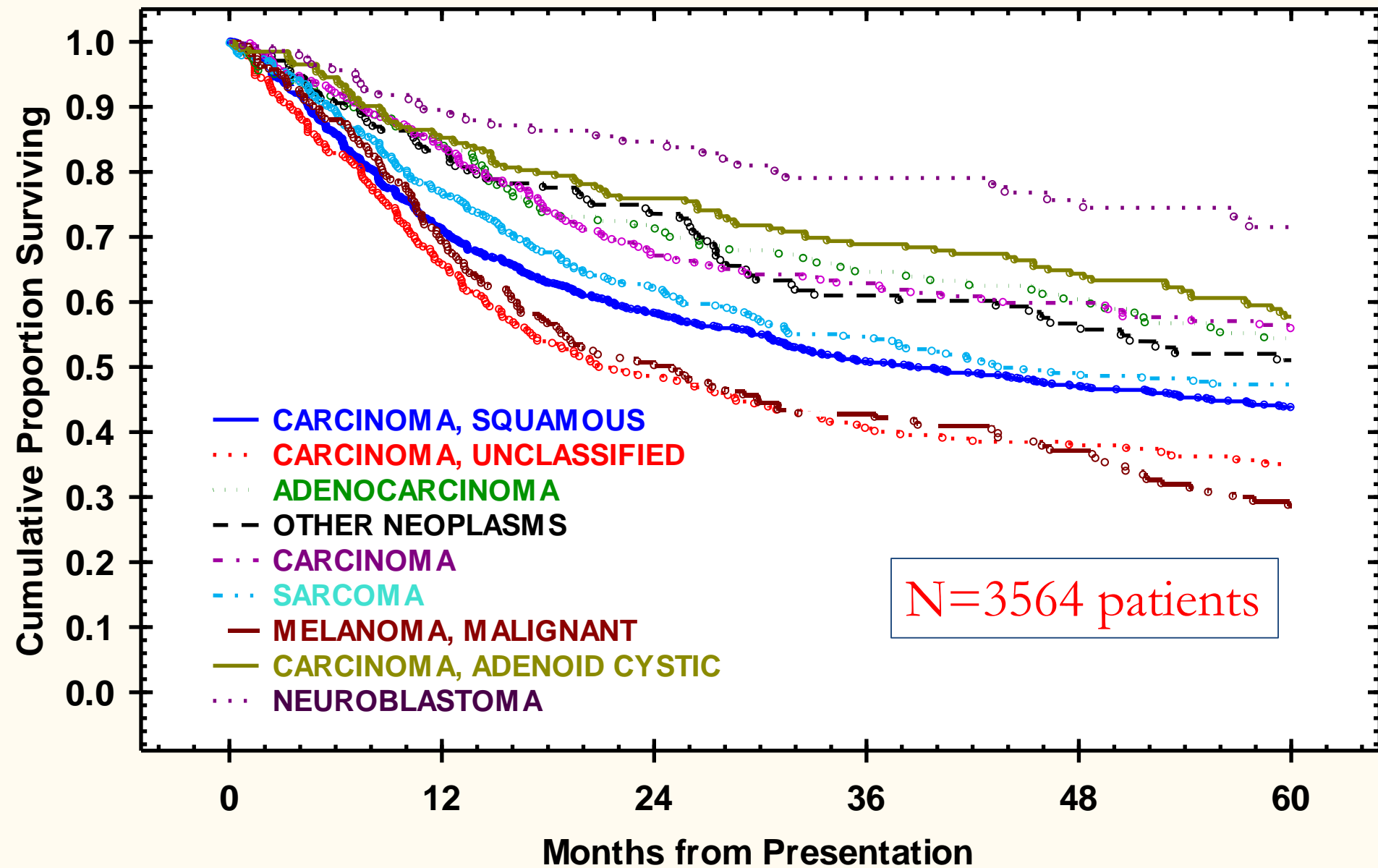
Pathology

N=3564 patients



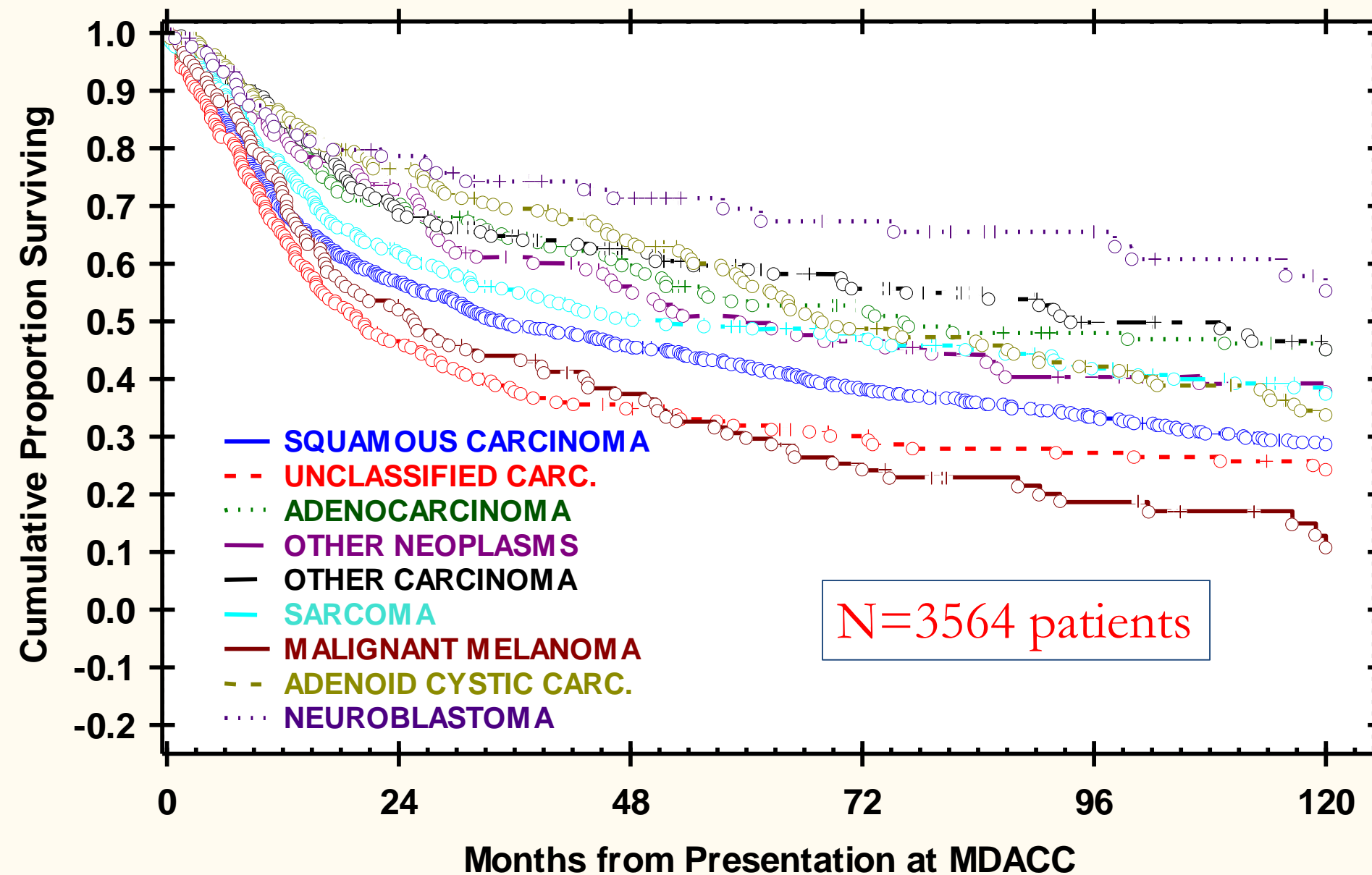
Overall Survival of Patients with Sinonasal Malignancies by Histology

○ Died Last Contact



Overall Ten-Year Survival of Sinonasal Malignancy Patients by Histology (Simpler)

○ Died + Last Contact



A

B

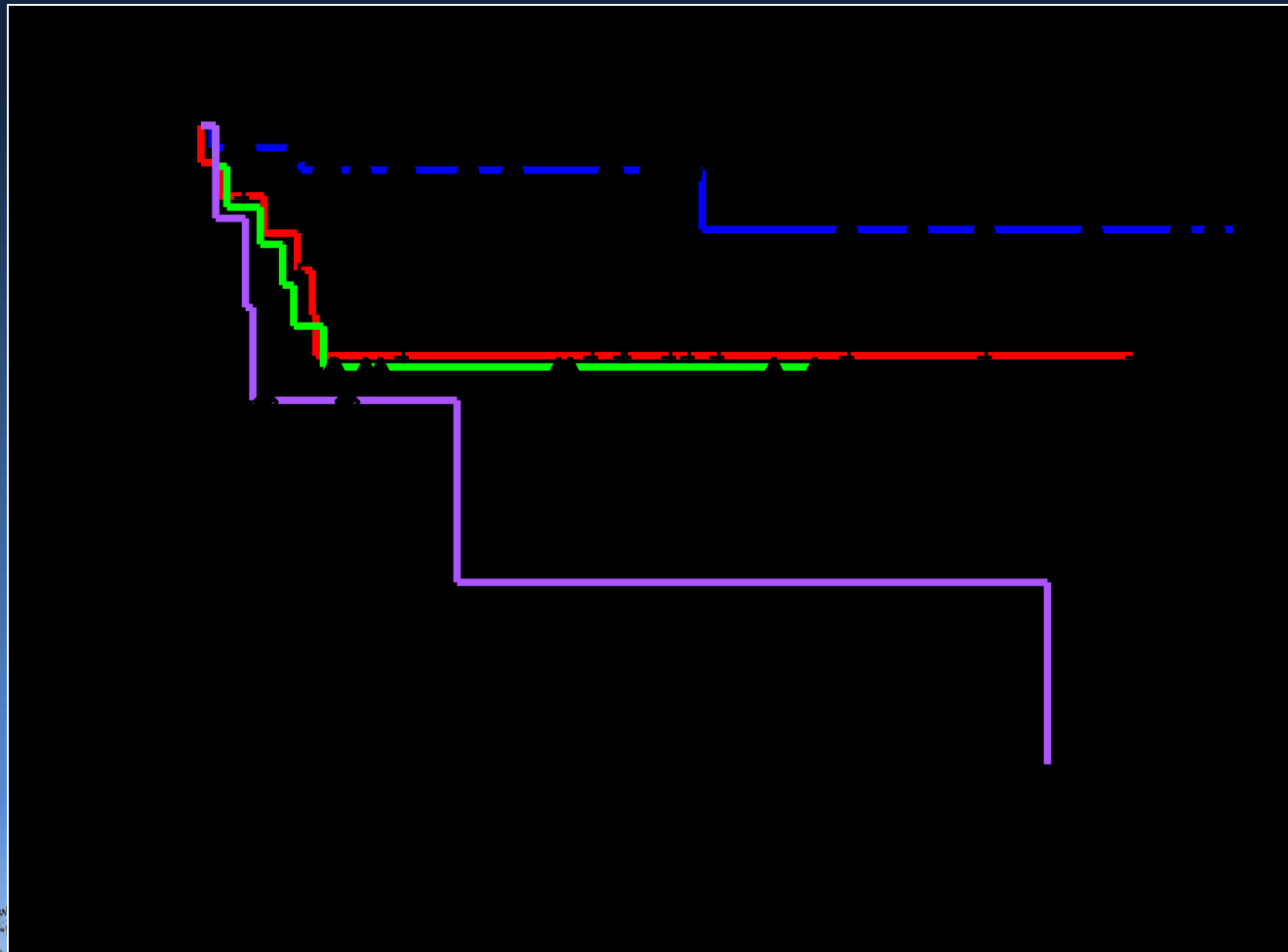
C

Olfactory Neuroblastoma

Neuroendocrine Carcinoma

Sinonasal Undifferentiated Carcinoma

Neuroendocrine Tumors – Overall Survival

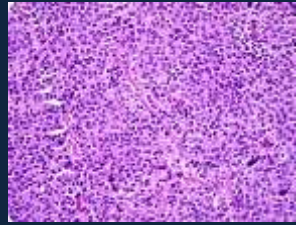


5y-OS
ENB 93.1%

NEC 64.2%

SNUC 62.5%

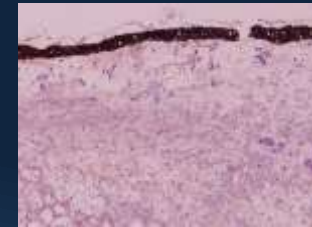
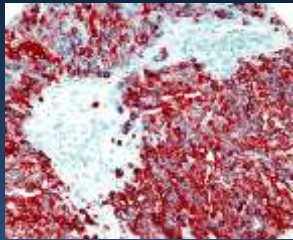
SmCC 28.6%



Pankeratin

+

-



**Neuroendocrine:
Chromo/Synap**

**Neuroendocrine:
Chromo/Synap**

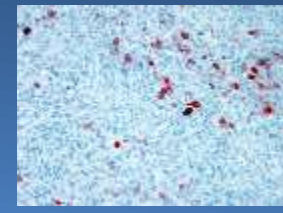
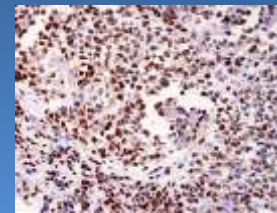
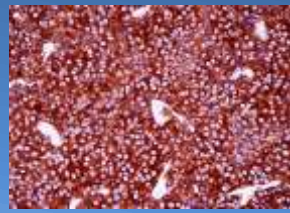
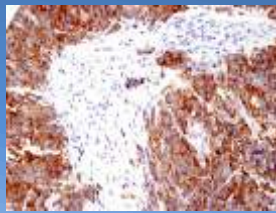
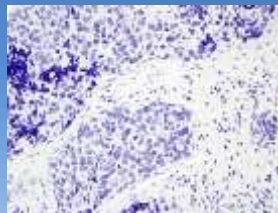
**Muscle:
Desmin**

CD99

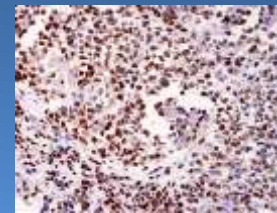
**Melanocytic:
PanMel/S100**

-

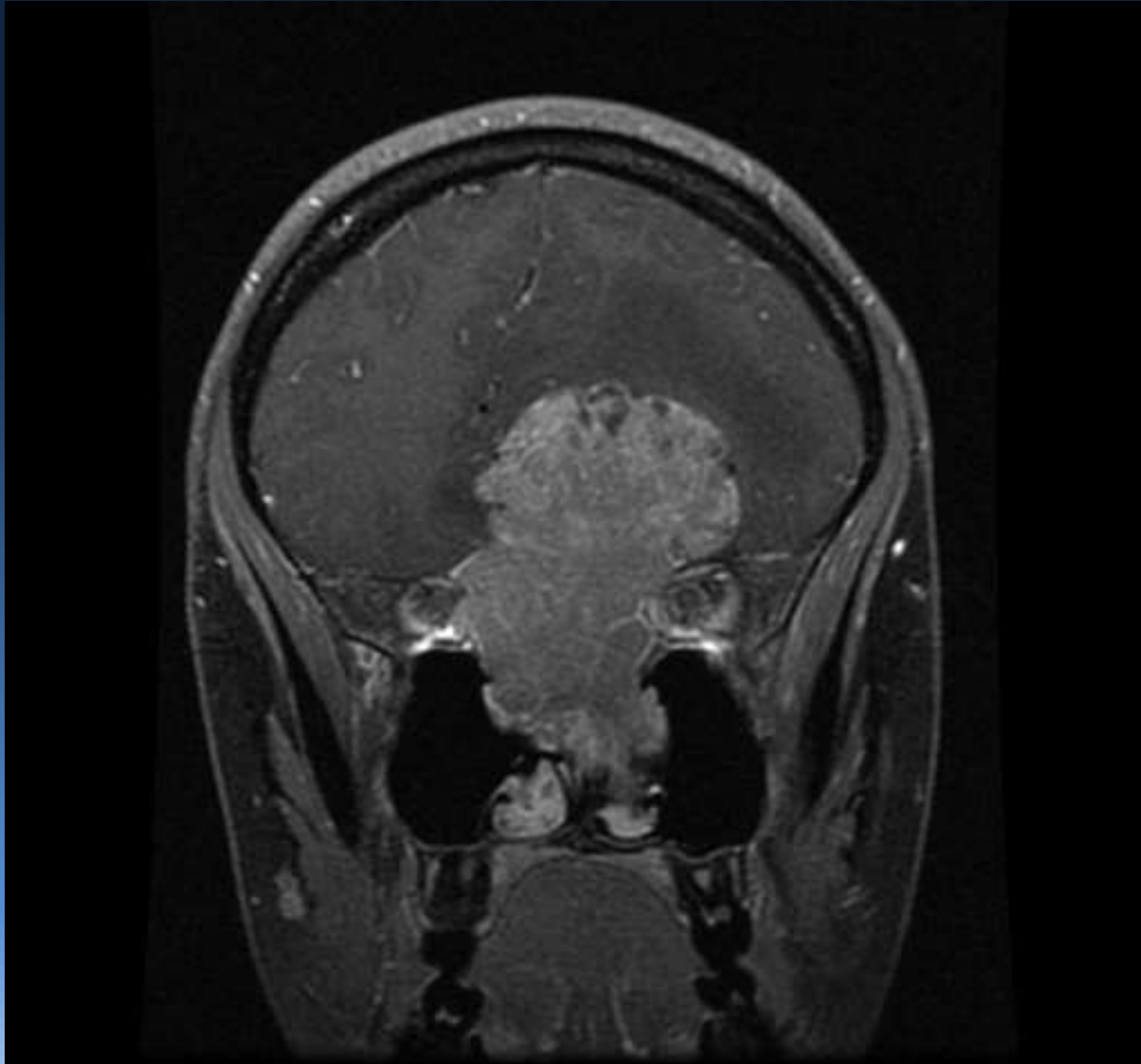
+



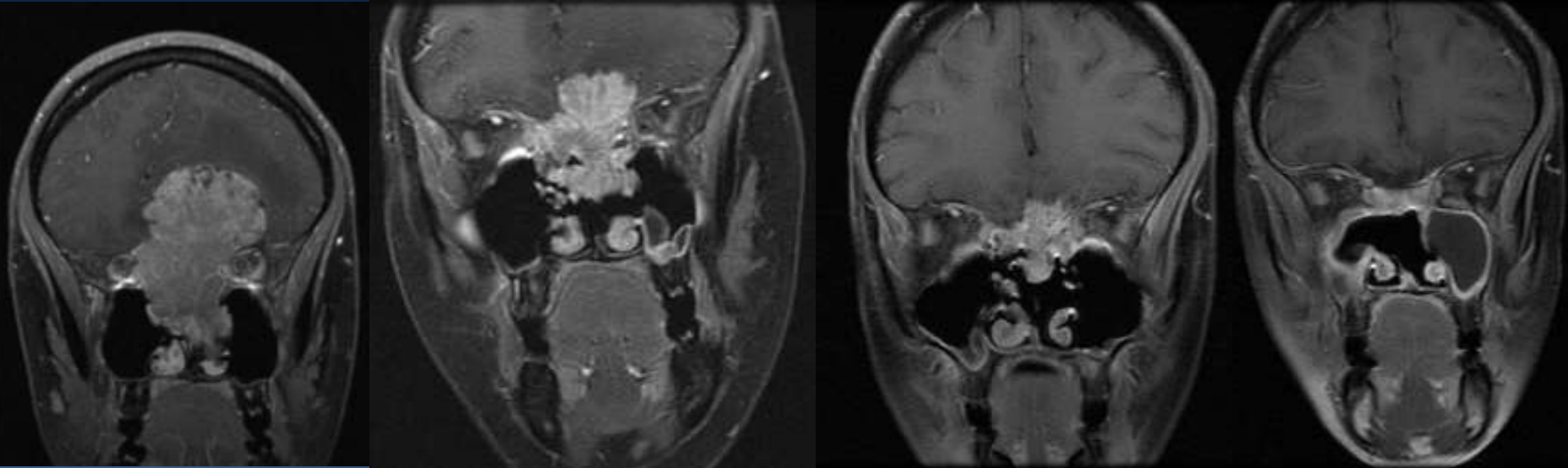
Myogenin +



Advances in Histopathologic Classification



Integrated Multidisciplinary Approach



At Presentation

Induction Chemotherapy

Concurrent
Chemoradiation

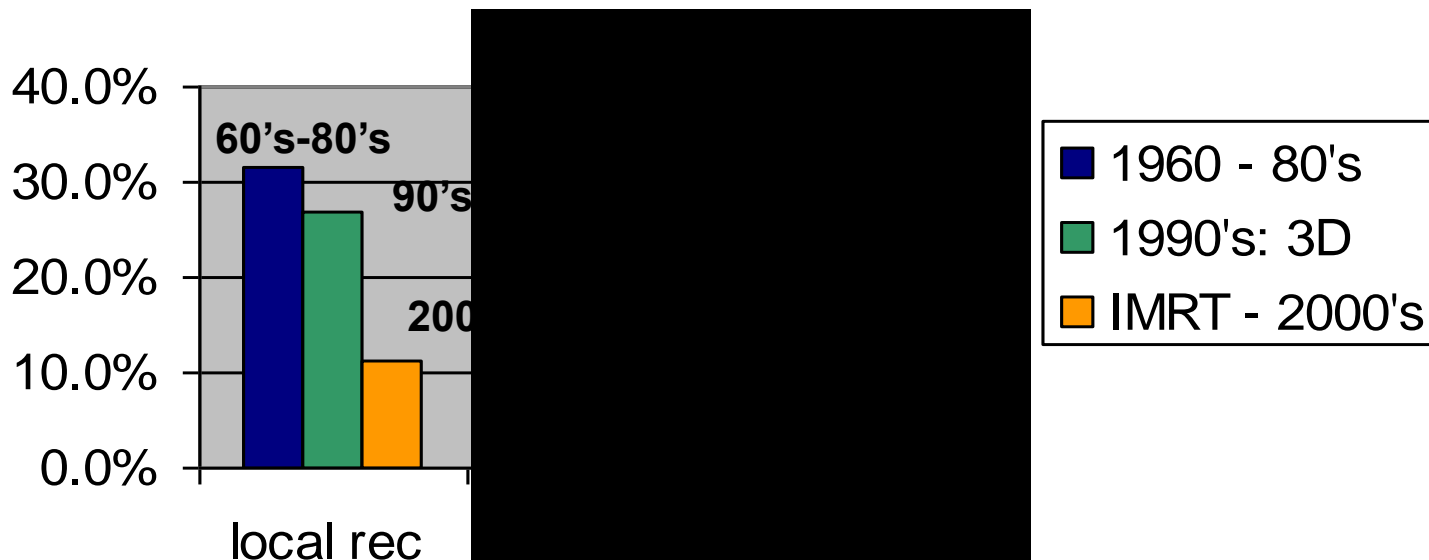
Craniofacial
Resection
2 yr. F/U

Improvement/Limitations/Future Directions

- **Craniofacial skull base surgery**
- **Endoscopic and Robotic Approaches**
- **Conformal Radiation**
- Active chemotherapeutic agents
- Treatment intensification

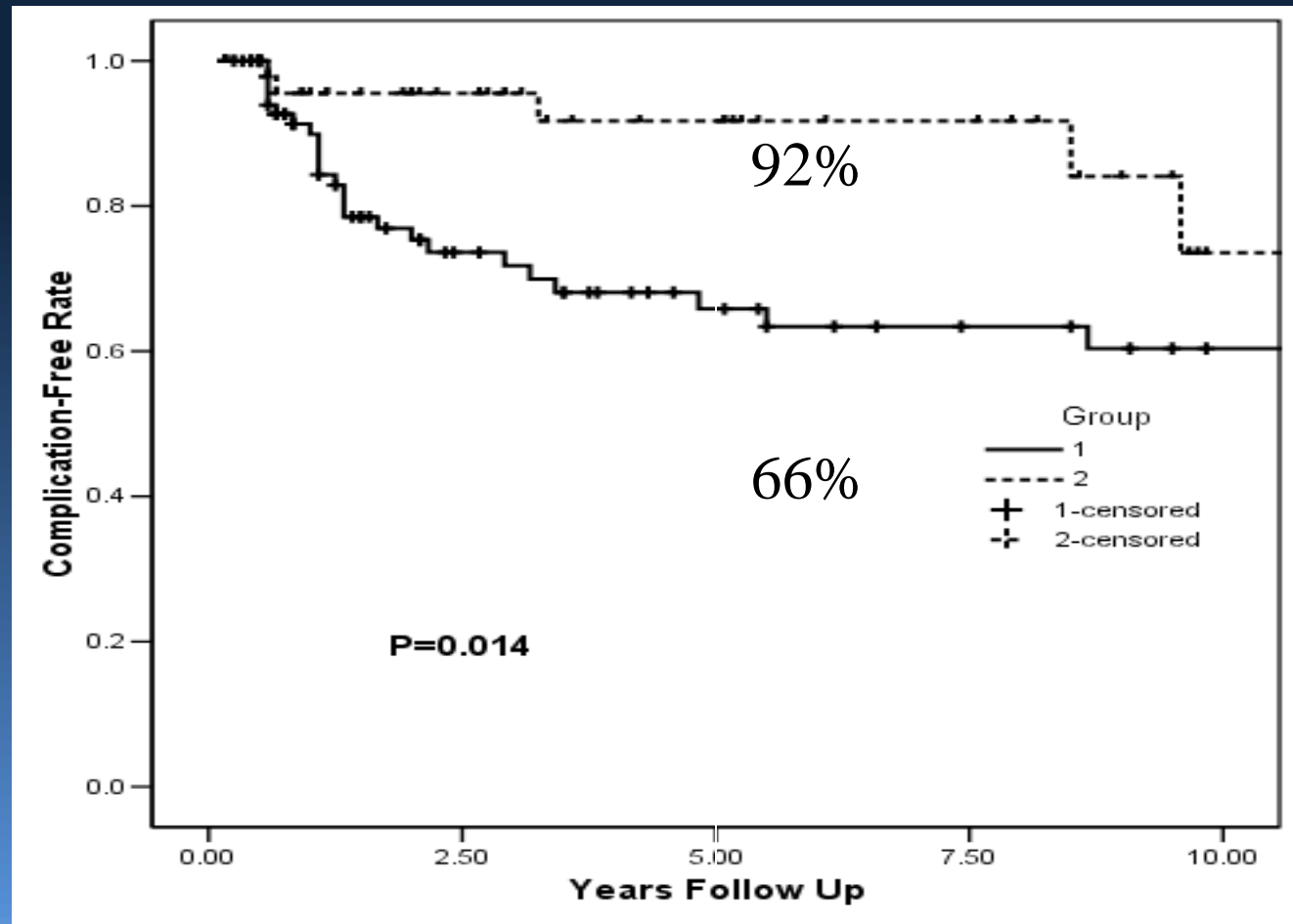
Does conformal radiation improve outcomes or reduce toxicity?

Local control by era / technique



Ahamad et al, AHNS 2007

Complication Free Rate

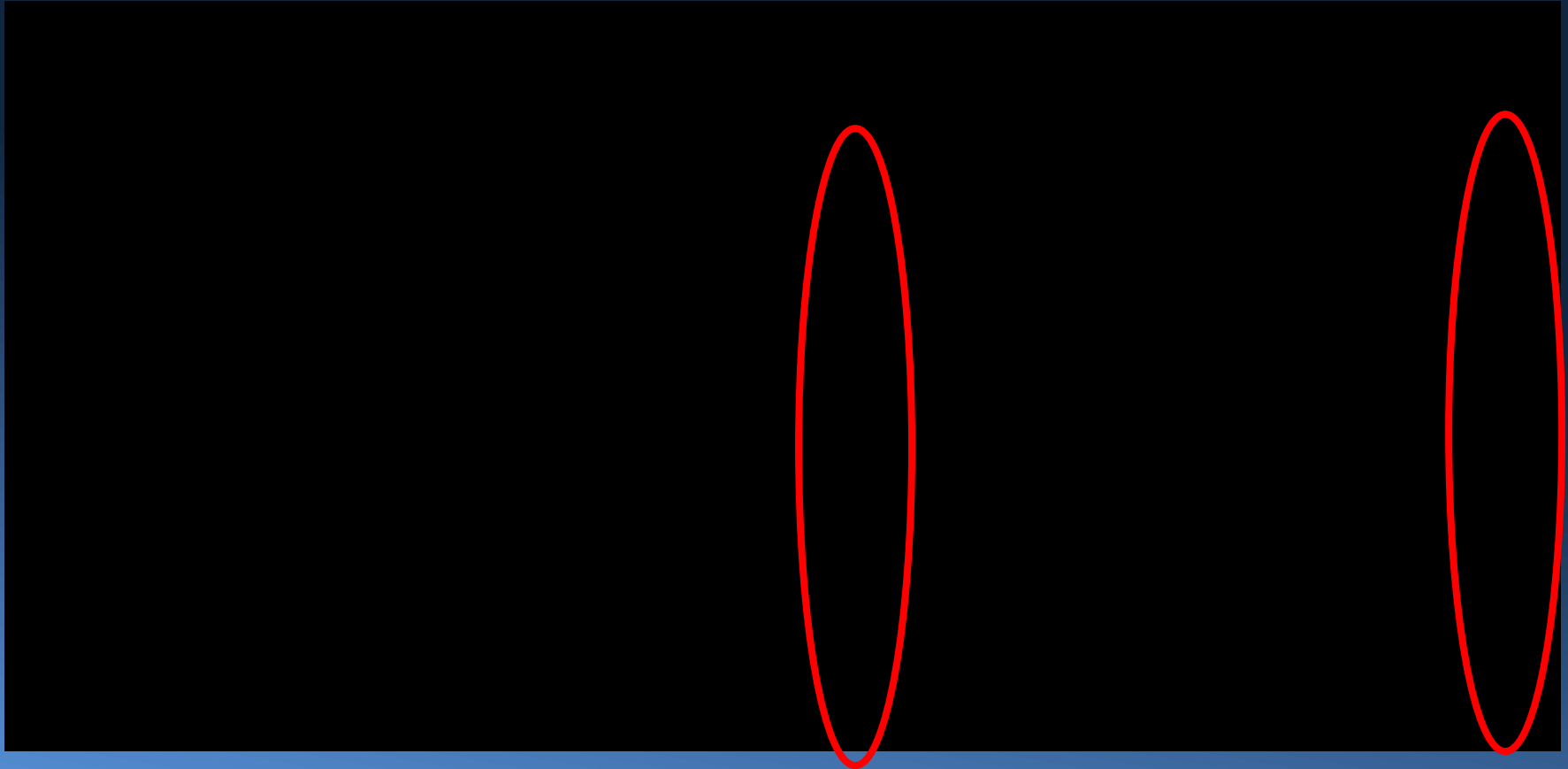


Bristol IJ, Ahamad A, Garden AS, Morrison WH, Hanna EY, Papadimitrakopoulou VA, Rosenthal DI, Ang KK.

Postoperative radiation for maxillary sinus cancer: long-term outcomes and toxicities of treatment. Int J Rad Onc Biol Phys

68(3):719-30, 7/2007.

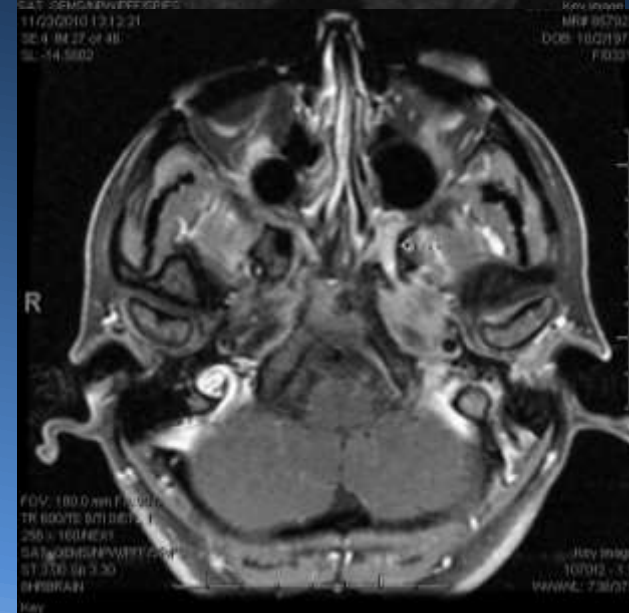
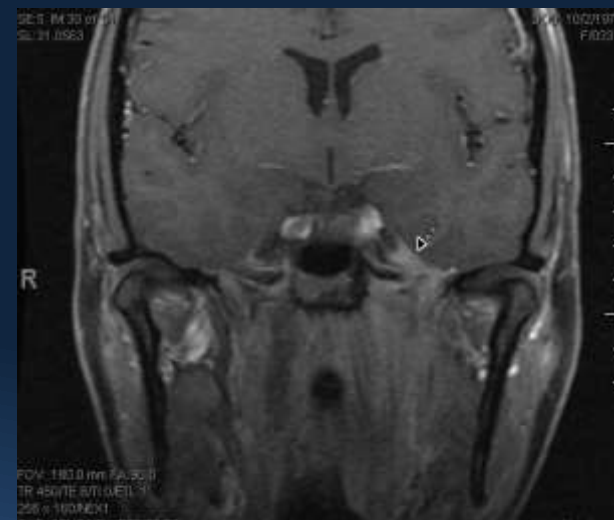
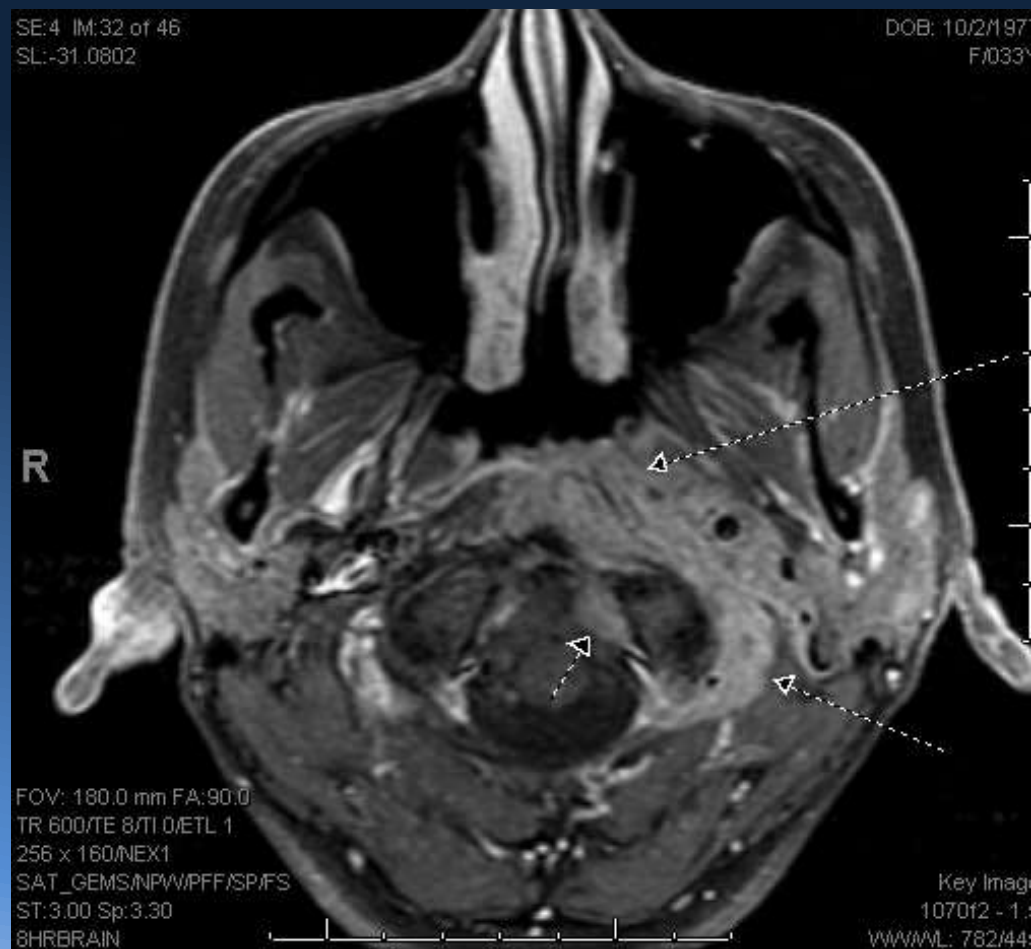
Complications between the Two Groups



Proton Therapy

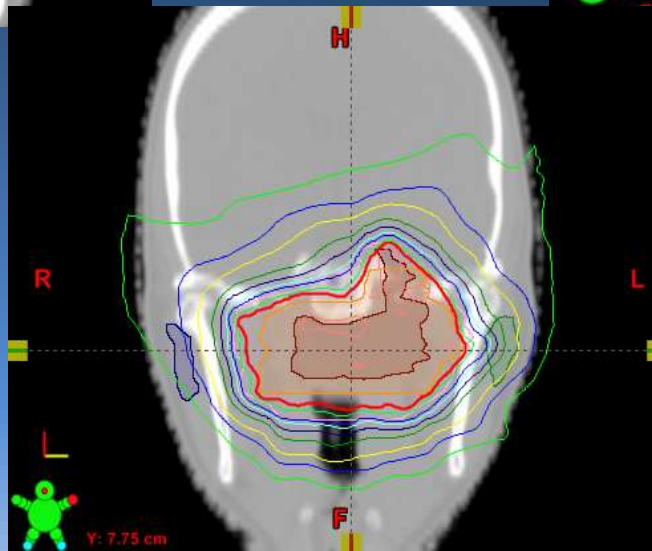


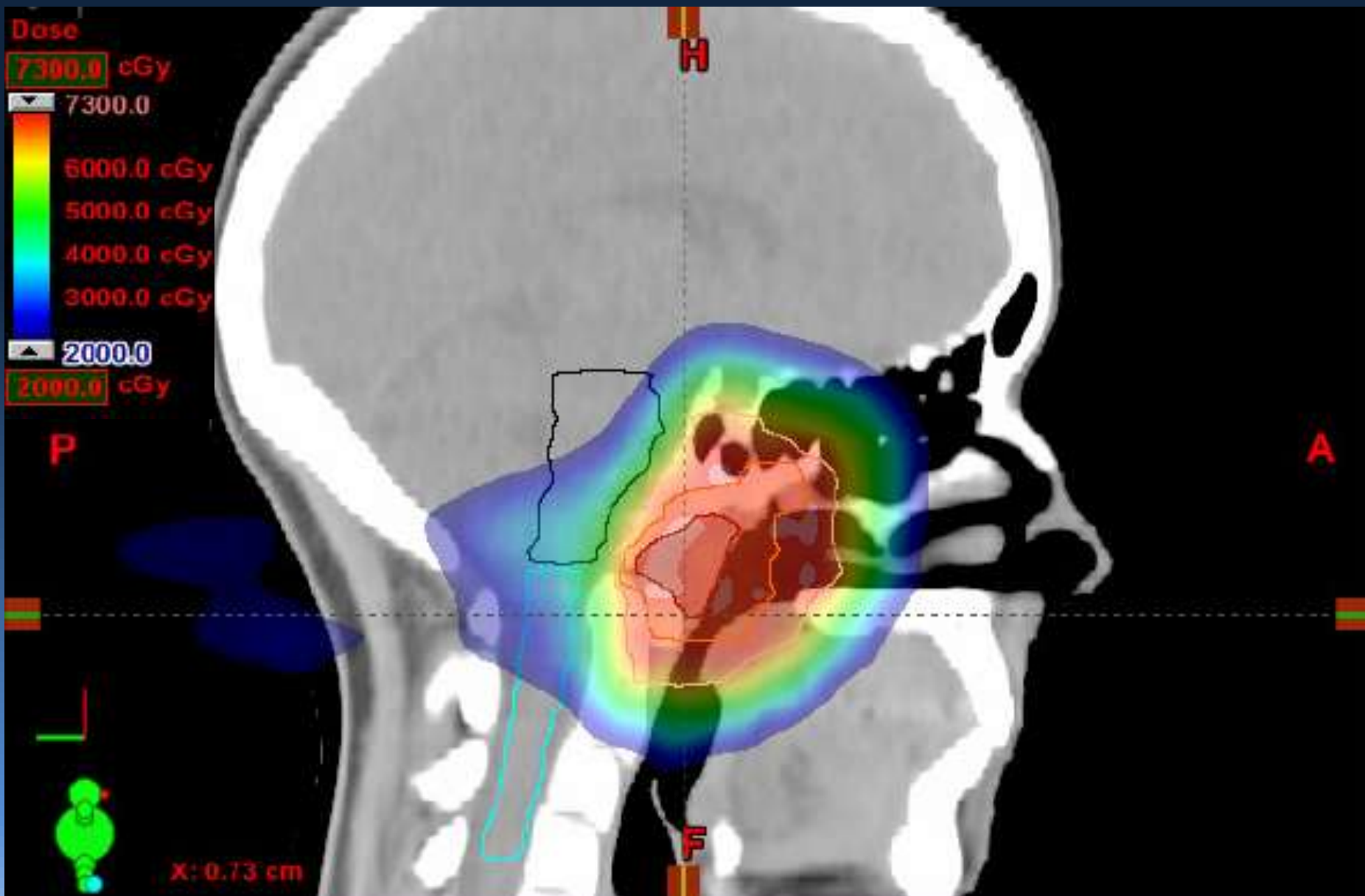
33 yo female Adenoid cystic carcinoma



Nasopharynx- ACC

70 CGE + CDDP

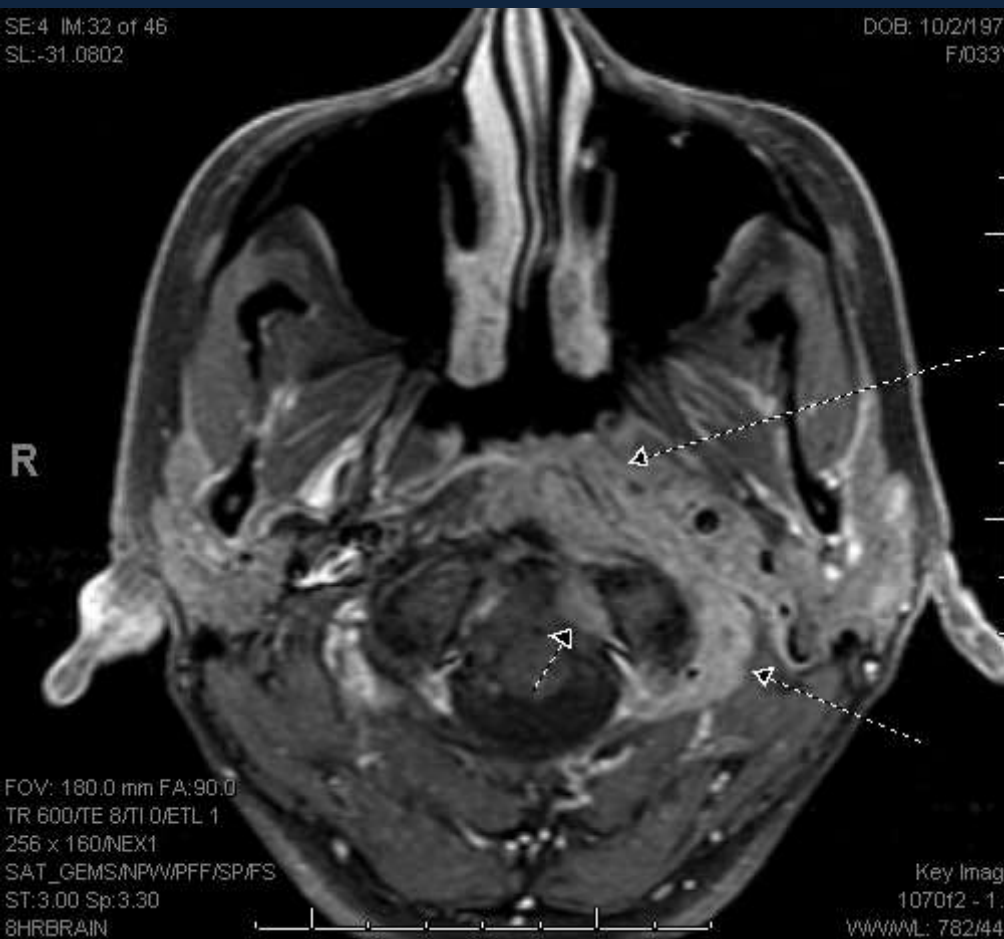




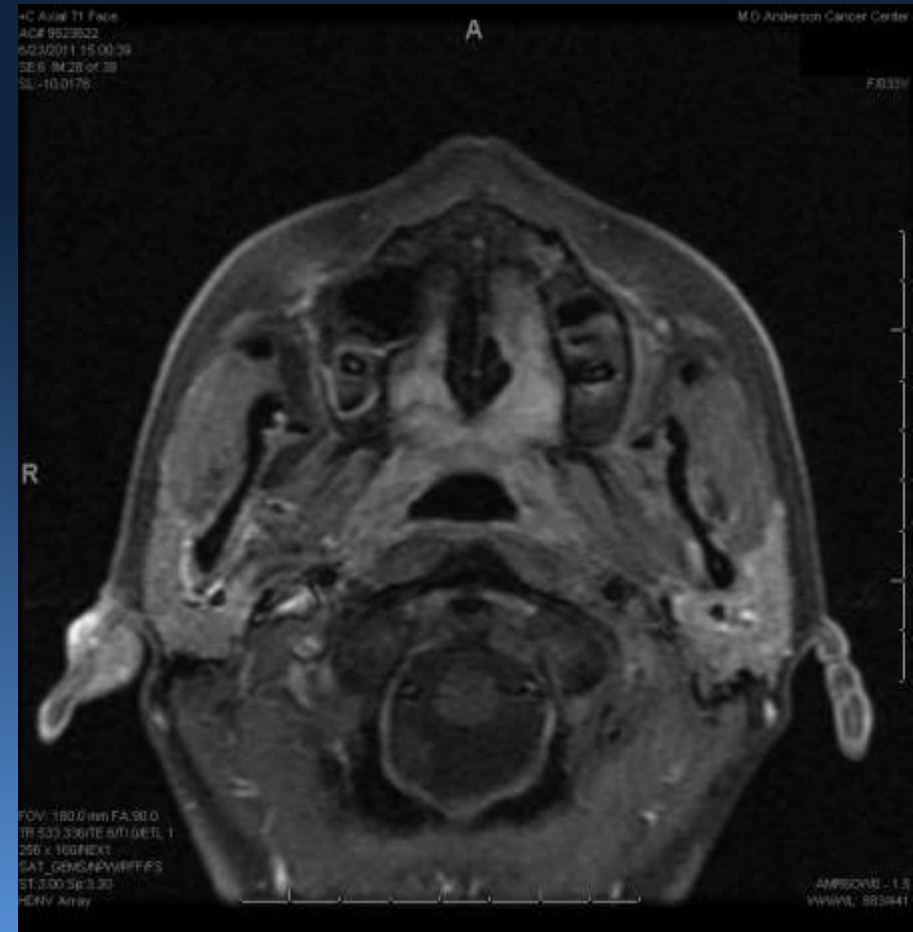
33 yo female

Adenoid cystic carcinoma

At presentation

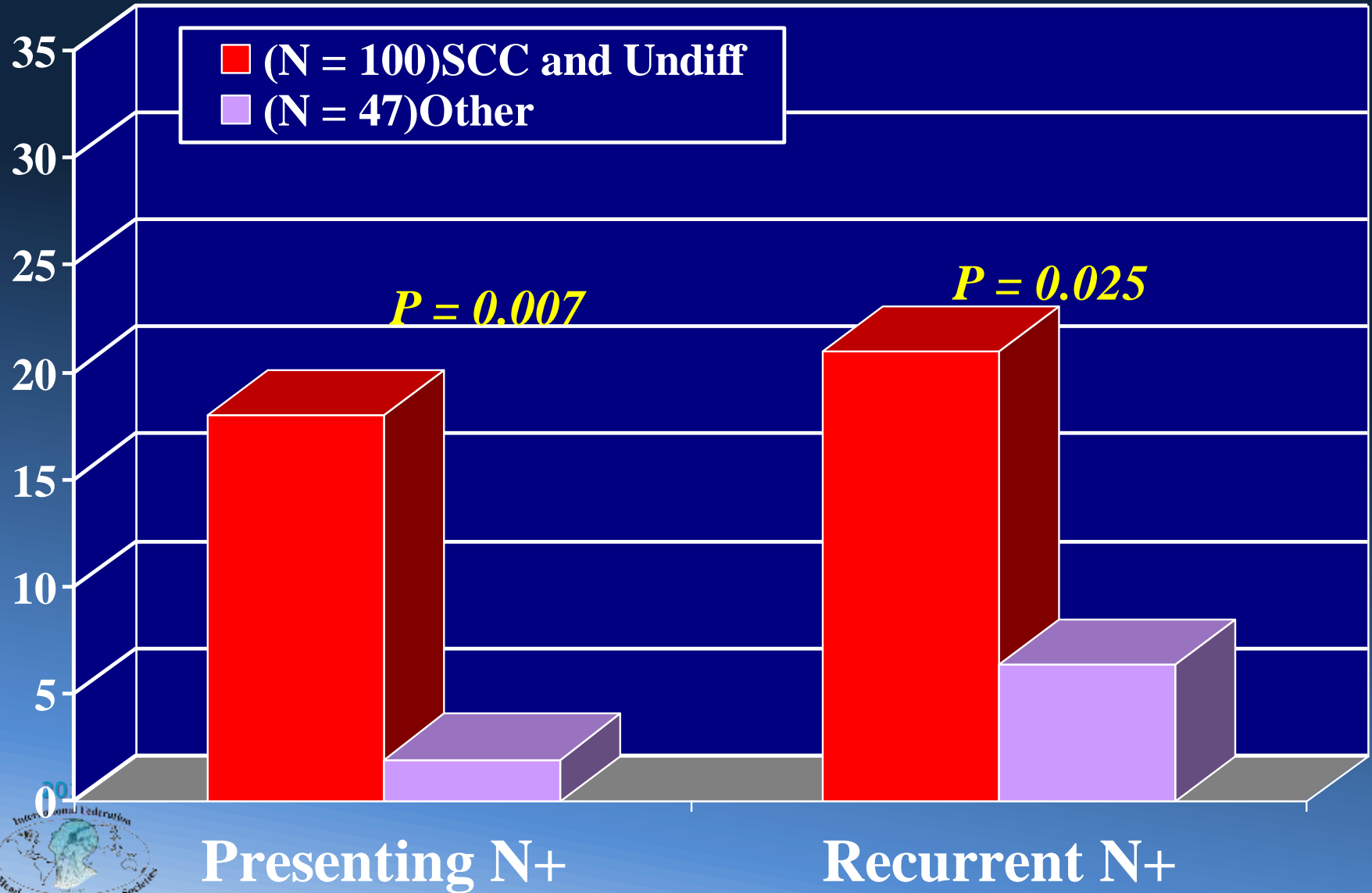


One year follow up

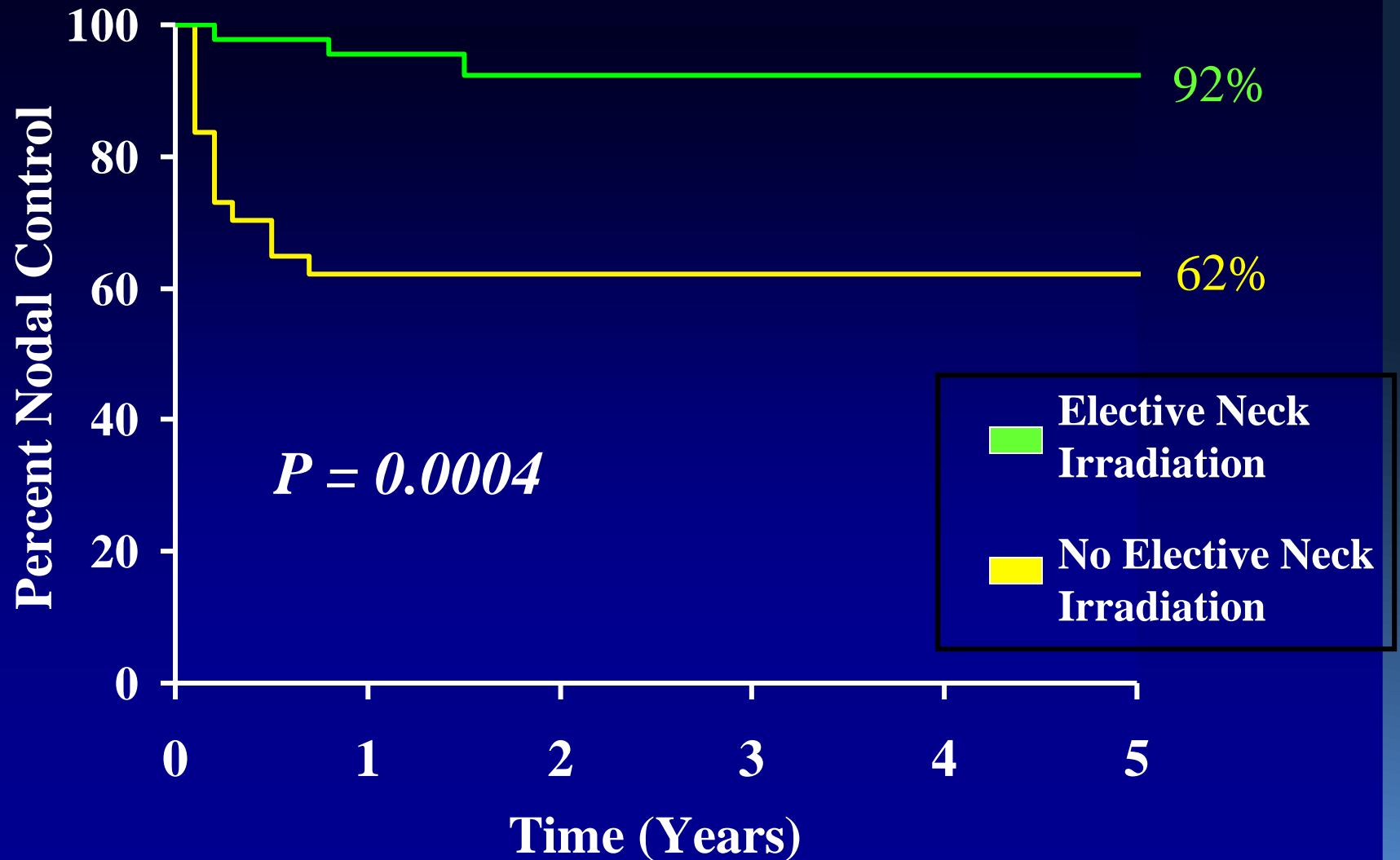


Should the N0 neck be
treated with elective nodal
radiation?

Nodal Disease by Histology (%)



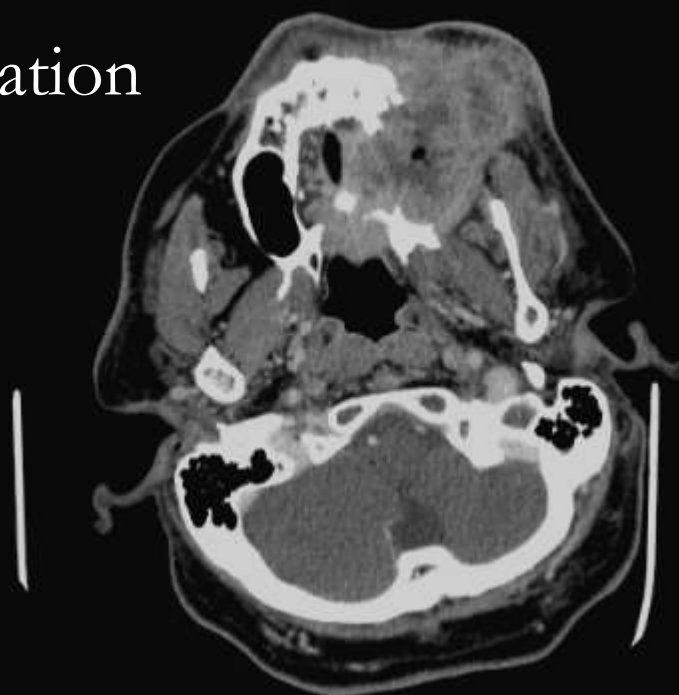
Nodal Control Rate in Patients with SCC or Undifferentiated Histology \pm ENI



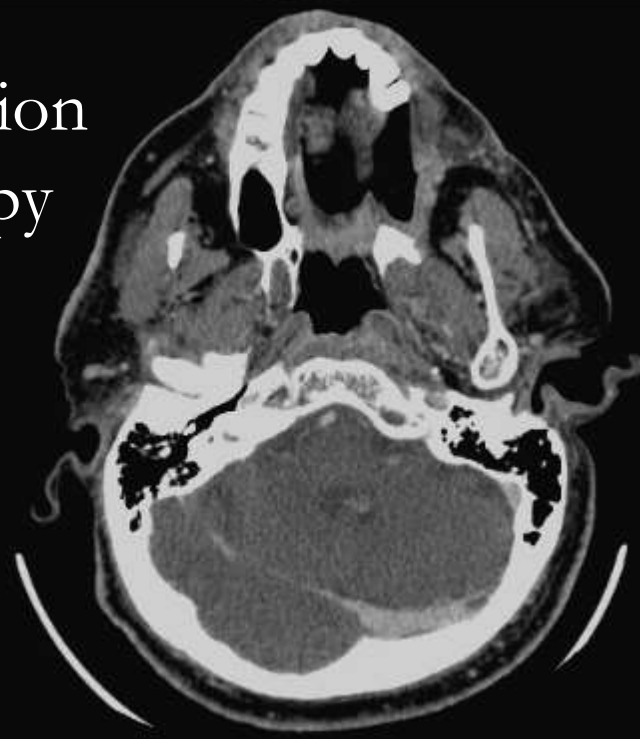
Improvement/Limitations/Future Directions

- **Craniofacial skull base surgery**
- **Endoscopic and Robotic Approaches**
- **Conformal Radiation**
- **Active chemotherapeutic agents**
- **Treatment intensification**

At presentation



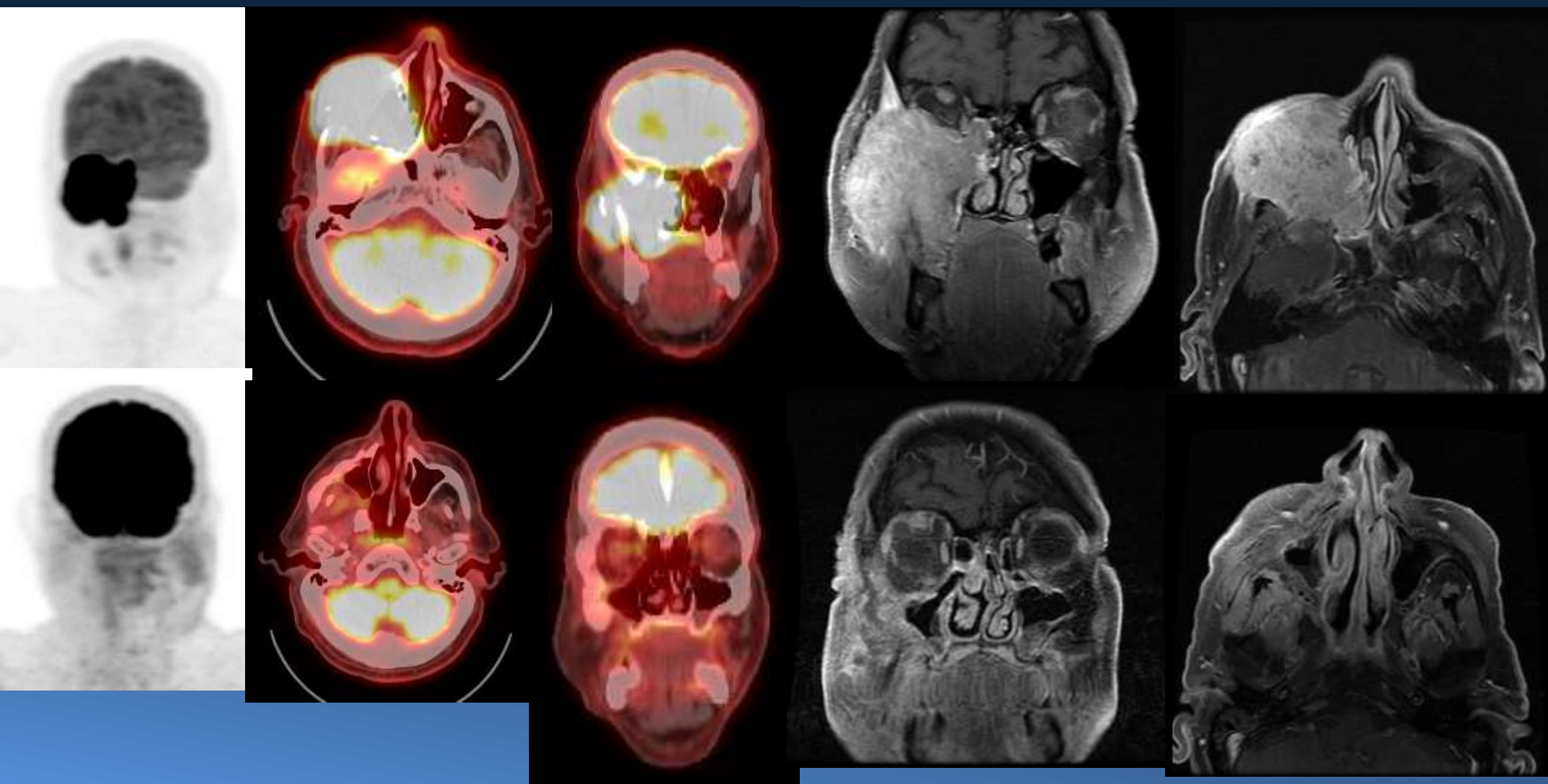
After induction
chemotherapy



When do we use it?

- Significant brain parenchymal invasion
- Orbital invasion requiring exenteration
- Facial soft tissue and skin invasion
- Nodal metastasis
- Gross cavernous sinus invasion

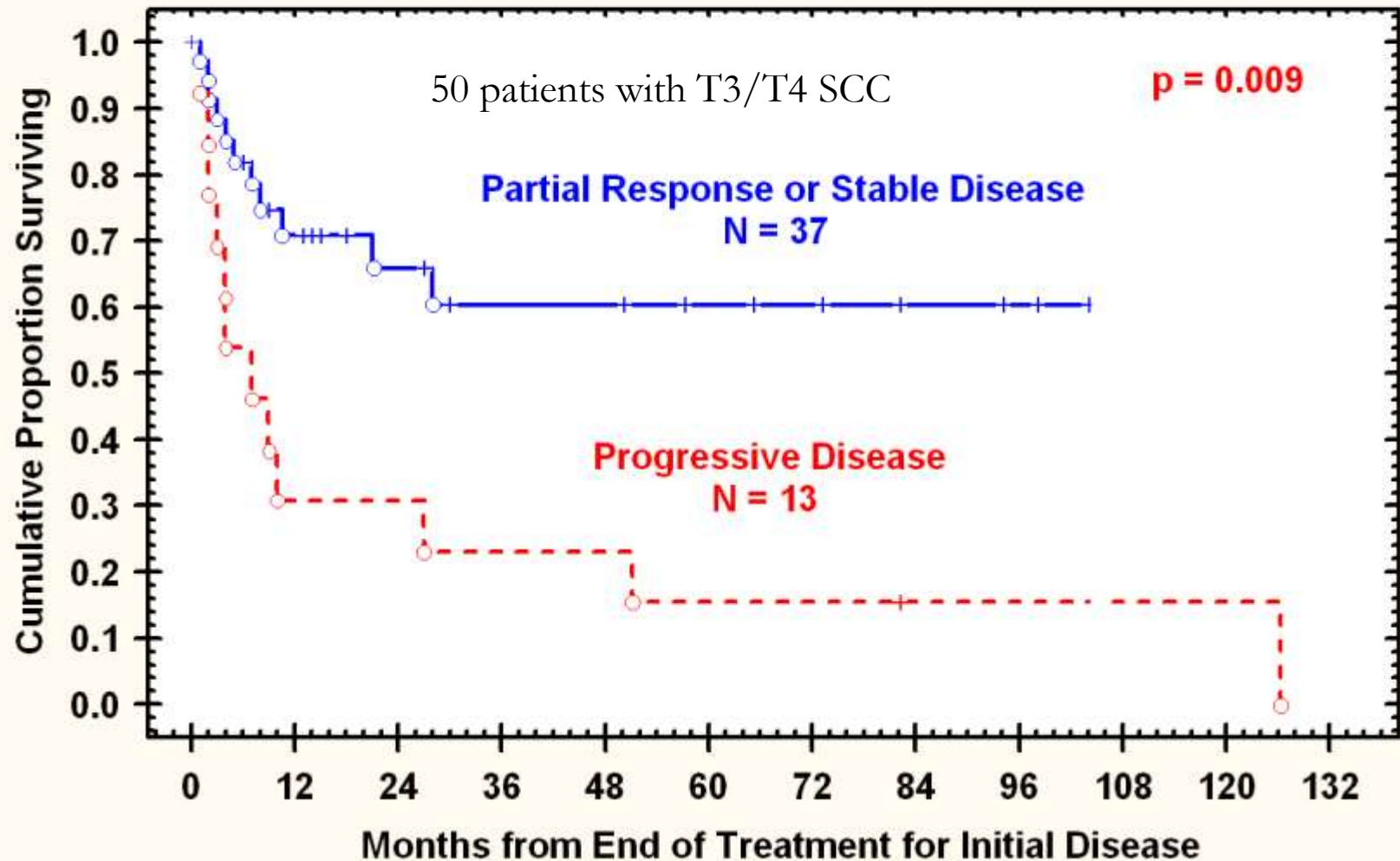
Before induction chemotherapy



One year after treatment

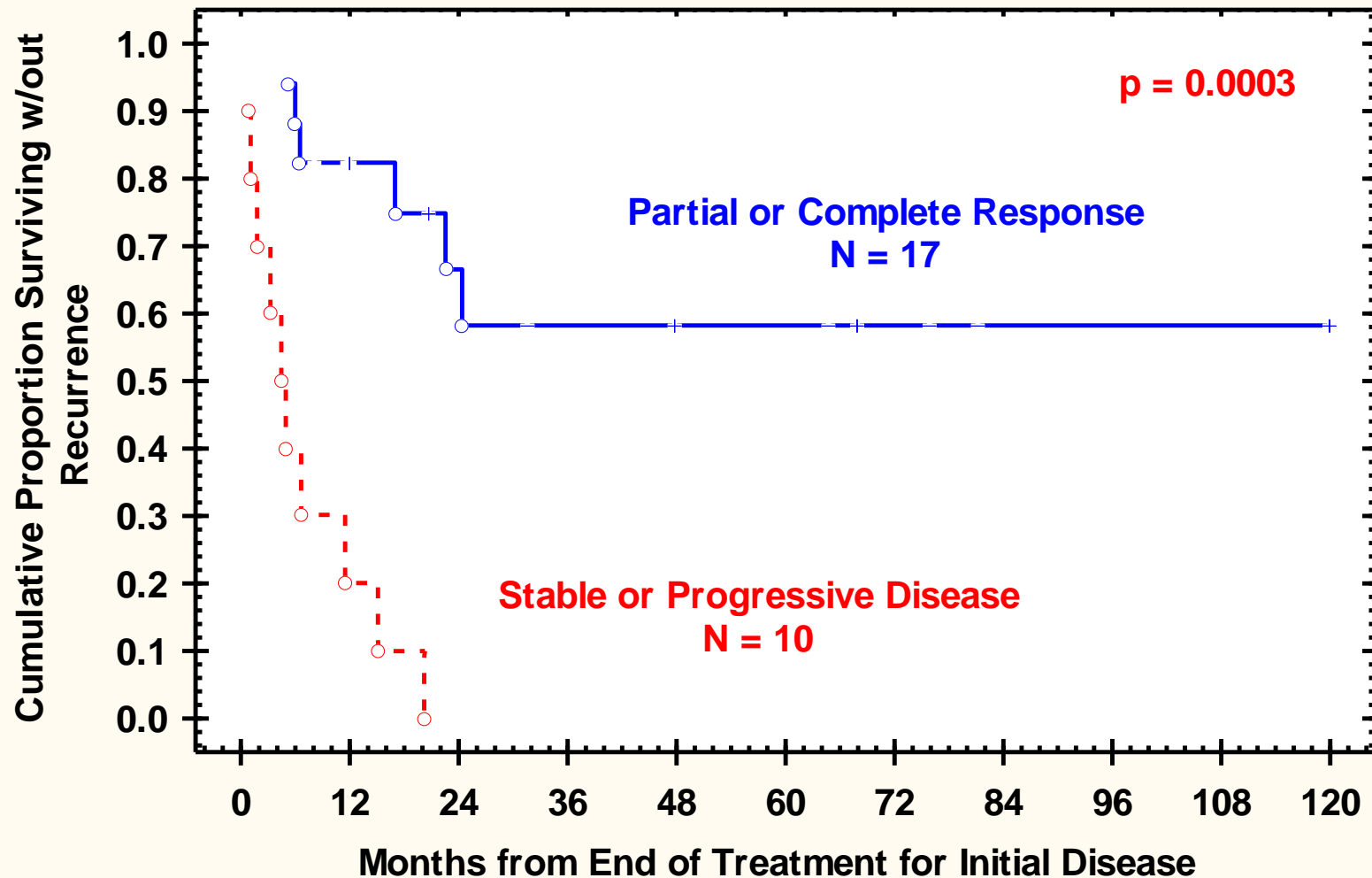
Post-Treatment Survival Time of Patients with Sinonasal SCC by Response to Induction Chemotherapy

○ Died + Last Contact



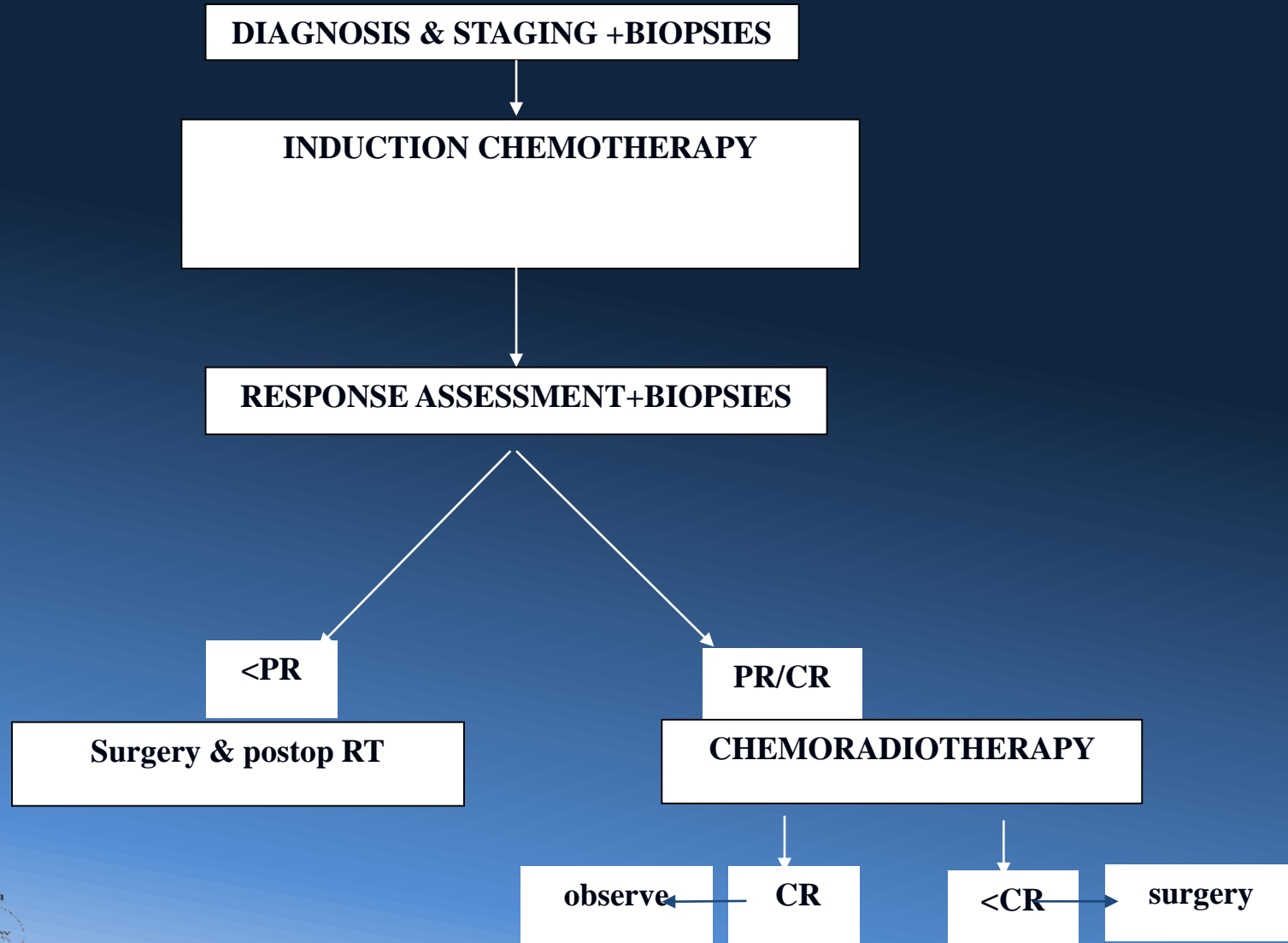
Disease-Free Survival in Patients with SNUC Who Underwent Induction Chemotherapy

○ Had Recurrence or Died Last Contact



Phase II Trial of Induction Chemotherapy in Advanced Sinonasal Cancers

Protocol Schema

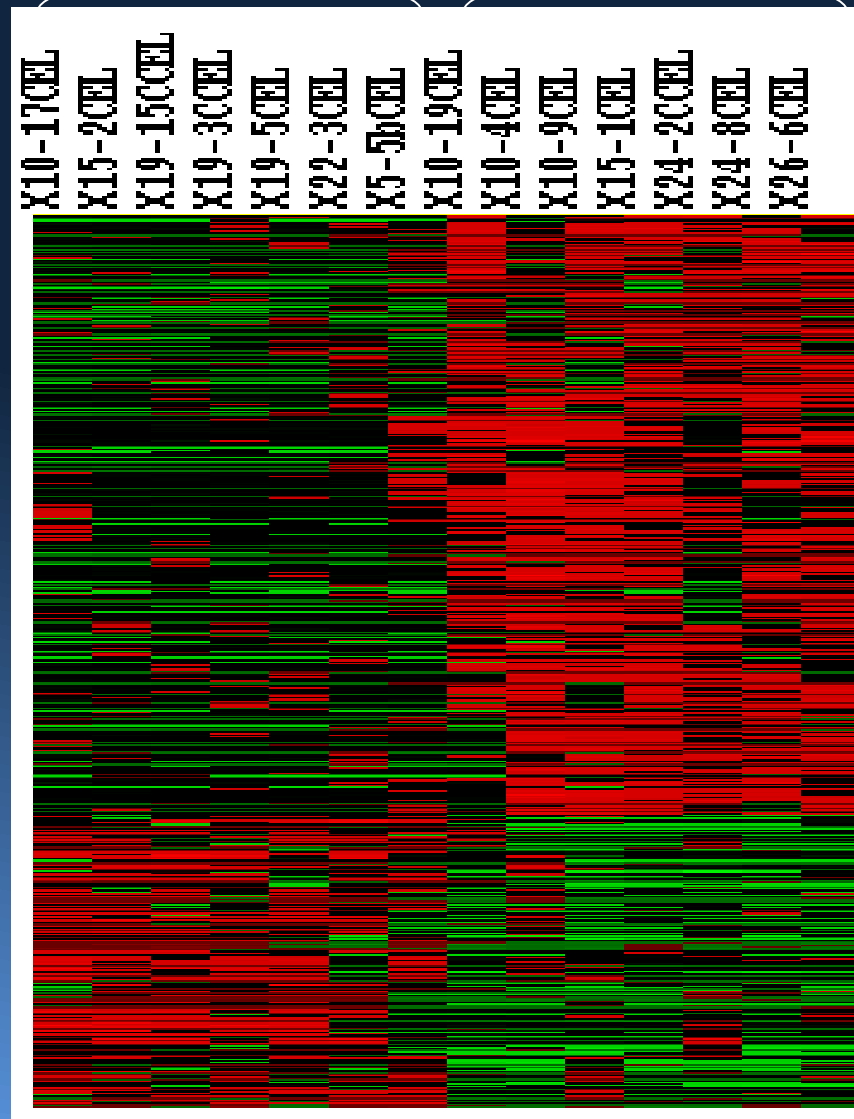


Correlative Study

- To identify biological markers that could serve as surrogates for response and predictors of long-term outcome.

Sensitive

Resistant



Hanna E et al. Cancer Research 2001; 61:2376-2380.

Summary

- Diagnostic imaging
- Craniofacial skull base surgery
- Endoscopic and Robotic Approaches
- Conformal Radiation
- Active chemotherapeutic agents
- Treatment intensification

MDACC Skull Base Surgery



Franco DeMonte
1992
Neurosurgery



Ehab Hanna
2004
HNS



Paul Gidley
2005
Neuro-Otology



Michael Kupferman
2007
HNS



Shirley Su
2013
HNS



Shaan Razza
2014
Neurosurgery



Marc Elie Nader
2017
Neuro-Otology

MDACC Head and Neck Team

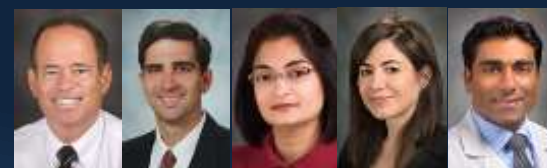


Head and Neck Surgery

Speech Pathology



Thoracic/Head and Neck Medical Oncology



Neuroradiology



Radiation Oncology/Medical Physics



Pathology



Oncologic Dentistry



Comprehensive Management of Skull Base Tumors

Edited by Ehab Y. Hanna & Franco DeMonte



informa
healthcare

Thank you

