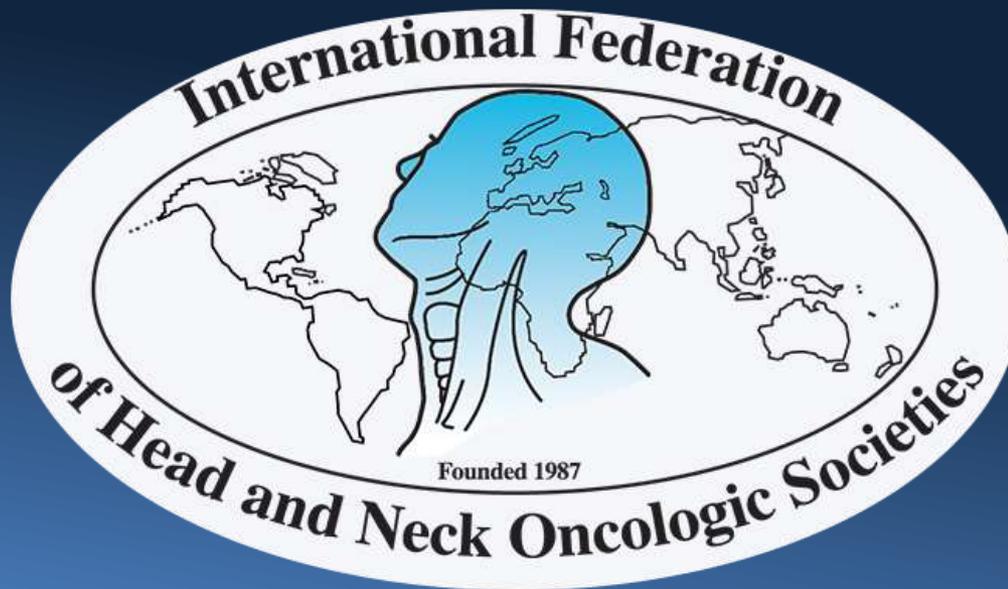




# The International Federation of Head and Neck Oncologic Societies

Current Concepts in Head and Neck Surgery and Oncology 2017



[www.ifhnos.net](http://www.ifhnos.net)



The International Federation  
of Head and Neck Oncologic Societies

Current Concepts in Head and Neck Surgery and Oncology 2017

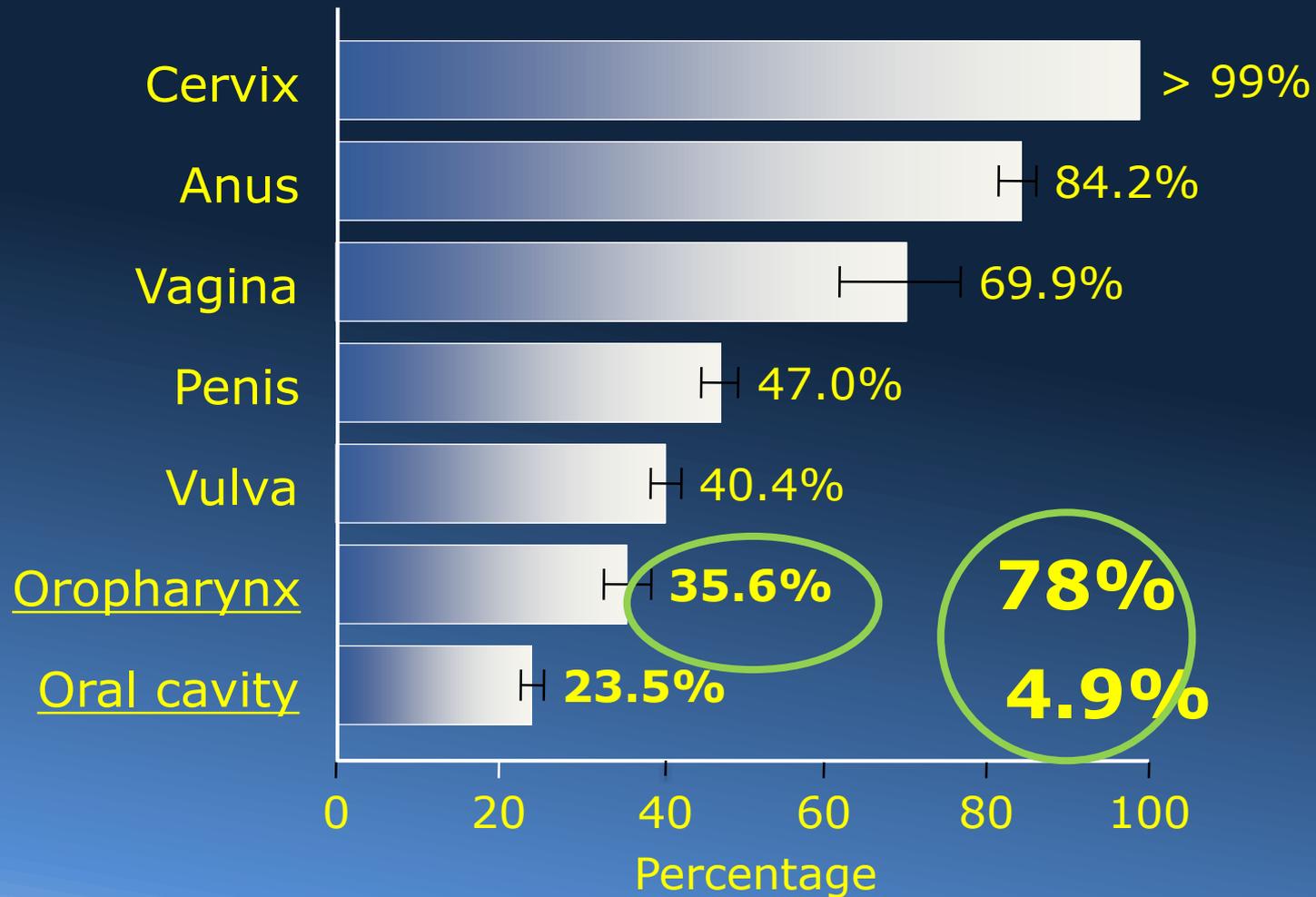
Salvage Surgery for Non-Surgical  
Treatment Failures:  
Oropharynx, Larynx/Hypopharynx

Dr. Patrick Gullane

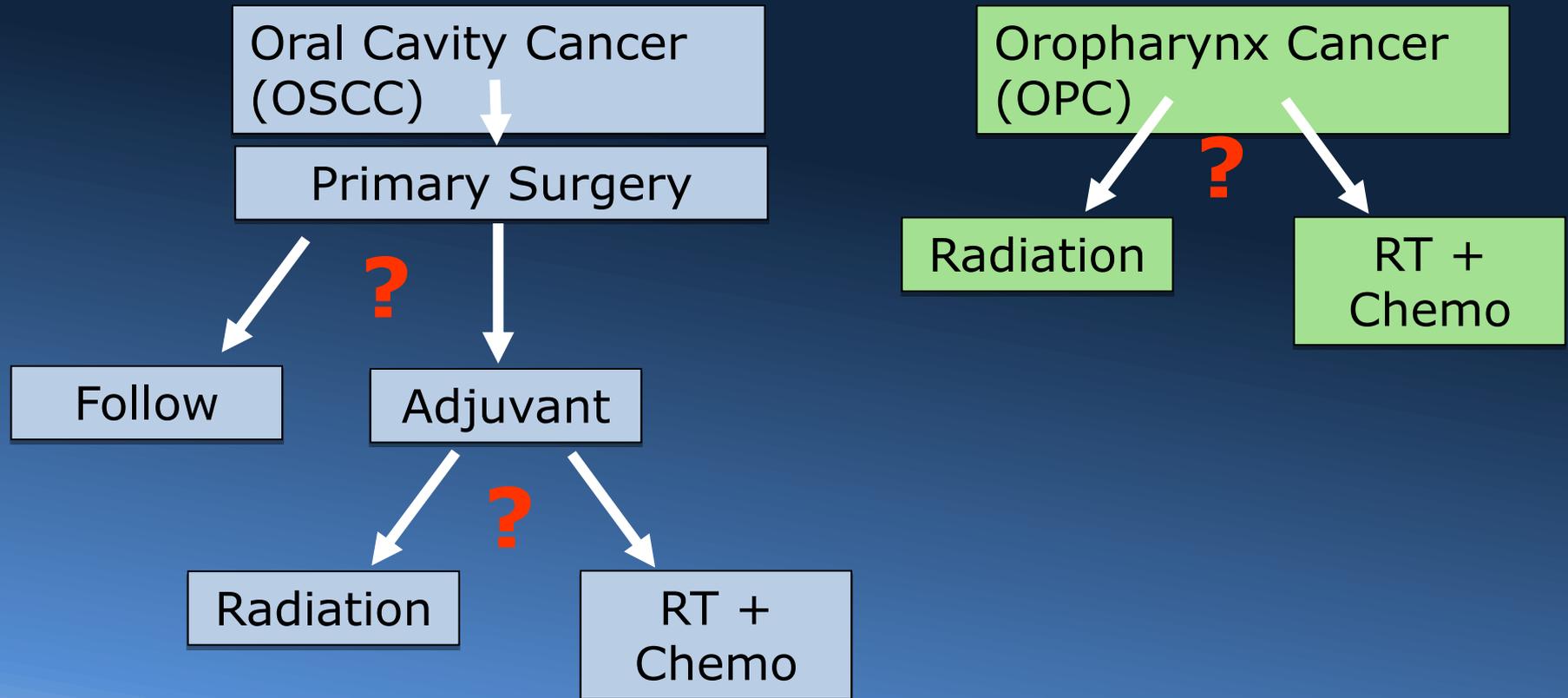
# Purpose of the Presentation

- Review the evidence with regard to the efficacy of salvage surgery after non-surgical treatment of the Oropharynx and Larynx/Hypopharynx
- Review our experience with complications following salvage surgery
- Present a treatment approach to reduce complications in patients undergoing salvage for recurrent or persistent oropharyngeal laryngeal/Hypopharyngeal cancer

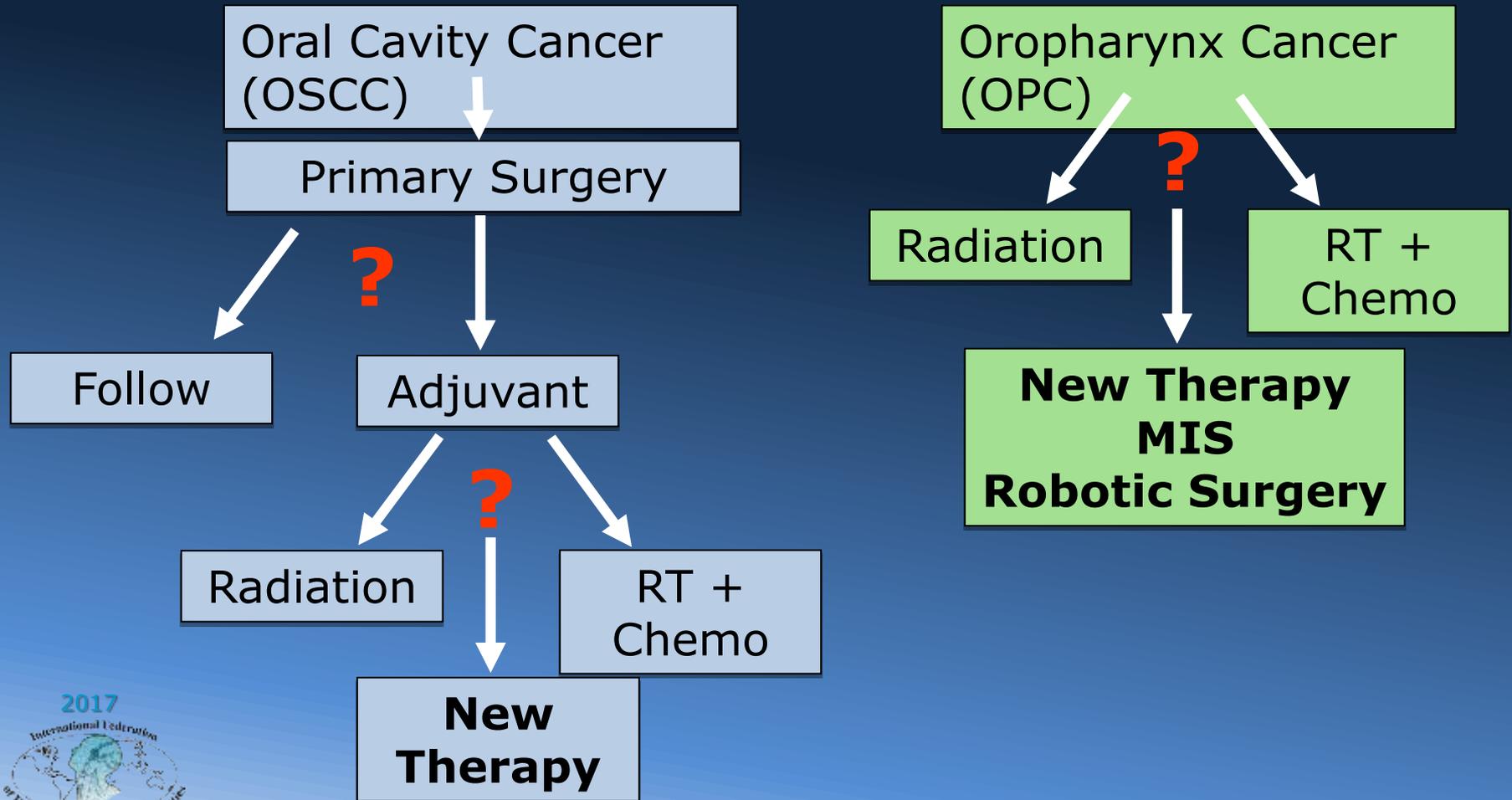
# Estimated HPV Contribution to Cancer – WHO



# Treatment

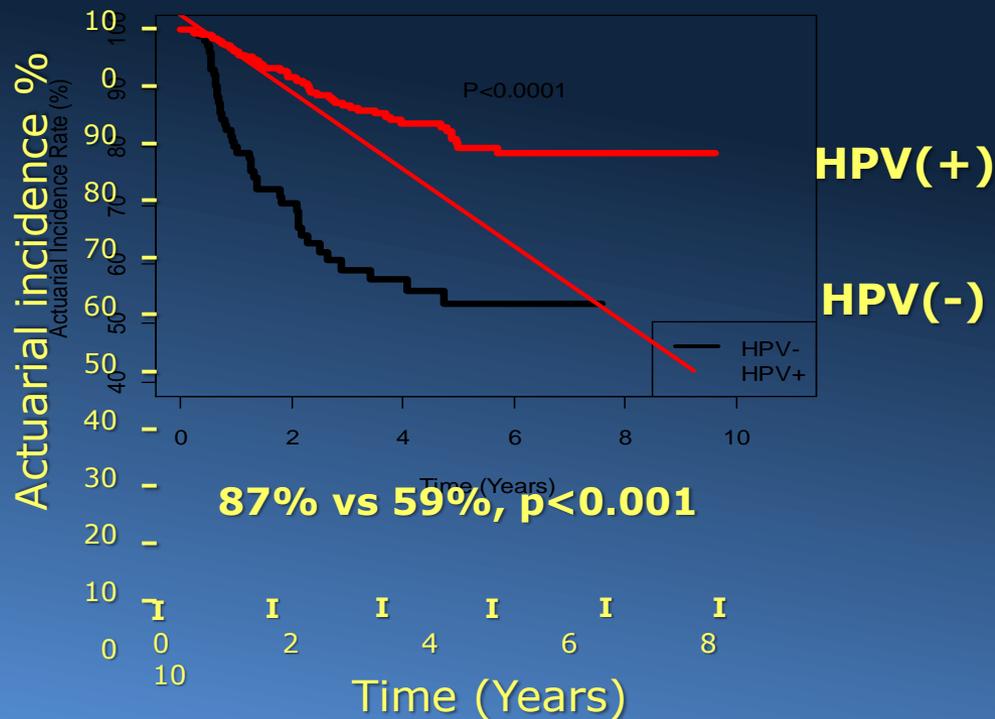


# Treatment



# Oropharyngeal Cancer-P.M.H

## Cause Specific Survival



- HPV + OPC better outcome
- Biology poorly understood
- Treatment is the same as HPV- OPC

# Toxicity



# So We Are Seeing A Shifting Landscape In Treatment to Minimize Toxicity

- Surgery
  - Open approach
  - Free tissue transfer
  - Minimally invasive
  - Laser,robotic
- Radiotherapy
  - Hyperfractionation
  - IMRT
    - 85% survival-PMH
  - Proton
- Chemotherapy
  - Concurrent
  - Induction
  - Biologics



*In your case, there's a choice – elective surgery, outpatient radiation/chemotherapy, or you can be part of a protocol.*

# Primary Oropharyngeal Treatment Outcome-Not all Cured

- 9-20% Develop Locoregional Recurrence

Oropharyngeal more challenging than any other Head and Neck site for complete resection due to the complex anatomy

- 30% Unresectable at presentation
- 7-10% Develop distant Metastases

# Question

*When primary therapy with  
Chemo/Radiation fails –  
Should we Consider  
Salvage Surgery?*

# Should we therefore consider Salvage Surgery?

## “It Depends On”

- Stage of the Disease-early vs delayed
- Recurrent vs Persistent
- Clear Understanding of the original extent of disease
- Surgically resectable as no adjuvant available
- Carefully consider likely functional outcome relative to patients probability of survival including co-morbidities and life style expectations
- Time of recurrence < than or > than 1 year

# Salvage Surgery: Post Chemo-RT: M.D Anderson Series

## The Role of Salvage Surgery in Patients With Recurrent Squamous Cell Carcinoma of the Oropharynx

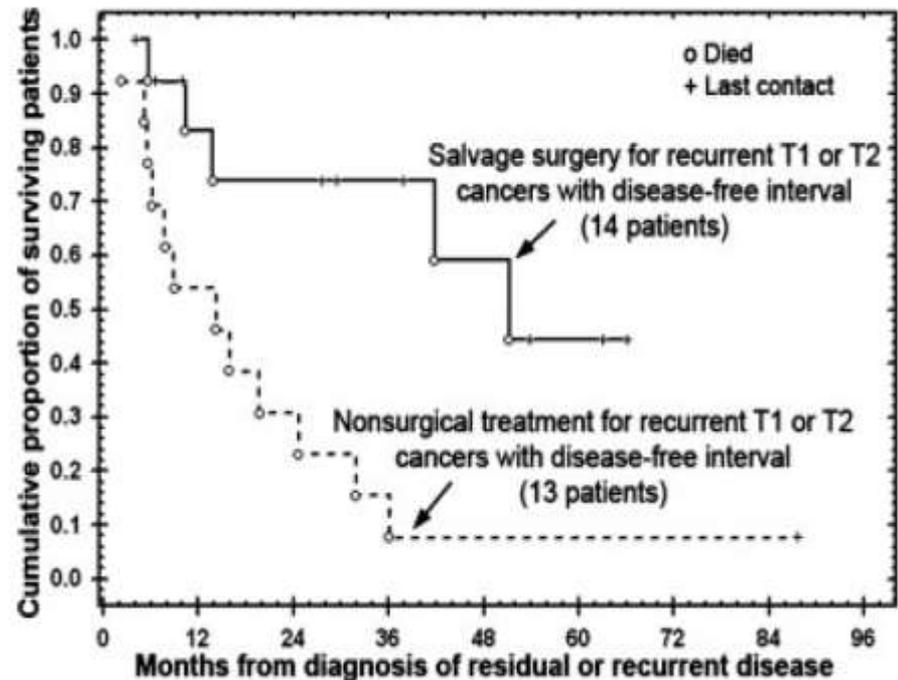
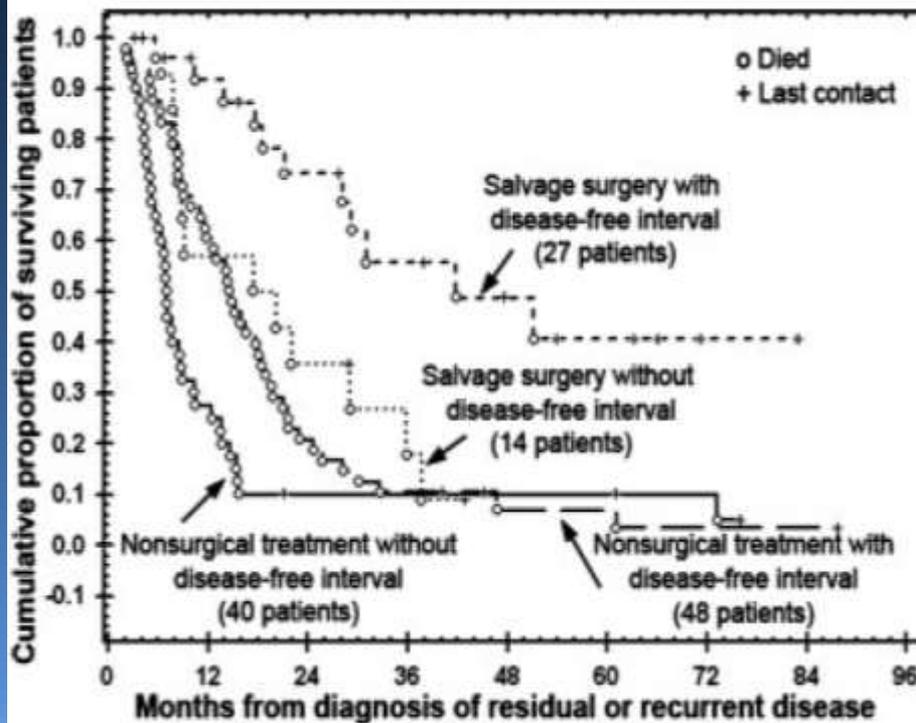
Mark E. Zafereo, MD<sup>1</sup>; Matthew M. Hanasono, MD<sup>2</sup>; David I. Rosenthal, MD<sup>3</sup>; Erich M. Sturgis, MD<sup>4</sup>;  
Jan S. Lewin, PhD<sup>4</sup>; Diana B. Roberts, PhD<sup>4</sup>; and Randal S. Weber, MD<sup>4</sup>

# Zafereo et al *Cancer* 2009

- Retrospective review
- Population
  - 1681 OP patients → 168 local recurrences
  - 41 surgery, 18 RT, palliative chemo 70, supportive care 39
- Management
  - Planned restaging 6 weeks after completing RT or CRT
  - T3/T4 had operative restaging

# Good, Bad and Ugly.

## Disease free interval to recurrence: Important factor in outcome



# Zafereo et al

- Conclusions:
  - Very select group can achieve long-term survival
  - Despite careful selection of these 41 patients, outcomes were still poor (28% 5-year survival)
  - Favorable candidates:
    - Younger
    - Disease-free interval after definitive therapy
    - Small recurrent tumors
    - Negative margins
    - No recurrent neck disease

# Salvage Surgery of Locally Recurrent Oropharyngeal Cancer Princess Margaret Experience

Samip N. Patel MD<sup>1</sup>, Marc A. Cohen MD<sup>1</sup>, Babak Givi MD<sup>1</sup>, Benjamin J. Dixon MD<sup>1</sup>, Ralph W. Gilbert MD<sup>1</sup>, Patrick J. Gullane MD<sup>1</sup>, Dale H. Brown MD<sup>1</sup>, Jonathan C. Irish MSc MD<sup>1</sup>, John R. de Almeida MSc MD<sup>1</sup>, Kevin M. Higgins MSc<sup>2</sup>, Danny Enepekides MSc<sup>2</sup>, Shao Hui Huang<sup>3</sup>, John Waldron MD<sup>3</sup>, Brian O'Sullivan MD<sup>3</sup>, Wei Xu PhD<sup>4</sup>, Susie Su MSc<sup>4</sup>, David P. Goldstein MSc MD<sup>1</sup>

This study aimed to determine the success rate of salvage surgery for locally recurrent oropharynx cancer and in addition factors influencing the outcome including p16 status.

*Salvage Surgery for Locally Recurrent Oropharyngeal Cancer: .Patel, Samip, Gullane, P, Goldstein, David, Gilbert R. Irish J et al Head and Neck Surgery-Vol 40, July 2015*

# Salvage Surgery for OPC

- **Primary Objectives**

- Assess survival outcomes in salvage oropharyngectomy cases.
- Determine the Permanent tracheotomy and G-tube rates.
- Evaluate the incidence of perioperative complications.

- **Secondary Objectives**

- The secondary objective was to assess predictors of outcome including HPV status (p16).

# Salvage Surgery for OPC

- 2000-2012
- 1163 consecutive Oropharyngeal patients
- 122 pts Recurrent OPC
- 88 pts - "Non-Salvage"
  - distant mets, unresectable, poor performance, patient choice
- 34 pts - Salvage surgery
  - 28 (82%) ♂, 6 (18%) ♀
- Median age - 61.2 yrs(41.2-75.9)

# Salvage Surgery

Variable                      Number of Patients  
n=34 (%)

---

## Primary Tumor Site

Tonsil	19 (55.9)
Base of Tongue	13 (38.2)
Soft Palate	1 (2.9)
Posterior Wall	1 (2.9)

## Initial Tumor Classification

T1	5 (14.7)
T2	10 (29.4)
T3	10 (29.4)
T4	9 (26.5)

# Salvage Surgery for OPC

Variable	Number of Patients (%)	Variable	Number of Patients (%)
<b>Primary Tumor Site</b>		<b>Initial Nodal Classification</b>	
Tonsil	19 (55.9)	N0	7 (20.6)
Base of Tongue	13 (38.2)	N1	9 (26.5)
Soft Palate	1 (2.9)	N2	16 (47.1)
Posterior Wall	1 (2.9)	N3	2 (5.9)
<b>Initial Tumor Classification</b>		<b>Initial AJCC Stage</b>	
T1	5 (14.7)	I	1 (2.9)
T2	10 (29.4)	II	1 (2.9)
T3	10 (29.4)	III	9 (26.5)
T4	9 (26.5)	IV	23 (67.7)

# Salvage Surgery

## Initial Nodal Classification

N0	7 (20.6)
N1	9 (26.5)
N2	16 (47.1)
N3	2 (5.9)

## Initial AJCC Stage

I	1 (2.9)
II	1 (2.9)
III	9 (26.5)
IV	23 (67.7)

# Salvage Surgery for OPC

Variable

Number of  
Patients (%)

---

## Primary Treatment

XRT alone	25 (73.5)
Concurrent CRT	9 (26.5)
RT dose (Gy) mean, (range)	65.2 (51-70)
RT dose mode, median	70, 64
RT fraction mean (range)	34 (20-40)
RT fraction mode, median	35, 35

# Salvage Surgery

Number of Patients  
n=34 (%)

## Variable

### Persistent/Recurrent Disease

Persistent	10 (29.4)
Recurrent	24 (70.6)

### Surgical Oropharyngectomy

+ Mandibulotomy	26 (76.5)
+ Mandibulectomy	5 (14.7)
+ Transoral	1 (2.9)
+ Total Laryngectomy	2 (5.9)

### Flap Reconstruction\*

None	1 (2.9)
Pectoralis Muscle	6 (17.6)
Anterolateral Thigh Free Flap	13 (38.2)
Radial Forearm Free Flap	12 (35.3)
Latissimus Dorsi Free Flap	1 (2.9)
Rectus Abdominis Free Flap	1 (2.9)
Fibula Free Flap	1 (2.9)

### Length of Hospital Stay

Median	17
Mean	20.5

\*One patient received 2 simultaneous free flaps



# Salvage Surgery for OPC

Variable	Number of Patients, n=34 (%)	Variable	Number of Patients, n=34 (%)
<b>Persistent/Recurrent Disease</b>		<b>Flap reconstruction</b>	
Persistent	10 (29.4)	None	33 (97)
Recurrent	24 (70.6)	Pectoralis Muscle	1 (2.9)
<b>Surgical Oropharyngectomy</b>		Anterolateral Thigh Free Flap	6 (17.6)
+ Mandibulotomy	26 (76.5)	Radial Forearm Free Flap	13 (38.2)
+ Mandibulectomy	5 (14.7)	Latissimus Dorsi Free Flap	12 (35.3)
+ Transoral	1 (2.9)	Rectus Abdominis Free Flap	1 (2.9)
+ Total Laryngectomy	2 (5.9)	Fibula Free Flap	1 (2.9)
		<b>Length of Hospital Stay</b>	
		Median	17
		Mean	20.5

# Post-op Complications

	Type of Complication	Number of Patients (%) <sup>*</sup>
Total Complications		15 (44.1)
	Wound Complications	15 (44.1)
	Minor Wound Infection/Cellulitis	7 (20.6)
	Flap Dehiscence	1 (2.9)
	Exposed Hardware <sup>**</sup>	1 (2.9)
	Fistula	3 (8.8)
	Chronic Wound Infection <sup>**</sup>	1 (2.9)
	Hematoma	1 (2.9)
	Compartment Syndrome	1 (2.9)
	Systemic Complications	
Sepsis <sup>***</sup>		1 (2.9)
Respiratory Failure <sup>***</sup>		1 (2.9)
Myocardial Infarction <sup>***</sup>		1 (2.9)
Cardiac Arrest <sup>***</sup>		1 (2.9)
Syncope		1 (2.9)
Pneumonia		1 (2.9)
	Atrial Fibrillation	1 (2.9)

Table 3. Postoperative Complications

<sup>\*</sup> note - numbers represent number of patients affected by each complication. Some patients experienced more than one complication.

<sup>\*\*</sup>2 patients with osteoradionecrosis as a consequence of primary therapy

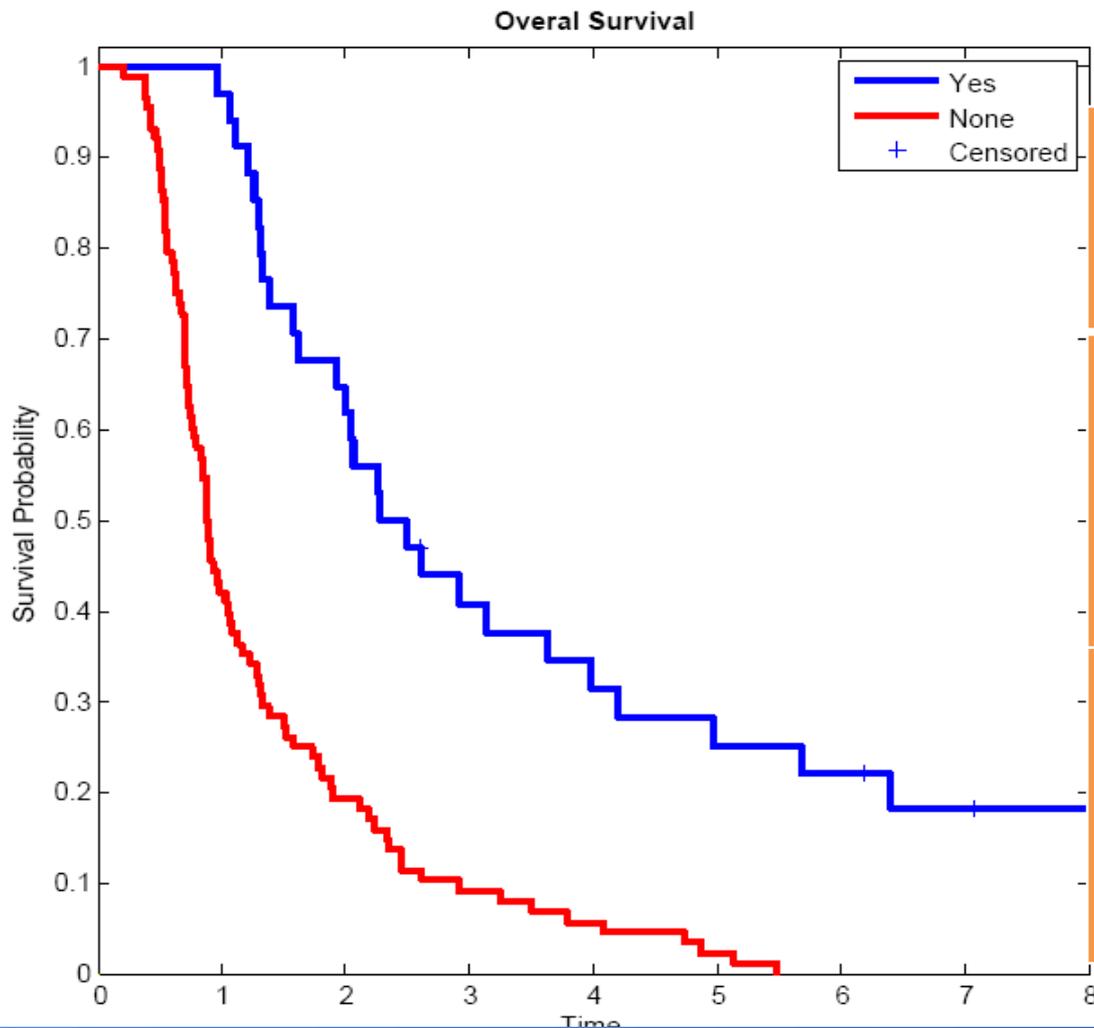


# Post Operative Complications

Type of Complication	Number of Patients (%)	Type of Complication	Number of Patients (%)
Total Complications	15 (44.1)	Systemic Complications	4 (11.8)
Wound Complications	15 (44.1)	Sepsis	1 (2.9)
Minor Wound Infection/Cellulitis	7 (20.6)	Respiratory Failure	1 (2.9)
Flap Dehiscence	1 (2.9)	Myocardial Infarction	1 (2.9)
Exposed Hardware	1 (2.9)	Cardiac Arrest	1 (2.9)
Fistula	3 (8.8)	Syncope	1 (2.9)
Chronic Wound Infection**	1 (2.9)	Pneumonia	1 (2.9)
Hematoma	1 (2.9)	Atrial Fibrillation	1 (2.9)
Compartment Syndrome	1 (2.9)		



# Overall Survival (OS) of Salvaged vs Non-Salvaged Patients (n=122)

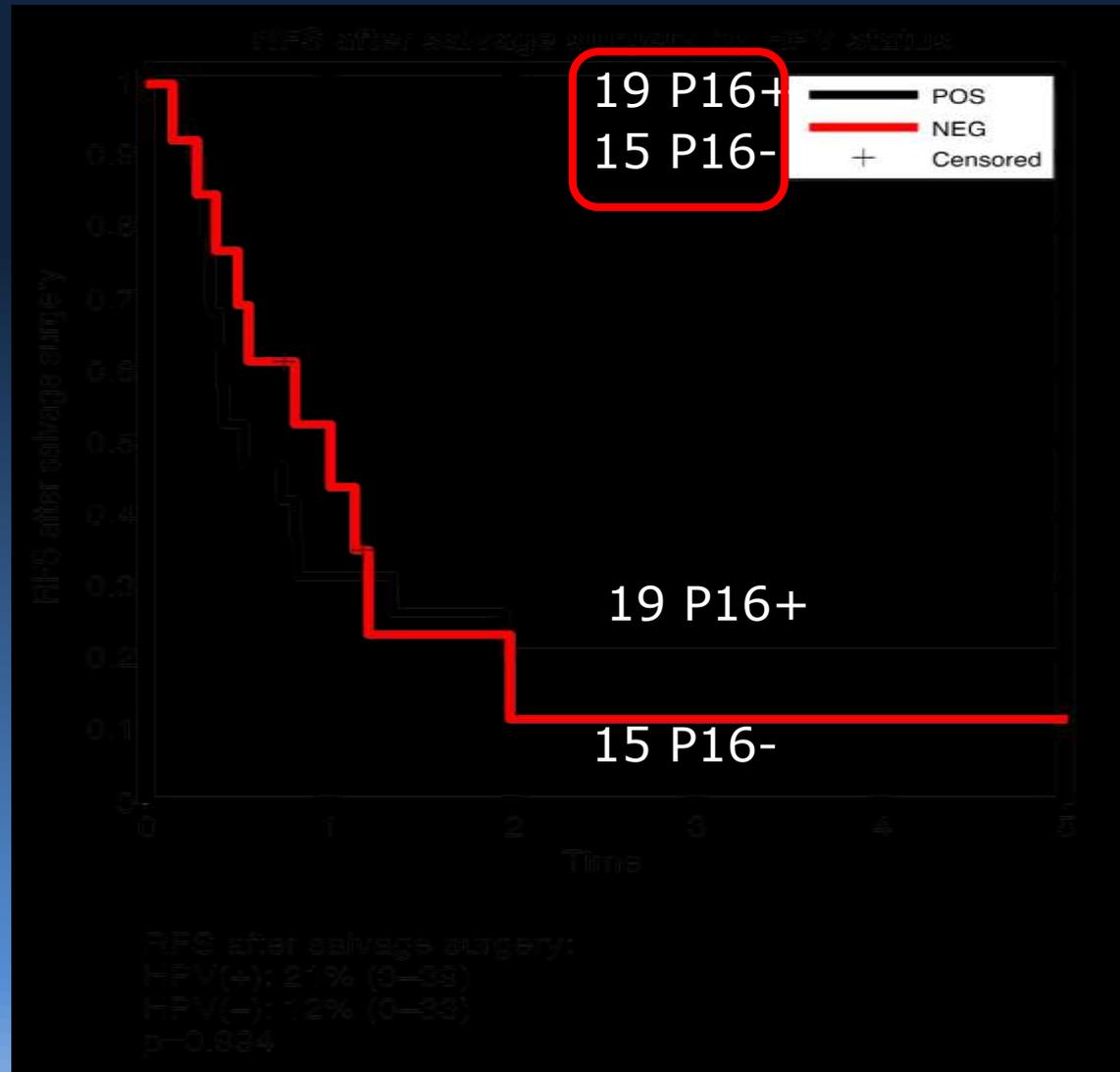


	n	2y	3y	5y	P
<b>Salvage Surgery</b>	34	62% (45-78)	41% (24-57)	25% (10-40)	
<b>No Salvage Surgery</b>	88	19% (11-28)	9% (3-15)	2% (0-5)	<0.001

2017



# 5-Year Recurrence Free Survival (RFS) Stratified by p16 status



\*HPV status determined by p16 immunohistochemistry testing

# Salvage Surgery- Take home Message

- 34 patients underwent salvage surgery.
- 5 patients (14.7%) were tracheostomy dependent
- 22 (64.7%) had permanent gastrostomy tube after salvage surgery.
- Post-operative complications occurred in 15/34 (44%) patients.

# Salvage Surgery-Take home Message

- Recurrence-free survival after salvage surgery was 41% and 25% at 3 and 5 years, respectively.
- The presence of nodal disease at the time of local recurrence, close or positive margins and lymphovascular invasion were the only factors associated with worse survival on univariable analysis.
- HPV status based on p16 status was not associated with either overall or recurrence-free survival.

# Salvage Surgery for OPC

- Overall **7/34 (20.50%)** alive at 5 years.
  - All >5yrs post initial treatment
- Other factors associated with failed salvage
  - Margin Status
    - $p=0.007$
  - rT3/T4 Staging – 100% failure
    - $p=0.033$

# Surgical Principles-Take Home Message- Handling the Mandible

- What is the role of Rim  
Mandibulectomy in Salvage Surgery-  
Post RT or Chemo-RT failure

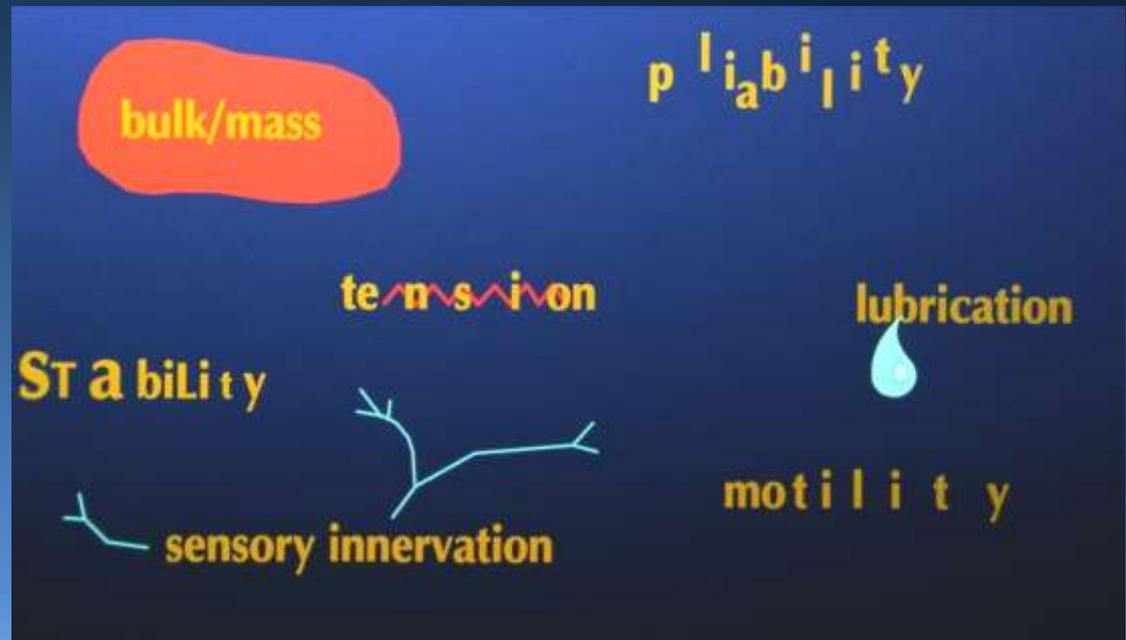
Rim mandibulectomy of radiated  
mandible

=

High Risk for ORN

# Surgical Principles of Mucosal Reconstruction-Take home Message

- Maintain Mobility of Remaining Tissues
- Restore Functional Characteristics
  - Movement
  - Sensation



# Reconstructive Options in the Salvage Setting- Take Home Message

- Skin Graft
- Local Flaps-Tongue
- Regional Myocutaneous
- Free Tissue Transfer



# Free Tissue Options- Take Home Message

	Flap Thickness	Volume Adjustment	Sensate
Forearm	++++	++	++++
Anterolateral Thigh	+++	++++	++
Lateral Arm	++	++++	++
Fibula	+++	++	++

# Conclusions

Surgical salvage for OPSCC after failure of radiotherapy (+/- chemotherapy) is feasible. Patients that may benefit from surgery include those without regional recurrence and/or those in whom negative margins can be obtained. However, patients may be tracheotomy or gastrostomy tube dependent. HPV p16 status did not appear to have prognostic impact in the salvage setting, however larger series are required to assess this relationship.



The International Federation  
of Head and Neck Oncologic Societies

Current Concepts in Head and Neck Surgery and Oncology 2017

# Salvage Surgery for Non-Surgical Treatment Failures: Larynx/Hypopharynx

Dr. Patrick Gullane

# Evolution of Organ Preservation Strategies Cancer of the Larynx, *Hypopharynx*

- 1960's – Laryngectomy/Pharyngectomy
- 1970's – Laryngectomy alone  
Planned radiation with surgery for salvage
- 1980's – Irradiation +/- Chemotherapy (5FU, Mitomycin C)
- 1990's – VA Trial, (Neoadjuvant Chemo/Rad or Laryngectomy)
- 2000's – Adoption of Organ Preservation Approaches

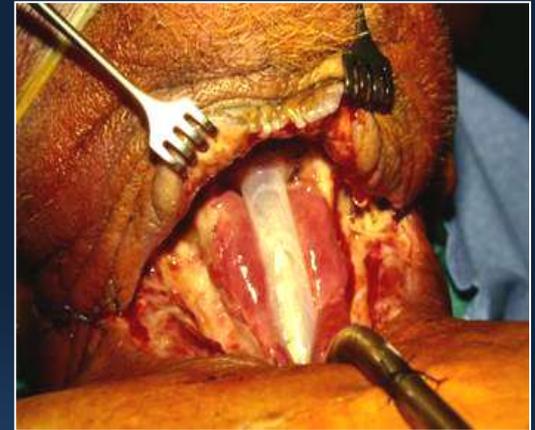


*“I have seen the future and it doesn't work.”*

*Robert Fulford*

# What about Surgical Salvage Following Organ Preservation Strategies?

- Increasing trend over the past decade to adopt organ preservation strategies using either concomitant chemoradiation or accelerated or hyperfractionated radiotherapy.
- While these approaches have increased the likelihood of primary control in certain head and neck mucosal malignancies, when this approach fails and surgical salvage is required the sequelae of the primary treatment creates major challenges for patients and their surgeons.



Hostile Wound

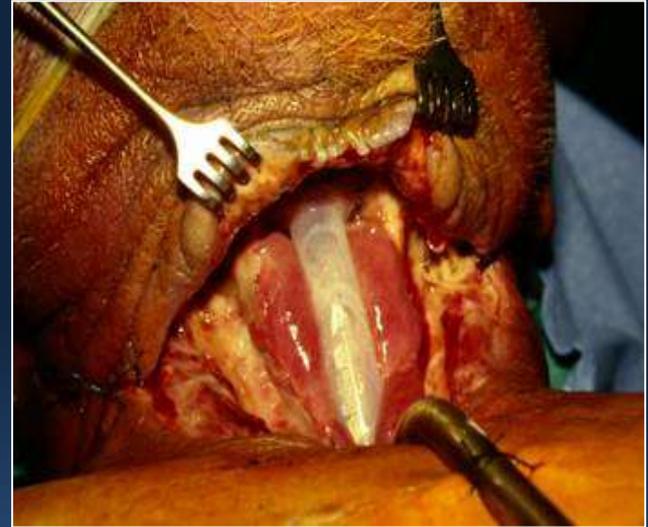


High Fistula Rate

# Salvage Surgery Following Irradiation ± Chemotherapy

## Problems

- Extent of recurrence
  - neck only
  - neck & primary
- Hostile wound
- High fistula rate
- Need for flap repair



# Grau C. Salvage laryngectomy & pharyngocutaneous fistulae after primary radiotherapy for head and neck cancer: a national survey from DAHANCA.

*Head & Neck. 25(9):711-6, 2003*

## Fistula Rate 9% to 57%

**Table 4.** The influence of previous radiotherapy on fistulae incidence after laryngectomy. Survey of reports published since 1990 with more than 100 patients.

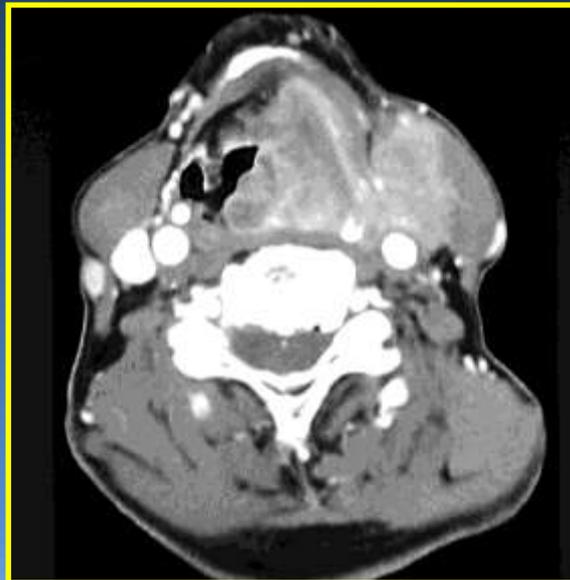
Author	Year	No. patients	Fistulae		RT significant risk factor for fistulae
			All	Previous RT	
Sarkar 1990 <sup>5</sup>	1981–1985	242	35%	57%	Yes
McCombe 1993 <sup>6</sup>	1965–1990	357	23%	39%	Yes
Natvig 1993 <sup>7</sup>	1980–1987	197	14%	19%	Yes
Hier 1993 <sup>8</sup>	1981–1991	126	19%	20%	If short interval after RT
Papazoglu 1994 <sup>9</sup>	1980–1989	310	9%	14%	Yes
Celikkanat 1995 <sup>14</sup>	1985–1994	110	17%	—	N/A
Greisen 1997 <sup>15</sup>	1975–1989	107	12%	—	N/A
Parikh, Gullane 1998	1992–1996	125	22%	23%	No
Soylu 1998 <sup>13</sup>	1975–1995	295	13%	19%	No
de Zinis 1999 <sup>17</sup>	1988–1995	246	16%	16%	No
Herranz 2000 <sup>18</sup>	1980–1997	471	21%	—	(No RT given)
Virtaniemi 2001 <sup>10</sup>	1975–1995	133	15%	29%	Only for Co-60
Grau 2003 (current series)	1987–1997	472	21%	21%	(All had RT)

Abbreviations: N/A, not available; RT, radiotherapy.



# Primary and Salvage (Hypo)Pharyngectomy: Analysis and Outcome

- Jonathan Clark, John de Almeida, Ralph Gilbert, Jonathan Irish, Dale Brown, Peter Neligan, Patrick Gullane



Head and Neck 28:671 - 677, 2006

# PMH Experience (Clarke et al 2006)

- Retrospective chart review 1992 – 2002
- N = 153
- Mean age 62 yrs
- 35 females, 118 males
- Mean follow up 3.2 yrs.
- All patients undergoing resection and flap reconstruction of the hypopharynx
- Analyse specifically
  - Initial treatment modality (salvage v primary surgery)
  - Defect extent
  - Type of flap reconstruction
  - Fasciocutaneous versus enteric free flap reconstruction

# Indications for Surgery

Post definitive radiotherapy 80 (52%)

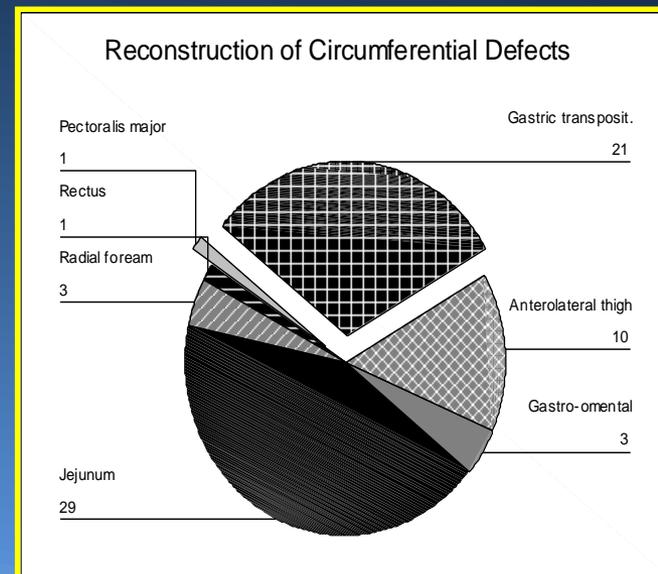
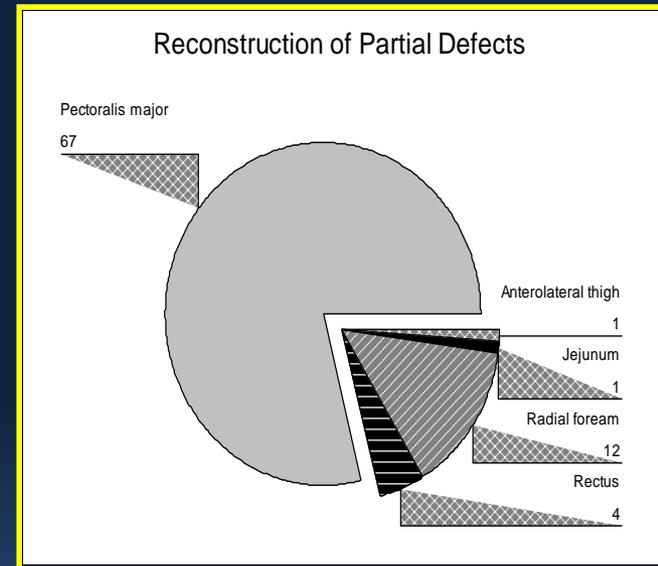
- Salvage for recurrence 75
- Stricture 5

Primary surgery 73 (48%)

- Prior radiotherapy (other site) 38
- Advanced disease 30
- Non-SCC 5

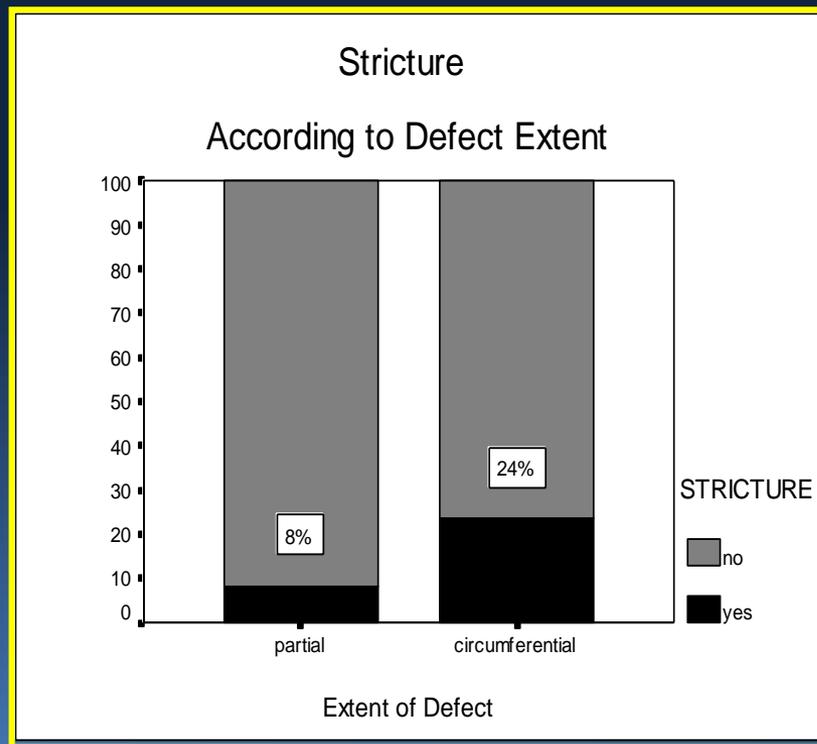
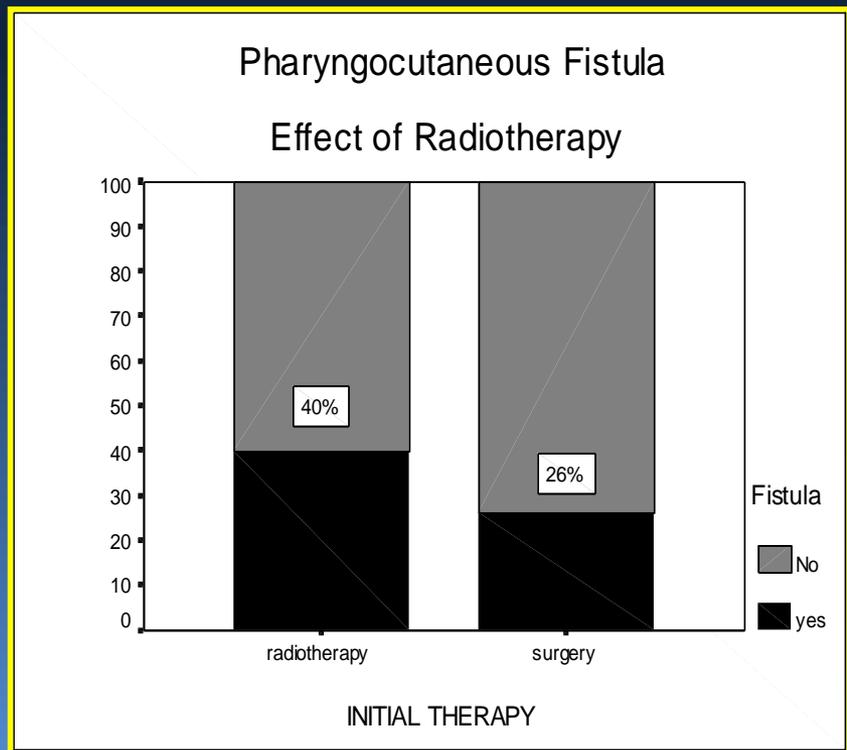
# Reconstruction-153 Defects

- Pharyngeal defect extent
  - Partial 85 (56%)
  - Circumferential 68 (44%)
- Initial reconstruction
  - Pectoralis major 68
- Gastric transposition 21
  - Free flap 64



Complication - Early	Frequency w/ Hypocalcemia	%	Frequency w/o Hypocalcemia	%
Total	109	71%	84	55%
Wound	38	25%	38	25%
Dehiscence	25	16%	25	16%
Infection	11	7%	11	7%
Skin necrosis	2	1%	2	1%
Vascular	14	9%	14	9%
Hematoma	7	5%	7	5%
Major vessel rupture	7	5%	7	5%
Fistula	51	33%	51	33%
Flap	20	13%	20	13%
Necrosis	9	6%	9	6%
Free flap failure	3	4.7%	3	4.7%
Donor site	6	4%	6	4%
Stent migration	4	36%	4	36%
Cardiopulmonary	21	14%	21	14%
Hypocalcemia	69	45%		

# Predictors of Pharyngeal Complications



2017

# Effect of Initial Treatment Salvage versus Primary Surgery

Salvage pharyngectomy (post-radiation) associated with increased

- Pharyngocutaneous Fistula ( $p = 0.048$ )

Trend towards

- Wound complications ( $p = 0.12$ )
- Major vessel rupture ( $p = 0.07$ )
  - 1% v 8%
- Length of stay ( $p = 0.07$ )
- Time to oral intake ( $p = 0.07$ )

# Conclusions

- Early and late morbidity following laryngopharyngeal reconstruction remains substantial despite technical advances.
- Morbidity can be predicted by:
  - initial treatment modality
  - method of reconstruction
  - extent of defect reconstruction
  - Patient co-morbidity

# What are the options for laryngopharyngeal reconstruction in 2017?

- *"between a rock and a hard place"*

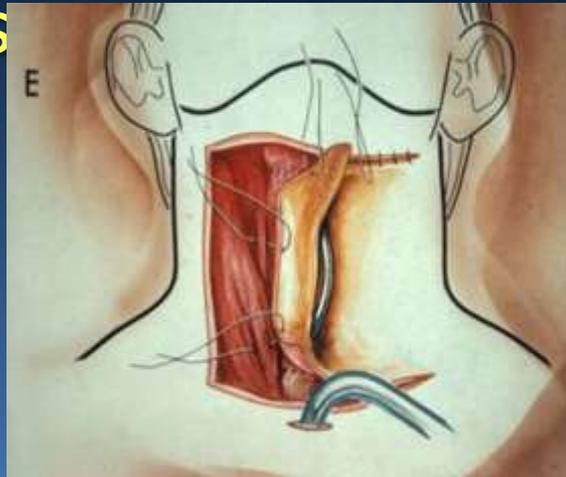
*Rabinovich*

# Phases in Development in Pharyngeal Reconstruction

- Regional Flaps
- *Cutaneous* 1877 - Czerny
- 1942 - Wookey
- 1965 - Bakamjian
- *Myocutaneous* 1979 - Ariyan
- Viscus
- *Gastric Pull Up* 1912 - Jianu
- 1949 - Ong & Lee
- 1998 - Wei et al
- *Colonic Interposition* 1954 - Goligher
- Free Flap
- *Jejunal graft* 1956 - Seidenberg
- *Tube Radial Forearm* 1979 - Yang
- *Anterolateral Thigh* 1984 - Song
- *Gastro-omental* 1979 - Baudet

# Harold Wookey

- Redesigned cervical flap
- Broad based pedicle
- More reliable 2 stage reconstruction
- 6 – 8 weeks



Dr. Harold Wookey  
Head, Division of  
General Surgery  
Toronto General  
Hospital  
1935 – 1951

Surgical treatment of carcinoma of the pharynx and upper oesophagus. *Surg Gynecol Obstet* 1942;75:499

# Problems with Wookey Flap

- Using tissue within radiation field
- Staged reconstruction
  - Aspiration
- > 90% complication rate
  - Fistula
  - Sepsis / Mediastinitis
- Length of esophagus resectable
- Mortality > 30%

# The Evolution of Pharyngeal Reconstruction Over 35 years

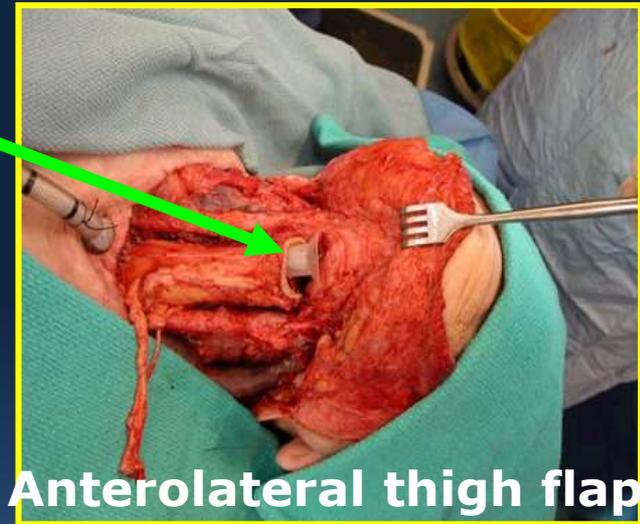
Now 2017,  
One stage procedure

## Stricture rate

- No stent 33%
- Stent < 10%  
(p=0.571)



Then 1970,  
Multiple  
Operations



**Anterolateral thigh flap**



**Gastro-omental flap**



*"The person who has a disease is more important than the disease a person has."*

*William Osler*

# Reconstructive Options Following Salvage Laryngopharyngectomy 2017

Pectoralis Major  
Pedicled Flap

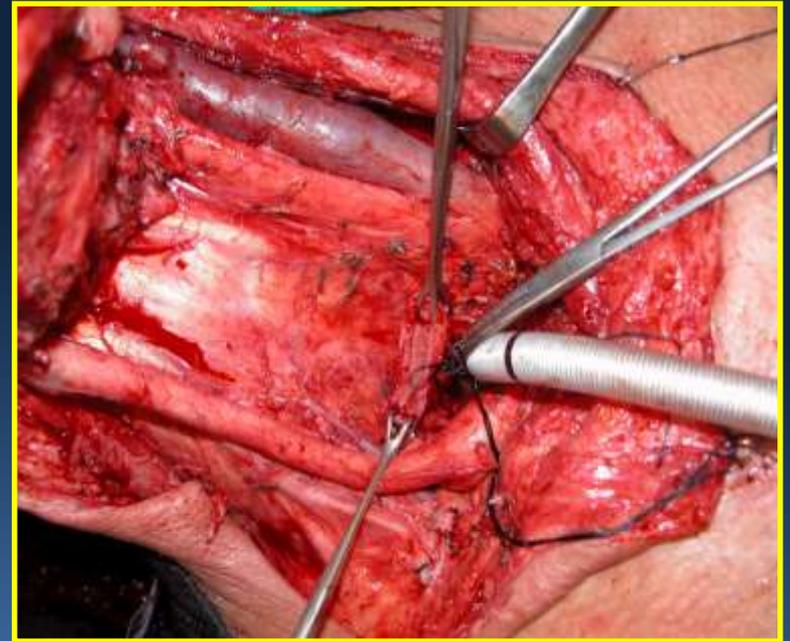
Radial Forearm Flap

Free Jejunal Graft

Anterolateral Thigh  
Flap

Gastro-omental Flap

Gastric Transposition



# Methods of Reconstruction *Then*

- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



# Methods of Reconstruction *Now*

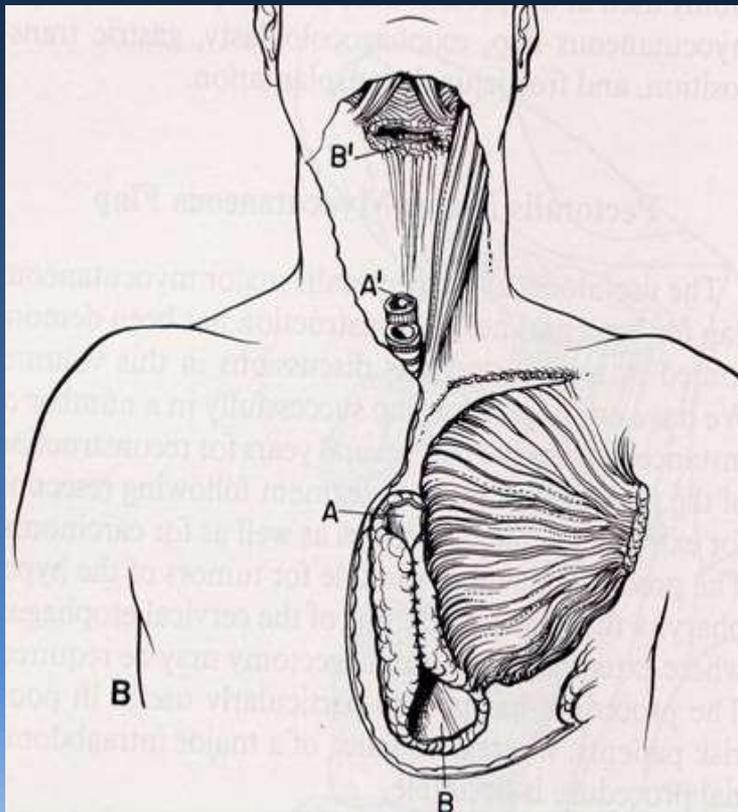
- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



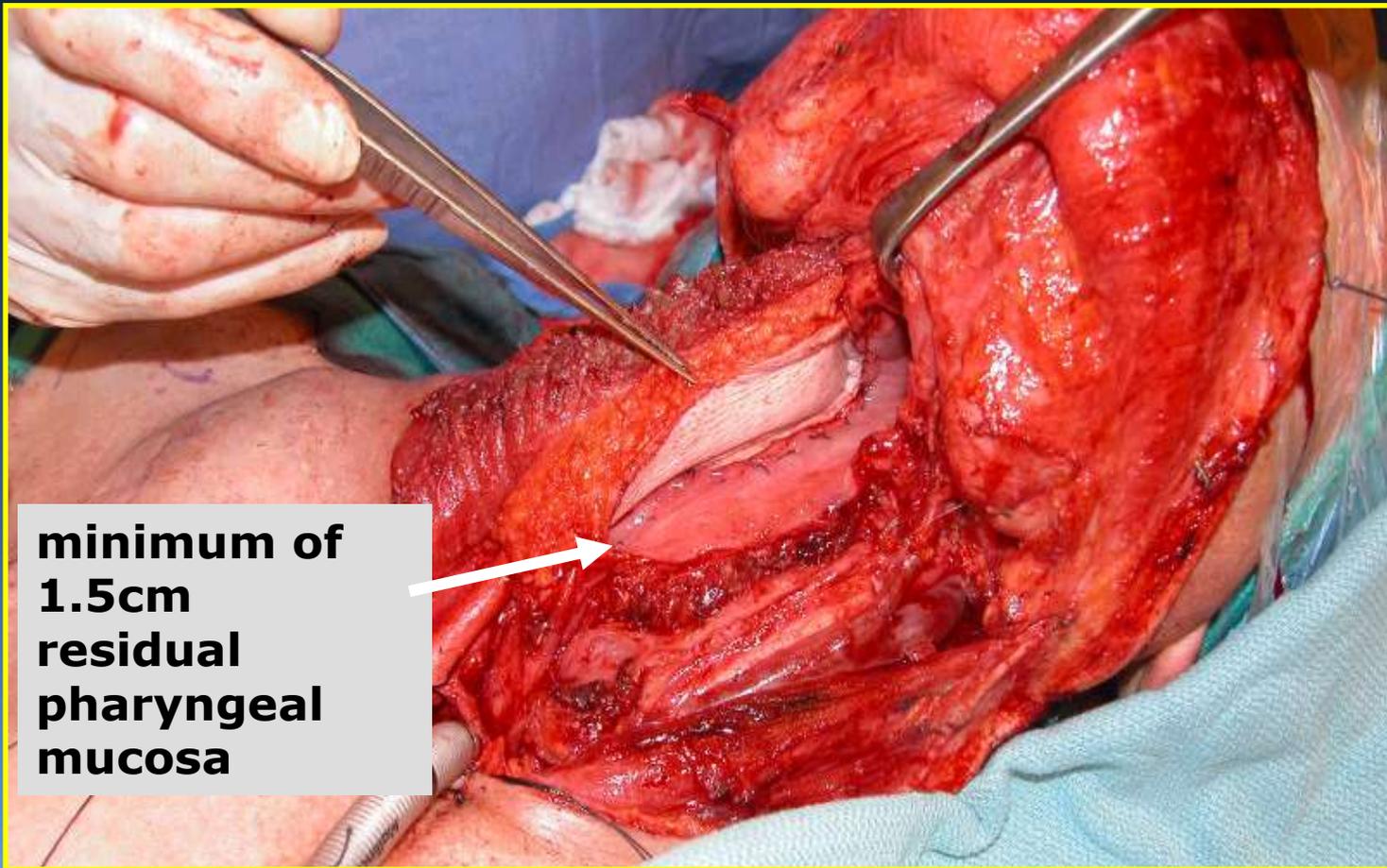
# The Pectoralis Major Myocutaneous Flap

*"You Can't Tube the New York Yellow Pages"*

*Richard Hayden*



# When should we use a Pedicled Pectoralis Major Flap?



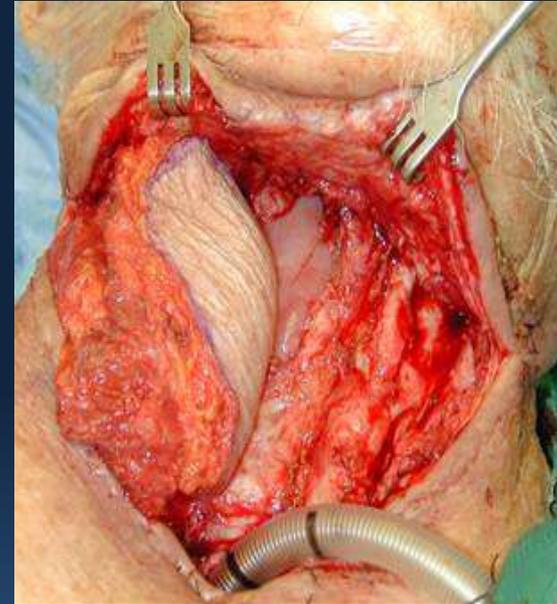
**minimum of  
1.5cm  
residual  
pharyngeal  
mucosa**

In Repair of partial Pharyngeal defects

# Pharyngeal Reconstruction with PMMF

- 67 patients (1987-1999)
- 37-82 years
- 97% flap success
- 17% fistula rate
  - 12% spontaneous closure
  - 5% second flap
- Permanent G-tube 2%
- Vocal rehabilitation 74%

Primary role in 2017 is reconstruction of partial pharyngeal defects.



Freeman JL, Gullane PJ, Rotstein LM: "The Double Paddle Pectoralis Major Myocutaneous Flap. J Otol. 1985

# Methods of Reconstruction

## *Now – on occasion*

- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



# CURRENT STATUS OF PHARYNGOLARYNGO-ESOPHAGECTOMY AND PHARYNGOGASTRIC ANASTOMOSIS

William Wei, Lai Kun Lam, Po Wing Yue, John Wong

Department of Surgery, The University of Hong Kong, Queen Mary Hospital, Hong Kong

HEAD & NECK May 1998

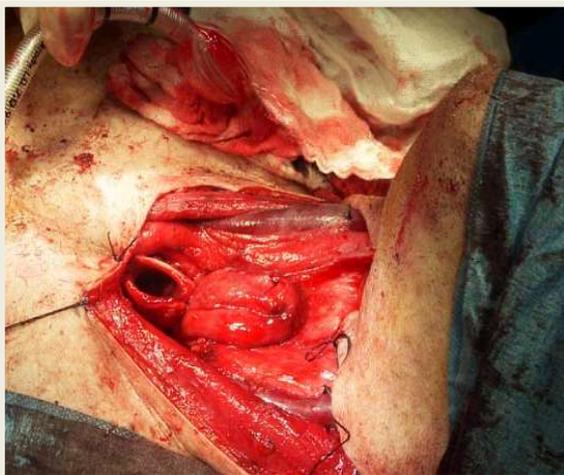
**Table 1.** Location of the primary tumor.

Years	Patient no.	Larynx	Hypopharynx	Cervical esophagus
1966–1979 <sup>8</sup>	157	83 (53%)	67 (43%)	7 (4%)
1980–1985 <sup>9</sup>	91	39 (43%)	41 (45%)	11 (12%)
1986–1995	69	0 (0%)	37 (54%)	32 (46%)
Total	317	122	145	50

When should we use  
a  
Gastric Transposition?

**Table 2.** Mortality and morbidity.

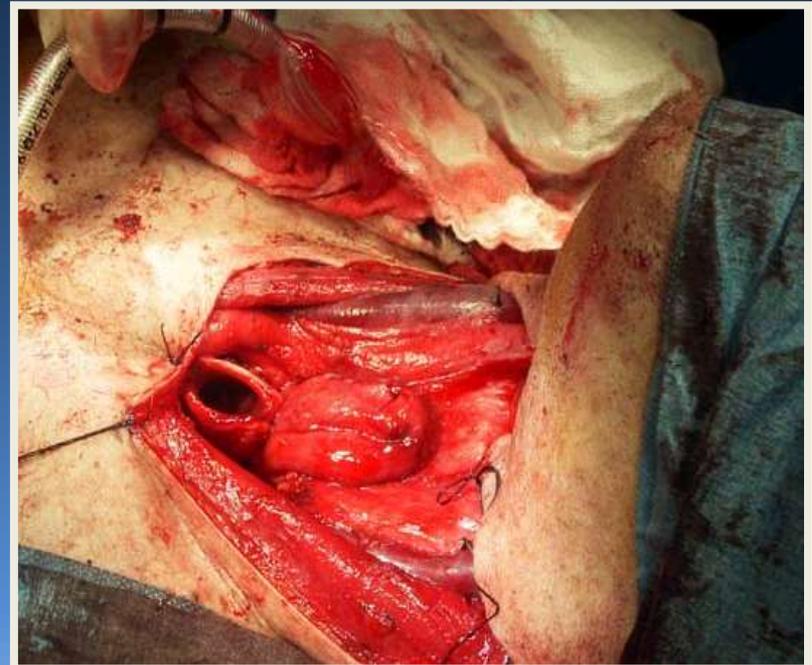
Years	Patient no.	Anastomotic leakage	Hospital mortality
1966–1979 <sup>8</sup>	157	36 (23%)	49 (31%)
1980–1985 <sup>9</sup>	91	10 (11%)	11 (12%)
1986–1995	69	6 (9%)	6 (9%)
Total	317	52	66



# Series of Gastric Transpositions

Goldberg M. Freeman J. Gullane PJ. Patterson GA. Todd TR. McShane D. Transhiatal esophagectomy with gastric transposition for pharyngolaryngeal malignant disease. J Thor Cardiovasc Surg. 97(3):327-33, 1989

- 41 patients (21 prior high dose RT)
- Mortality 14%
- Morbidity 46%
- Fistula 22%
- Mean LOS 31 days
- Overall 35% 2YS

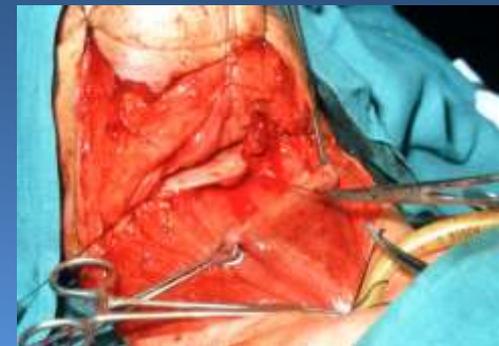


# Problems

- Perioperative mortality 10 – 20%
- Length of hospital stay
- Hemorrhage
- Anastomotic disruption and fistula >30%
- Resection extending to nasopharynx a limitation
- Gastric emptying and dumping
- Speech – poor
- Last resort form of reconstruction today

**Table 3.** Reports in the literature on patient number, mortality, and morbidity of pharyngolaryngo-esophagectomy with pharyngogastric anastomosis.

Authors	Year	No. of patients	Mortality number (%)	Morbidity number (%)
LeQuesne <sup>3</sup>	1966	10	3 (30%)	4 (40%)
Leonard <sup>15</sup>	1970	10	2 (20%)	1 (10%)
Stell <sup>15</sup>	1973	24	11 (46%)	1 (4%)
Akiyama <sup>4</sup>	1975	25	0 (0%)	1 (4%)
Shepperd <sup>17</sup>	1977	19	4 (21%)	7 (37%)
Lam <sup>5</sup>	1981	157	48 (31%)	83 (53%)
Schechter <sup>18</sup>	1982	13	1 (8%)	2 (15%)
Peracchia <sup>19</sup>	1982	32	5 (16%)	15 (47%)
Pradhan <sup>20</sup>	1984	25	5 (20%)	5 (20%)
Surkin <sup>12</sup>	1984	12	1 (8%)	4 (33%)
Jones <sup>21</sup>	1986	16	8 (50%)	4 (25%)
Harrison <sup>22</sup>	1986	101	11 (11%)	33 (33%)
Lam <sup>5</sup>	1987	91	10 (11%)	30 (30%)
Goldberg <sup>23</sup>	1989	41	8 (20%)	19 (46%)
Silver <sup>24</sup>	1989	15	3 (20%)	8 (53%)
Mehta <sup>13</sup>	1990	75	7 (9%)	30 (40%)
Spiro <sup>14</sup>	1991	120	13 (11%)	66 (55%)
Cahow <sup>25</sup>	1994	59	8 (14%)	16 (27%)
Marmuse <sup>26</sup>	1995	37	( )	10 (25%)
Bardini <sup>27</sup>	1995	96	( )	20 (23%)
Total		978	160 (16%)	359 (37%)



# Methods of Reconstruction

## *Now – on occasion*

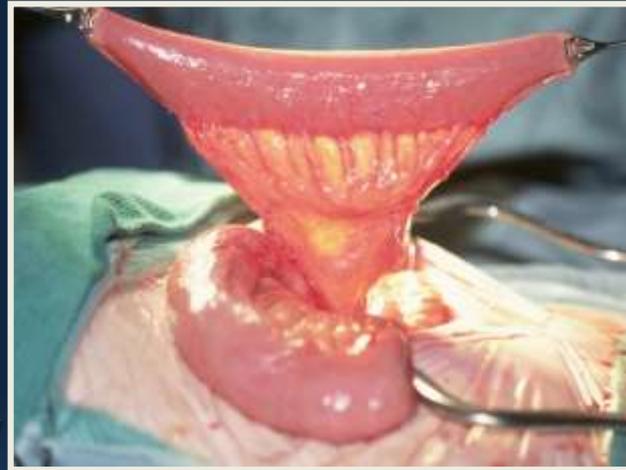
- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



# Free Jejunum

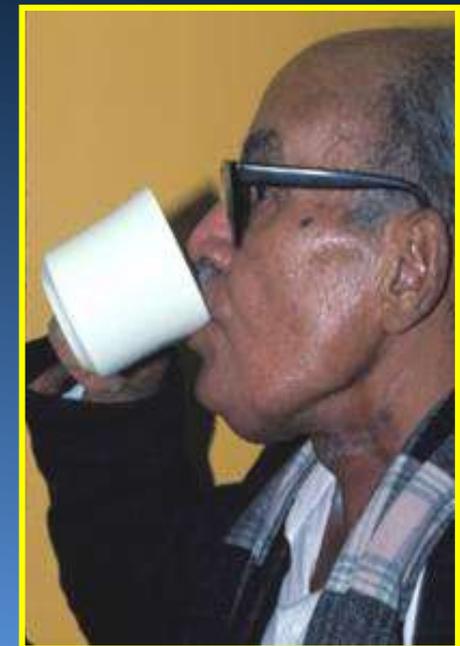
## Advantages

- Simple, extensive experience in most centres
- Reliable
- Length
- Donor Site Morbidity



## Disadvantages

- Swallowing
  - In our experience unless radiated post-op average to poor swallowing results
- Speech
  - TEP speech is a major problem because wet patulous conduit



Hynes B, Boyd JB, Gullane PJ, Manktelow RT, Rotstein LE:  
“Free Jejunal Grafts in Pharyngoesophageal Reconstruction”  
CJS Nov 1987

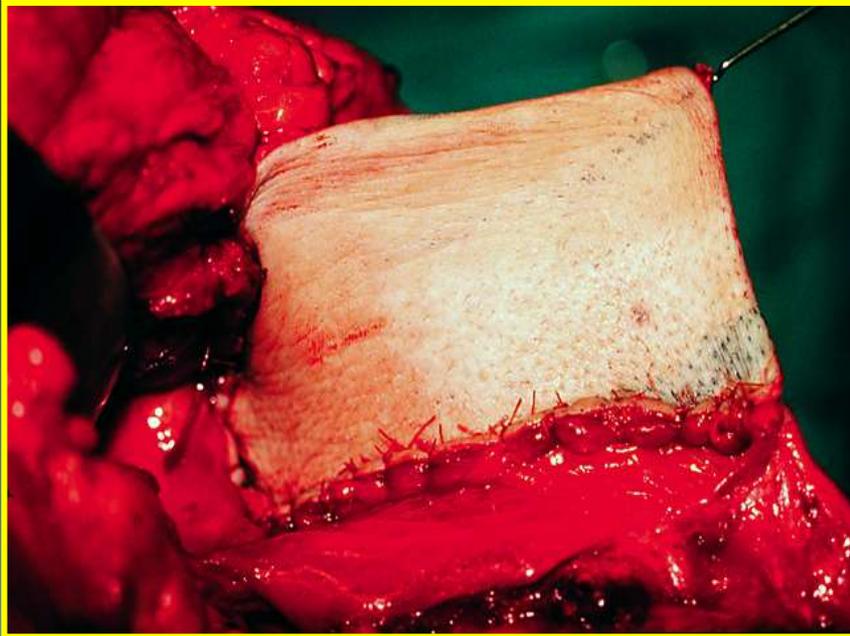
# Methods of Reconstruction

## *Now – on occasion*

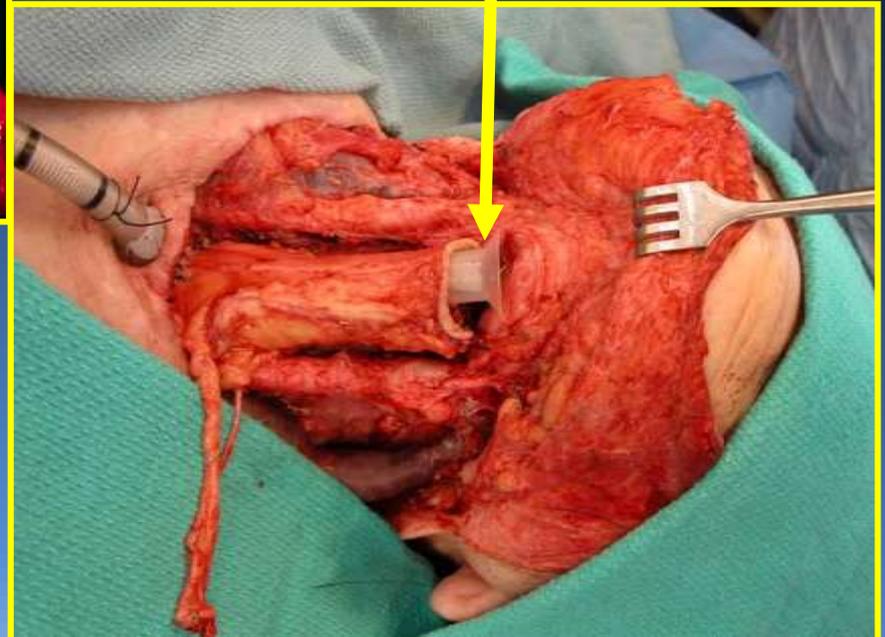
- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



# Radial Forearm Flap



Savary Fistula tube vital



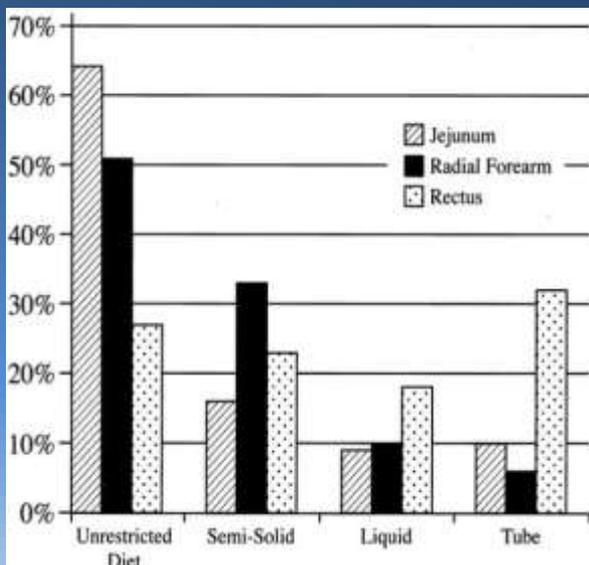
# Tubed Forearm

## Pros

- Minimal immediate donor morbidity
- Reliable
- Easy tubulation
- Speech better than jejunum?

## Cons

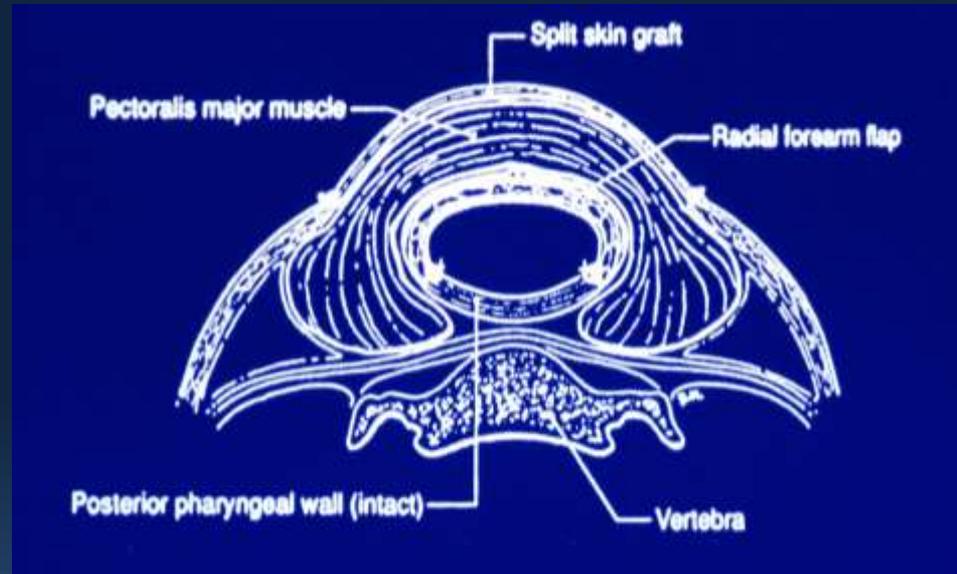
- Stricture
  - ?overcome by salivary tube or Z plasty at distal skin-mucosal junction
- Fistula
- No peristalsis
  - ?advantage



# Swallowing

Disa et al

# Hypopharyngeal Reconstruction with Lining and Cover



Used as lining for salvage repair with second flap for cover



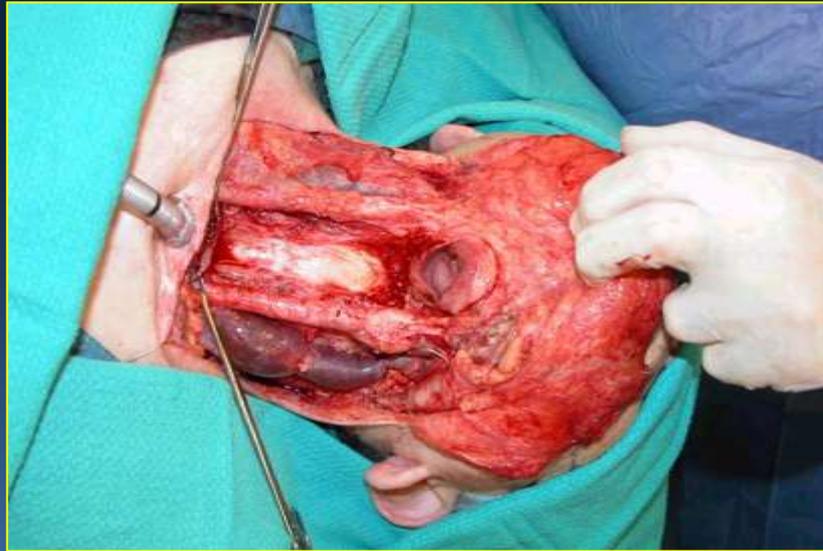
# Methods of Reconstruction

## *Now – frequently*

- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



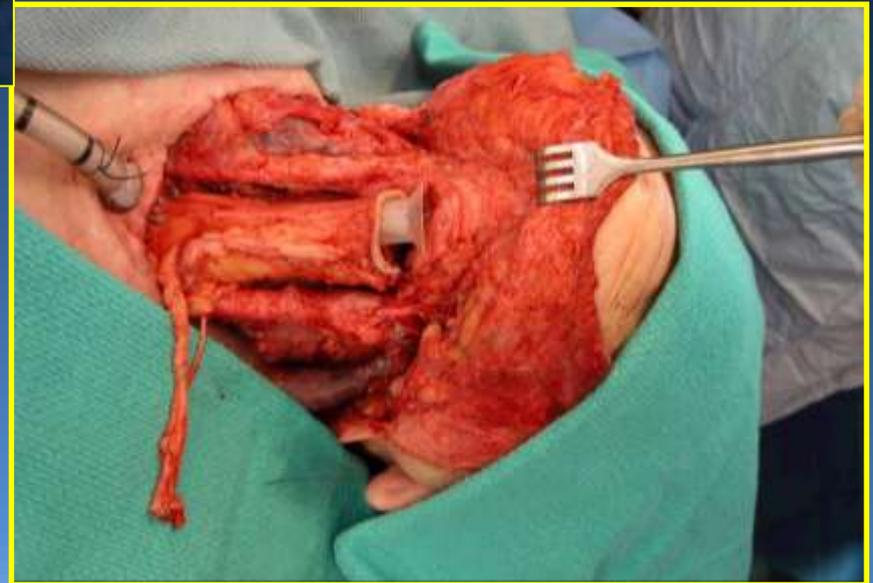
# When should we use a Anterolateral Thigh Flap?



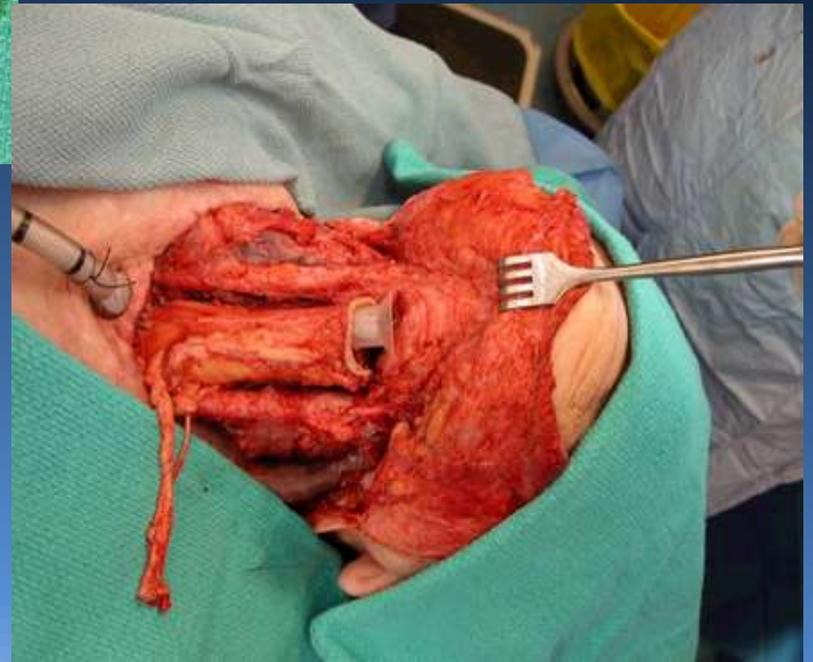
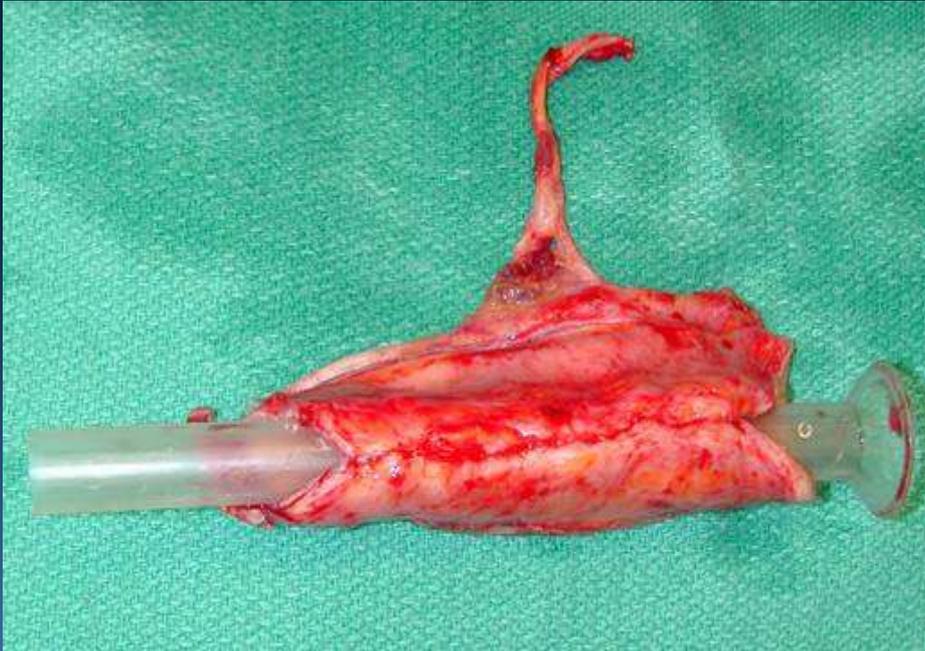
## Stricture rate

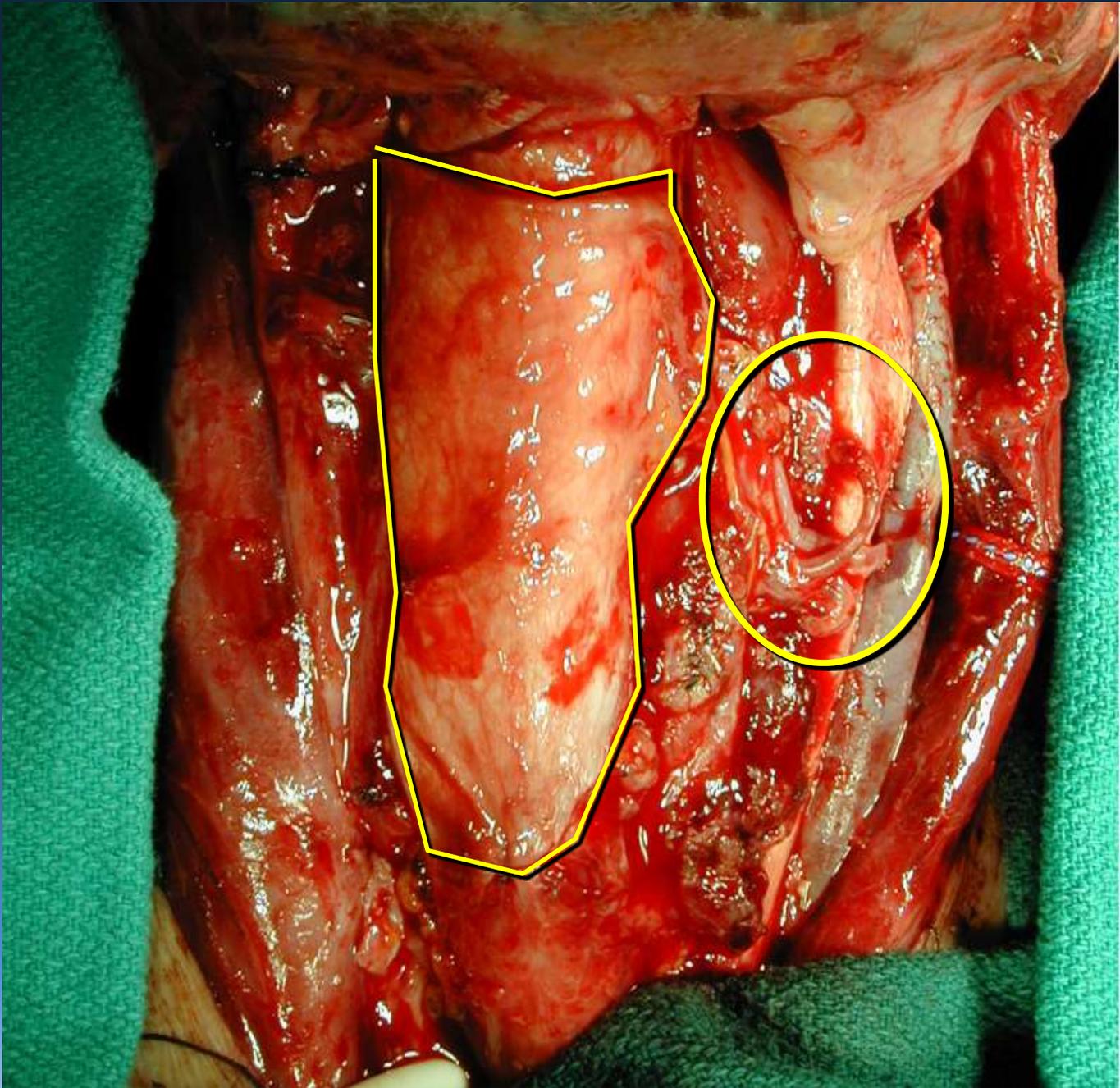
- No stent 33%
- Stent < 10%  
( $p=0.571$ )

Most commonly used  
flap in our centre for  
repair of total  
circumferential defects.



# Tubed Anterolateral Thigh Flap





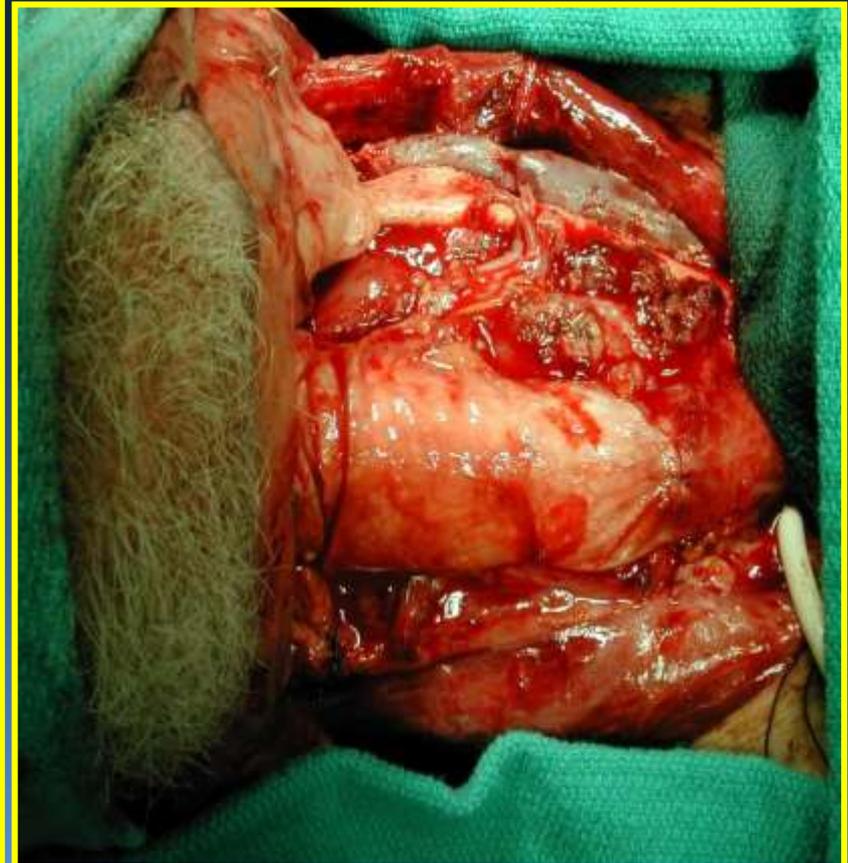
ANTTI MAKITIE, NIGEL BEASLEY, PETER C. NELIGAN,  
JOAN LIPA, PATRICK J. GULLANE, RALPH W. GILBERT.

Head and neck reconstruction with anterolateral thigh flap  
*Otolaryngol Head Neck Surg* 2003;129:547-55.

Table 3. Flap characteristics of 39 anterolateral free flaps

	No. of patients
Site of reconstruction	
Laryngopharyngeal	3
Oral or oropharyngeal	20
External skin	14
Other (maxillectomy repair)	2
Recipient vessel	
Superior thyroid artery	19
Facial artery	13
Transverse cervical artery	5
Superficial temporal artery	2
Internal jugular vein	25
External jugular vein	2
Facial vein	6
Transverse cervical vein	3
Superficial temporal vein	2
Previously connected cephalic vein (RFFF)	1

RFFF, Radial forearm free flap.



2007- 89 anterolateral thigh flap repairs

# Anterolateral Thigh Flap

- Tube anterolateral thigh flap appears to be the best reconstructive option in patients with appropriate anatomy.
- The flap can easily reconstruct a defect from nasopharynx to thoracic inlet.
- The Fascial Lata is unique feature providing a second layer of closure not available in other flaps.
- Major disadvantage is the variable vascular anatomy, and potential difficulty in dissection.

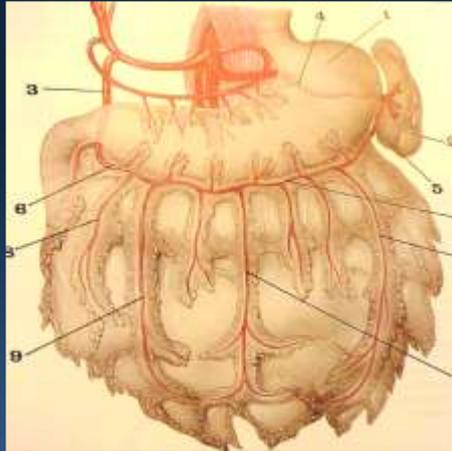
# Methods of Reconstruction

## *Now – on occasion*

- Regional flaps
  - cutaneous
  - myocutaneous
- Viscus
  - gastric pull up
  - colonic interposition
- Free flap
  - jejunal graft
  - tubed radial forearm
  - anterolateral thigh
  - gastro-omental flap



# Gastro-Omental Flap

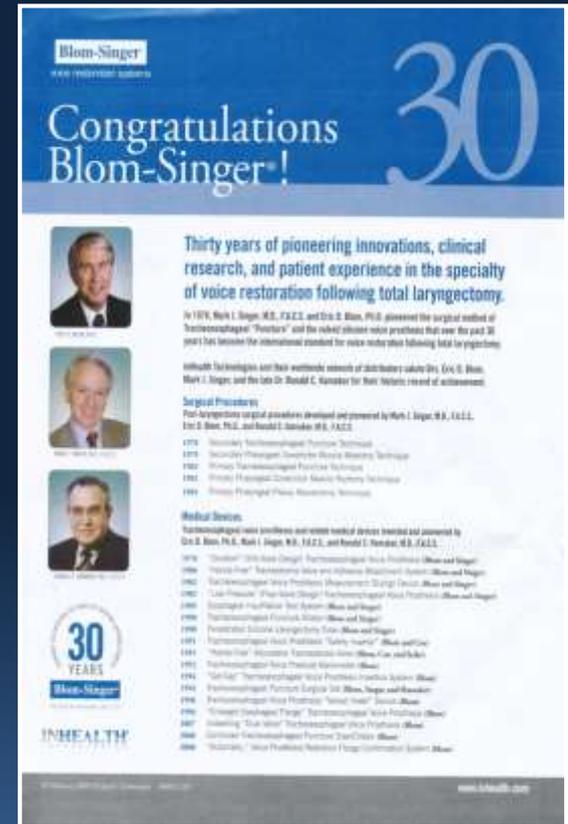


In salvage pharyngectomy my following organ preservation therapy in good performance patients.



# Free Gastro-Omental Transfer

- Summary
- Advantages
  - One Stage, Low Morbidity
  - Unlimited tube diameter,
  - Swallowing
  - Speech
  - Harvest with Omentum
- Disadvantages
  - abdominal harvest, mucoid secretions



**Blom-Singer**  
www.blom-singer.com

## Congratulations Blom-Singer! 30

**Thirty years of pioneering innovations, clinical research, and patient experience in the specialty of voice restoration following total laryngectomy.**

In 1979, Mark I. Singer, M.D., F.R.C.S., and Eric S. Blom, Ph.D., pioneered the surgical method of "blom-singer" "Proloker" and the related omentum voice prostheses that over the past 30 years has become the international standard for voice restoration following total laryngectomy.

Without the knowledge and their worldwide network of distributors, collaborators, Eric S. Blom, Mark I. Singer, and the late Dr. Ronald C. Knudsen for their historic record of achievement.

**Surgical Procedures:**  
First-Stage/Second-stage surgical procedures developed and pioneered by Mark I. Singer, M.D., F.R.C.S., Eric S. Blom, Ph.D., and Ronald C. Knudsen, M.D., F.R.C.S.

1979 Secondary Tracheostomy/Tongue Suture Technique  
1979 Secondary Tracheostomy/Tongue Suture Technique  
1980 Primary Tracheostomy/Tongue Suture Technique  
1981 Primary Tracheostomy/Tongue Suture Technique  
1981 Primary Tracheostomy/Tongue Suture Technique

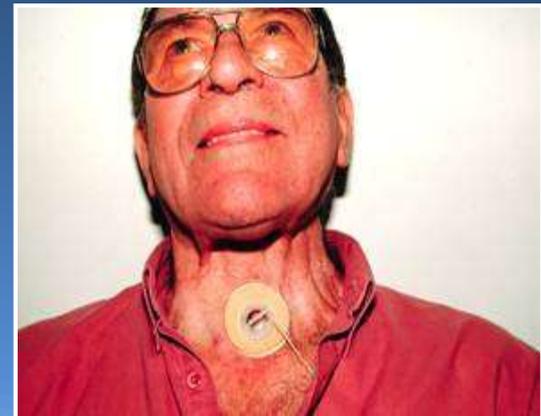
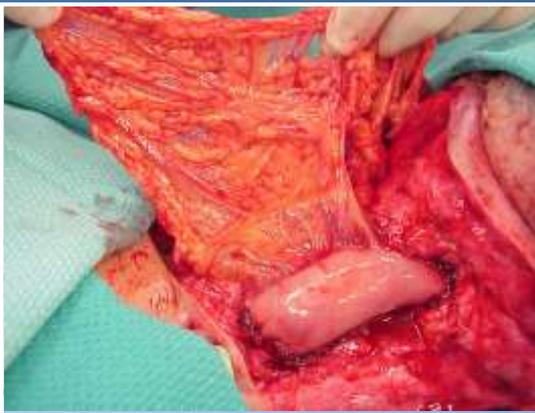
**Medical Devices:**  
Blom-Singer omentum voice prostheses and related medical devices invented and patented by Eric S. Blom, Ph.D., Mark I. Singer, M.D., F.R.C.S., and Ronald C. Knudsen, M.D., F.R.C.S.

1979 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1980 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1981 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1982 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1983 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1984 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1985 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1986 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1987 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1988 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1989 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1990 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1991 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1992 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1993 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1994 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1995 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1996 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1997 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1998 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
1999 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2000 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2001 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2002 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2003 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2004 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2005 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2006 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2007 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2008 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2009 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2010 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2011 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2012 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2013 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2014 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2015 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2016 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)  
2017 "Proloker" (Silicone Design) Tracheostomy/Tongue Suture Technique (Blom and Singer)

**Blom-Singer**  
30 YEARS

**INHEALTH**

www.blom-singer.com



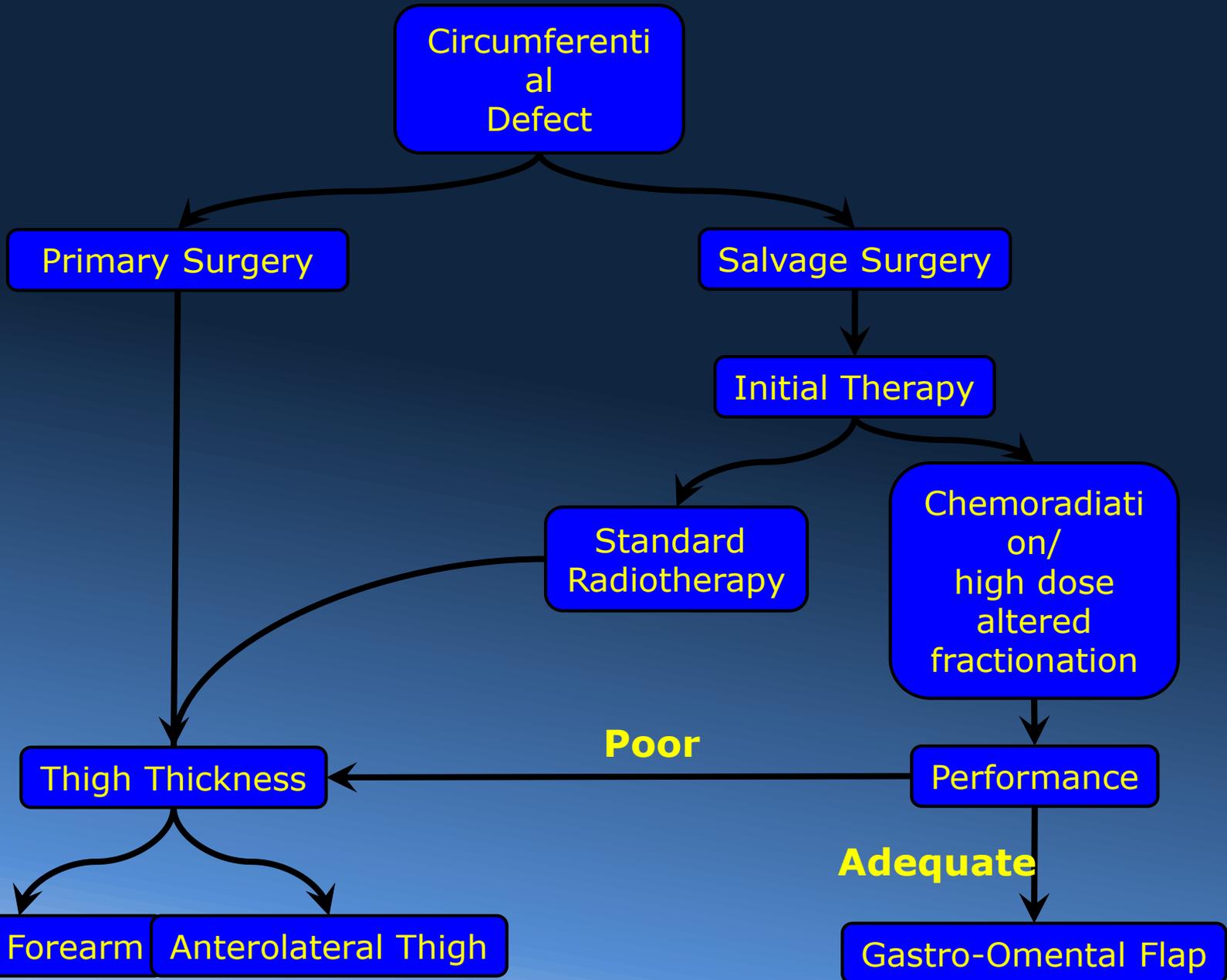
# Options in Pharyngeal Reconstruction 2010



Flap Selection	Swallow	Speech	Morbidity
Anterolateral Thigh + Stent	+++	+++	0
Forearm + Stent	++	+++	0
Free Gastro-Omental	+++	+++	+
Free Jejunum	+	+	+
Gastric Pullup	++++	0	++++

It's Role to be evaluated

# Algorithm of Pharyngeal Reconstruction in an Era of Organ Preservation 2010



# Conclusions

- Organ preservation approaches clearly provide an opportunity for functional preservation of critical structures.
- Surgical Salvage of these primary treatment approaches is associated with extremely high rates of post operative complications particularly in open mucosal procedures.

# Conclusions

- Patients are best served by liberal use of either regional myocutaneous flaps or free tissue transfer.
- This subset of patients are likely best managed in regional centres of excellence with well developed multidisciplinary programs for ablative and reconstructive head and neck surgery with ancillary rehabilitation services.



# University Health Network

