THE UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Extracapsular Dissection for Parotid Tumors

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Professor and Chair
UTHSC Otolaryngology-Head & Neck Surgery

Disclosures

Scientific Advisory Board	CryOSA
Consulting	HuMannity; LivaNova
Research Funding	Nyxoah; CryOSA (Department)

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Parotid Tumor Enucleation (Pre-1950's)

Parotid Tumor Operations

The Case Against Enucleation

S. L. PERZIK, M.D., Beverly Hills

California Medicine, 1955

• So-called mixed "encapsulated" parotid tumors are best managed by surgical procedures which avoid contact with the "capsule." Enucleation is often a hazardous and incomplete procedure. Subtotal or total parotidectomy with exposure of the facial nerve to avert accidental damage to it is the treatment of choice.

Microscopic study of the periphery of such tumors reveals that the "capsule" does not fully encapsulate; hence, enucleation and lesser procedures may leave neoplastic tissue behind.

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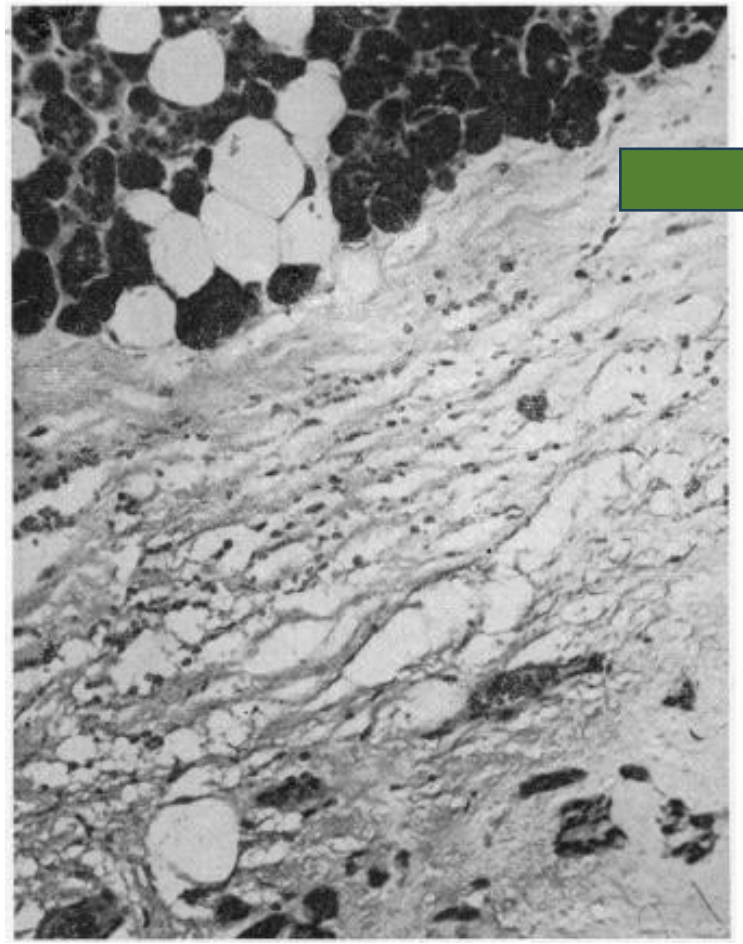
Parotid Tumor Enucleation (Pre-1950's)



Lack of a true capsule

"The danger of any procedure less than subtotal parotidectomy in the management of parotid tumors is well illustrated by microscopic study of the so-called "encapsulated" neoplasm."

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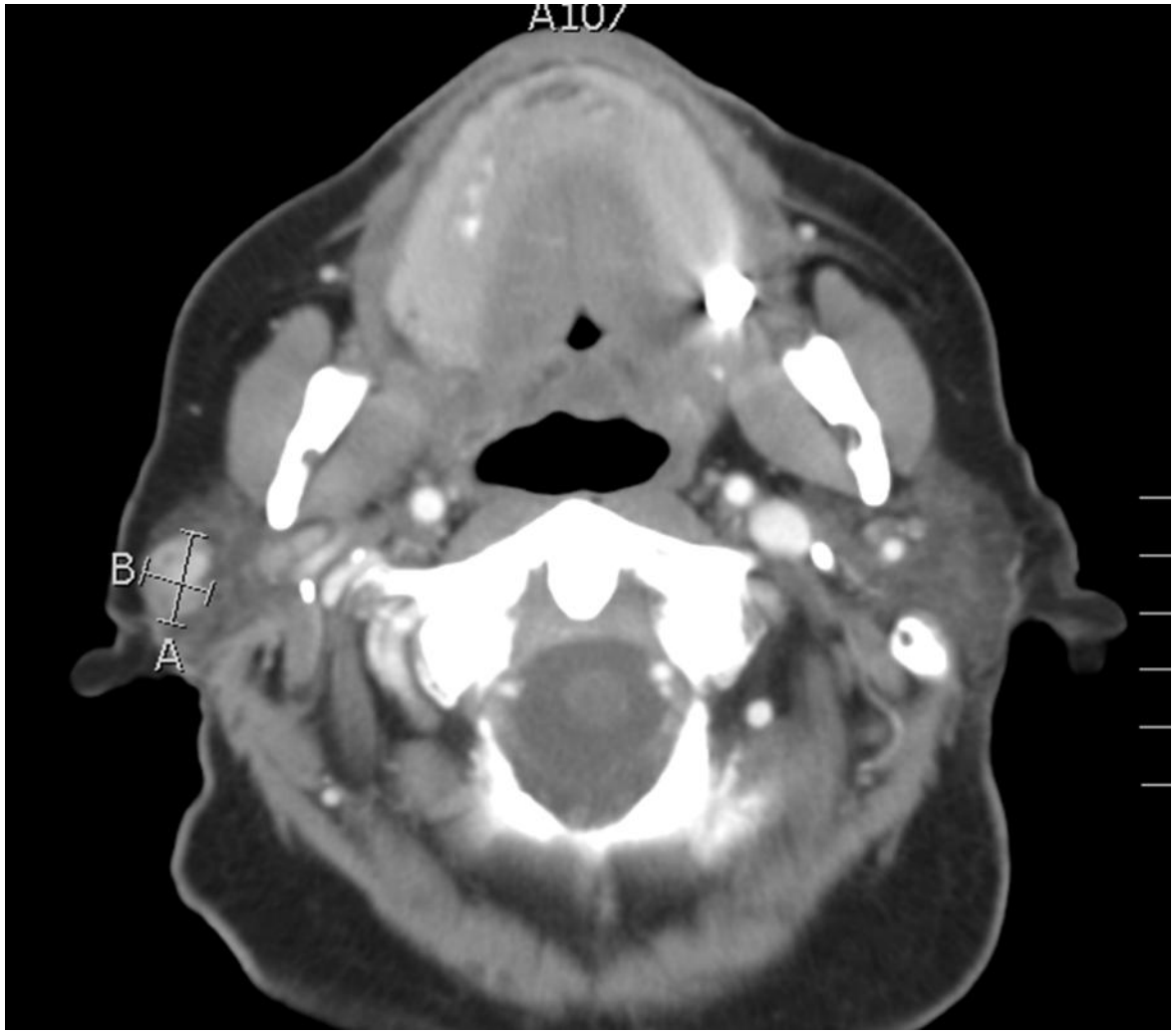
Parotid Surgery circa 1990's



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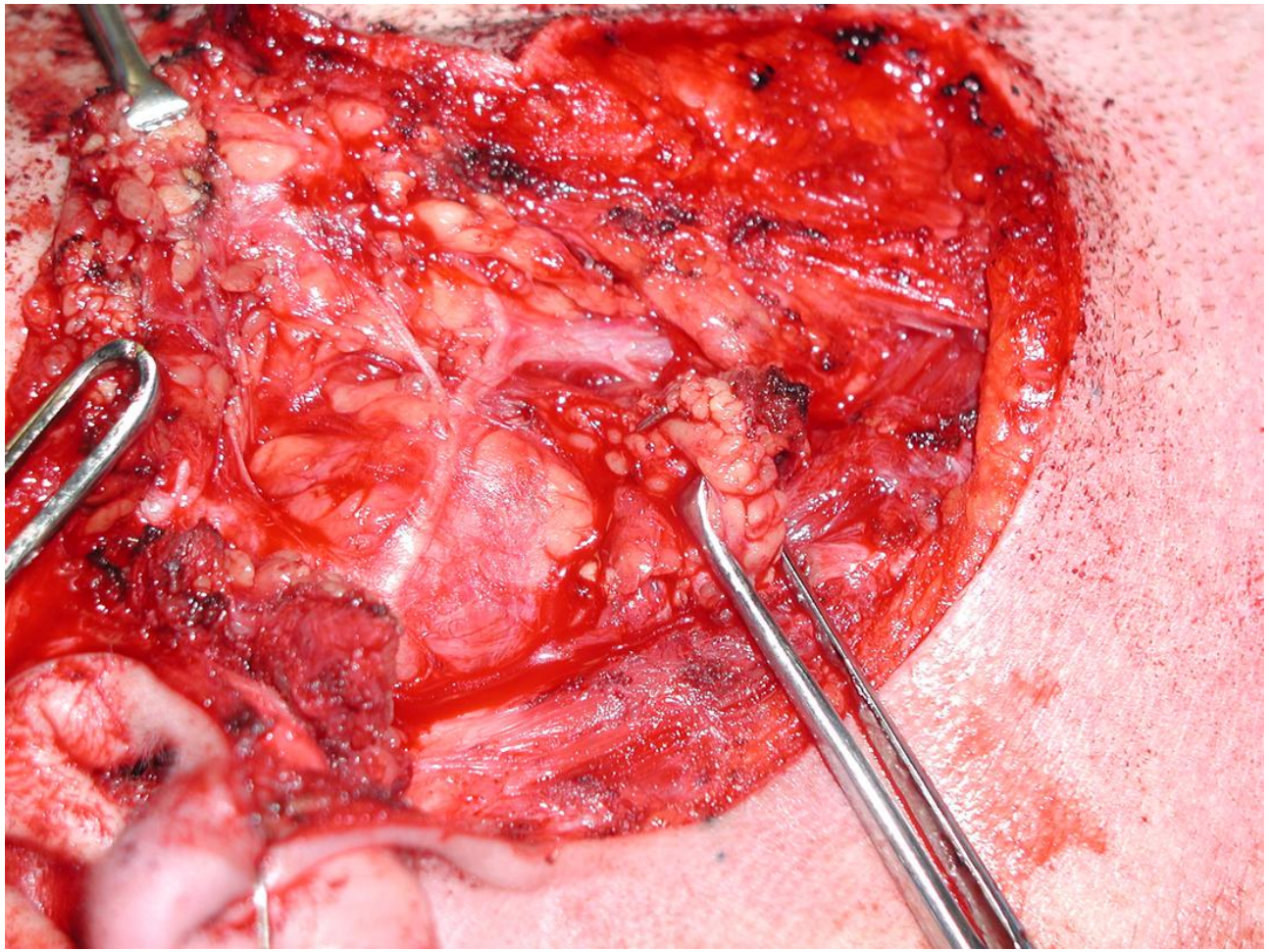
Parotid Surgery circa 1990's



- Low tumor recurrence rate (2%)
- Long scar line
- Loss of glandular function
- Loss of glandular volume
- Increased risk of Frey syndrome
- Increased risk of temporary FN paresis

I. Evidence for ECD

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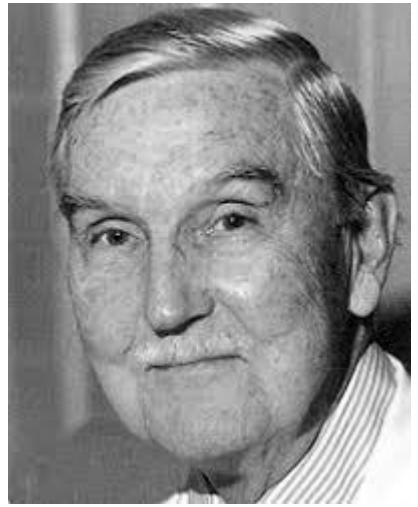
Extracapsular Dissection

Capsular significance in parotid tumor surgery: Reality and myths of lateral lobectomy. *Laryngoscope* 1984; 94: 324-329

60% of parotidectomy specimens show evidence of partial capsular dissection.

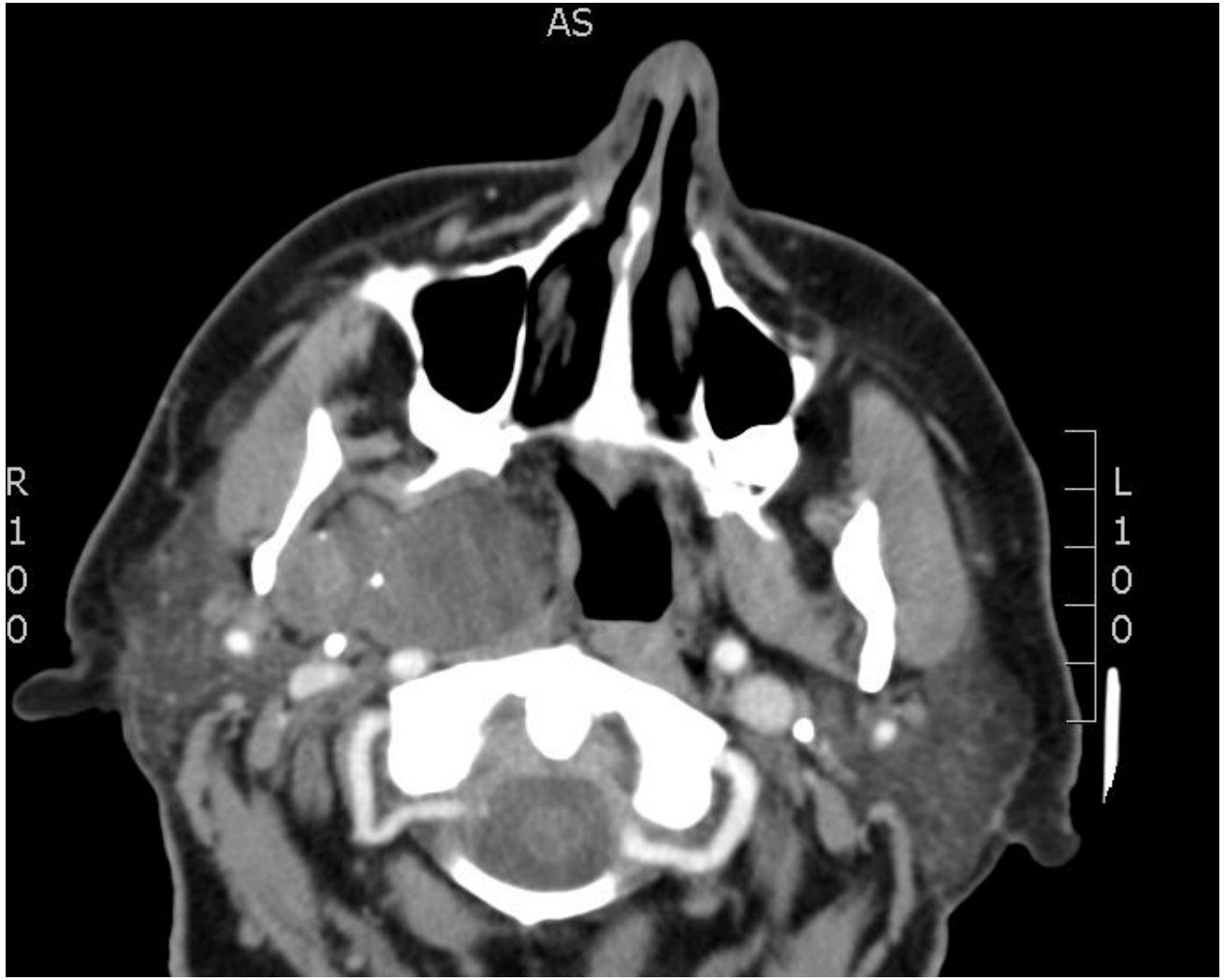
- **Peeling tumor off the facial nerve**
- **Parapharyngeal/Deep Lobe**
- **Raising skin flap off tumor**
- **Common technique for recurrent pleomorphic adenoma nodules**



John J. Conley, MD

Historically, parotid gland surgery has evolved from an operation of surgical enucleation to that of lateral lobectomy or total parotidectomy with facial nerve dissection. While the enucleation operation originally resulted in recurrence rates as high as 45% in some series, the technique of lateral lobectomy has resulted in recurrence rates of 2% in benign tumors. However, the currently recommended procedure of lateral lobectomy or total parotidectomy with facial nerve preservation for benign or low grade malignant tumors is not a pure ***en bloc*** resection in most cases, and ***in fact enucleation in part or total is often the reality of the operation.*** In over 60% of the cases, superficial or total parotidectomy with facial nerve preservation incorporated the principle of limited enucleation or capsular dissection at some point in the technique. The illusion that ***en bloc*** removal of parotid tumors with wide surgical margins is discredited. The reality of the procedure and the reasons for its success are examined.

Donovan and Conley, 1984



Parapharyngeal space tumors removed by extracapsular finger dissection with low rates of recurrence.

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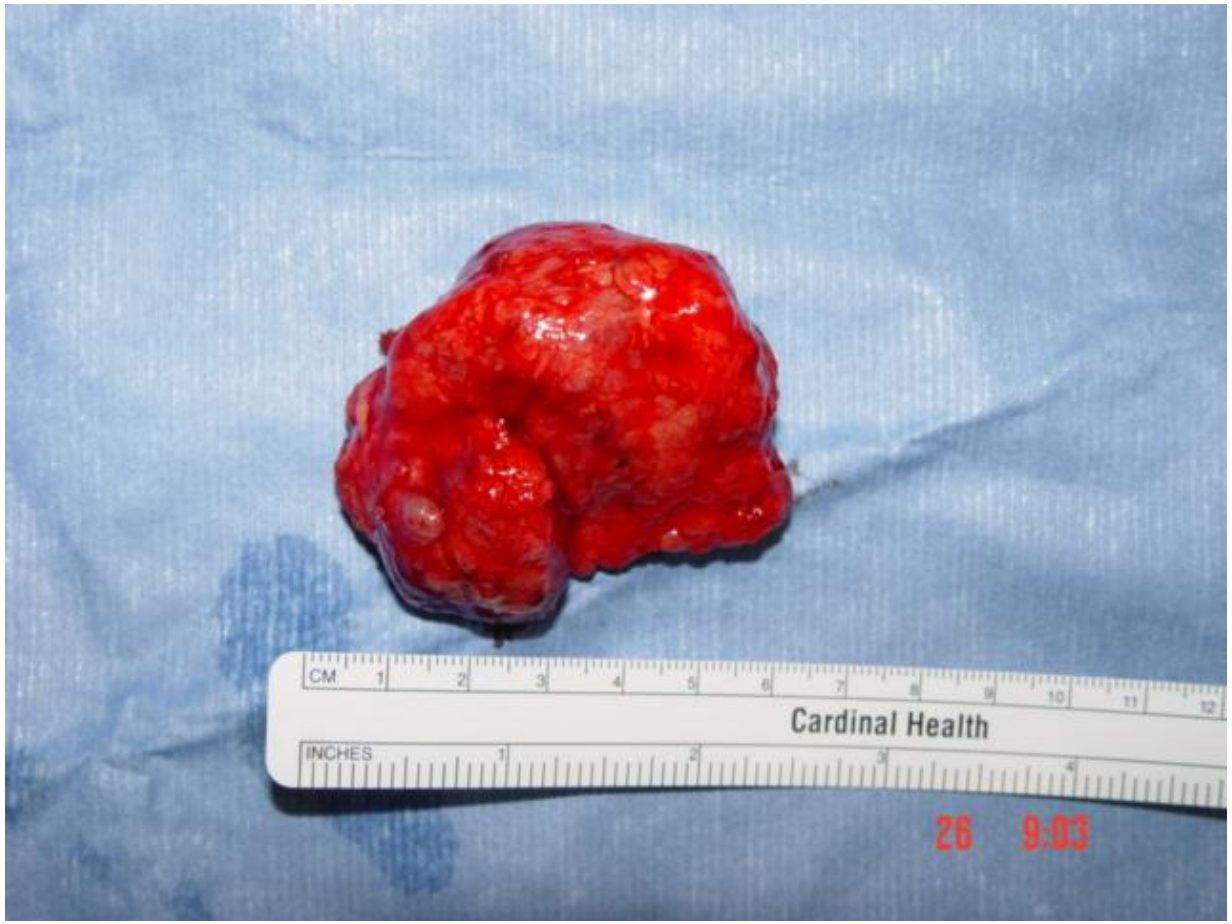

Excised PA of Parapharyngeal Space Tumor with capsule intact

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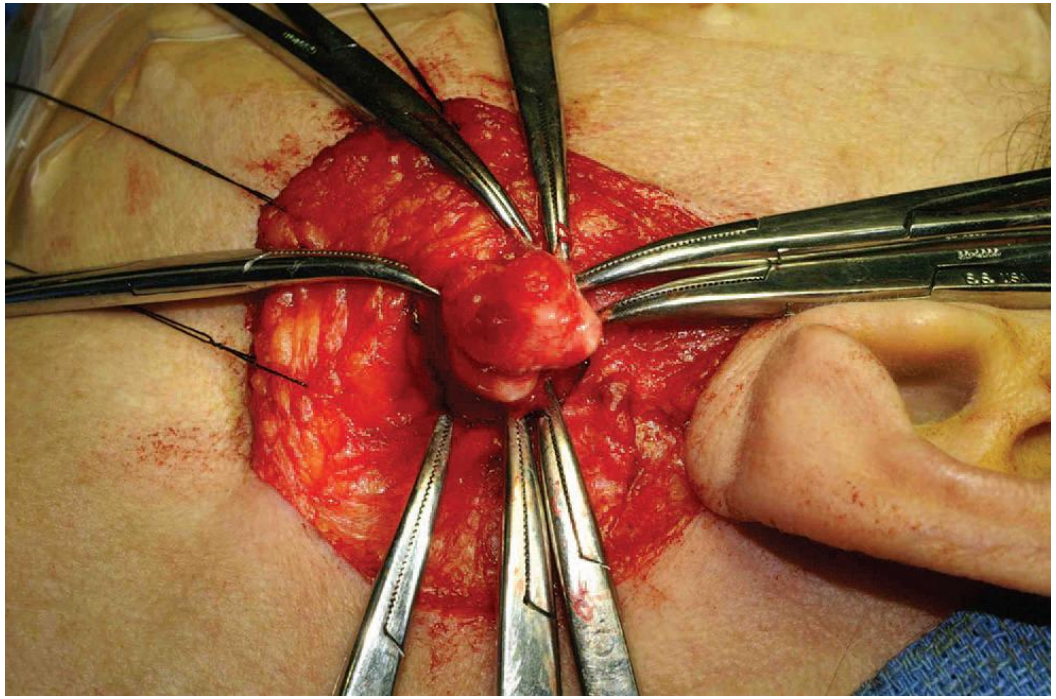
Extracapsular Dissection for Benign Parotid Tumors



Smith, S.L. and A. Komisar, ***Limited parotidectomy: the role of extracapsular dissection in parotid gland neoplasms.*** **Laryngoscope, 2007. 117(7): p. 1163-7.**

- First described in 1979
- Alternative surgical modality to superficial parotidectomy
- Plane of dissection in loose parenchymal tissue 2-3mm adjacent to the tumor
- Differs from enucleation (intracapsular technique)
- Removes tumor and pseudocapsule
- *No pre-identification of the facial nerve*
- Transformed a nerve dissection surgery into a tumor dissection surgery

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Extracapsular Dissection for Benign Parotid Tumors

- McGurk, M., et al., Clinical significance of the tumour capsule in the treatment of parotid pleomorphic adenomas. *The British Journal of Surgery*, 1996. **83**(12): p. 1747-9.
- 475 clinically benign superficial parotid tumors treated by ECD and SP (380 and 95 patients respectively)
- 12.5 year follow-up showed no difference in recurrence between the two groups with similar rates of permanent facial nerve damage

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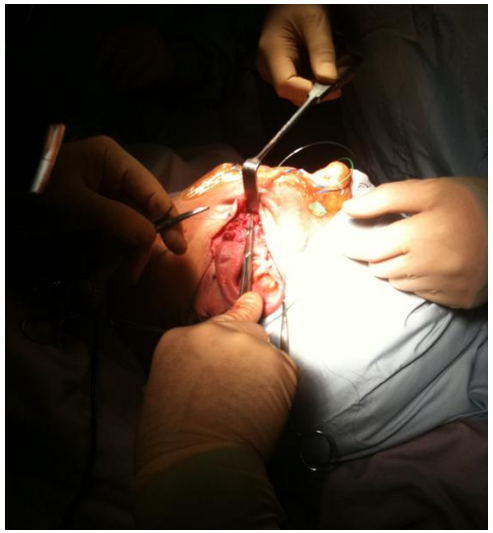
Gland Preserving Surgery circa 2000's

Germany

United Kingdom

Switzerland



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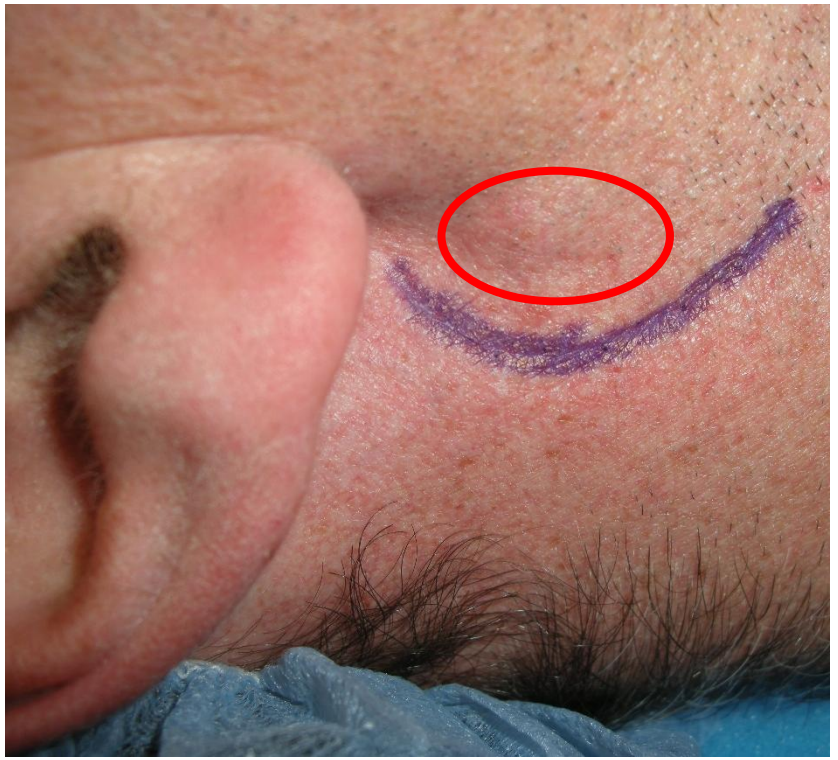
Extracapsular Dissection for Benign Parotid Tumors

Increasing Application Based On:

- Smaller, more cosmetic incision
- Same day surgery (no drain)
- Faster (avg. 60 minutes)
- Potentially fewer complications
- Can be converted to standard partial parotidectomy if not feasible
- Non-identified facial nerve well protected and easy to identify in the event of recurrence or malignancy requiring revision surgery.



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The Laryngoscope

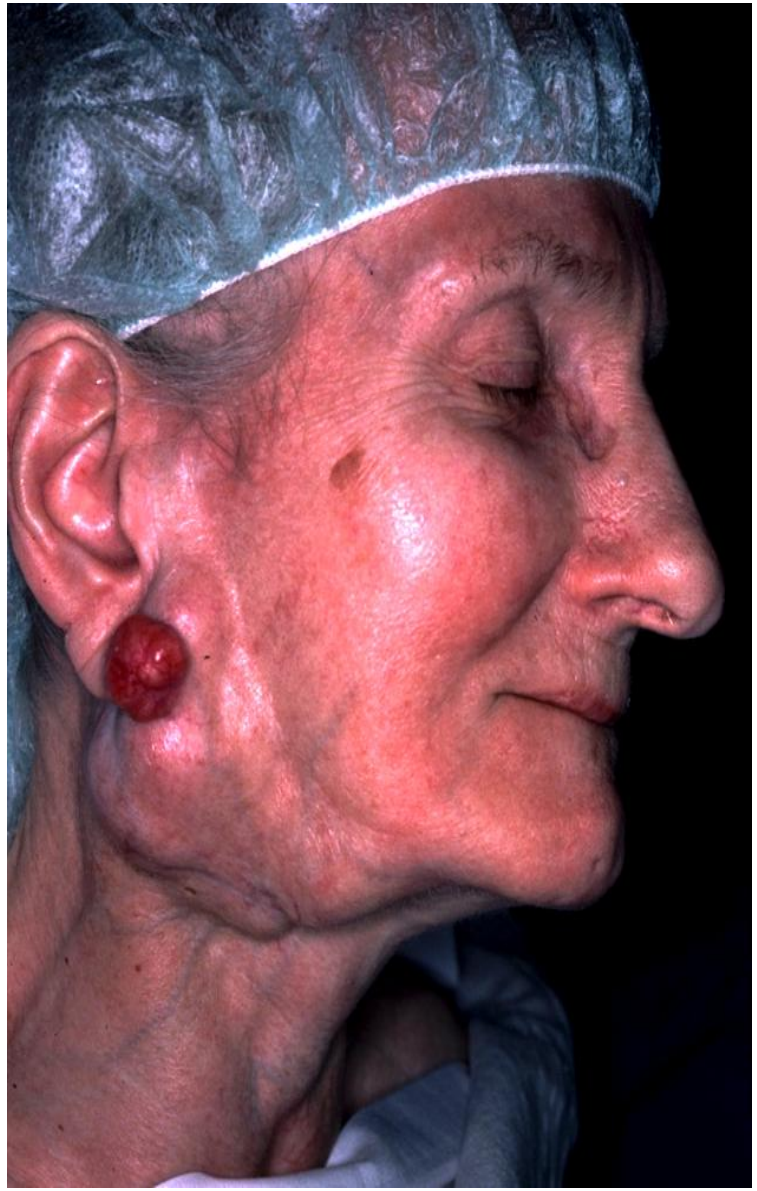
Extracapsular Dissection for Benign Parotid Tumors: A Meta-Analysis

W. Greer Albergotti, BA; Shaun A. Nguyen, MD, MA; Johannes Zenk, MD, PhD; M. Boyd Gillespie, MD, MSc

Laryngoscope 2012; 122: 1954-60.

- Meta-analysis of retrospective cohort studies comparing ECD to SP in terms of recurrence rates and/or complications
- Inclusion criteria:
- Comparison of ECD to SP with regard to at least one outcome of interest (recurrence, facial weakness, Frey syndrome)
- Exclusion criteria:
  - Inclusion of data on recurrent or multiple tumors which could not be separated from primary, solitary tumors
  - Non-parotid salivary tumors
  - Malignant neoplasms
- 9 papers (1882 patients) met inclusion criteria- ECD (1102) and SP (780)
- Mean follow-up time was 12 years (range 2 – 32 years)
- 5 countries represented
- Indications used by authors for ECD varied:
  - Clinically benign, superficial parotid tumor < 2.5 cm
  - Others used 4cm cut-off or large enough to allow for digital manipulation

Tumor Recurrence



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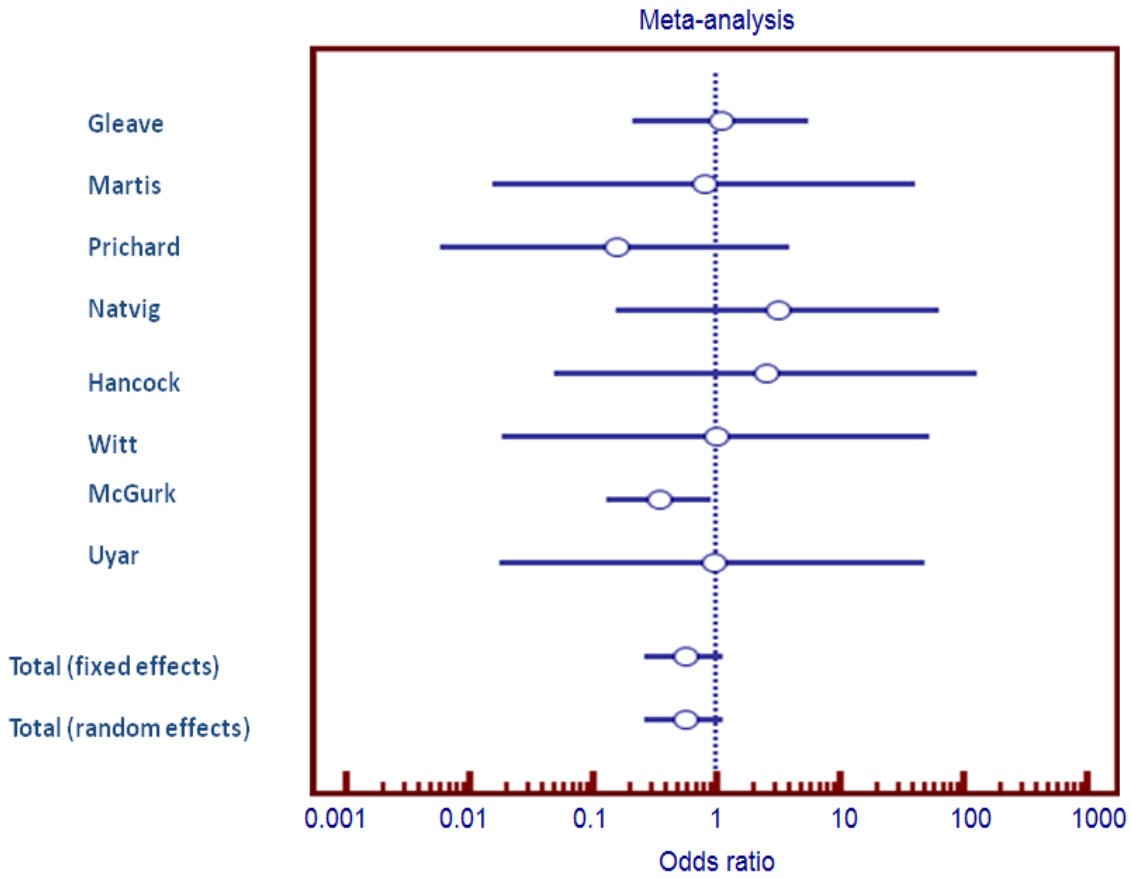
Recurrence Results

Recurrence rate

- ECD 1.5% (14/963 cases)
- SP 2.4% (16/670 cases)

No significant difference



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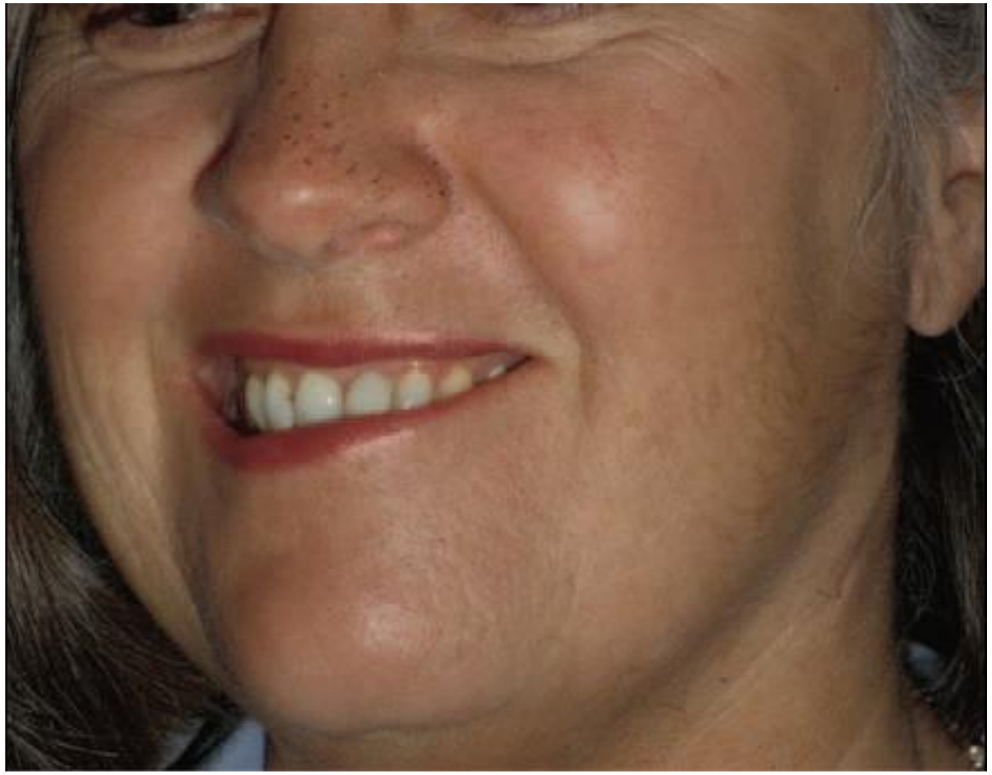
Facial Paralysis



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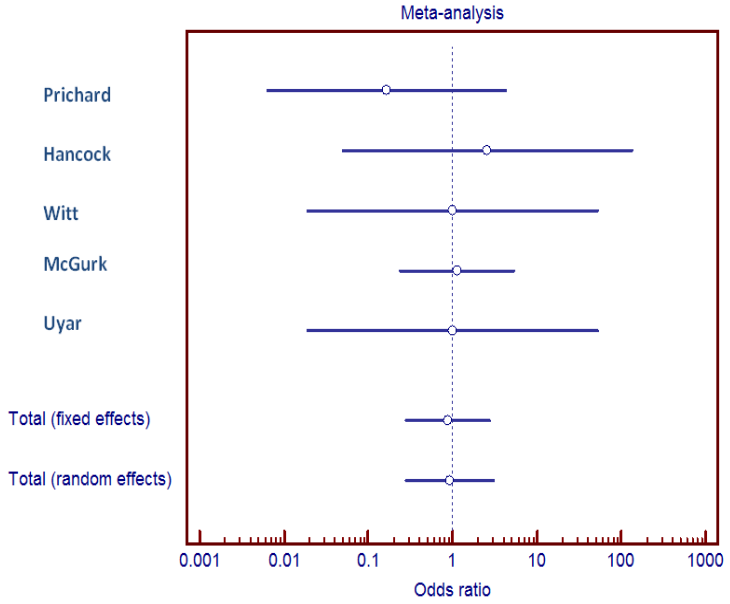
Facial Nerve Paralysis Results

Permanent facial nerve paralysis

- ECD 1.4% (8/590 cases)
- SP 1.1% (3/268 cases)

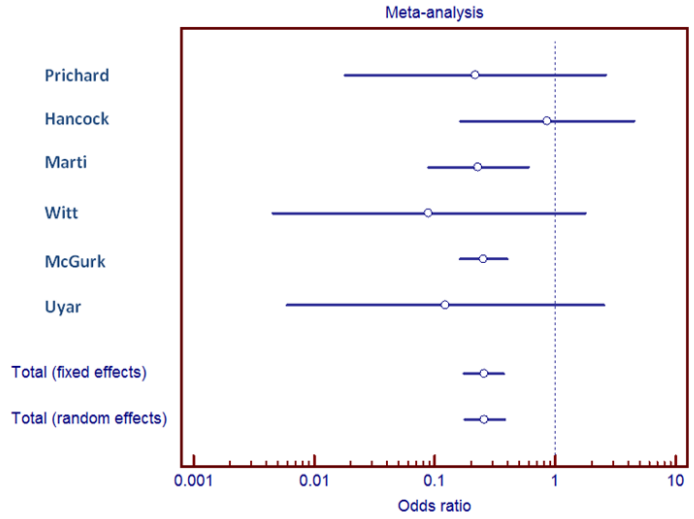
No significant difference



Transient facial nerve paresis

- ECD 8.0% (59/741 cases)
- SP 20.4% (81/397 cases)

ECD associated with 73% reduction



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Frey Syndrome

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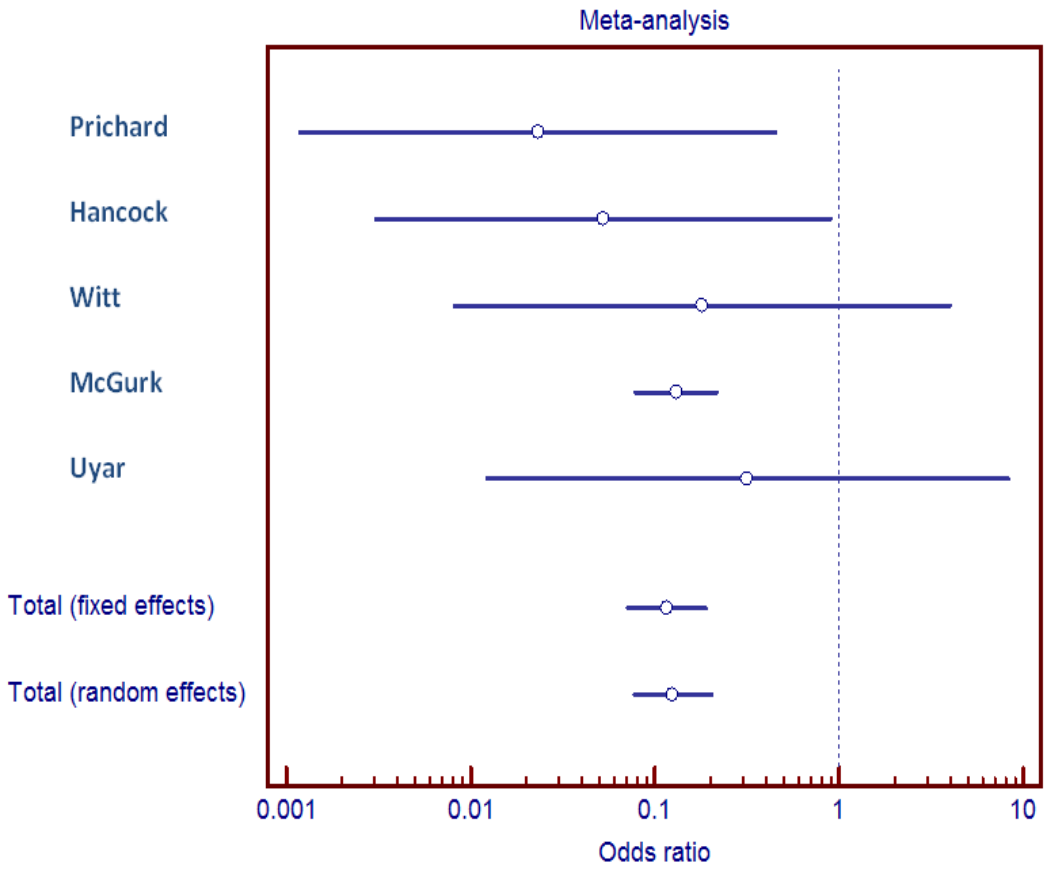
Results

Frey syndrome

- ECD 4.5% (27/602 cases)
- SP 26.1% (75/287 cases)

Reduction in symptomatic Frey syndrome with ECD by 87%



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Study limitations

- Selection bias- ECD applied to smaller, more mobile tumors than superficial parotidectomy
  - McGurk (2003) applied ECD at time of surgery to more mobile tumors
  - Likely similar bias in other papers
  - Meta-analysis run without McGurk's data without difference in results
- Lack of randomized trial in literature

Conclusions

- ECD may be considered a safe procedure when applied to solitary, superficial, clinically benign parotid tumors
- ECD may be considered as a surgical option by otolaryngologists who are trained in its application

PRISMA—Extracapsular Dissection Versus Superficial Parotidectomy in Treatment of Benign Parotid Tumors

Evidence From 3194 Patients

Shang Xie, MD, PhD, Kan Wang, MD, PhD, Hui Xu, MD, PhD, Rui-Xi Hua, MD, PhD, Tian-Zhu Li, MD, PhD, Xiao-Feng Shan, MD, PhD, and Zhi-Gang Cai, MD, PhD

Medicine 2015; 94

- Meta-analysis of 14 studies (3194 patients) comparing ECD to SP.
- No difference in recurrence between ECD (30/1885; 1.6%) and SP (21/1309; 1.6%)
- Significantly lower permanent (1.1% v. 1.7%) and transient (8.8% v. 23%) FN paralysis in ECD group
- Significantly lower rate of Frey syndrome (2.7% v. 19%) in ECD group

JAMA Otolaryngology–Head & Neck Surgery | Original Investigation

Extracapsular Dissection vs Superficial Parotidectomy of Benign Parotid Lesions
Surgical Outcomes and Cost-effectiveness Analysis

Masanari G. Kato, BS; Evren Erkul, MD; Shaun A. Nguyen, MD; Terry A. Day, MD; Joshua D. Hornig, MD; Eric J. Lentsch, MD; M. Boyd Gillespie, MD

JAMA Otolaryngol Head Neck Surg. 2017; 143: 1092-1097.

- Compared cost of 20 SP to 26 ECD at same institution
- Mean tumor size- SP 2.3 cm (±1.1) v ECD 2.2 cm (±0.9)
- 60% PA in both groups; remainder WT, BCA, Oncocytoma

Table 3. Procedure Time, Length of Stay, and Anesthesia Time

Characteristic	Mean (SD)		Effect Size (95% CI)
	ECD	SP	
Procedure time, min	83.5 (36.8)	139.0 (48.8)	−1.31 (−1.93 to −0.65)
Anesthesia time, min	148.2 (48.1)	213.3 (46.8)	−1.37 (−1.99 to −0.70)
Length of stay, d	0.5 (0.8)	1.3 (1.6)	−0.66 (−1.25 to −0.05)

Abbreviations: ECD, extracapsular dissection; SP, superficial parotidectomy.

Table 4. Associated Costs

Type of Charge	Charge, Mean (SD), $		Effect Size (95% CI)
	ECD	SP	
Surgeon	4735.29 (2164.58)	5235.67 (35.95)	−0.31 (−0.89 to 0.28)
★ Anesthesia	2396.17 (709.33)	3865.83 (1189.61)	−1.55 (−2.19 to −0.86)
Other professional	693.88 (482.66)	723.22 (390.14)	−0.07 (−0.65 to 0.52)
★ OR	12 271.33 (4527.52)	18 090.94 (6266.58)	−1.09 (−1.69 to −0.45)
★ Total hospital	24 118.23 (8397.57)	35 835.88 (12 475.35)	−1.13 (−1.74 to −0.49)

Abbreviations: ECD, extracapsular dissection; OR, operation room; SP, superficial parotidectomy.

JAMA Otolaryngol Head Neck Surg. 2017; 143: 1092-1097.

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Clinical outcomes and cost-effectiveness of superficial parotidectomy versus extracapsular dissection of the parotid gland: a single-centre retrospective study of 161 patients

R. Vanroose[a,b], J. Scheerlinck[b], R. Coopman[a,c], E. Nout[a,b]

[a]Department of Oral Health Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium; [b]Department of Oral and Maxillofacial Surgery, Sint-Elisabeth Hospital, Tilburg, the Netherlands; [c]Department of Plastic, Reconstructive and Aesthetic Surgery, Ghent University Hospital, Ghent, Belgium

R. Vanroose, J. Scheerlinck, R. Coopman, E. Nout: Clinical outcomes and cost-effectiveness of superficial parotidectomy versus extracapsular dissection of the parotid gland: a single-centre retrospective study of 161 patients. Int. J. Oral Maxillofac. Surg. 2023; 52: 191–198.

Int J Oral Maxillofac Surg. 2023; 52: 191-198.

Table 4. Cost-effectiveness characteristics.

	ECD Mean ± SD	SP Mean ± SD	*P*-value
Operation time (min)	69 ± 27	140 ± 23	< 0.001[a]
Anaesthesia time (min)	98 ± 28	172 ± 27	< 0.001[a]
Length of stay (days)	0.7 ± 0.5	1.2 ± 0.5	< 0.001[a]

ECD, extracapsular dissection; SP, superficial parotidectomy; SD, standard deviation.
[a]Mann–Whitney *U*-test.

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ECD Reservations Remain

Invited Commentary

CLINICAL CHALLENGES IN OTOLARYNGOLOGY

Extracapsular Dissection of Benign Parotid Tumors

Daniel G. Deschler, MD

JAMA Otolaryngol Head Neck Surg. 2014; 140

- Comparing ECD to PP is a better comparison
- ECD is performed on smaller, mobile, more superficial tumors in most series (whereas cases are converted to PP or SP when found to be more challenging; comparing apples with oranges)
- Unclear if Frey rates are based on positive starch iodine or patient disability
- ECD limitations- experienced surgeon; experienced cytopathologist
- Imaging and FNA are not 100%; management dilemmas created when malignant tumor is removed by ECD
- Revision surgery after ECD will still require care for FN branches in proximity to the dissected field
- Most surgeons practicing ECD were trained during the era of PP or SP; we must ensure that the next generation gains experience with these proven techniques of management.

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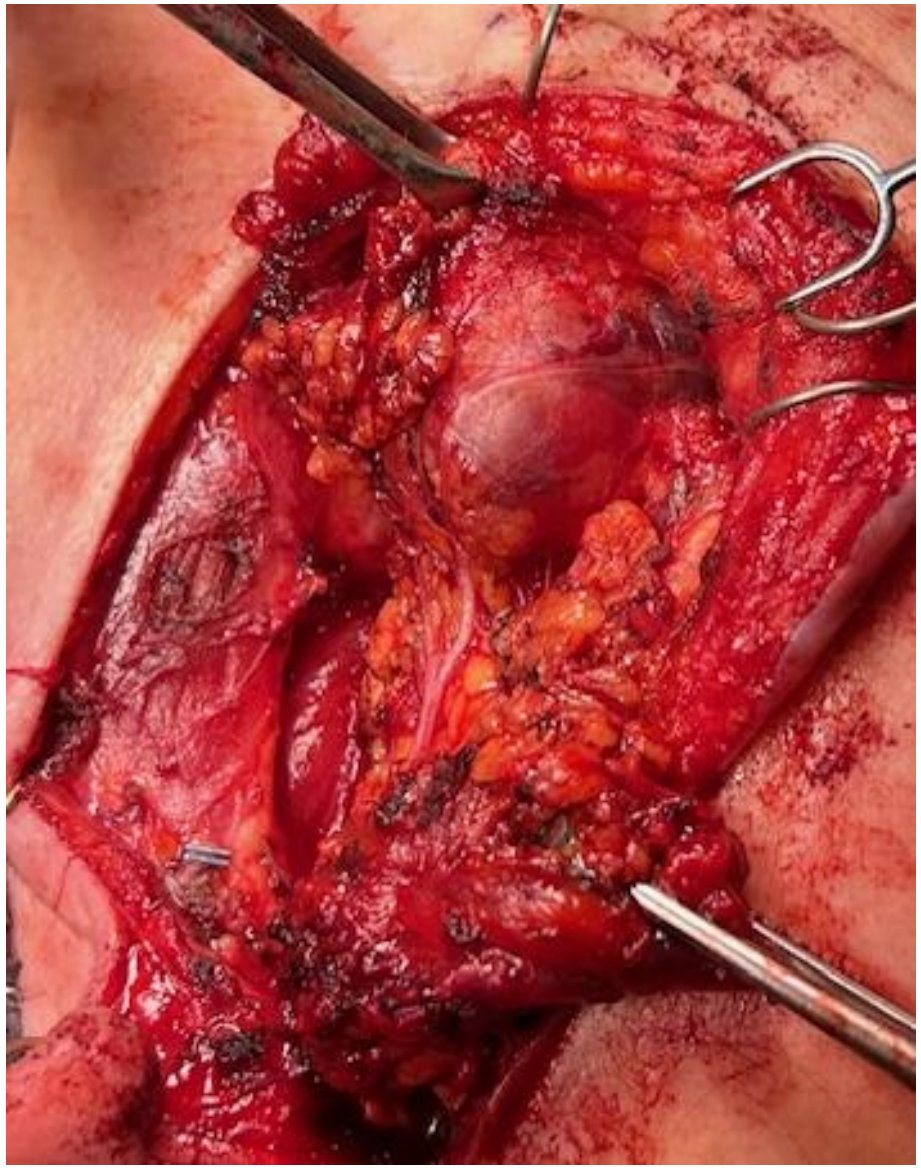
ECD Reservations Remain



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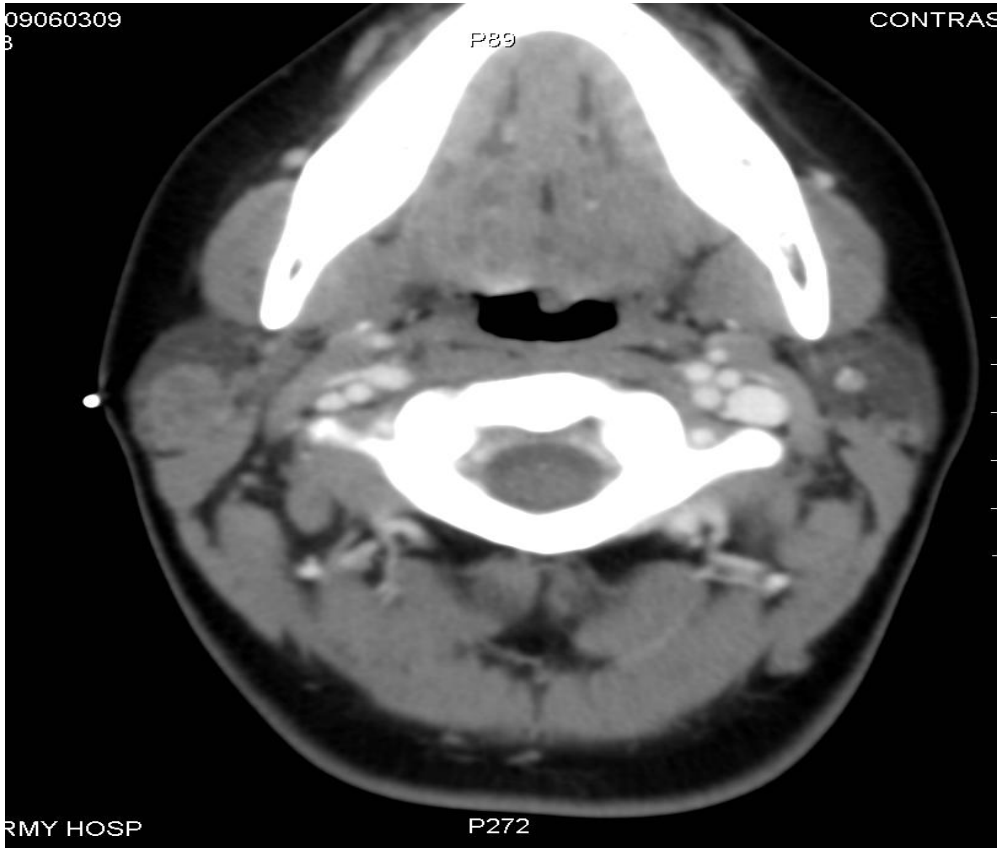

- 14 y.o. F with slowly enlarging right parotid mass.

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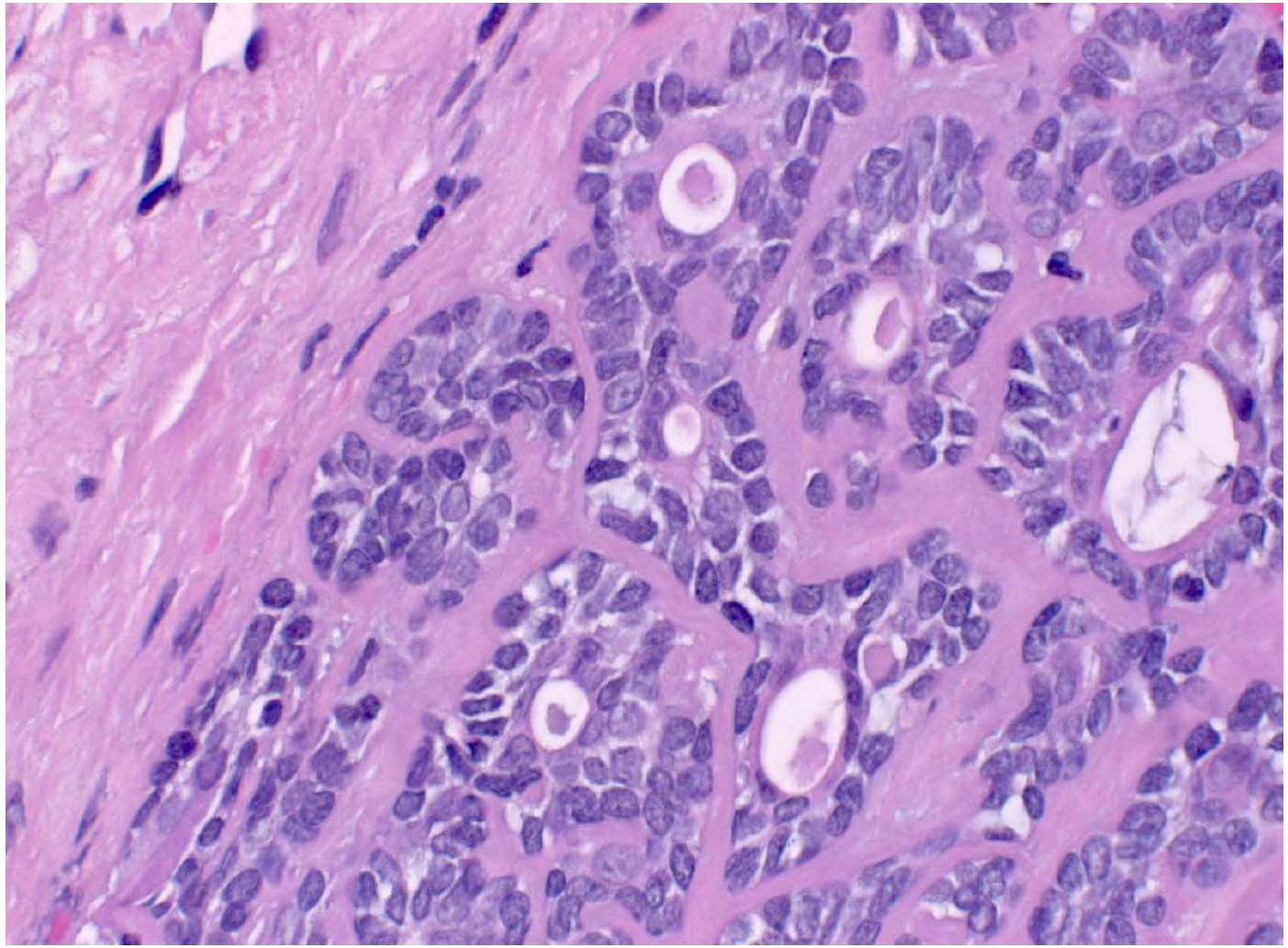

Acinic Cell Carcinoma, completely excised.
Revision partial parotidectomy 2 weeks later. No residual tumor.

Original Research—Head and Neck Surgery

AMERICAN ACADEMY OF OTOLARYNGOLOGY—HEAD AND NECK SURGERY FOUNDATION

Otolaryngology–
Head and Neck Surgery
2015, Vol. 152(6) 1042–1047

DOI: 10.1177/0194599815578104
http://otojournal.org
SAGE

Unexpected Detection of Parotid Gland Malignancy during Primary Extracapsular Dissection

Konstantinos Mantsopoulos, PhD, MD[1], Stylianos Velegrakis, MD[1], and Heinrich Iro, PhD, MD[1]

Otolaryngol Head Neck Surg. 2014; 152: 1042-47.

- 30 patients who underwent ECD found to have subsequent malignant tumor
- 22/30 (73%) were low-grade parotid cancers
- 3/25 (12%) had residual tumor cells detected on revision superficial parotidectomy
- 5/30 (17%) underwent adjuvant radiation therapy
- 5-year disease specific survival 100%; local disease control 97%
- 2/30 (7%) with slight facial paralysis (HB II) after completing treatment
- Main point- additional surgery but otherwise no increased risk of tumor/FN complications

II. ECD Patient Selection

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Extracapsular Dissection- Patient Selection

Patient History

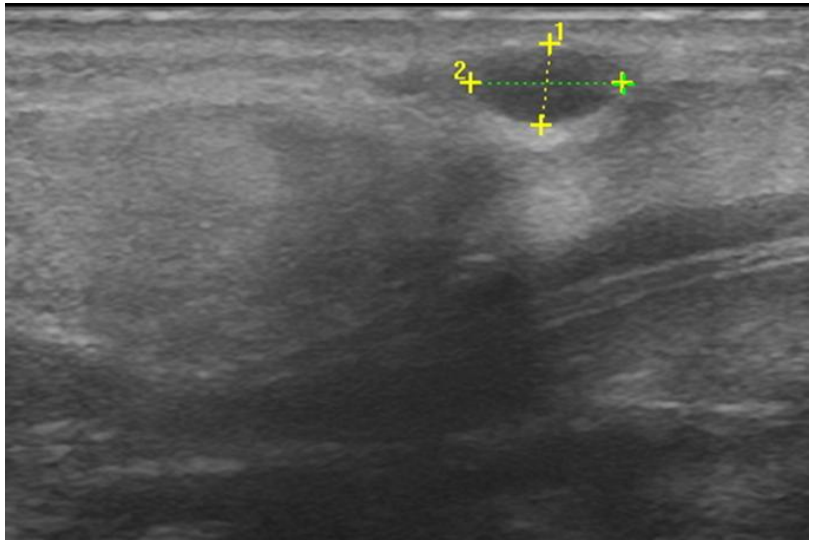
- Smaller size (< 3cm.)
- Longstanding stability; slow growth (months or years)
- Painless
- No numbness or facial weakness
- No skin fixation
- Easily palpable- mobile; rubbery

Imaging

- CT with contrast or MRI preferred
- Adjuvant ultrasound for real-time confirmation
- Smaller size (< 3cm)
- Superficial location
- Smooth, regular borders
- Limited projections/pseudopodia
- No suspicious adenopathy (main reason for CT or MRI)

Fine Needle Aspiration (FNA) Biopsy

- Required to reduce chance of occult malignant tumor
- Ultrasound-guided biopsy preferred
- Milan II or IVa
- Exact tumor type may be difficult; can differentiate malignant from benign in roughly 90% of cases



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Extracapsular Dissection- Patient Selection

Contents lists available at ScienceDirect

American Journal of Otolaryngology–Head and Neck Medicine and Surgery

journal homepage: www.elsevier.com/locate/amjoto

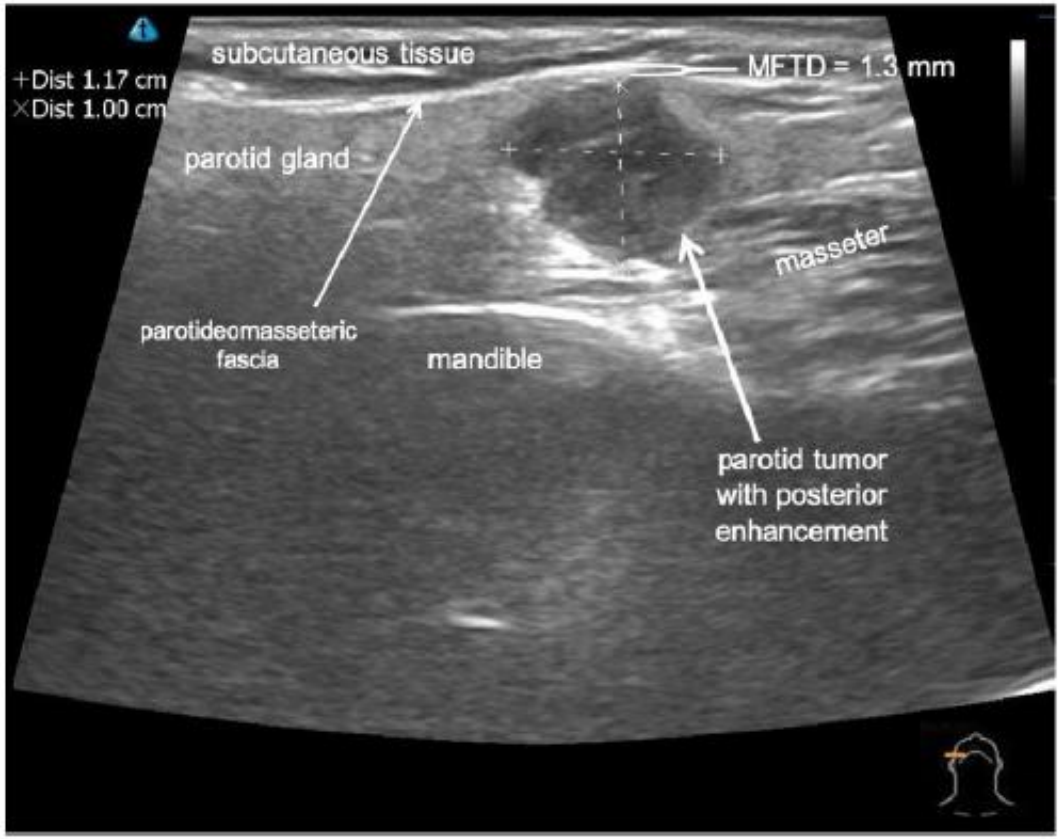
Minimum fascia tumor distance for selection of extracapsular dissection for benign parotid tumors: A preliminary study☆

Christopher D. Badger [1], Margaret C. Michel [*,1], Joseph F. Goodman, Punam Thakkar, Arjun S. Joshi

[No Title]

Division of Otolaryngology-Head and Neck Surgery, George Washington University School of Medicine & Health Sciences, Washington, DC, United States of America

Am J Otolaryngol Head Neck Surg. 2021; 42



- Retrospective review of center that routinely performs ECD
- Mean maximum tumor diameter: ECD 2.35 cm v. PP 3.80 cm
- Minimum fascia-tumor distance on US
- < 3 mm; ECD feasible in 11/13 (85%)
- ≥3mm; ECD feasible in 1/10 (10%)

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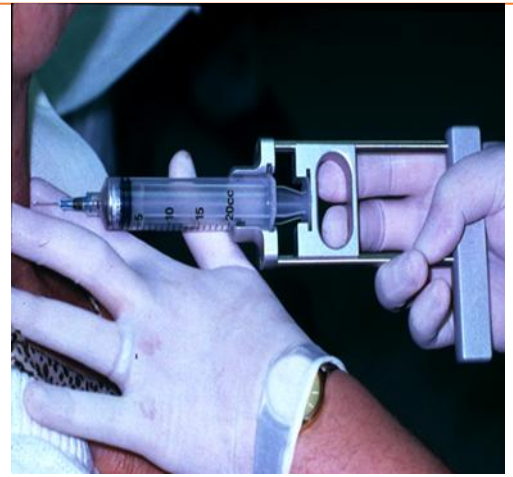
Fine-Needle Aspiration Cytology of Salivary Gland Lesions: A Systematic Review

Giuseppe Colella, MD, MDS, Rosangela Cannavale, DDS,†*
Federica Flamminio, MD,‡ and Maria P. Foschini, MD§

J Oral Maxillofac Surg. 2010; 68: 2146-2153

Sensitivity
387/484 = 80%
Specificity
1401/1429 = 98%
Positive Predictive Value
387/415 = 93%
Negative Predictive Value
1429/1498 = 95%

Tumors most likely to be wrongly classified:
Lower risk tumors-
Acinic cell; Myoepthelial; low-grade MEC;
Diagnostic confusion- Lymphoma



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Journal of the American Society of Cytopathology (2018) 7, 111–118

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jascyto.org/

SPECIAL ARTICLE

The Milan System for Reporting Salivary Gland Cytopathology (MSRSGC): an ASC-IAC—sponsored system for reporting salivary gland fine-needle aspiration

Esther Diana Rossi, MD, PhD, MIAC[a,*], Zubair Baloch, MD, PhD[b], Marc Pusztaszeri, MD[c], William C. Faquin, MD, PhD[d]

[a] *Division of Anatomic Pathology and Histology, Catholic University of Sacred Heart, "Agostino Gemelli" School of Medicine, Rome, Italy*
[b] *Department of Pathology and Laboratory Medicine, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, USA*
[c] *Division of Pathology, Jewish General Hospital and McGill University, Montréal, Canada*
[d] *Department of Pathology, Massachusetts General Hospital, Boston, Massachusetts, USA*

- Joint effort- American Society of Cytopathology and International Academy of Cytopathology
- Milan, Italy- 2015

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Table 1 Diagnostic categories and ROM in the Milan System for Reporting Salivary Gland Cytopathology (MSRSGC).

Diagnostic category	% ROM
I. Nondiagnostic	25
II. Non-neoplastic	10
III. Atypia of Undetermined Significance (AUS)	20
IV. Neoplasm	
IVA. Neoplasm: Benign	<5
IVB. Neoplasm: Salivary Gland Neoplasm of Uncertain Malignant Potential (SUMP)[e]	35
V. Suspicious for Malignancy	60
VI. Malignant	90

Abbreviation: ROM, risk of malignancy.

Rossi ED, et al. *J Am Soc Cytopath.* 2018; 7: 111-118.

Note- Milan I or III may require repeat FNA or core needle biopsy
IVa best candidates for ECD

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III. ECD Surgical Technique

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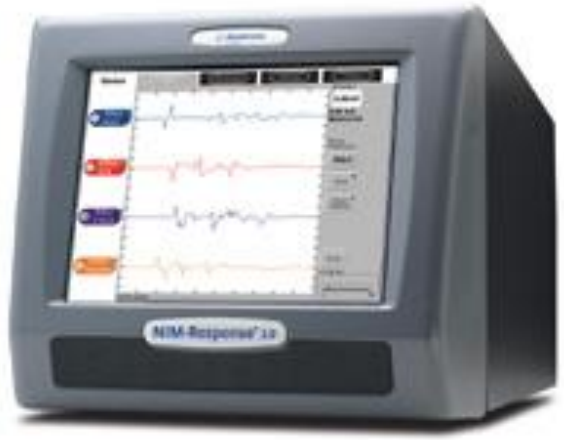
Surgical Tools



NIMS Monitor

Surgical Loupes

Ultrasound

Operative Microscope

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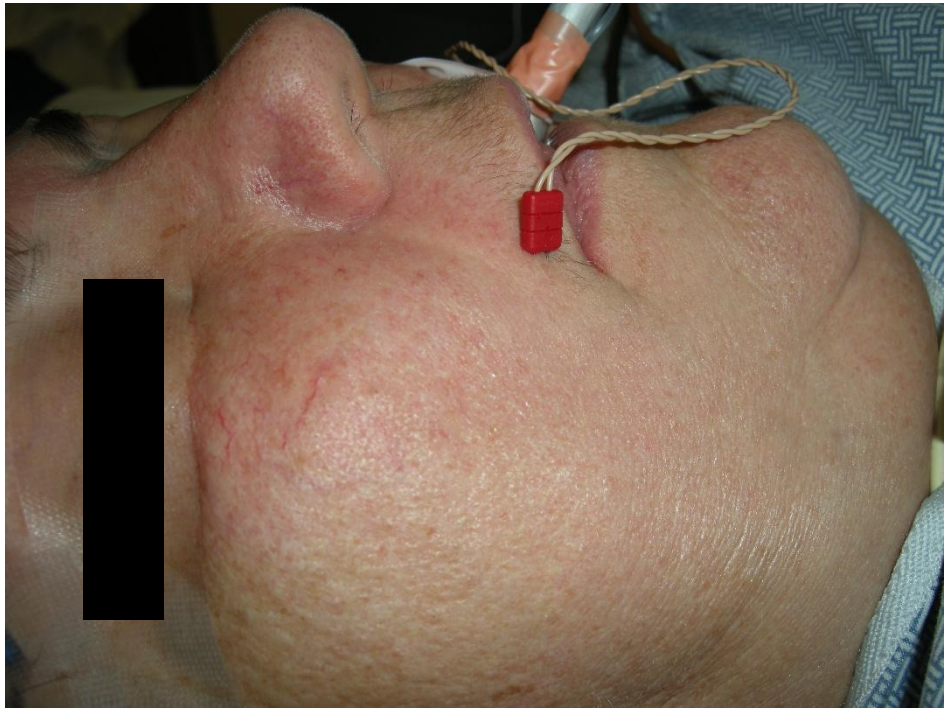
Extracapsular Dissection Surgical Technique

- Facial nerve monitoring of at-risk nerves



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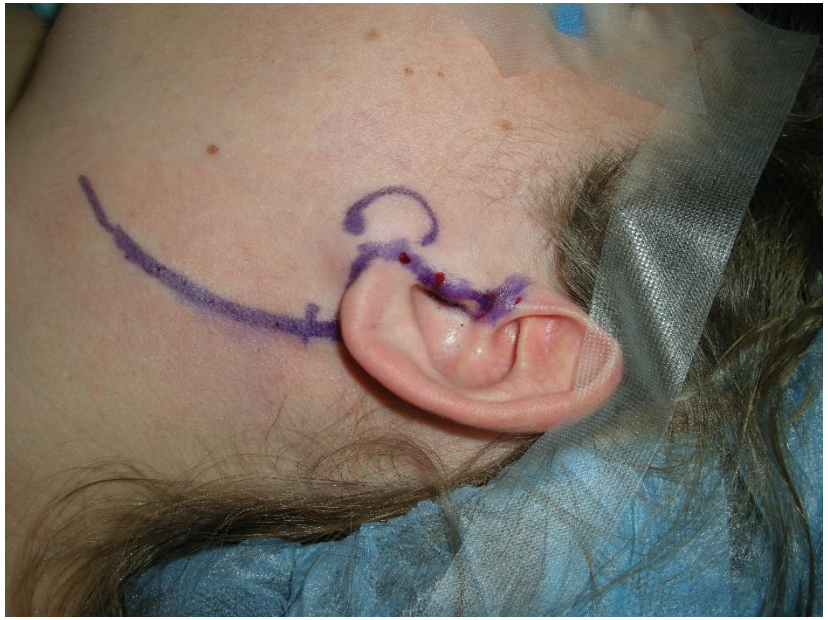
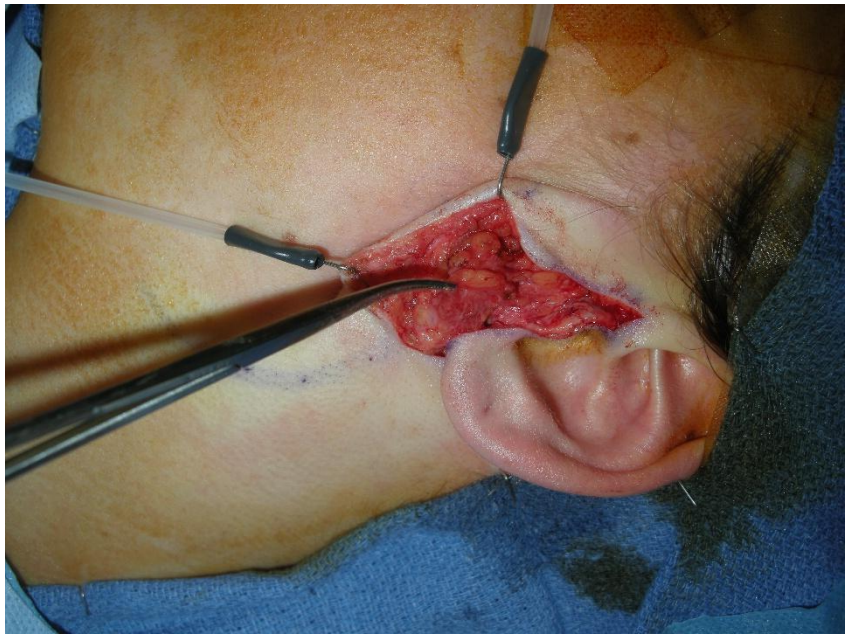
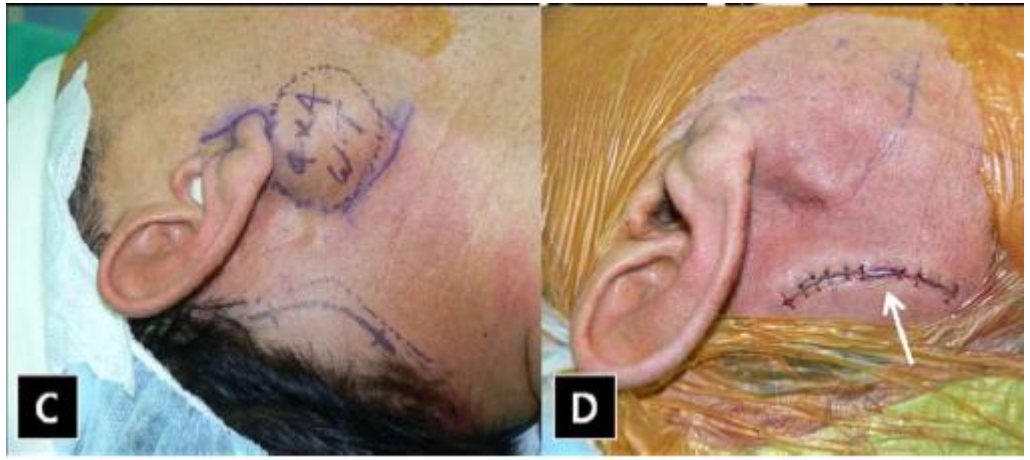
Extracapsular Dissection Surgical Technique

- Plan limited incision (expand if needed)

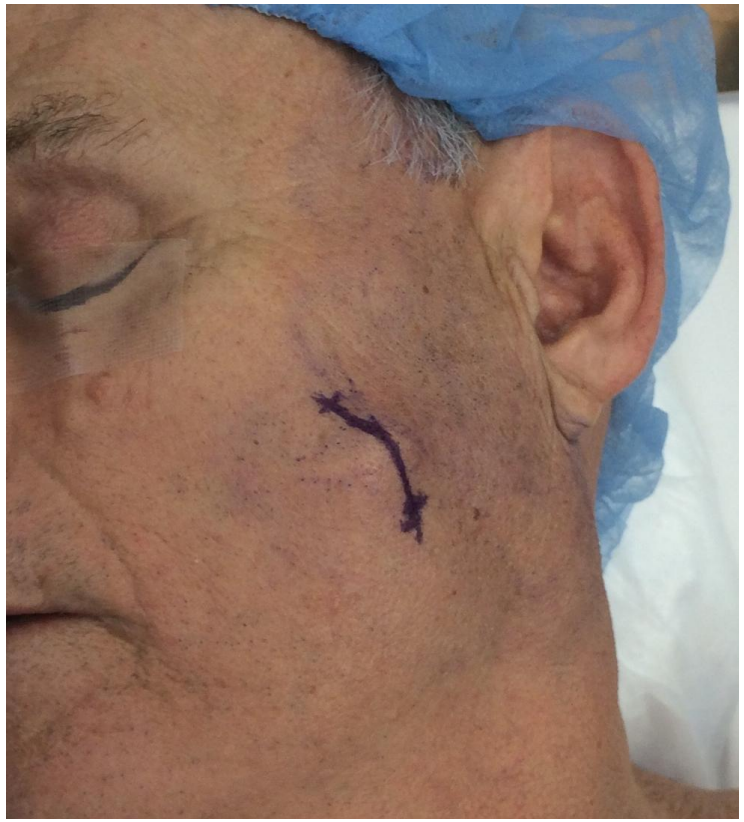




Extracapsular Dissection Surgical Technique: Alternative Approaches



Woo SH et al. *Head Neck* 2016



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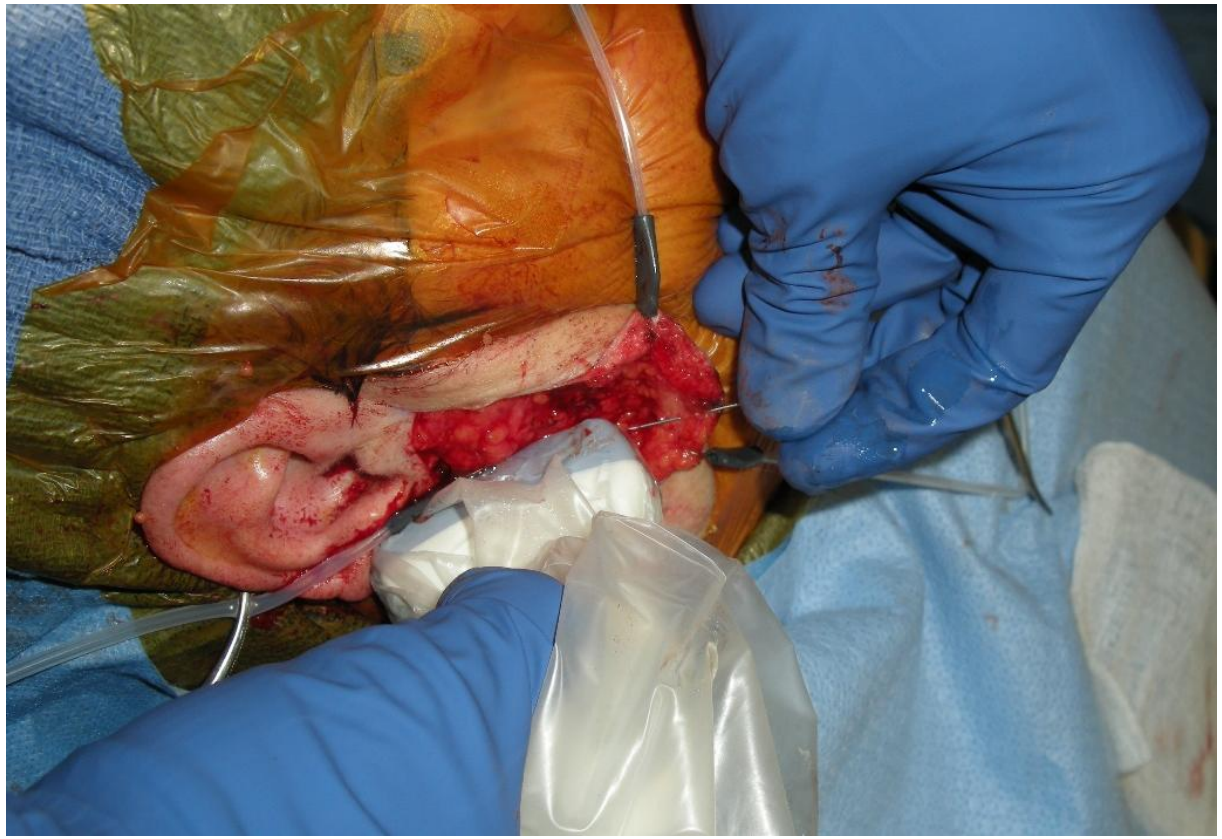
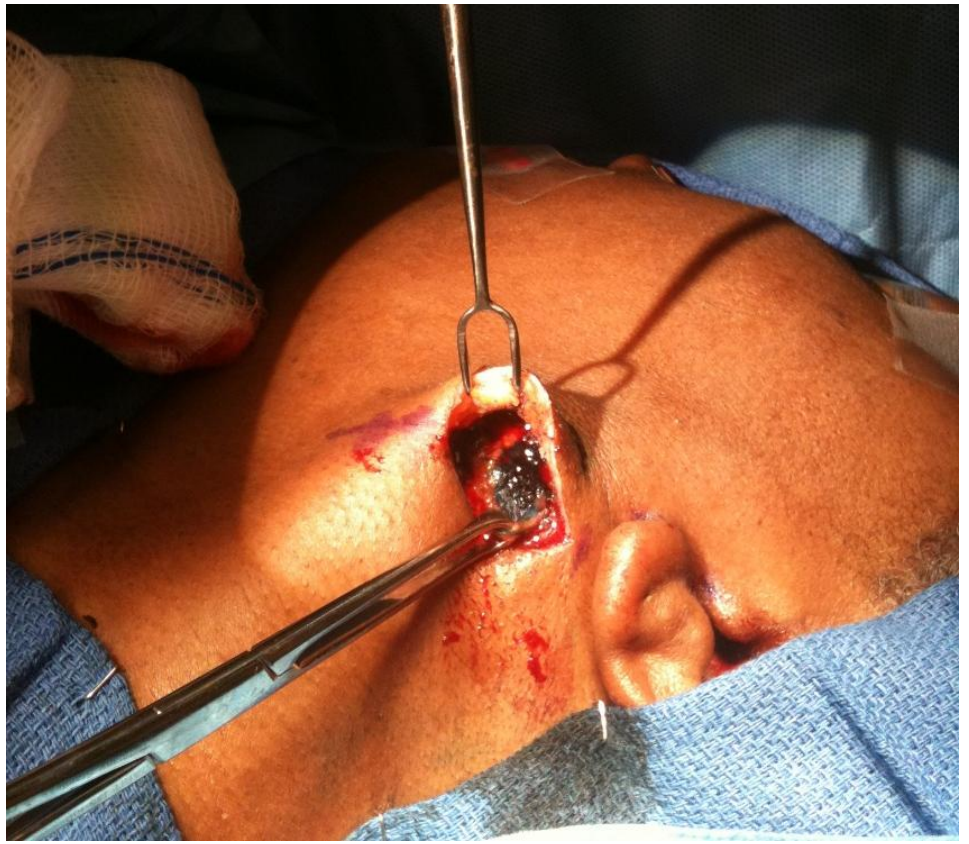
Extracapsular Dissection Surgical Technique

- Intraoperative US with methylene blue helpful to localize small tumors





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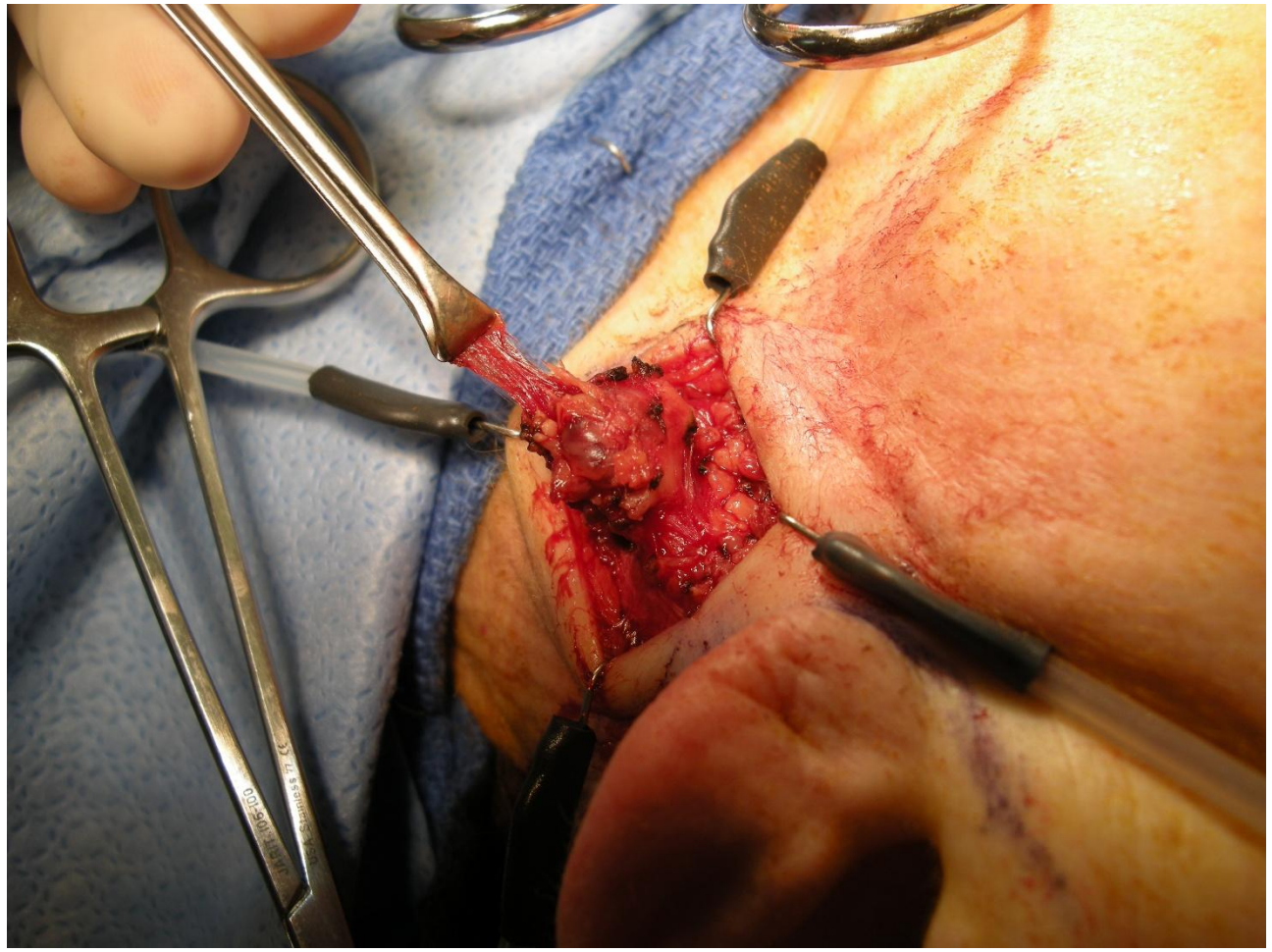
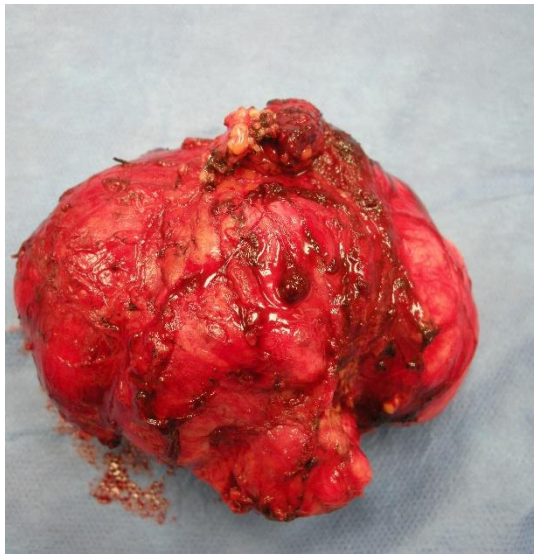
Extracapsular Dissection Surgical Technique





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Extracapsular Dissection Surgical Technique

- Incise overlying parotid fascia
- Reveal edge of tumor
- Dissect 1-2 mm around tumor capsule in loose areolar tissue
- Dissect away from facial nerve branches as encountered (magnified view required)
- Close without drain
- Send home; Jaw bra dressing for 72 hours
- Annual follow-up

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Extracapsular parotidectomy

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