Submandibular Neoplasms

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Objectives

- Clinical diagnosis of patients with submandibular neoplasms
- - Clinical signs and symptoms
  - Differentiation of neoplasm from inflammatory condition
- Surgical management
- Adjuvant radiation therapy for select submandibular carcinomas
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Submandibular Gland Neoplasms

- Approximately 60-65% are benign
- Pleomorphic adenoma most common
- Other benign neoplasms -
  - myoepithelioma
  - oncocytoma
  - cystadenoma
  - basal cell adenoma

Submandibular Carcinomas

- Heterogeneous group of tumors
- Varied clinical behavior
- Most common tumors-
    1) Adenoid cystic carcinoma
    2) Mucoepidermoid carcinoma
    3) Adenocarcinoma
    4) Carcinoma ex-pleo adenoma
    5) Acinic cell carcinoma

Submandibular Gland Neoplasms

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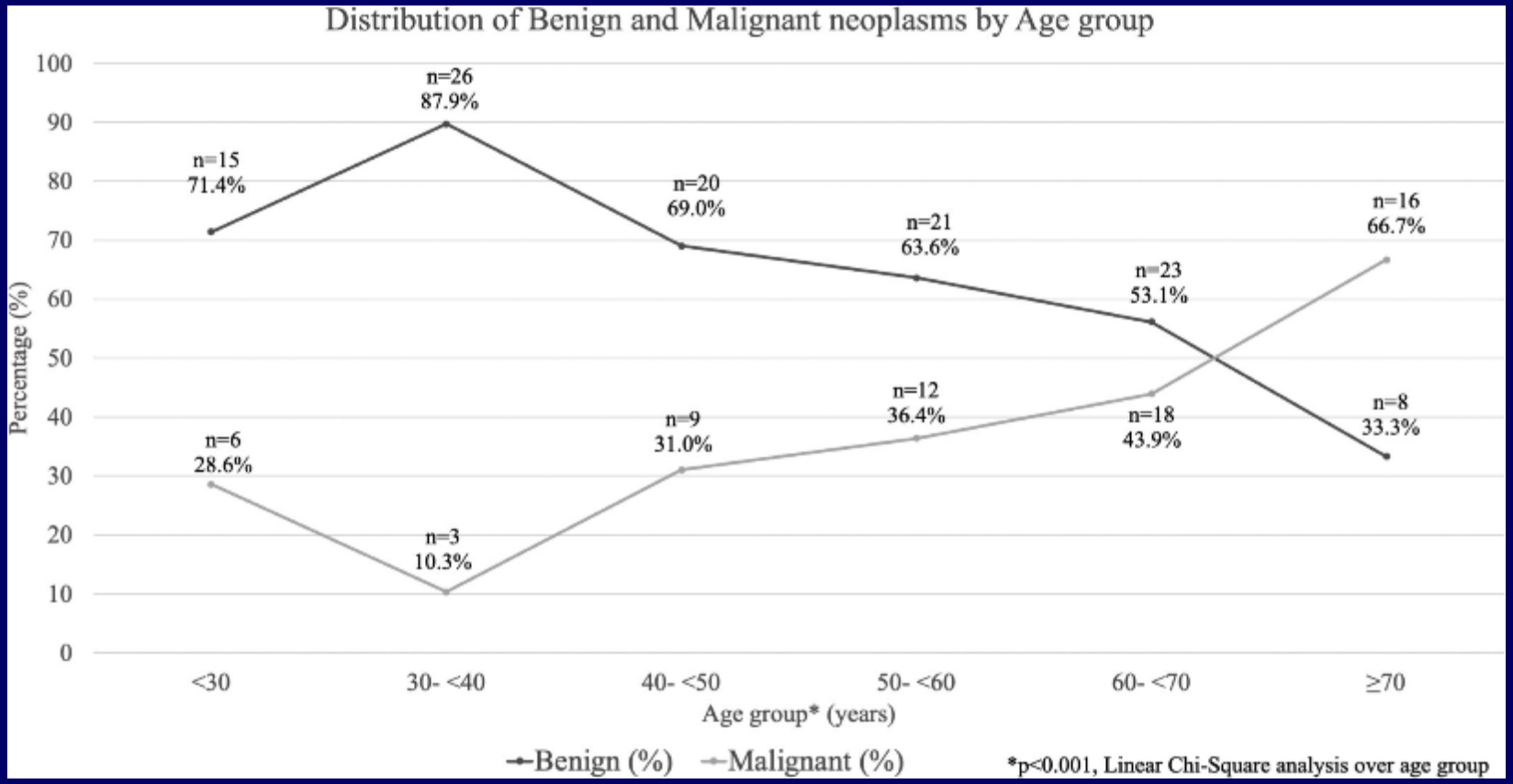


History

- Onset, growth rate
- Symptoms – pain, sensory loss, facial weakness, tongue weakness, trismus
- Differentiate from symptoms suggestive of gland outflow obstruction or inflammation
- History of radiation

Physical Examination

- Complete head and neck examination
- Bimanual palpation
  extent, mobility related to adjacent structures
- Cervical nodes
- Cranial nerve integrity
  facial, lingual, hypoglossal

Submandibular Gland Malignancies

Vander Poorten et al; Cancer, 1999

Bornthe et al; J Rad Oncol Biol Phys, 1886

- Painless neck mass 70-80%
- Pain 20-30%
- Other signs :
  - fixation 2%
  - skin invasion 7%
  - facial paralysis 7-10%
  - cervical lymphadenopathy 17%

Fine Needle Aspiration Biopsy

- Good approach to establish the diagnosis of neoplasm
- Not intended to establish a definitive diagnosis
- Helpful to avoid surgery in select patients:
  - reactive lymph node
  - lymphoma
  - non-neoplastic disorder eg. inflammatory
- Guides imaging, consultations, extent of surgery discussion, surgery timing

Fine Needle Aspiration Biopsy

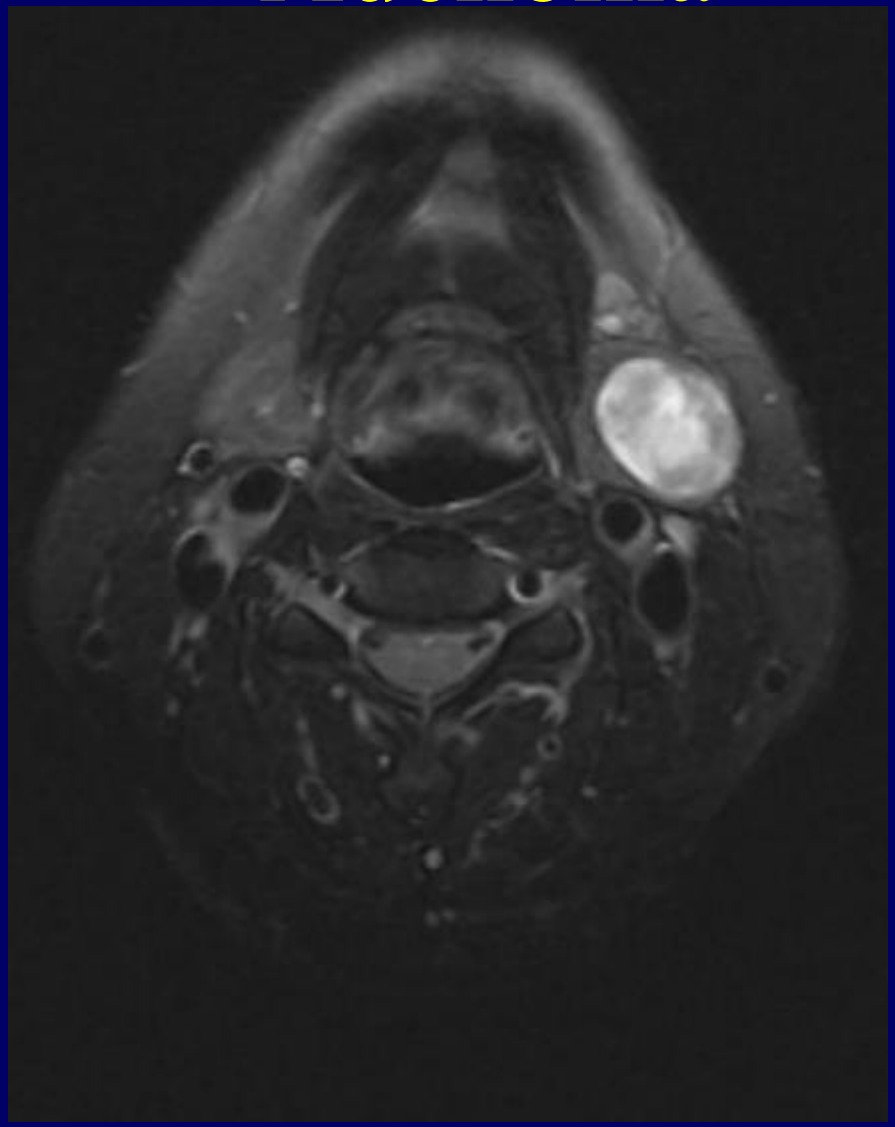
- Accurate aid for neoplasm diagnosis
  90-95%
- Adequate tissue sampling necessary
- Improved with core needle technique
- Image-guidance sometimes helpful
  - Ultrasound
  - CT Scan
- Clinicopathological correlation important

Submandibular Gland Cytopathology - Milan System ROM

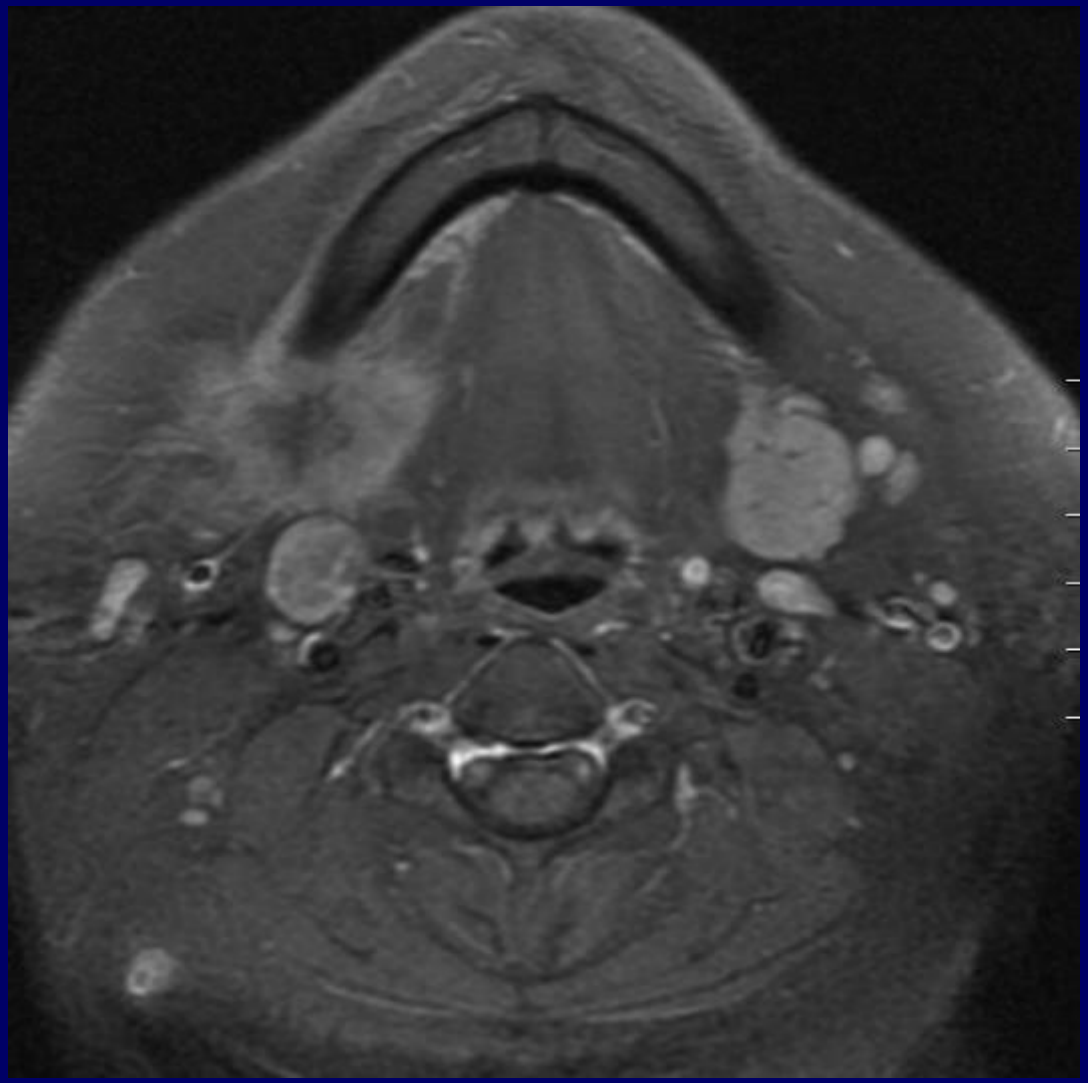
Maleki, Z; Cancer Cytopathol, 2019

Milan System Diagnostic Category	Total Cases, No. (%)	Cases With Surgical Follow-Up, No. (%)	Surgical Correlation, No.			Risk of Neoplasm, %	Risk of Malignancy, %
			Malignant Neoplasm	Benign Neoplasm	Nonneoplastic		
Nondiagnostic	157 (21.4)	47 (29.9)	5	11	31	34	10.6
Nonneoplastic	178 (24.2)	53 (29.8)	4	1	48	9.4	7.5
AUS	49 (6.7)	29 (59.2)	8	6	15	48.3	27.6
Benign neoplasm	134 (18.3)	93 (69.4)	3	90	0	100	3.2
SUMP	88 (11.9)	31 (35.2)	13	16	2	93.5	41.9
SM	26 (3.5)	17 (65.4)	14	2	1	94.1	82.3
Malignant	102 (13.9)	63 (61.8)	59	2	2	96.8	93.6

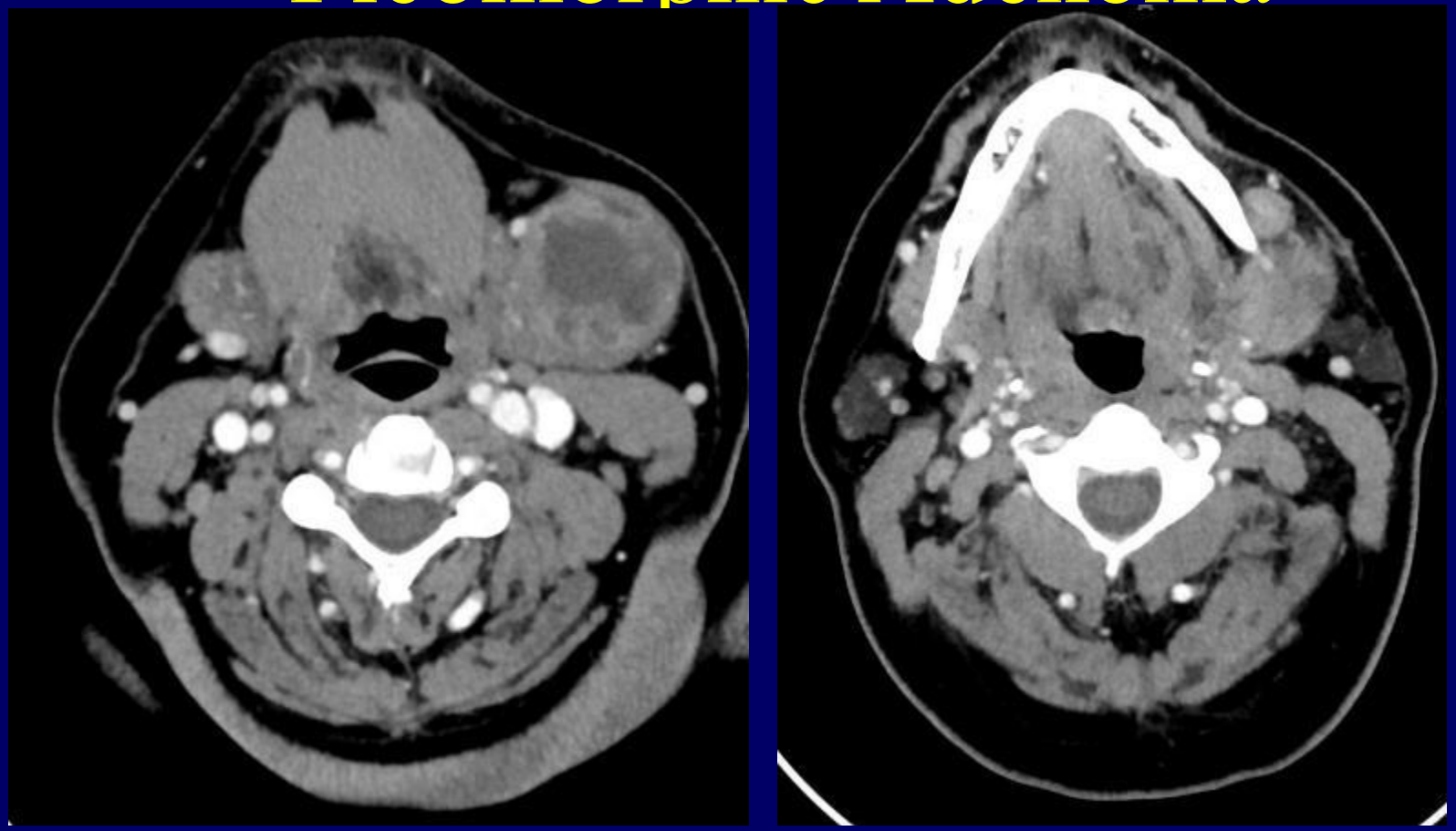
MRI – Left SMG Pleomorphic Adenoma



MRI - Right Submandibular Gland Adenocarcinoma



CT Scan – Left Carcinoma Ex-Pleomorphic Adenoma



Submandibular Gland Mass
Conley et al; Ann Otol, 1972

" there is a operating built-in deception because the dominant and most frequently found pathology in this region is that of inflammation. In a sense, this conditions the surgeon to be unprepared for malignant neoplasia…When a diagnosis of cancer is forthcoming there is embarrassment and disappointment."

IgG4 Related Sialadenitis

- Formerly known as Kuttner Tumor
- Relationship between chronic sclerosing sialadenitis and IgG4 described in 2010
  Geyer et al; Am J Surg Pathol, 2010
- Lymphoplasmacytic infiltrate with increased IgG4-positive plasma cells
- Manifestation of systemic disorder
- Wide spectrum of disease manifestations
- Clinical presentation varies based on organs affected

IgG4 Related Sialadenitis

- Usually middle-age; male predominance
- Neck mass most common complaint
- Characteristic morphological appearance
  - marked lymphoplasmacytic infiltrate
  - storiform fibrosis (irregular whorled pattern)
  - obliterative phlebitis
- Elevated serum IgG4, 70-80% sensitivity
- Rheumatology consultation
- Corticosteroid therapy

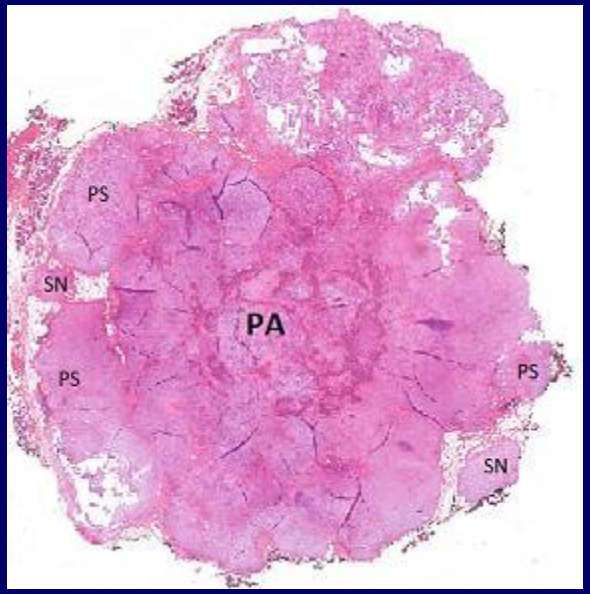
Submandibular Benign Neoplasm - Extent of Surgery

- Complete tumor resection, usually with entire gland
- Avoid tumor violation and spillage
- Very small proportion of patients have decreased resting saliva production, or neck asymmetry
- Partial sialadenectomy for select tumors

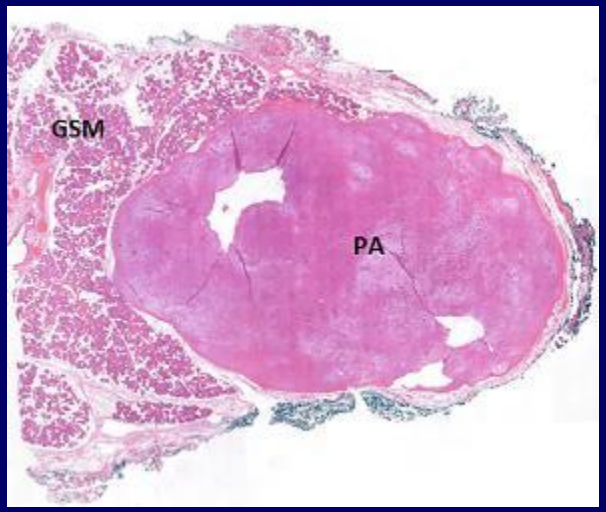
Roh, JL, Park, CI; Br J Surg, 2008
Dou et al; J Cranio-Maxillofac Surg, 2025

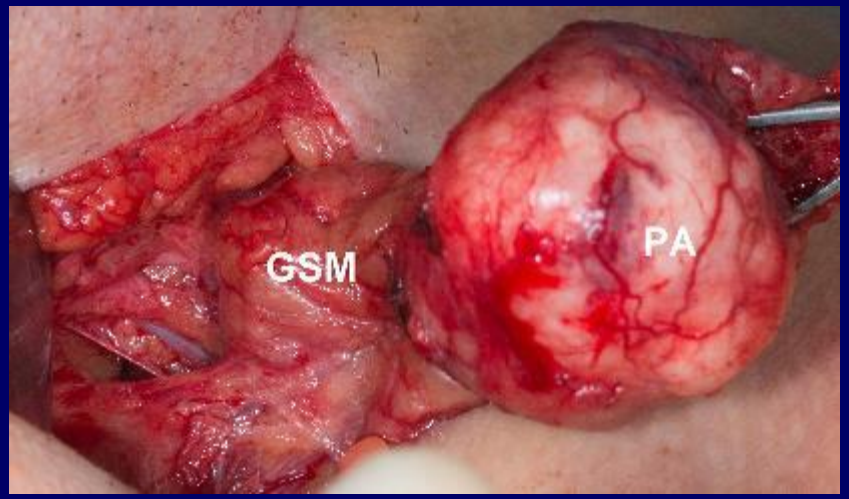
SMG vs. Parotid Pleomorphic Adenoma

Mantsopoulos, K; Oral Diseases, 2022

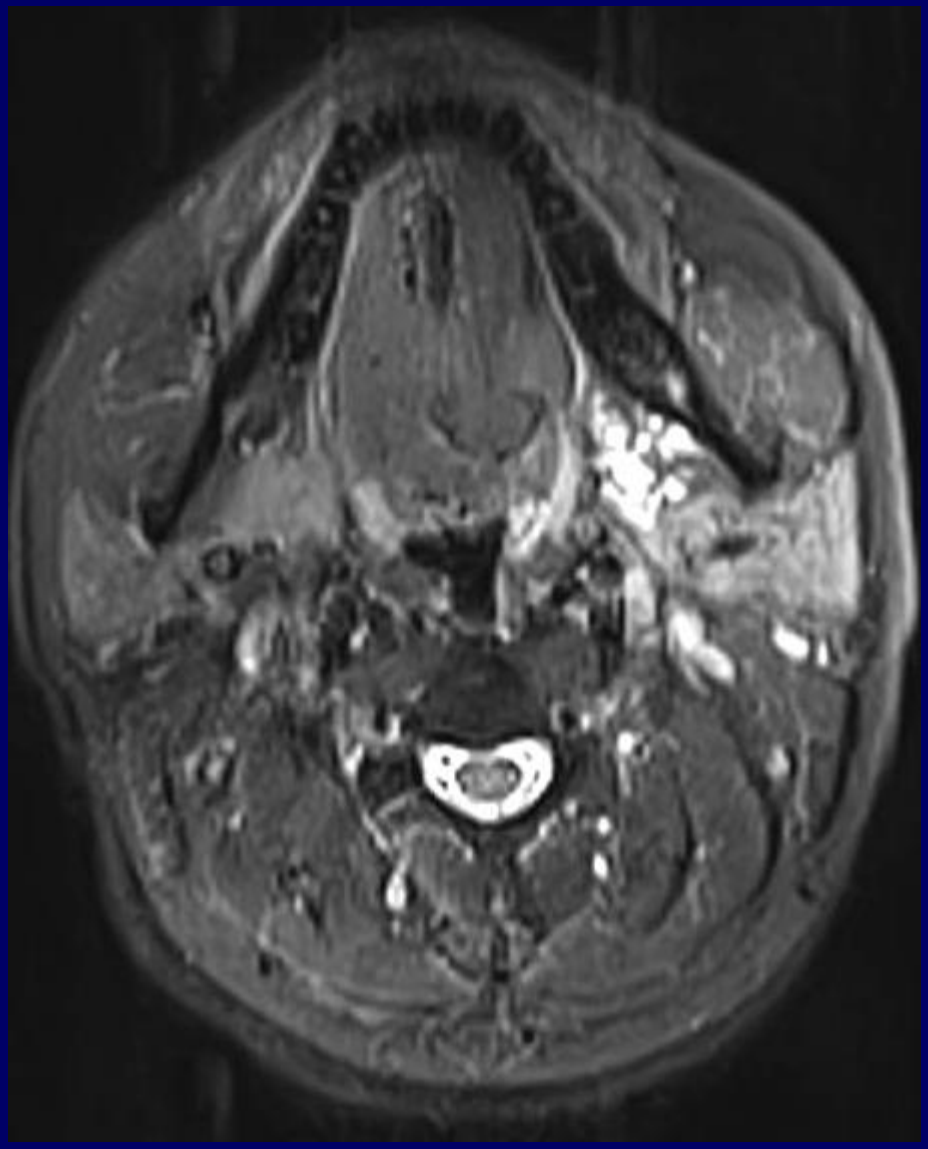


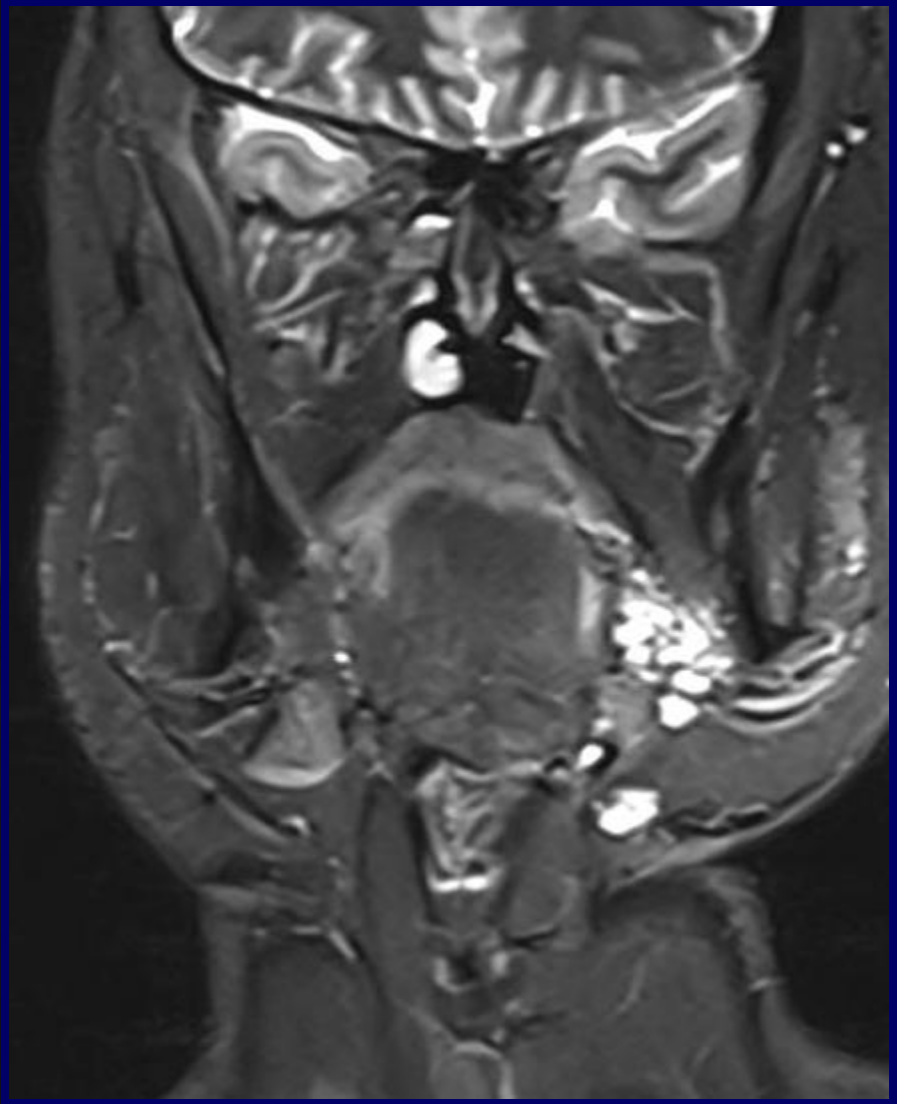
Submandibular gland PAs characterized by the consistent presence of an intact anatomical capsule, infrequent occurrence of pseudopodia and satellite nodules



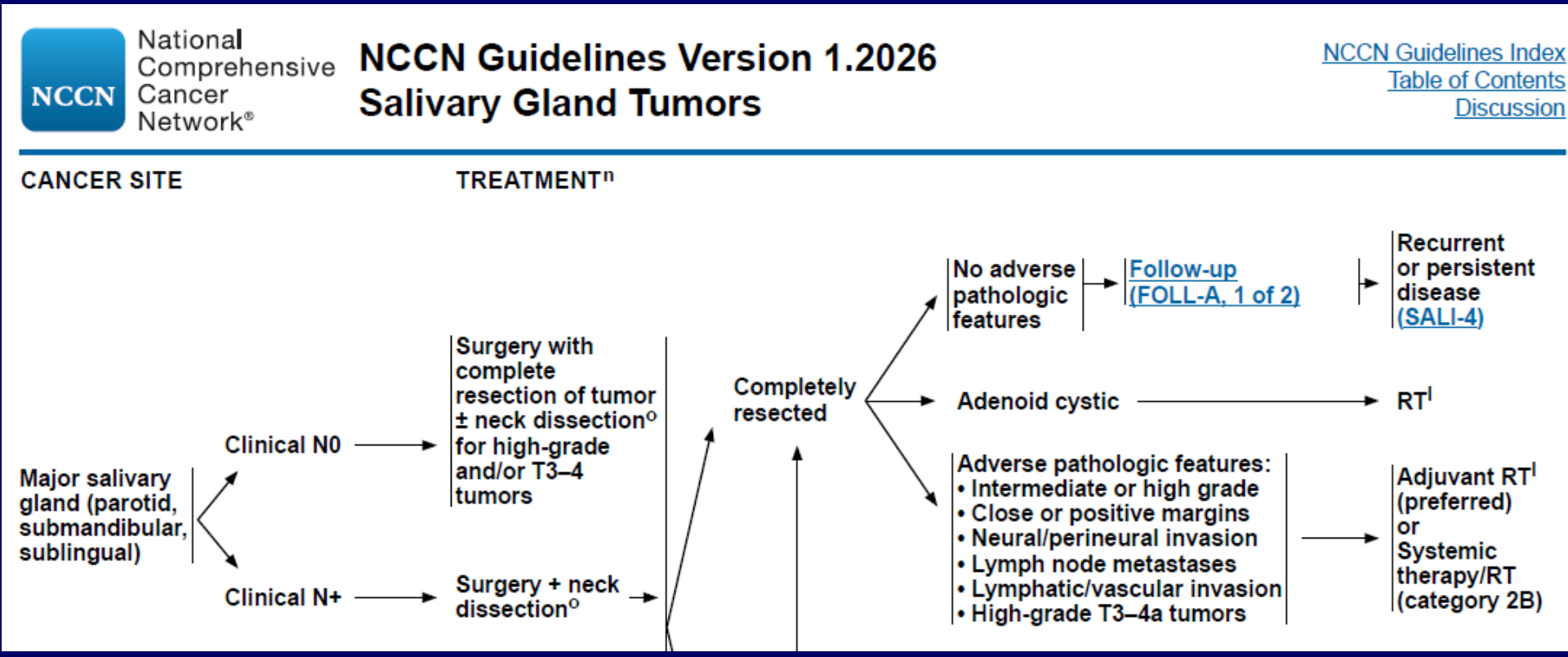


MRI – Recurrent Pleo Adenoma





NCCN Guidelines - Salivary Carcinomas



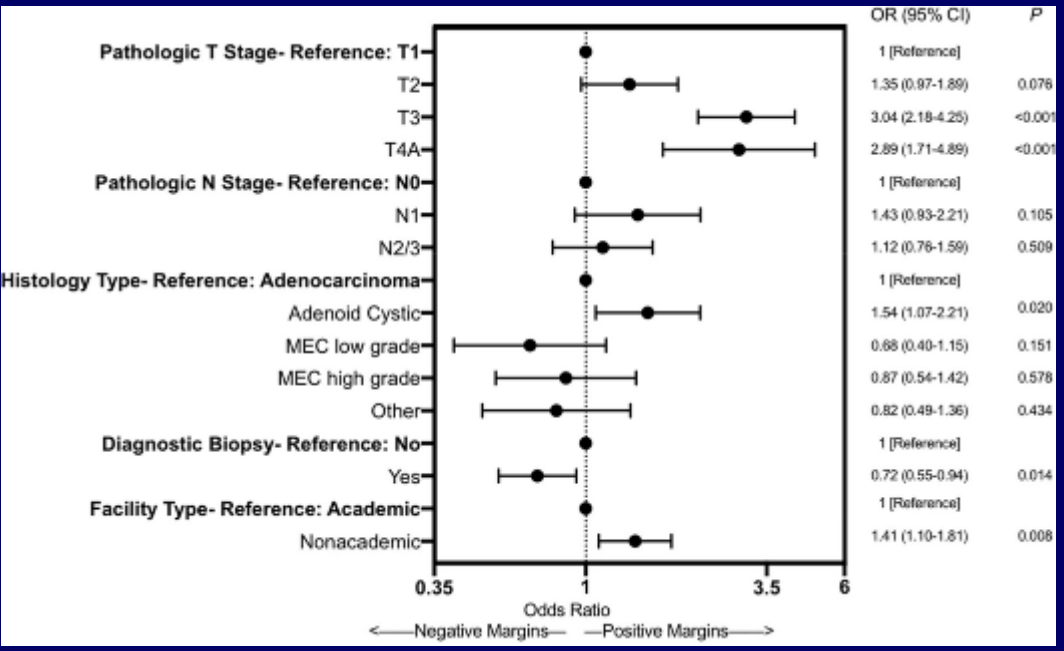
Submandibular Malignant Neoplasm - Extent of Surgery

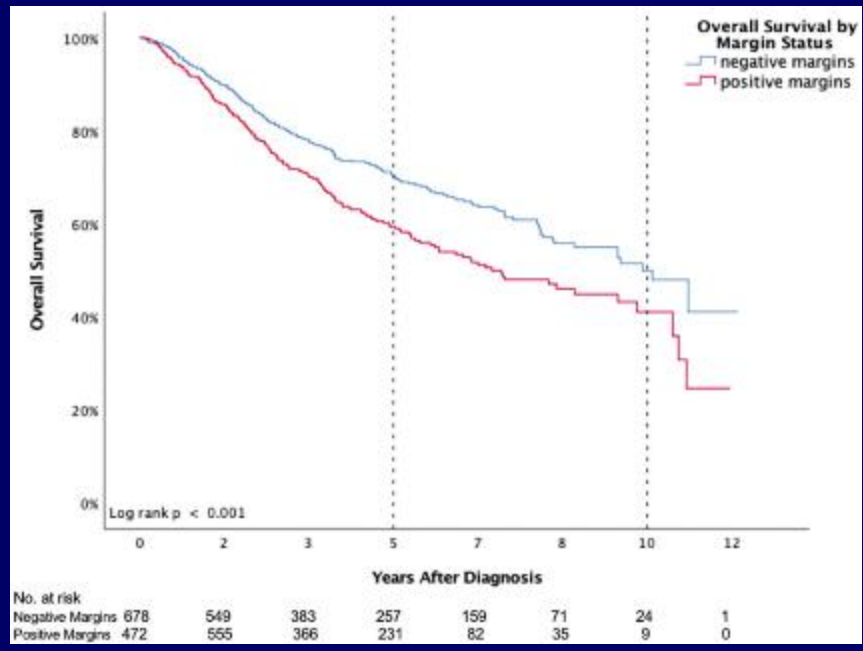
- Complete tumor resection with gland resection
- Regional dissection of submandibular triangle
  Weber et al; Arch OHNS, 1990
- Resect extra-glandular tissues as required
  Nerves - lingual, hypoglossal, facial
  Muscles - platysma, digastric, mylohyoid, hyoglossus, styloglossus
  Floor of mouth mucosa
  Tongue
  Mandible, Skin
- Goal is to achieve clear surgical margins

Submandibular Gland Carcinoma - Surgical Margins

Benchetrit, L et al; OHNS, 2019

- National Cancer Database 2004-214
- n = 1150
- Positive surgical margin rate - 41%





Submandibular Gland Carcinoma - Neck Management

- Clinically N+ comprehensive neck dissection
- Clinically N0
  - Occult nodes 15-20%

    Tamagawa, K et al; Eur Arch ORL, 2023

    Warshavsky, A et al; OS OM OP OR, 2022
  - Consider elective ND (levels I, II) for T3, T4 tumors, high-grade tumors*

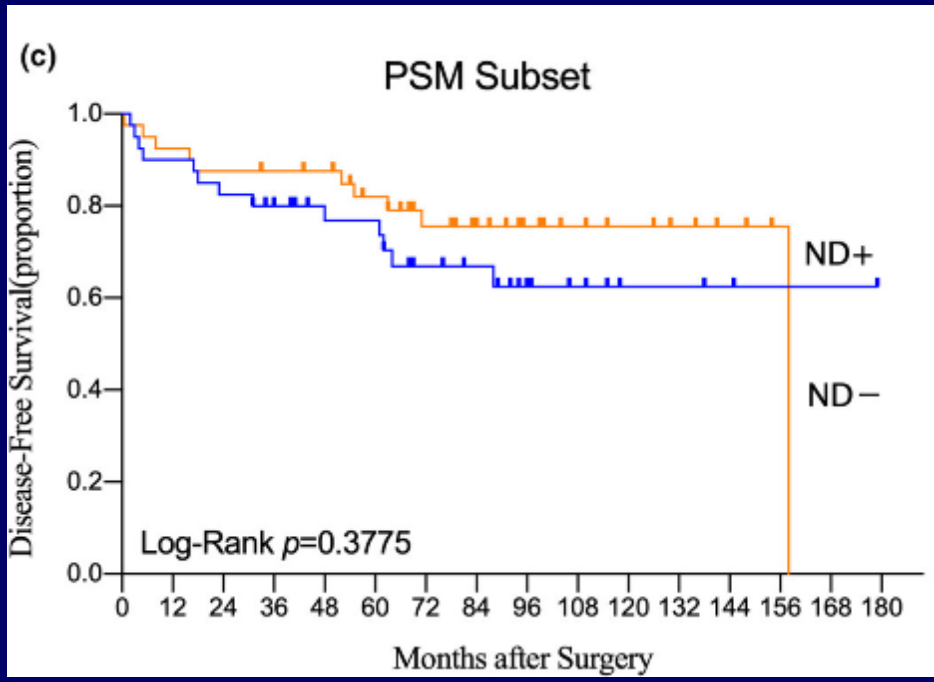
	Ia (%)	Ib (%)	IIa (%)	IIb (%)	III (%)	IV (%)	V (%)
cN + /pN +	1 (8)	9 (75)	10 (83)	2 (17)	10 (83)	4 (33)	5 (42)
n = 12							
cN - /pN +	1 (17)	3 (50)	3 (50)	1 (17)	0	0	0
n = 6							

Tamagawa, K et al; 2023

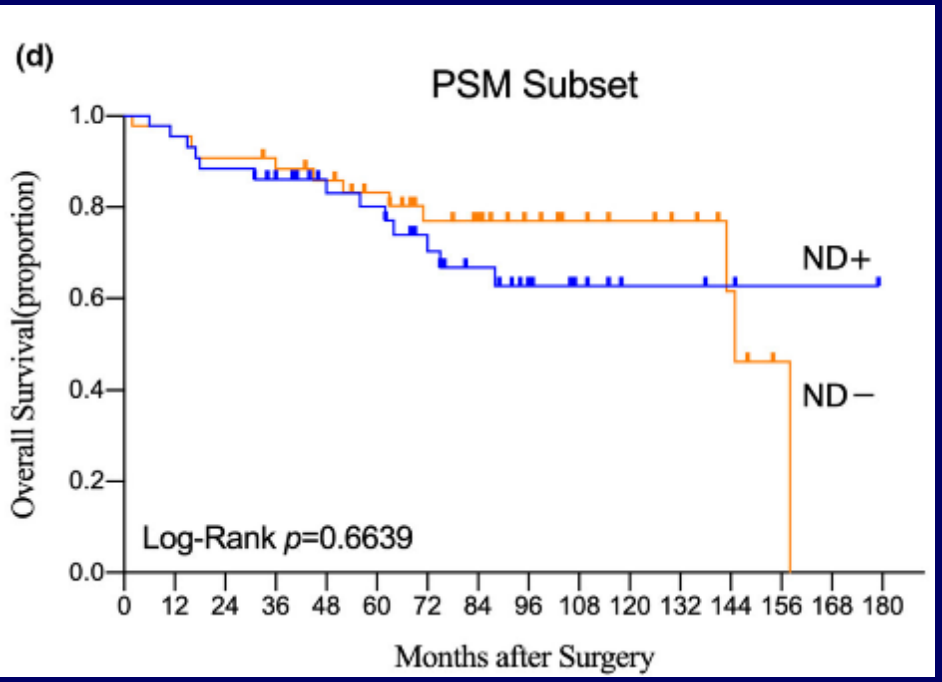
Elective Neck Dissection - Submandibular Gland Carcinoma (ACC excluded)

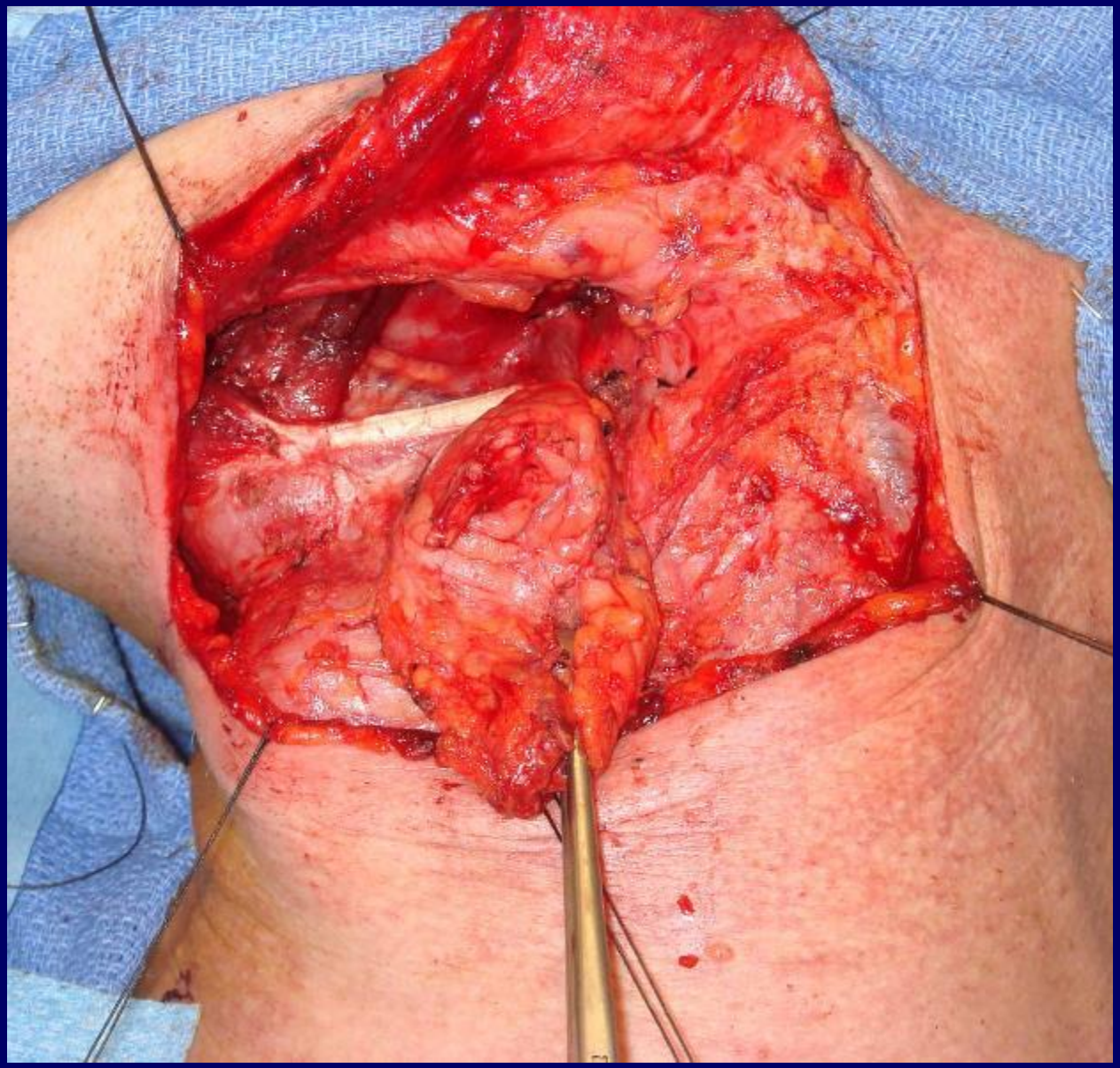
Liu, S; Oral Diseases, 2023

DFS



OS



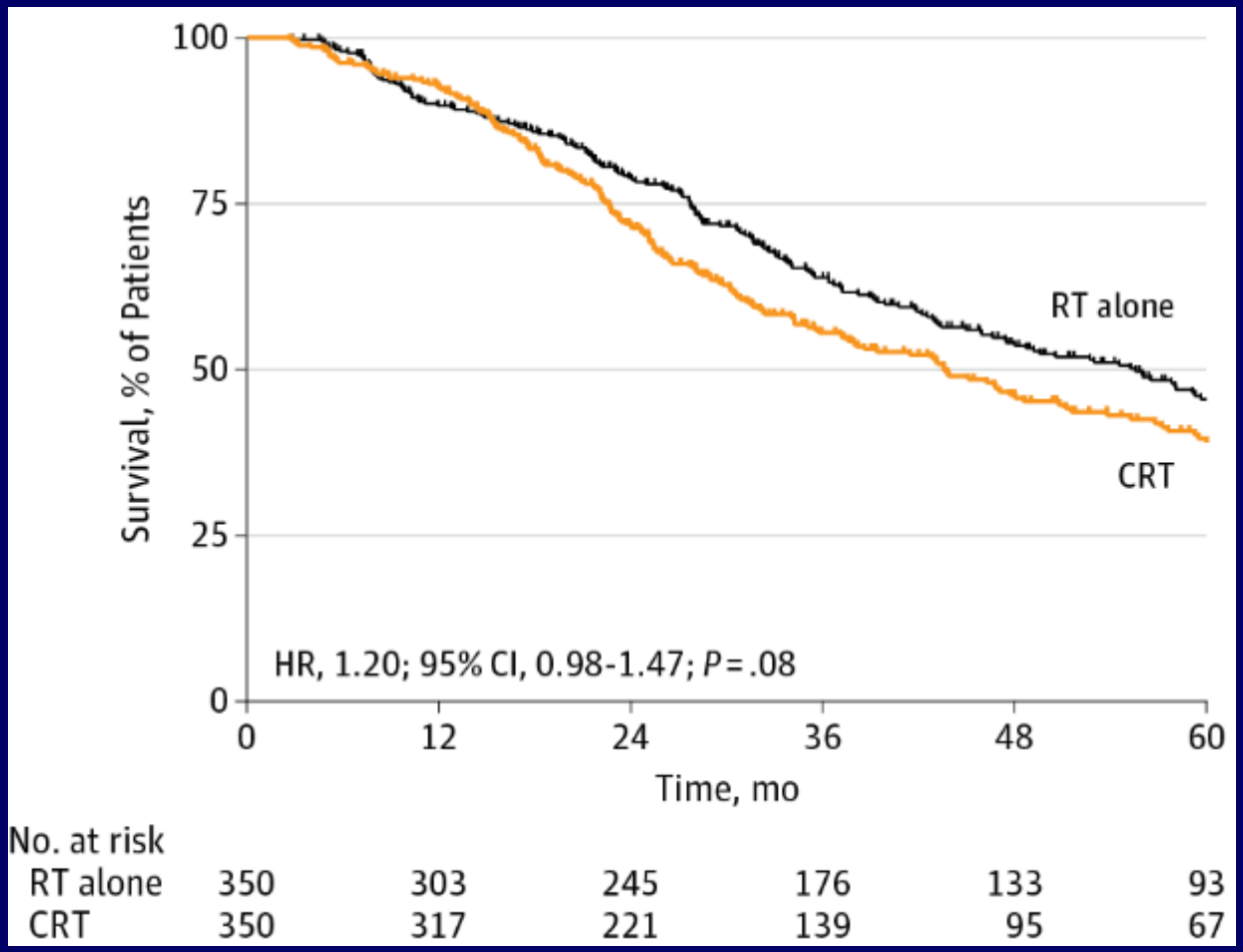


Postoperative Radiation Therapy - Indications

- Large and high-grade malignant tumors
- Perineural or perilymphatic invasion
- Nodal metastases
- Microscopic residual disease (consider reop)
- Concurrent chemoradiotherapy recommended to the context of a clinical trial (RTOG 1008 completed recruitment)

Adjuvant Chemoradiotherapy

Amini A et al; JAMA, 2016



Malignant Submandibular Gland Tumors
SEER Database 1973-2011
Lee et al; JAMA Otolaryngol Head Neck Surg, 2015

- 2626 patients
- 52.9% men and 47.1% women
- Mean age of 61.3 years
- Adenoid cystic carcinoma (36.0%)
  Squamous cell carcinoma (18.1%)
  Mucoepidermoid carcinoma (16.9%)
  Adenocarcinoma (13.7%)

SEER Database 1973-2011

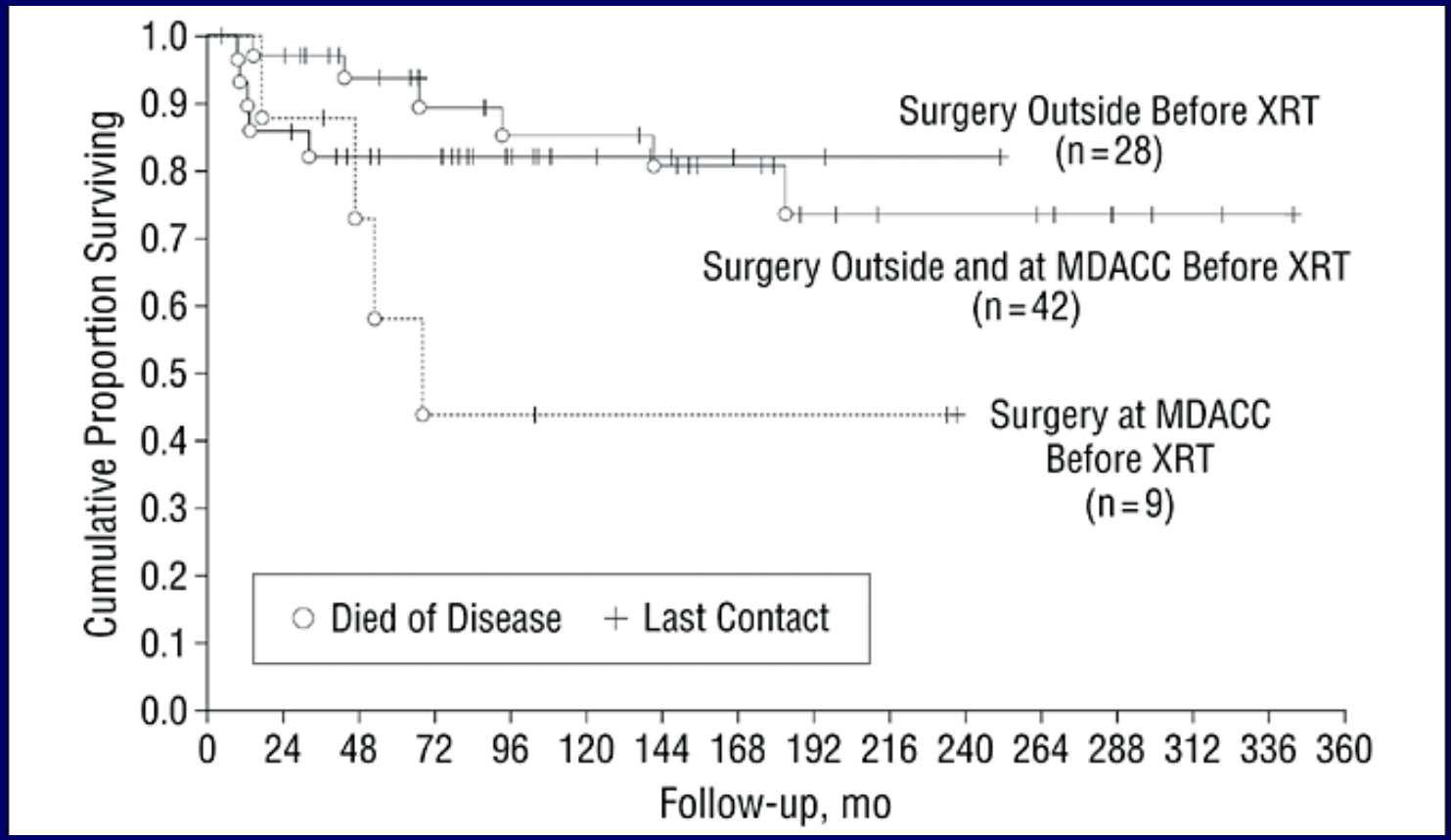
Lee et al; JAMA Otolaryngol Head Neck Surg, 2015

- Multivariate Cox regression analysis
- Independent predictors of OS and DSS -
  - Age
  - Gender
  - Tumor grade
  - Tumor stage
  - Surgical resection completeness

Submandibular Gland Excision - Adenoid Cystic Carcinoma

Enucleation and XRT vs. Enucleation then Definitive Surgery and XRT

Kaszuba et al: Arch OHNS, 2007



Effect of specific treatment sequences before radiation therapy (XRT) on survival of patients with submandibular gland cancer

Summary

- Most submandibular gland neoplasms present as an asymptomatic neck mass
- Most are benign, but there is a higher proportion of malignant tumors relative to the parotid
- Important to differentiate a neoplasm from an inflammatory condition
- Goal is complete surgical resection of the primary neoplasm, benign or malignant
- Select patients with malignant neoplasms are candidates for adjuvant therapy

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