MSKCC-TMC present:

Multidisciplinary Tumor Board on Oral Cancer

25th Feb 2022

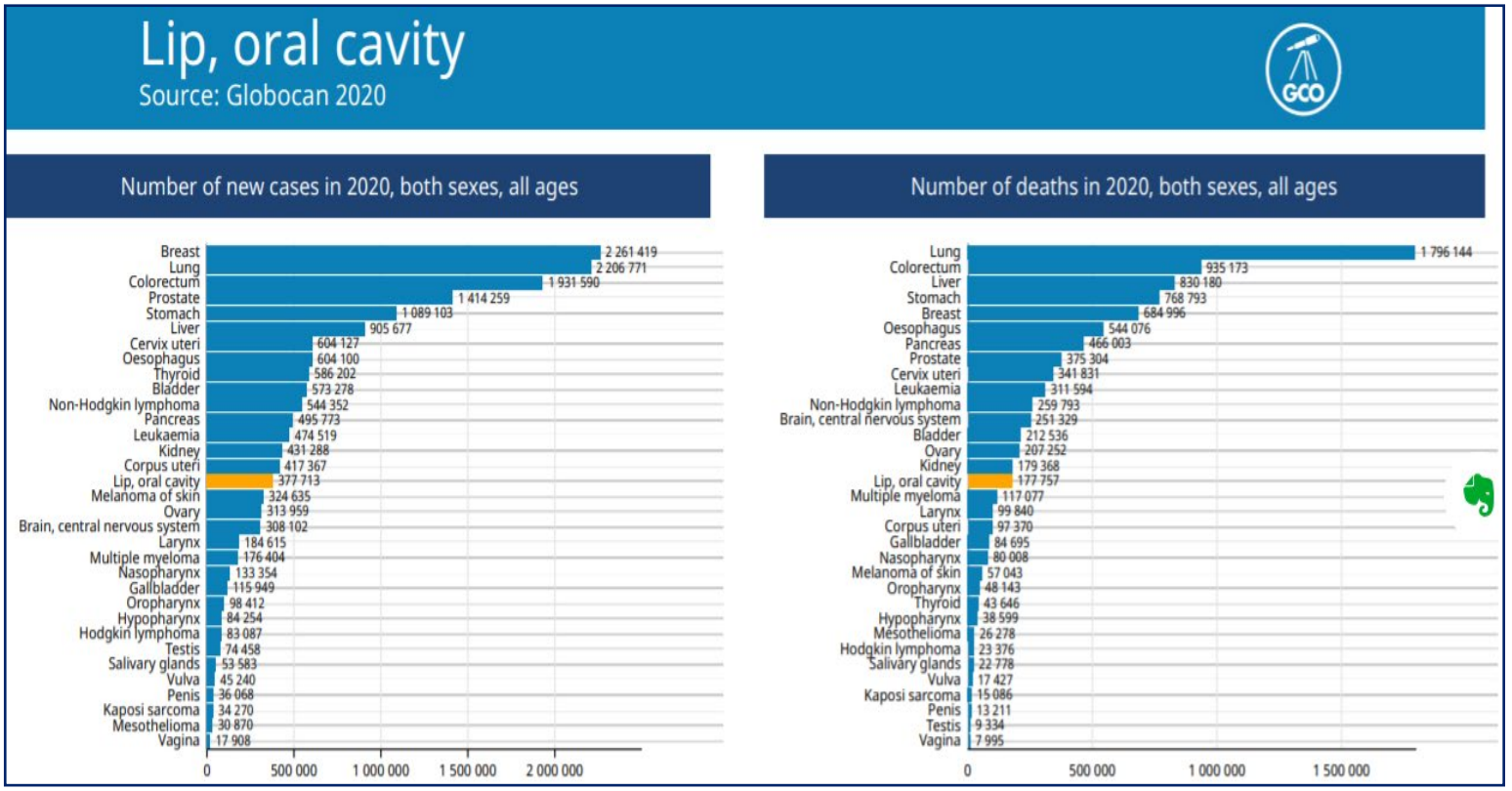
Memorial Sloan Kettering Cancer Center

TATA MEMORIAL CENTRE

Overview of oral cancer

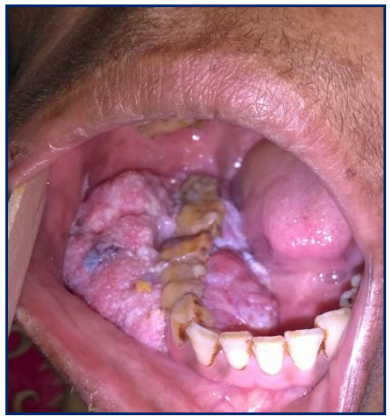
Devendra Chaukar
Professor and surgeon
Head, Department of Head and Neck
Tata Memorial Hospital

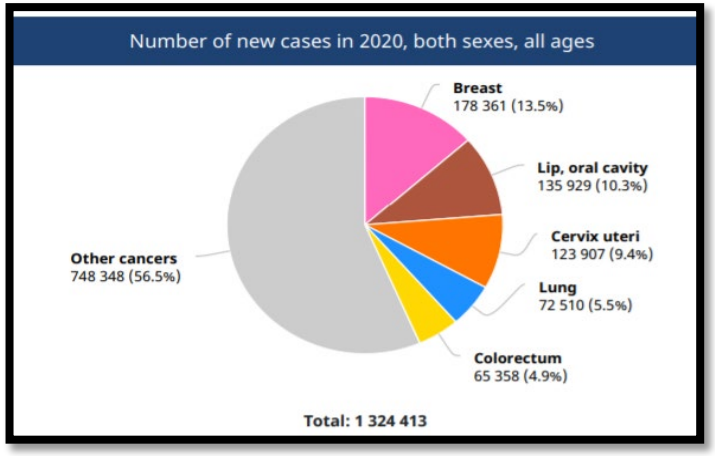
GLOBOCAN DATA 2020



GLOBOCAN: Indian data

Facts & Figures





Most common subsite:
Buccal mucosa-GBS complex.

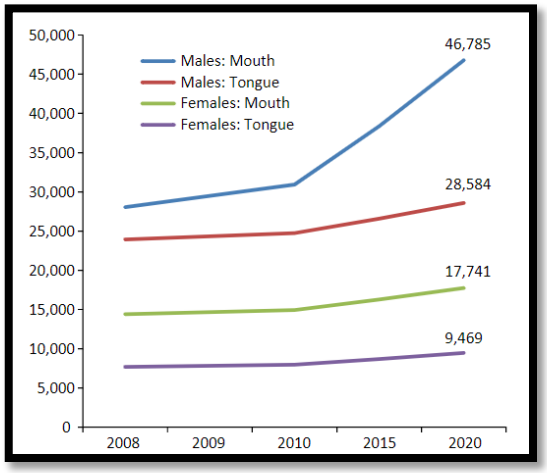
Major Public health concern

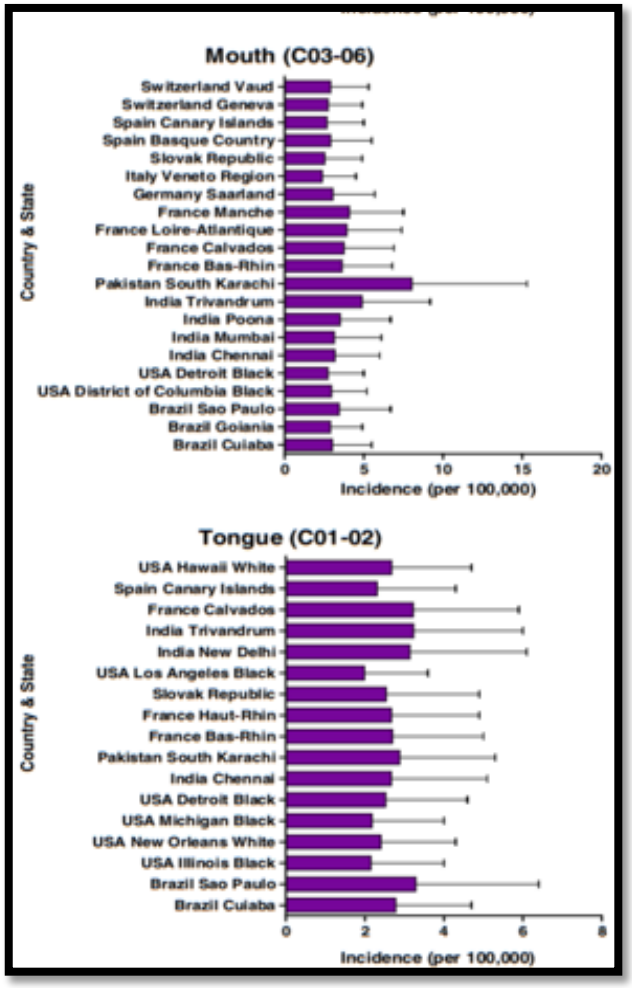
Tongue cancer:
Higher trend in Western population

Global epidemiology of oral and oropharyngeal cancer

Saman Warnakulasuriya *

Department of Oral Medicine and Experimental Oral Pathology, King's College Dental Institute, Bessemer Road, London SE5 9RS, UK
WHO Collaborating Centre for Oral Cancer and Precancer in the United Kingdom, Denmark Hill Campus, London SE5 9RS, UK



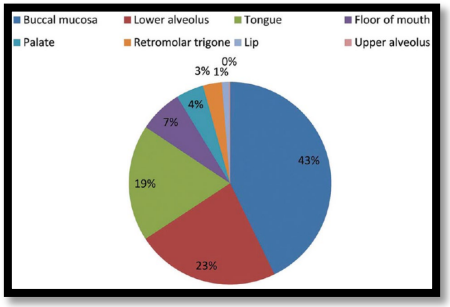


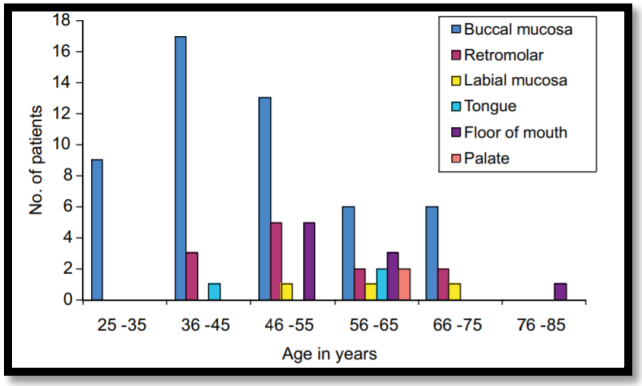
Trends in the epidemiology of oral squamous cell carcinoma in western UP: An institutional study

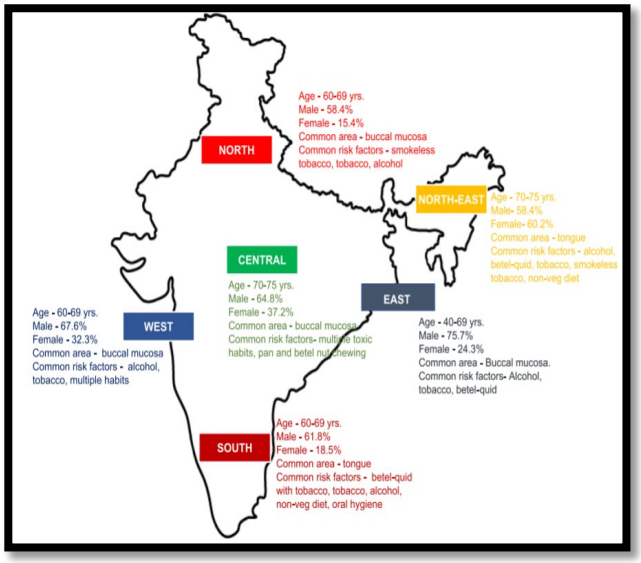
Preeti Sharma, Susmita Saxena, Pooja Aggarwal

Oral cancer in India continues in epidemic proportions: evidence base and policy initiatives

Bhawna Gupta[1], Anura Ariyawardana[2,3] and Newell W. Johnson[2]





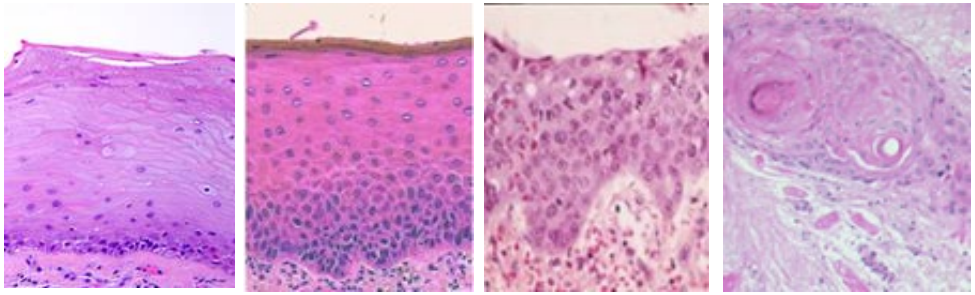


- In Indian population buccal mucosa & GBS tumors are most common because of pan chewing.
- However of note there is rise in tongue cancer index cases too

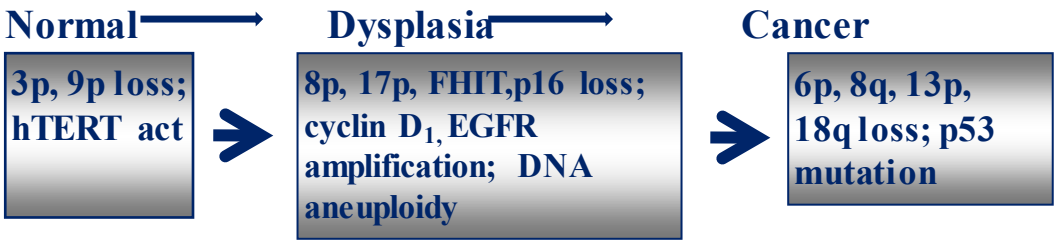
Multistep Progression Model for Oral Cancer

Clinical

Histologic



Molecular

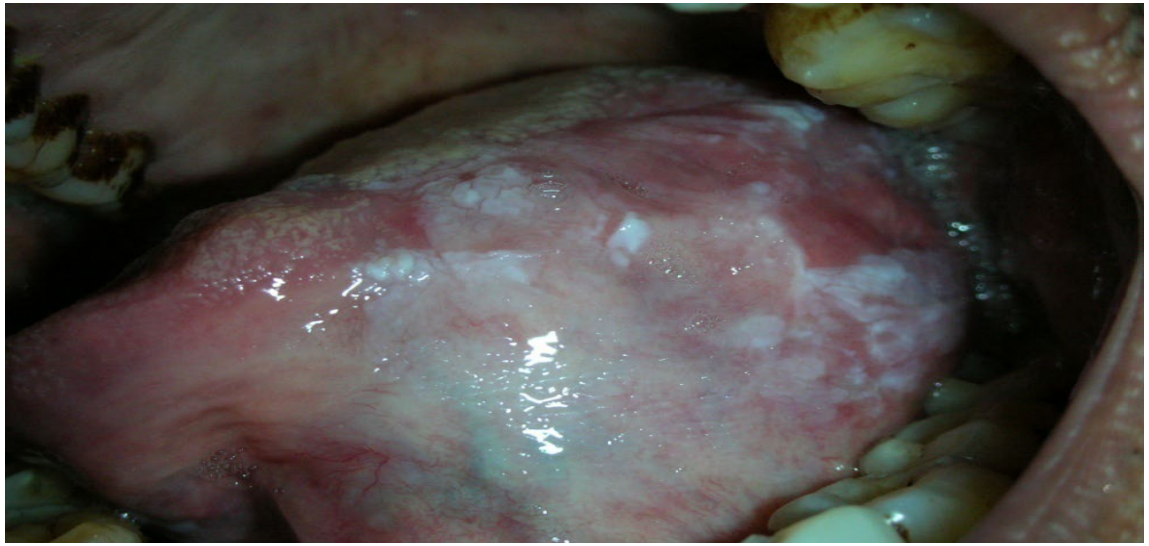


Management

Prevent

Early diagnosis

Treatment
Which ones?



Submucous fibrosis

Areca nut chewing most common cause

Grades:

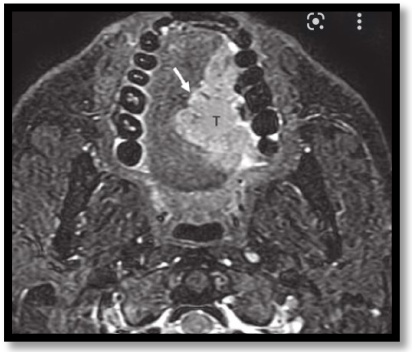
- Grade I:Acute ulceration and recurrent stomatitis, MO>4cm
- Grade II: Mottled and marble-like sheets of epithelium palpable, MO-2.5-3.5cm
- Grade III: Pale firmly adherent mucosa with spread to oropharyngeal structures, MO-1.5-2.5cm
- Grade IVA: Thickened mucosa, restricted tongue movement, MO<1.5cm
- Grade IVB: Hyperkeratotic leukoplakia with SCC in situ changes

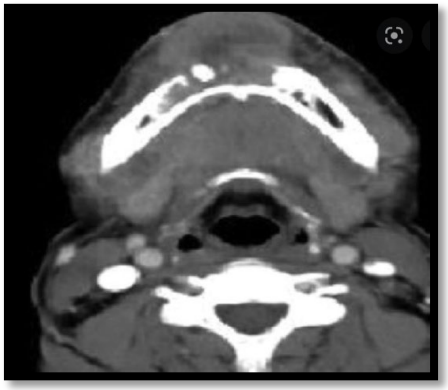
Changes in AJCC staging of lip and oral cavity

T stage	7th edition	8th edition
Tx	Primary cannot be assessed	Primary cannot be assessed
Tis	Carcinoma insitu	Carcinoma insitu
T1	Tumour maximum dimension <2cm	Tumour maximum dimension </=2cm with DOI</=5mm
T2	Tumour maximum dimension between 2-4cm	• </=2cm with DOI >5mm • 2-4cm with DOI </= 10mm
T3	Tumour maximum dimension >4cm	Tumour 2-4cm with DOI >/=10mm Or >4cm with DOI<10mm
T4a(moderately advanced)	(**oral cavity**)Tumour involves adjacent structures cortical bone,maxillary sinus,deep extrinsic muscles of tongue,skin	**Extrinsic muscles of tongue removed Tumour >4cm with DOI >10mm Or involving adjacent structures(bone,maxillary sinus or skin)** **Superficial cortical erosion is not sufficient to qualify as T4a**
	(**Lip**)Cortical bone ,inferiror alveolar nerve,floor of mouth,skin of face	
T4b(very advanced disease)	Tumour involves the masticator space,pterygoid plates,skull base or encases the internal carotid artery	No change

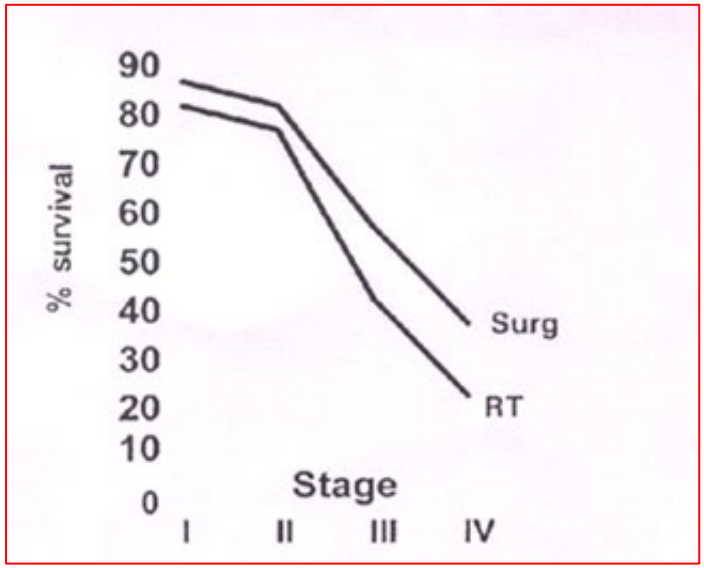
Imaging

- **Soft tissue lesions** Like Tongue- Warrant MRI
- **Buccal cancers, RMT, Lower & Upper alveolus-** To see bone involvement & extent of disease→ CECT
- **Neck evaluation-** Done by identical imaging as primary
- **Metastatic work up→** NCCT Thorax





Early Oral Cancers



Surgery = RT

Early Oral Cancers

Brachytherapy

Pre Brachytherapy

A week after Implant removal

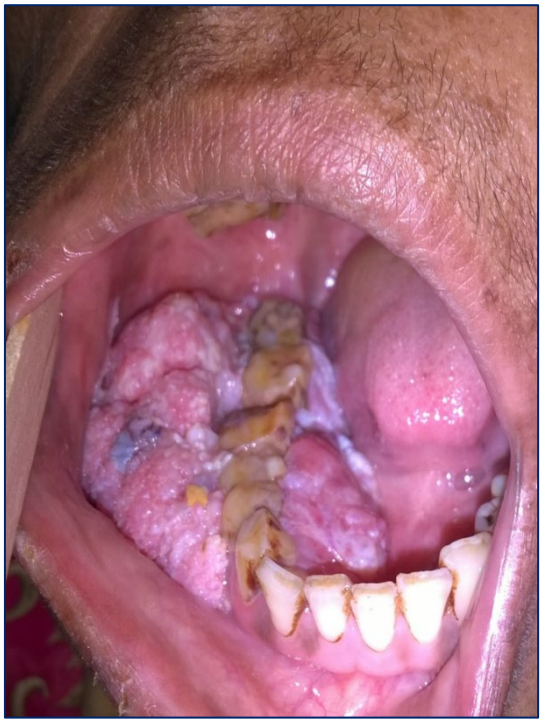
3 Months post implant

What constitutes locally advanced?

	N0	N1	N2	N3
T1	Stage I			
T2	Stage II			
T3	Stage III			
T4a	Stage IVA			Stage IVB
T4b				

Early Oral Cancers

Locally advanced Oral cancers



Increased scope of Resectability

AJCC 6th edition -

T4a: Resectable cancers

T4b: Unresectable cancers

Stage IV:

- Stage IV A: advanced resectable cancers
- Stage IV B: advanced unresectable cancers
- Stage IV C: distant metastatic cancers

Operable oral cancers

AJCC 7th edition:

- T4a: Moderately advanced
- T4b: Very advanced

The term un-resectable is done away with..

AJCC 8th edition: Added depth>1cm as T3, irrespective of tumour size

Definitions

- Operable
- Resectable
- Inoperable
- Are these the same?

Advanced oral cancers

Operability is influenced by:

- Ability to achieve negative margins
- Feasibility of adequate reconstruction to restore meaningful quality of life

Inoperable

- Prevertebral involvement
- Carotid encasement
- Pterygoid plate involvement
- Mediastinal extension

Final comment!!!

Decision of treatment is dependent on following factors

Physician factors

- Surgical skills
- Access to minimally invasive surgical technology
- Radiotherapy skills
- Chemotherapy expertise
- Dental and prosthetic services
- Rehabilitation services
- Support services

Tumour factors

- Site of the primary tumor
- Location in the oral cavity (anterior versus posterior)
- Size and Depth of Invasion (T stage)
- Proximity to bone (mandible or maxilla)
- Status of cervical lymph nodes
- Histology (type, grade and depth of invasion)
- Previous treatment

Patient factors

- Age
- General medical condition
- Tolerance
- Occupation
- Acceptance and compliance
- Lifestyle, smoking/drinking status
- Socioeconomic and geographic considerations

Case #1: Oral Cancer with Oral Submucous Fibrosis

Case Presenter

Dr. Nithyanand C
Resident, Head & Neck Surgery
Tata Memorial Center, Mumbai

Moderator

Dr. Devendra Chaukar
Surgeon
Tata Memorial, Mumbai

Case #1: Oral Cancer with Oral Submucous Fibrosis

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Dr. Devendra Chaukar
Surgeon
Tata Memorial, Mumbai

Panelists

Dr. Snehal Patel
Surgeon
MSKCC, New York

Dr. Munita Bal
Pathologist
Tata Memorial, Mumbai

Dr. Shivakumar Thiagarajan
Surgeon
Tata Memorial, Mumbai

Dr. Sean McBride
Radiation Oncologist
MSKCC, New York

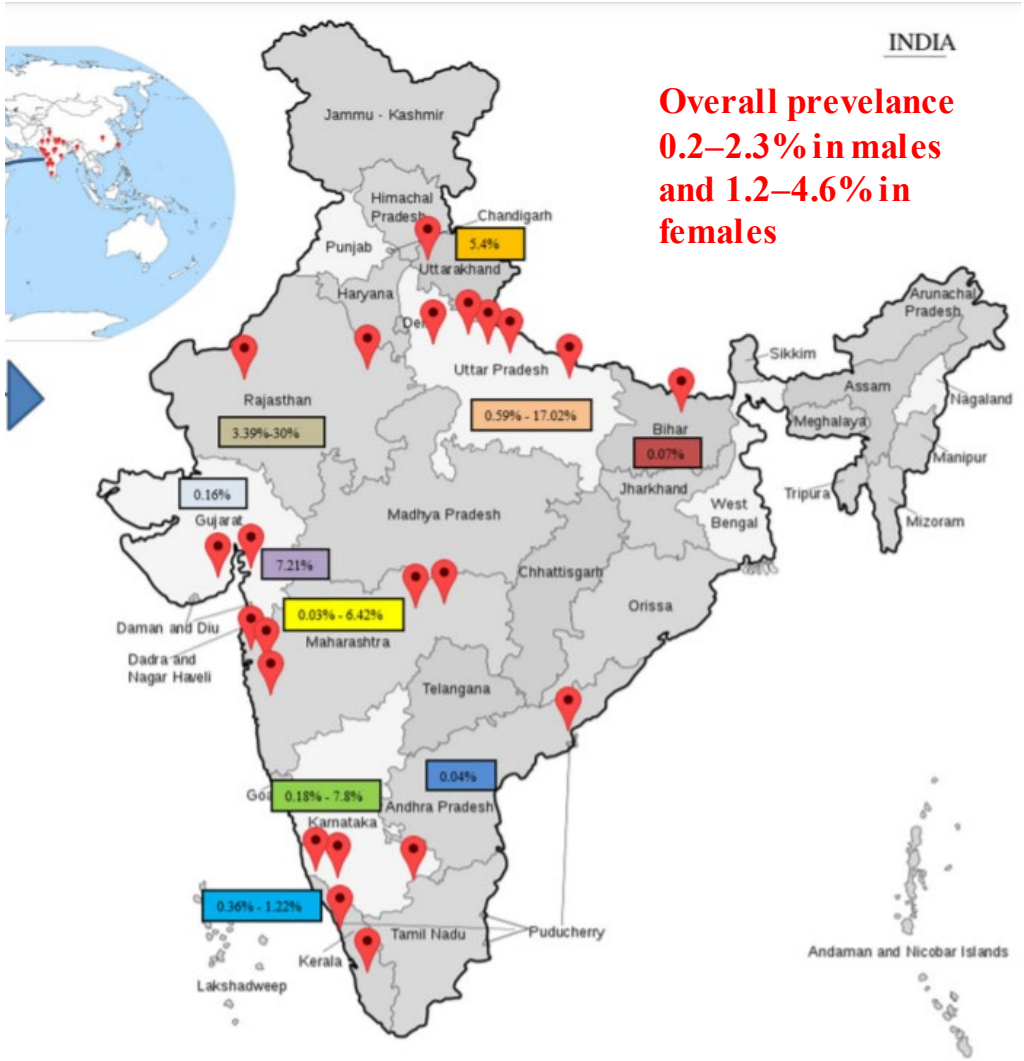
Oral submucous fibrosis

"a chronic, insidious, scarring disease of the oral cavity, often with involvement of the pharynx and the upper esophagus"

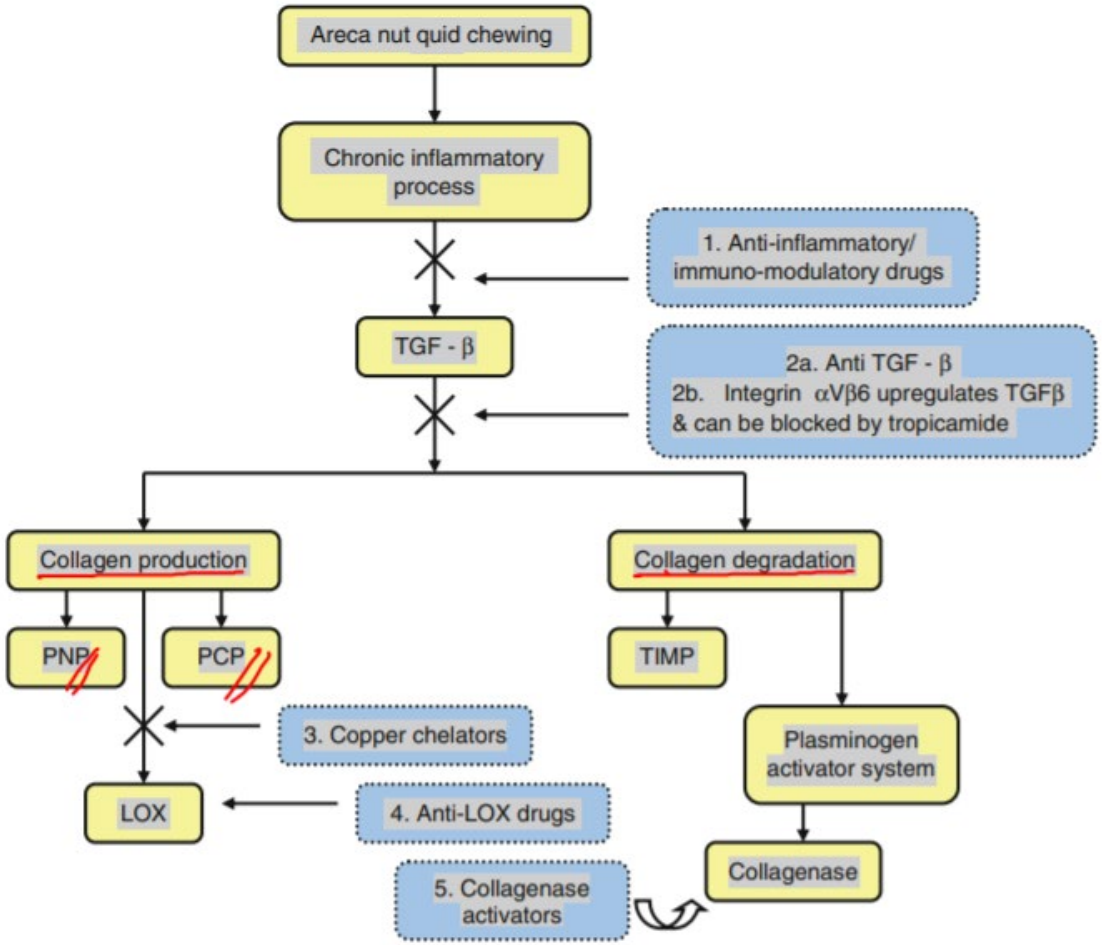
Prevalance:

- Predominant in Asian countries
- China- 1.0-3.03%
- Vietnam – 0.15-14.4%
- Taiwan – 0.086-17.6%
- India- 0.2- 1.3%

Naman Rao et al 2020.,



Pathogenesis- Arecanut



Clinical Syndrome

Gutka or areca nut Chewer's syndrome

P Chaturvedi

LETTER TO EDITOR
Year : 2009 | Volume : 46 | Issue : 2 | Page : 170-172

Fibrotic buccal mucosa

Restricted tongue movement

Fibrotic faucial pillars

Depapillated tongue

Fibrotic palate

Clinical staging:

Table 5 More et al. 2012 classification of OSMF

Clinical staging	Interpretation
Stage 1 (S1)	Stomatitis and/or blanching of oral mucosa.
Stage 2 (S2)	Presence of palpable fibrous bands in buccal mucosa and/or oropharynx, with /without stomatitis.
Stage 3 (S3)	Presence of palpable fibrous bands in buccal mucosa and/or oropharynx, and in any other parts of oral cavity, with/ without stomatitis.
Stage 4 (S4)	Any one of the above stages along with other potentially malignant disorders (e.g. oral leukoplakia, oral erythroplakia)
	Any one of the above stages along with oral squamous cell carcinoma.
Functional staging	Interpretation
M1 Staging	Interincisal mouth opening up to or greater than 35 mm.
M2 Staging	Interincisal mouth opening between 25 and 35 mm.
M3 Staging	Interincisal mouth opening between 15 and 25 mm.
M4 Staging	Interincisal mouth opening less than 15 mm.

Other classification system:

- Pindborg classification
- Mehrotra staging
- Khanna and Andrade classification

Potentially malignant disorders of the oral cavity and oral dysplasia: A systematic review and meta-analysis of malignant transformation rate by subtype

Oreste Iocca MD, DDS[1,2] | **Thomas P. Sollecito DMD, FDSRCSEd**[3] |

TABLE 2 Results of cumulative meta-analysis by subgroup and overall

Subgroup	Cumulative MT rate (99% confidence interval) Arcsine square root transformed data, random effects method restricted maximum likelihood	MT rate per year
Lichen planus	1.4% (0.9%-1.9%)	0.28%
Oral lichenoid lesions	3.8% (1.6%-7.0%)	0.57%
Leukoplakia	8.6% (5.1%-13.0%)	1.56%
Erythroplakia	33.1% (13.6%-56.2%)	2.7%
Proliferative verrucous leukoplakia	49.5% (26.7%-72.4%)	9.3%
Oral submucous fibrosis	5.2% (2.9%-8.0%)	0.98%
Overall	7.9% (4.9%-11.5%)	NA

Case #1: Oral Cancer with Oral Submucous Fibrosis

- 32 year old male
- Tobacco chewer for past 10 years

- Presented with ulcer in the right cheek for past 3 months
- No pain, no neck swelling
- Reduced mouth opening since 4years
- Occasional complains of burning sensation of mouth while having hot or cold foods

- On examination:
- Reduced mouth opening nearly 1 finger breadth
- Inadequate exposure-Proliferative lesion on the right buccal mucosa involving the upper and lower gingiva buccal sulcus
- External Skin appears free

How do we evaluate this patient further?

1. Contrast enhanced CT

2. MRI

3. Endoscopy in the OPD

- CECT- heterogenous lesion in the BM **without bone erosion** at the mandible
- Lesion involving the lower GBS with residual height of mandible >18mm
- No metastatic nodes
- No paramandibular disease

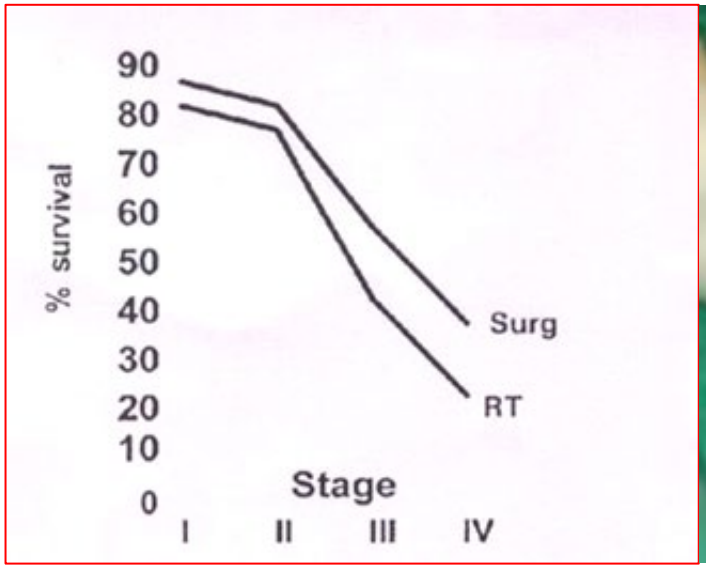
Poll Question 1:

In case of severe trismus how would you plan for a histological diagnosis?

A. Punch biopsy from the lesion- endoscope guidance
B. CT guided biopsy
C. FNAC from the lesion in OPD
D. Examination under anaesthesia and biopsy

Choosing best treatment modality

Early Oral Cancers



Surgery = RT

Factors impacting management (surgery) of oral cancers in the background submucous fibrosis

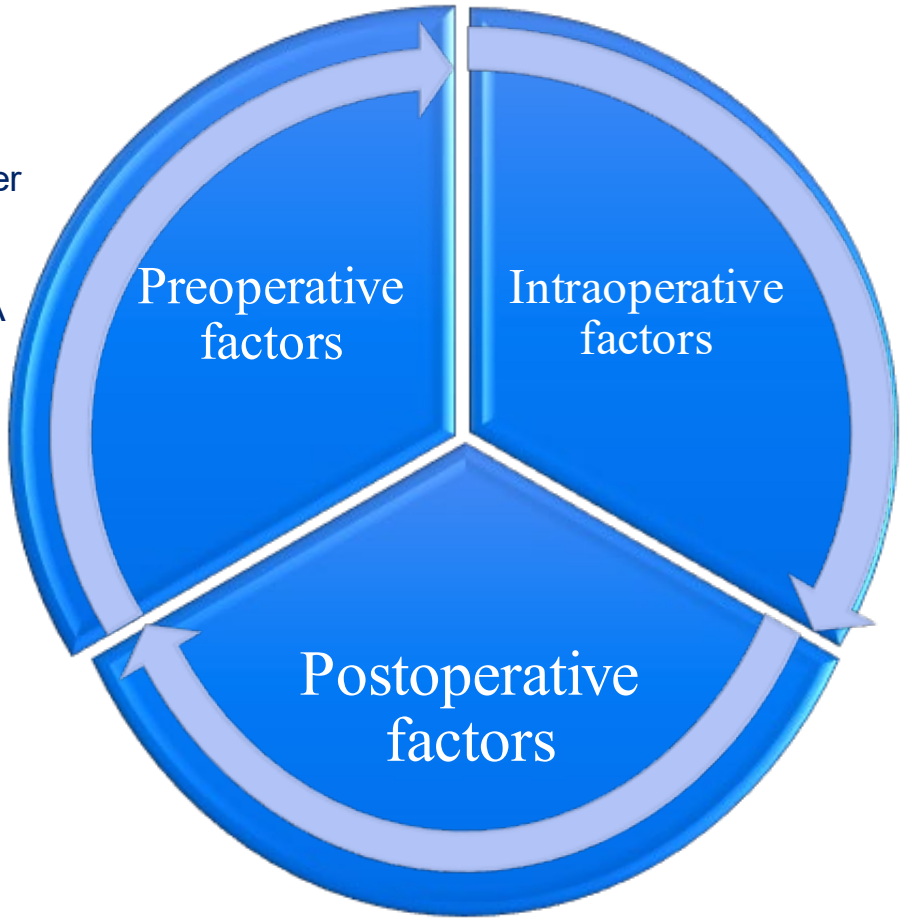
Operative management of oral cancers with OSMF

Preoperative factors

- Inadequate visualization due to trismus- can hamper access and biopsy
- Non pliable mucosa does not even relax during EUA or general anaesthesia

Postoperative factors:

- Aggressive postoperative management- jaw stretching exercises
- Higher toxicities with adjuvant therapy
- Close follow up as OSMF is itself a premalignant condition



Intraoperative factors:

- Difficulty in intubation, lower threshold for tracheostomy
- Requirement of flaps even in smaller buccal mucosa defects
- Additional surgical procedure to tackle trismus
- Non pliable mucosa – difficulty in flap inset

Oral squamous cell carcinoma arising in background of oral submucous fibrosis: A clinicopathologically distinct disease

Pankaj Chaturvedi, MS, FICS, FAIS, MNA, Sagar S. Vaishampayan, MDS*, Sudhir Nair, MCh, Deepa Nair, MS, J. P. Agarwal, MD, S. V. Kane, MD, Prashant Pawar, MS, Sourav Datta, MS

Prospectively studied 371 consecutive patients

Results:

- oral cancer with OSMF are younger males with better prognostic factors such as
- better grade of tumor differentiation,
- lesser incidence of nodal metastases,
- and extracapsular spread

TABLE 4. Stage-matched analysis for advanced-stage disease between oral cancer and oral cancer–OSMF.

Parameters assessed	Advanced-stage oral cancer–OSMF	Advanced-stage oral cancer	*p* value
Age, y			
<30	1	3	.03
30–50	19	55	
>50	9	65	
Sex			
Male	25	88	.01
Female	4	35	
Histologic differentiation			
Well	3	10	.309
Moderately	18	60	
Poorly	8	53	
Nodal status			
N0	20	46	.009
N+	9	77	
Extracapsular spread			
Present	6	55	.018
Absent	23	68	

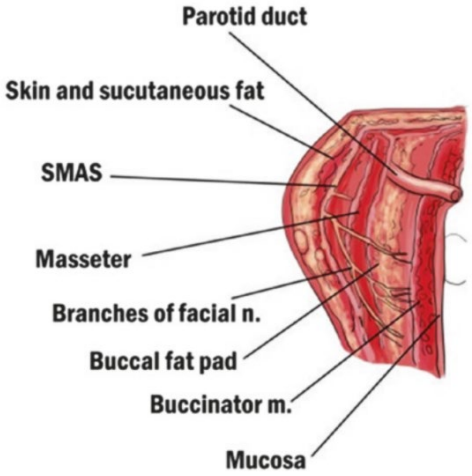
Poll question 2

What would be best surgical option for this patient?

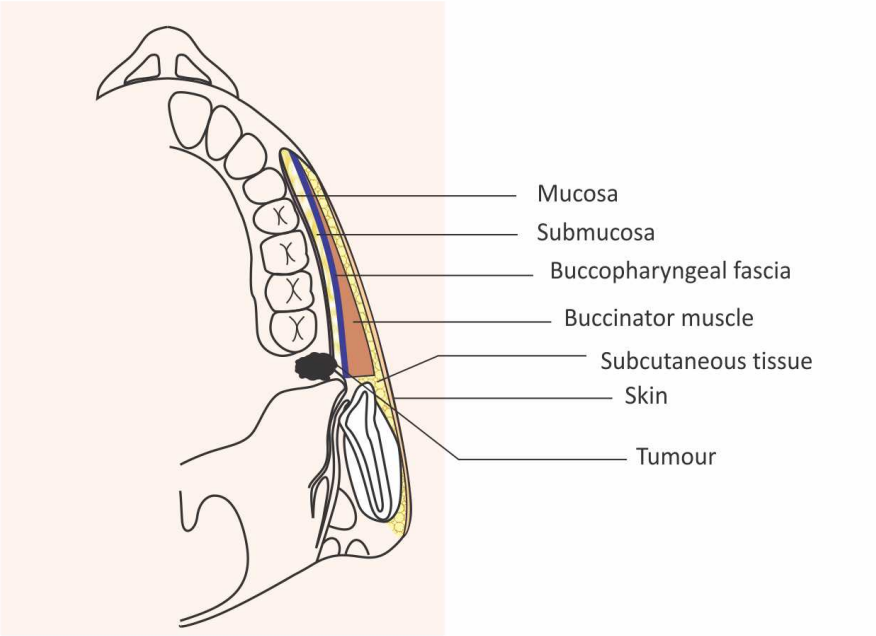
A. Marginal mandibulectomy +Neck Dissection with free flap
B. Marginal mandibulectomy+ contralateral coronoidectomy+ ND with free flap
C. Segmental mandibulectomy+ ND with free flap
D. Segmental mandibulectomy +contralateral coronoidectomy+ ND with free flap

Decision- Depth of Excision

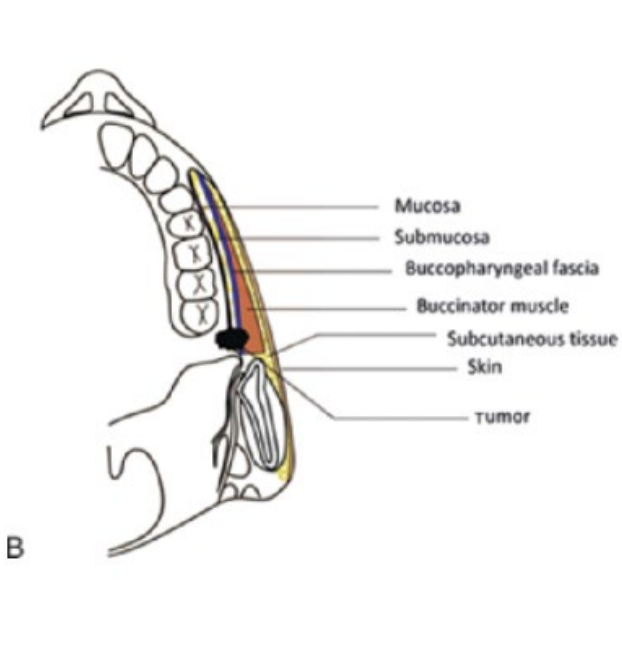
- Thickness of buccal mucosa ranges from 9-15mm
- Thickness increases from anterior to posterior
- Tumour with higher DOI involves skin and becomes T4a



Cut section through the cheek wall



Tumor invading Mucosa/ Submucosa



Tumor invading Buccinator muscle

Deep margin

D1 – Mucosal and submucosal not reaching buccinators

D2 – Extending to the buccinators, but not breaching its continuity

D3 - Breaching buccinator

Material & Methods

IRB approved , Prospective observational study

Candidate's thesis

June 2013 – November 2015

Inclusion Criteria

- Squamous cell carcinoma invading buccal mucosa
- Deep soft tissue infiltration with close proximity to skin with no obvious invasion into the skin
- Skin was excised for margins

Exclusion Criteria

- Obvious skin involvement - puckering / ulceration / fungation by the tumor
- Prior surgery, chemotherapy or radiotherapy to head neck region

Material & Methods - CT Scan

Distance between tumor edge & skin (cm)

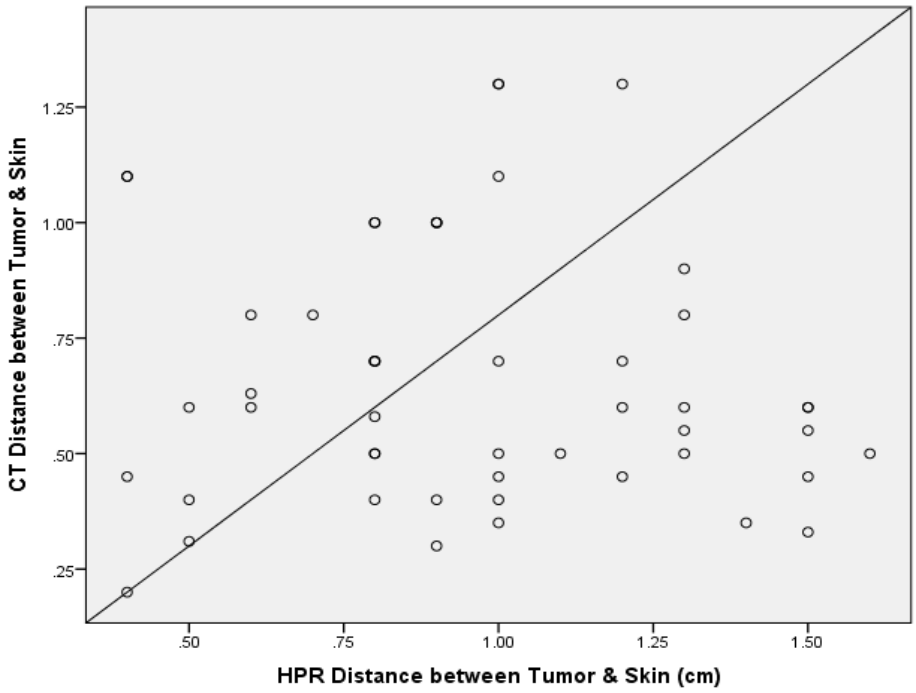
Material & Methods - CT Scan

Tumor thickness (cm)

Fat stranding

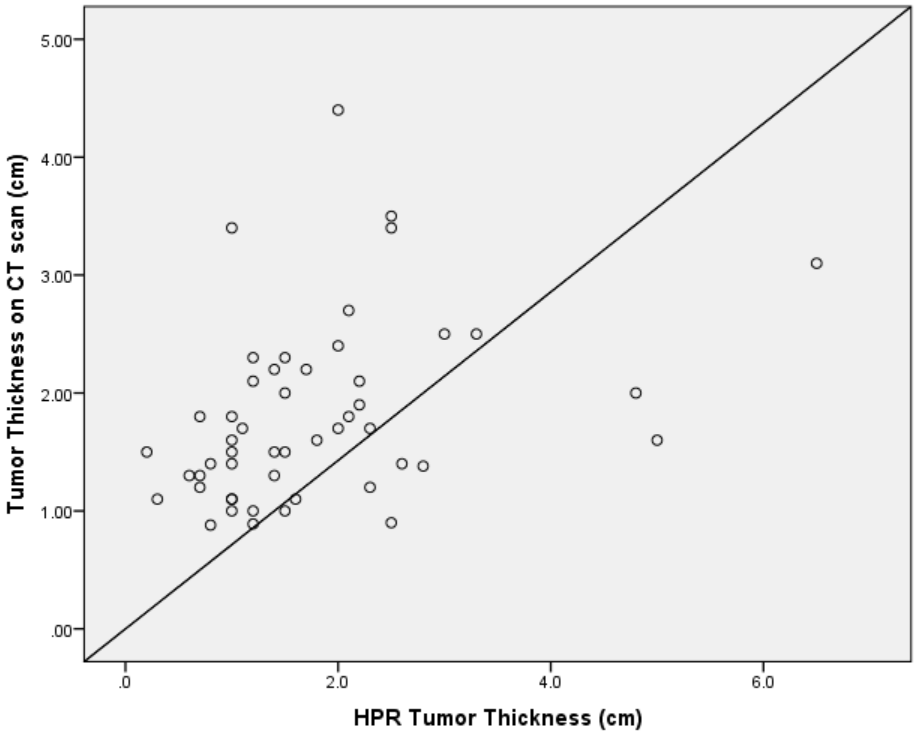
Comparison of CT and Histopathology

Distance b/w Tumor & Skin



No Correlation r= 0.09

Comparison of CT and Histopathology
Tumor Thickness



Poor Correlation r=.37

Fat Stranding

- Fat stranding is indicative of subdermal lymphatic invasion
- 90 % - fat stranding
- No subdermal lymphatic Invasion on histology

Margin assessment

Firm fibrotic bands hampers proper intraoperative margin assessment

Role of frozen section in margin control

Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology
Volume 107, Issue 2, February 2009, Pages 235-239

Oral and maxillofacial pathology

Impact of use of frozen section assessment of operative margins on survival in oral cancer

Kumar Alok Pathak MS, Dip NB, FRCS(Glasg), FRCSEd [a], Richard W. Nason MD, MSc, FRCSC [b], Carla Penner DDS, FRCD(C) [c], Norbert R. Viallet MD, FRCSC [d], Donna Sutherland MD, FRCSC [d], Paul D. Kerr MD, BSc (Med), FRCSC [e]

- Retrospective analysis of 416 pts – 229 with FS and 197 without FS
- Local failure was determined by age , T stage , N stage and Margin status
- Chance of achieving clear margins – not significantly improved by Frozen section
- Use of Frozen section did not seem to have an impact on local control or Survival

Gross examination by the surgeon as an alternative to frozen section for assessment of adequacy of surgical margin in head and neck squamous cell carcinoma

Pankaj Chaturvedi, MS, FAIS, FICS, MNAMS, FACS,[1] Sourav Datta, MS,[1]* Sudhir Nair, MCh,[1] Deepa Nair, MS,[1] Prashant Pawar, MS,[1] Sagar Vaishampayan, MDS,[1] Asawari Patil, MD,[2] Shubhada Kane, MD[2]

[1]Department of Head and Neck Surgery, Tata Memorial Hospital, Mumbai, India, and [2]Department of Pathology, Tata Memorial Hospital, Mumbai, India.

- Gross margins assessed by senior surgeon after resection of primary using bread loafing technique
- Gross free margins of 7mm correspond to clear margins on final HPR almost 90% of times
- Achieving Gross margin of 7 mm can obviate the need for Frozen Section

NECK JOURNAL OF THE SCIENCES AND SPECIALTIES OF THE HEAD AND NECK

Original Article | Full Access

Impact of positive frozen section microscopic tumor cut-through revised to negative on oral carcinoma control and survival rates*

Rajan S. Patel MBChB, MD, FRCS ORL-HNS, David P. Goldstein MD, FRCS(C), Jennifer Guillemaud MD, Guillem Andreu Bruch MD, Dale Brown MD, FRCS(C), Ralph W. Gilbert MD, FRCS(C), ... See all authors

- Retrospective review of 547 patients of oral cancer
- Divided into 2 groups :
  - Group 1 : clear margins achieved on Frozen section
  - Group 2 : positive cut through margins, revised to clear margins and confirmed on Frozen Section
- Outcomes were similar in both groups
- **Frozen Section controlled Re revision improves outcomes**

Role of Reresection of margins?

Does Clearance of Positive Margins Improve Local Control in Oral Cavity Cancer? A Meta-analysis

Mustafa G. Bulbul, MD[1,2], Osama Tarabichi, MD[1,2],

- **R1 to R0 Versus R0 Resection**:R1 to R0 patients showed a significantly worse 5-year LRFS compared to R0 patients
- **R1 to Negative versus R0 Resection**:R1 to negative patients showed a significantly worse 5-year LRFS compared to R0 patients
- **R1 versus R1 to R0 Resection**: R1 patients showed a trend toward worse 5-year LRFS compared to R1 to R0 patients but did not reach significance

How to assess Margin Intra - operatively ?

Specimen Driven Approach

- Surgeon orients the main resection specimen and identifies areas of interest for pathologist

Defect Driven approach

- Surgical tissue margin is removed from the patient's resection cavity

Specimen versus Defect Driven Approach

Improving the rate of negative margins after surgery for oral cavity squamous cell carcinoma: A prospective randomized controlled study

Moran Amit, MD, MSc,[1,2] Shorook Na'ara, MD,[1,2] Leonor Leider-Trejo, MD,[3] Sharon Akrish, MD,[4] Jacob T. Cohen, MD,[1,2] Salem Billan, MD,[5] Ziv Gil, MD, PhD[1,2,6*]

- A prospective RCT comparing the 2 methods of intra operative margin assessment
- 51 pts in Specimen driven arm , 20 pts in Patient driven arm

Specimen Driven method has improved rates of :
1) identifying close /positive margins
2) Achieving wider margins
3)Prevents escalation of adjuvant by margin revision

	Revision of close /positive margins	Wide negative margin rate after revision	Prevention of escalation of adjuvant by revising margins
Specimen driven Approach	43 %	84 % p=0.02	38 %
Patient driven Approach	10 %	55 %	10 %

Any manoeuvres to improve mouth opening….

Coronoidectomy for the Treatment of Trismus in Head and Neck Cancer Patients

The Laryngoscope
Lippincott Williams & Wilkins

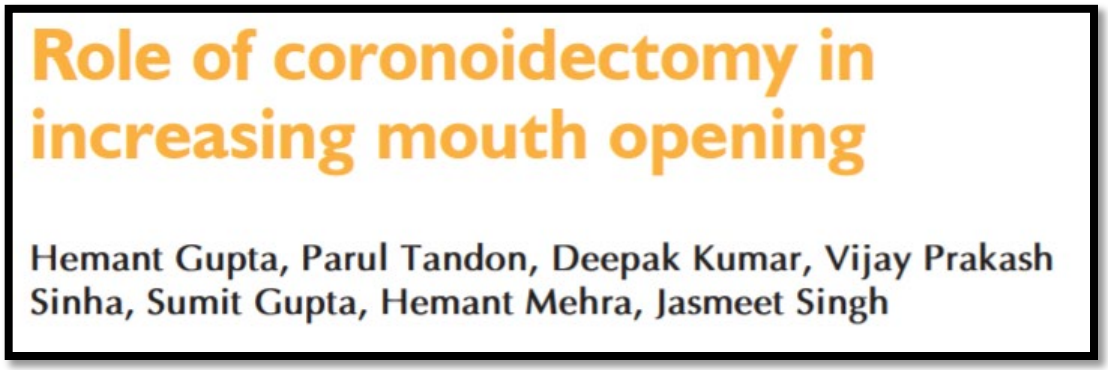
Amit D. Bhrany, MD; Mark Izzard, MBBS; Andrew J. Wood, MBBS; Neal D. Futran, MD, DMD

TABLE III.
One Year Follow-Up.

				Interincisal Distance (mm)			
Tumor Type	Mean Age (yr)	Surgery, n	Months From RT	Preoperative	Postoperative	6 mo	12 mo
All (n = 18)	60.7 ± 6.4	9	10.4 ± 2.3	16.1 ± 3.7	43.1 ± 4.2	38.3 ± 3.8	
1 yr (n = 11)	60.5 ± 6.8	4	10 ± 2.1	16.8 ± 3.4	43.2 ± 3.4	39.5 ± 3.5	38.6 ± 3.2

RT = radiation therapy.

Postcoronoidectomy, mean interincisal distances improved 22.1 mm and 21.8 mm at 6 and 12 months, respectively



- Mean preoperative interincisal opening of 14.40 mm which increased to 24.60 mm after conventional procedures and showed further increment to 35 and 44.80 mm after unilateral and bilateral coronoidectomy, respectively; which was statistically significant (P = 0.043)

- This is due to masticatory muscle atrophy and myotomy and coronoidectomy increases the mouth opening

Histopathology

- Pt underwent wide local excision with marginal mandibulectomy with corinoidectomy + free flap

Final HPR:

- Moderately differentiated SCC -2.7x 2.0cm
- DOI 4mm
- Closest margin 3mm
- No bony involvement
- LVI/PNI –ve
- 24 nodes free of tumour

- What is the further plan of management?

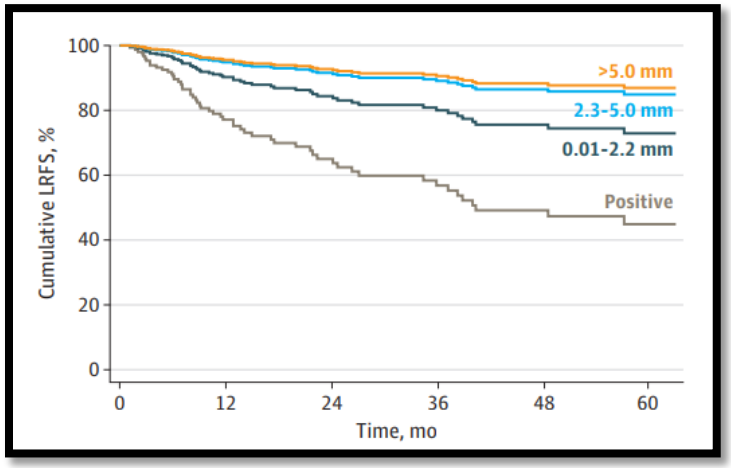
Revision of margin or adjuvant radiotherapy or observation?

JAMA Otolaryngology–Head & Neck Surgery | Original Investigation

A Proposal to Redefine Close Surgical Margins in Squamous Cell Carcinoma of the Oral Tongue

Daniella Karassawa Zanoni, MD; Jocelyn C. Migliacci, MA; Bin Xu, MD, PhD; Nora Katabi, MD; Pablo H. Montero, MD; Ian Ganly, MD, PhD; Jatin P. Shah, MD; Richard J. Wong, MD; Ronald A. Ghossein, MD; Snehal G. Patel, MD

- The optimal margin associated with locoregional free survival was determined to be 2.2mm
- Pts with margins between 2.2-5mm had similar LRFS as patients with margins>5mm



- <u>limitations</u>
- Only 12% were T3 and T4
- Use of adjuvant treatment in 25%-RT
- Adjuvant CTRT in 7.9%

Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 May;107(5):625-9. doi: 10.1016/j.tripleo.2008.11.013. Epub 2009 Jan 25.

What is the adequate margin of surgical resection in oral cancer?

Nason RW[1], Binahmed A, Pathak KA, Abdoh AA, Sándor GK.

- Historical cohort of 277 oral cancer patients - incremental benefit of margin on survival assessed
- 5-year survival rate :

  Margins > 5 mm :73%
  3 to 4 mm : 69%
  2 mm or less :62%
  involved margins : 39% P = .0001
- Each 1 mm increment decreased risk of death by 8 %
- Advocated 3 mm as adequate margin

Defining optimum surgical margins in buccoalveolar squamous cell carcinoma

Aseem Mishra [a, 1], Akshat Malik [a, 1], Sourav Datta [b], Manish Mair [a], Munita Bal [c], Deepa Nair [a], Sudhir Nair [a], Pankaj Chaturvedi [a, *]

- To evaluate the impact of each mm of margin on the local recurrence free survival (LRFS) and obtain a cut-off value which would have maximum impact the survival.

Results: A cut off margin of 5.5 mm was achieved on ROC for early (T1-T2) tumors and 6.5 mm cut off was achieved for advanced (T3-T4) tumors. Based on these cut off different margin groups were made. The cohort was grouped into positive margin, 1–5.5 mm, 5.6–7 mm and > 7 mm. Hazard ratio for patients with 1–5.5 mm and positive margin was 1.886 (95%CI, 1.15 to 3.09) and 5.58 (95%CI, 1.75 to 17.78) respectively. HR for margin 5.5 mm to 7 mm was 1.15 (95% CI, 1.15 to 2.06). There was no statistically significant difference in survival between margin groups of 5.6–7 mm and > 7 mm ($p < 0.589$) for both early and advanced tumors.

Conclusion: Minimum surgical margins of 5.5 mm in the final histopathology should be aimed for in the bucco-alveolar carcinomas. There was significant improvement in LRFS with increasing margins upto 7 mm. Taking margins beyond 7 mm does not improve LRFS.

Adequate Margins in oral cavity:

A meta-analysis of margin size and local recurrence in oral squamous cell carcinoma

Caroline Rachael Anderson [a,*], Katherine Sisson [b], Marc Moncrieff [a,c]

Results: Recurrence rates were pooled to give a 21% absolute risk reduction (95% confidence interval 12–30%, p =< 0.00001) in local recurrence with margins clear by more than 5 mm. Unweighted pooled recurrence rates were 20% in patients with margins clear by more than 5 mm.

Conclusion-A 5mm margin is a minimal acceptable adequate margin

ORIGINAL ARTICLE
Year : 2016 | Volume : 12 | Issue : 2 | Page : 932--937

Acute toxicities of adjuvant treatment in patients of oral squamous cell carcinoma with and without submucous fibrosis: A retrospective audit

Swagnik Chakrabarti[1], Aseem Mishra[1], Jai Prakash Agarwal[2], Apurva Garg[1], Deepa Nair[1], Pankaj Chaturvedi[1],

Mean RT doses between the group were similar

Table 7: Acute toxicities-submucous fibrosis versus nonsubmucous fibrosis groups

	SMF group (*n*=36) (%)	Non-SMF group (*n*=73) (%)	*P*
Severe mucositis	22/36 (61.11)	20/73 (27.39)	0.001
Severe skin toxicity	6/36 (16.66)	2/73 (2.73)	0.015
Severe xerostomia	10/36 (27.77)	15/73 (20.54)	0.4
Trismus	7/12 (58.33)	9/29 (31.03)	0.16
Treatment breaks	20/36 (55.55)	7/73 (9.58)	<0.001
Mean weight loss (kg)	5.63	4.77	0.8

SM

SMF group (*n*=36)	Centralized lesions (*n*=15) (%)	Lateralized lesions (*n*=21) (%)	*P*
Severe mucositis	10/15 (66.66)	12/21 (57.14)	0.08
Severe skin toxicity	3/15 (20)	3/21 (14.28)	0.67
Severe xerostomia	9/15 (60)	1/21 (4.76)	0.00
Trismus	2/5 (40)	5/7 (71.4)	0.55

SMF=Submucous fibrosis

Conclusion:O SCC patients with SMF have worse toxicity with adjuvant therapy and require good supportive care.

Case scenario…

- Pt undergoes wide local excision with marginal mandibulectomy with corinoidectomy + free flap

- Final HPR:

Moderately differentiated SCC -2.7x 2.0cm

DOI 5mm

Closest margin 7mm

LVI/PNI –ve

1/24 nodes shows mets, No ECE

ORIGINAL ARTICLE

The Impact of Adjuvant Radiotherapy on Survival in T1-2N1 Squamous Cell Carcinoma of the Oral Cavity

Mark G. Shrime, MD; Patrick J. Gullane, MD, FRCSC; Laura Dawson, MD, FRCPC; John Kim, MD, FRCPC; Ralph W. Gilbert, MD, FRCSC; Jonathan C. Irish, MD, MSc, FRCSC; Dale H. Brown, MD, FRCSC; David P. Goldstein, MD, FRCSC

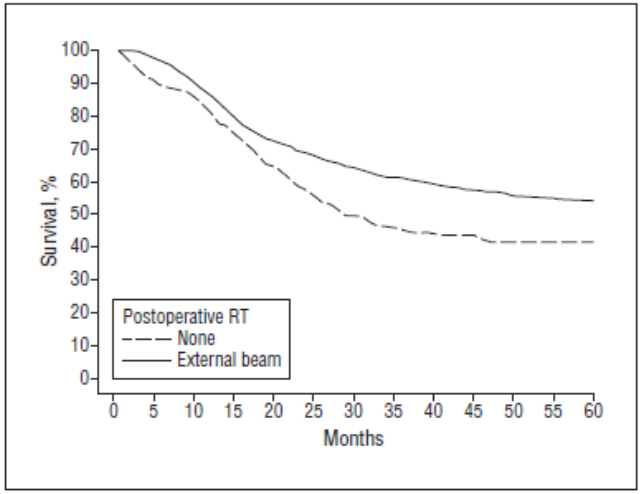


Figure 1. Overall 5-year survival for T1-2N1 oral cavity squamous cell carcinoma with and without postoperative radiotherapy (RT) ($P < .001$ at 60 months).

Addtl Case

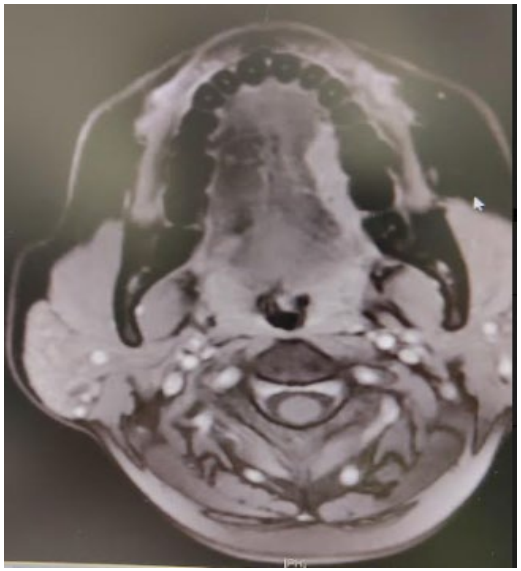
35 year old male who chews tobacco and smokes beedi for 10 years

Presented with ulcer on the tongue on the right lateral border for past 3 months
Pain radiating to the ear

Poll question 3

How do you approach this tumour intraoperatively

A. Per oral excision
B. Mandibulotomy and wide local excision
C. Pull through excision
D. Angle split or midline lip split with wide local excision



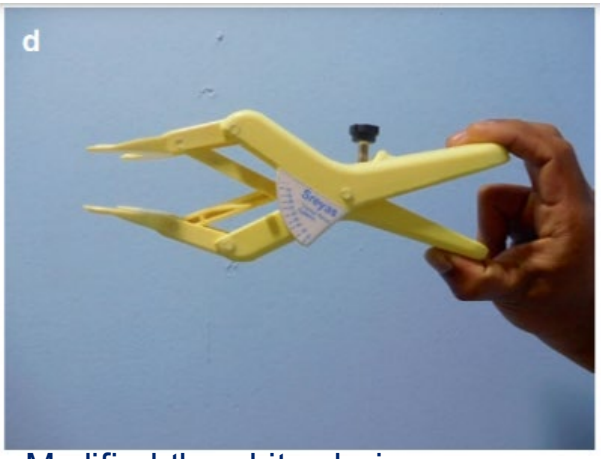
Mechanical stretching devices/Exercise therapy

Therabite device

Dynamic mouth opener

Ice cream stick stacks

Heister mouth opening device



Modified therabite device

Treatment method	Reference	Results
Physiotherapy	Grandi et al. [16], Dijkstra et al. [4, 23, 25], Buchbinder et al. [15]	Useful in some cases
Pentoxifylline	Chua et al. [27]	Modest effect
Jaw Dynasplint system	Shulman et al. [20], Stubblefield et al. [21]	Effective ✓
TheraBite	Kamstra el al. [19, 26], Buchbinder et al. [15]	Effective ✓
Botulinum toxin	Hartl et al. [28]	No improvement
Hyperbaric oxygen	King et al. [29], Teguh et al. [11, 30]	No improvement in trismus, but on other RT side effects

Conclusion

Squamous cancer on the backgound of SMF is a distinct clinical entity

Poses clinical challenges in assessment and approach

Further studies required regarding prognosis

Rehabilitation plays an important role

Thank you

Multidisciplinary Tumor Board on Oral Cancer: MSKCC & Tata Memorial

Friday February 25th, 2021

7:00-8:30 PM IST | 8:30-10:00 AM EST

An MSKCC (Chennai) Educational Series

Memorial Sloan Kettering Cancer Center

TATA MEMORIAL CENTRE

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Elliot W. Strong Chair,
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Medical Oncologist
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Case #2: Locally Advanced Oral Cancer with Mandibular Invasion

Case Presenter

Dr. Robbie Woods
Fellow, Head & Neck Surgery
MSKCC, New York

Moderator

Dr. Snehal Patel
Surgeon
MSKCC, New York

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Surgeon
MSKCC, New York

Panelists

Dr. Sarbani Ghosh
Radiation Oncologist
Tata Memorial, Mumbai

Dr. Prathamesh Pai
Surgeon
Tata Memorial, Mumbai

Dr. David Pfister
Medical Oncologist
MSKCC, New York

Dr. Evan Matros
Surgeon
MSKCC, New York

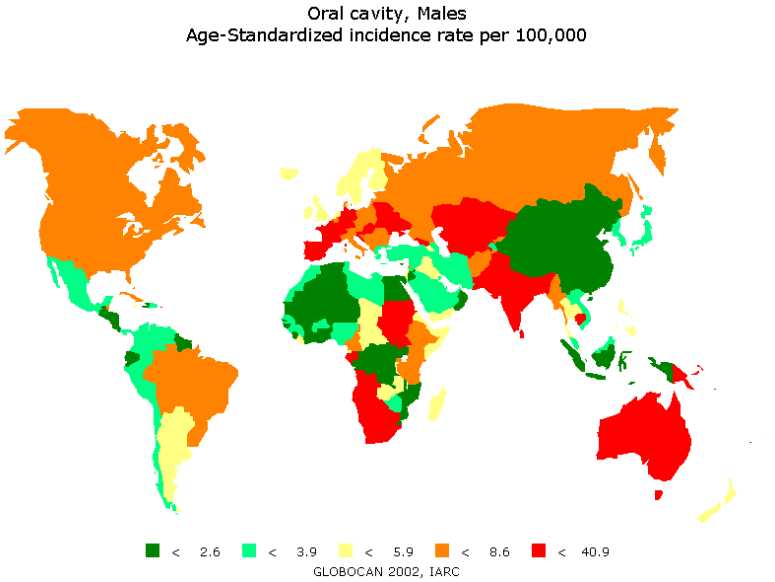
Outline

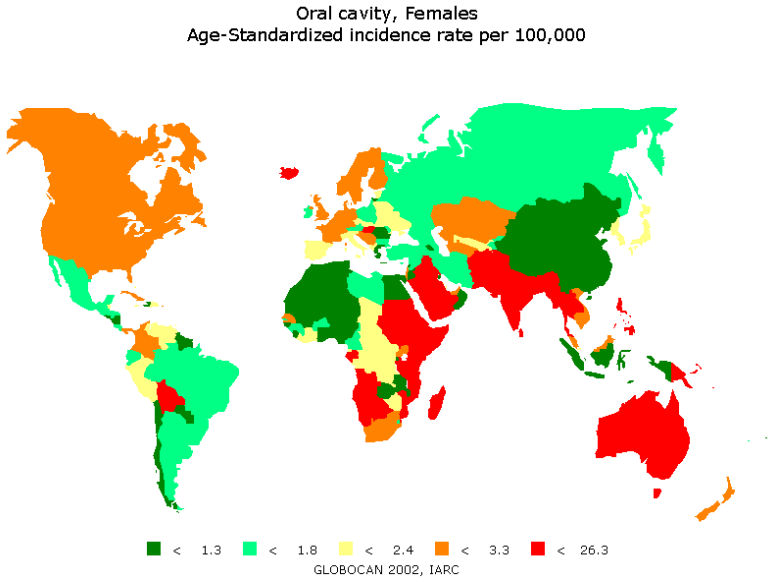
Introductory Remarks

Case Presentation

Interactive Discussion

- Audience Response to 5 Questions
- Chat Function on Zoom
- Expert Input from Panelists

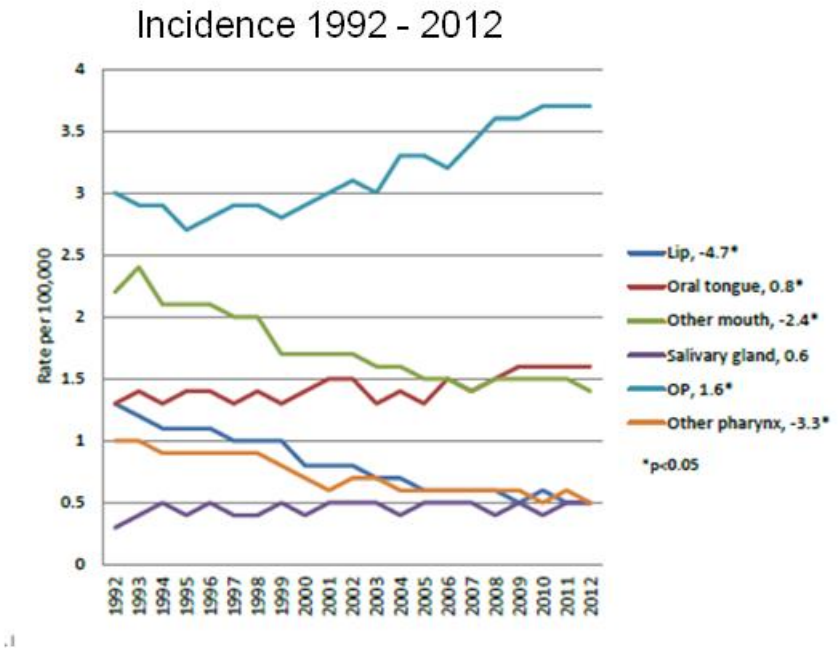


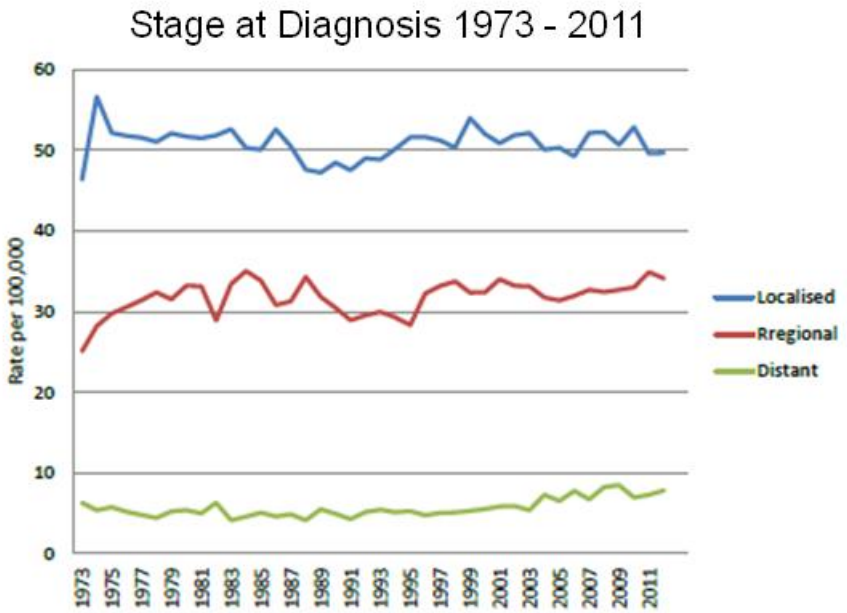


- 8th most common cancer worldwide
- Global annual burden 263,000 new cases causing 128,000 deaths
- 3rd most common cancer in developing countries
- Most common cancer in resource-poor areas

Jemal A et al. Global cancer statistics. CA Cancer J 2011

Incidence in US ↓ but Stage at Dx ↔





Declining incidence (except tongue) in the North America consistent with population-level declines in prevalence of cigarette smoking over the past four decades

Chaturvedi A et al. The Global Oral Cancer Forum 2016

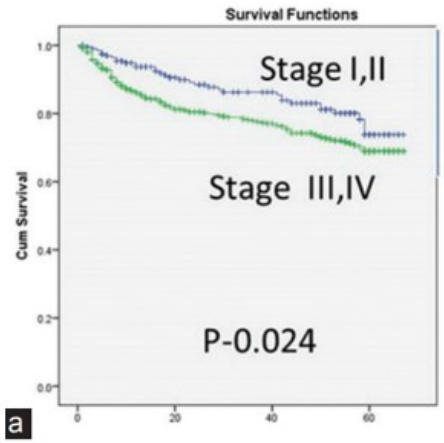
Oral Cancer Stage & Outcomes

TMH Oral Cancer Stage & Outcomes

Table 1: Demographics and clinical presentation

	Numbers	Percentage
Age	Median – 52 years Mean – 51 years	
Gender		
Males	659	77.5
Females	191	22.5
Comorbidities		
Hypertension	127	14.9
Diabetes mellitus	83	9.8
Others	48	5.3
Subsite		
Buccal mucosa/GBS	552	64.94
Tongue	232	27.64
FOM	13	1.5
Lip	22	2.7
Hard palate	31	3.64
Clinical T stage		
T1	60	7.1
T2	193	22.7
T3	87	10.2
T4	448	52.7
TX	62	7.3
Clinical N stage		
N0	486	57.2
N+	364	42.8
Clinical TNM staging		
Early (Stage I - II)	220	25.9
Advanced (Stage III - IV)	630	74.1

25% Stage I-II
75% Stage III-IV



n = 850

Overall Survival

Memorial Sloan Kettering Cancer Center

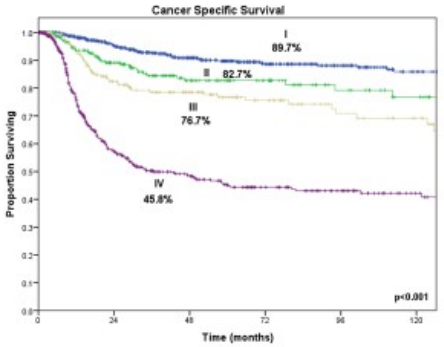
Nair D et al. Indian J Cancer 2018

MSK Oral Cancer Stage & Outcomes

Distribution of Patients by Clinical Stage (AJCC 7th Edition).

Stage		N0	N1	N2	N3	Total	(%)
I	T1	657	54	28	1	740	36.4%
II	T2	557	116	107	3	783	38.6%
III	T3	97	29	53	2	181	8.9%
IV	T4	139	67	118	3	327	16.1%
	Total	1450	266	306	9	2031	100%
	%	71.4%	13.1%	15.1%	0.4%	100%	

75% Stage I-II
25% Stage III-IV



n = 2082

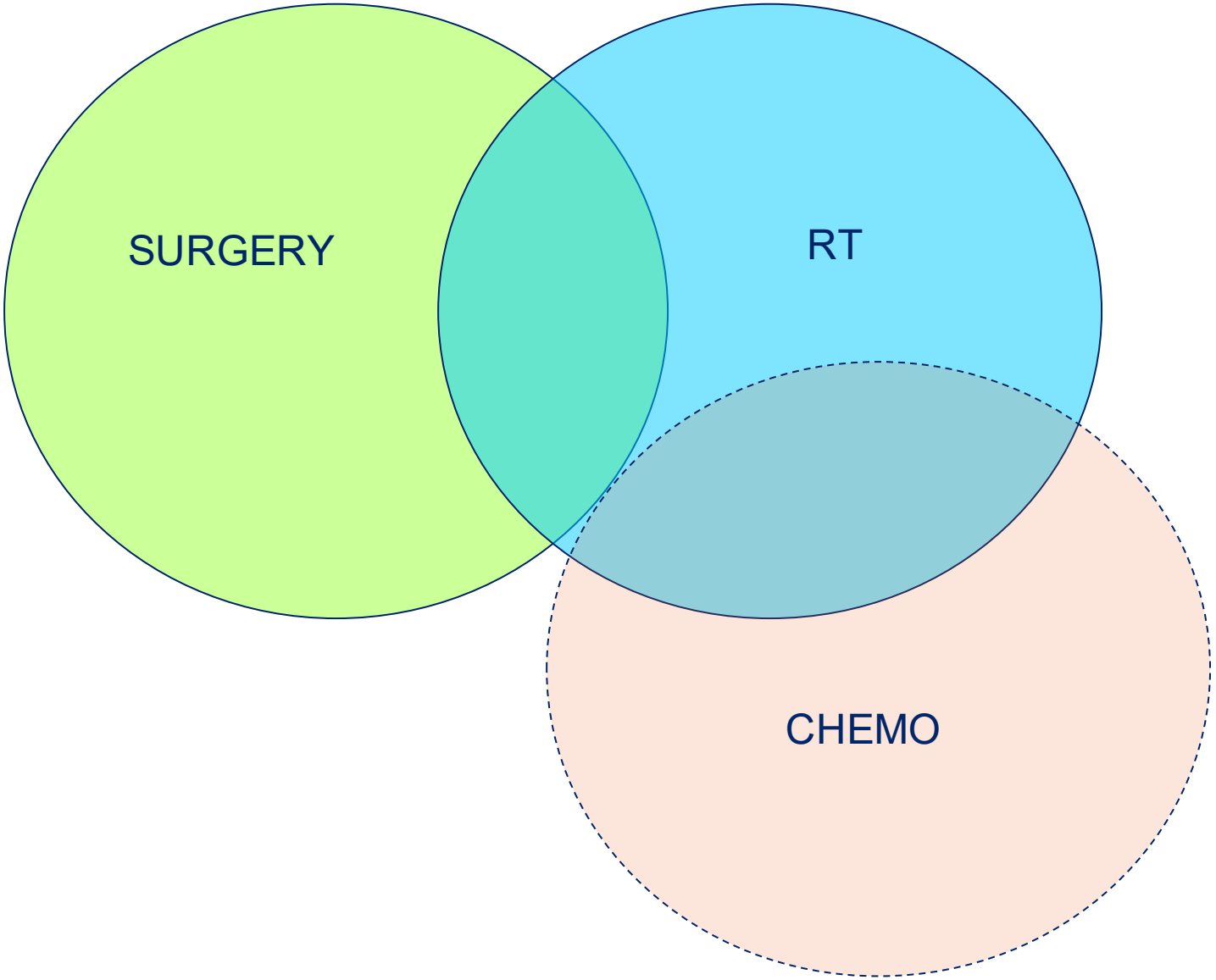
Cancer Specific Survival

Memorial Sloan Kettering Cancer Center

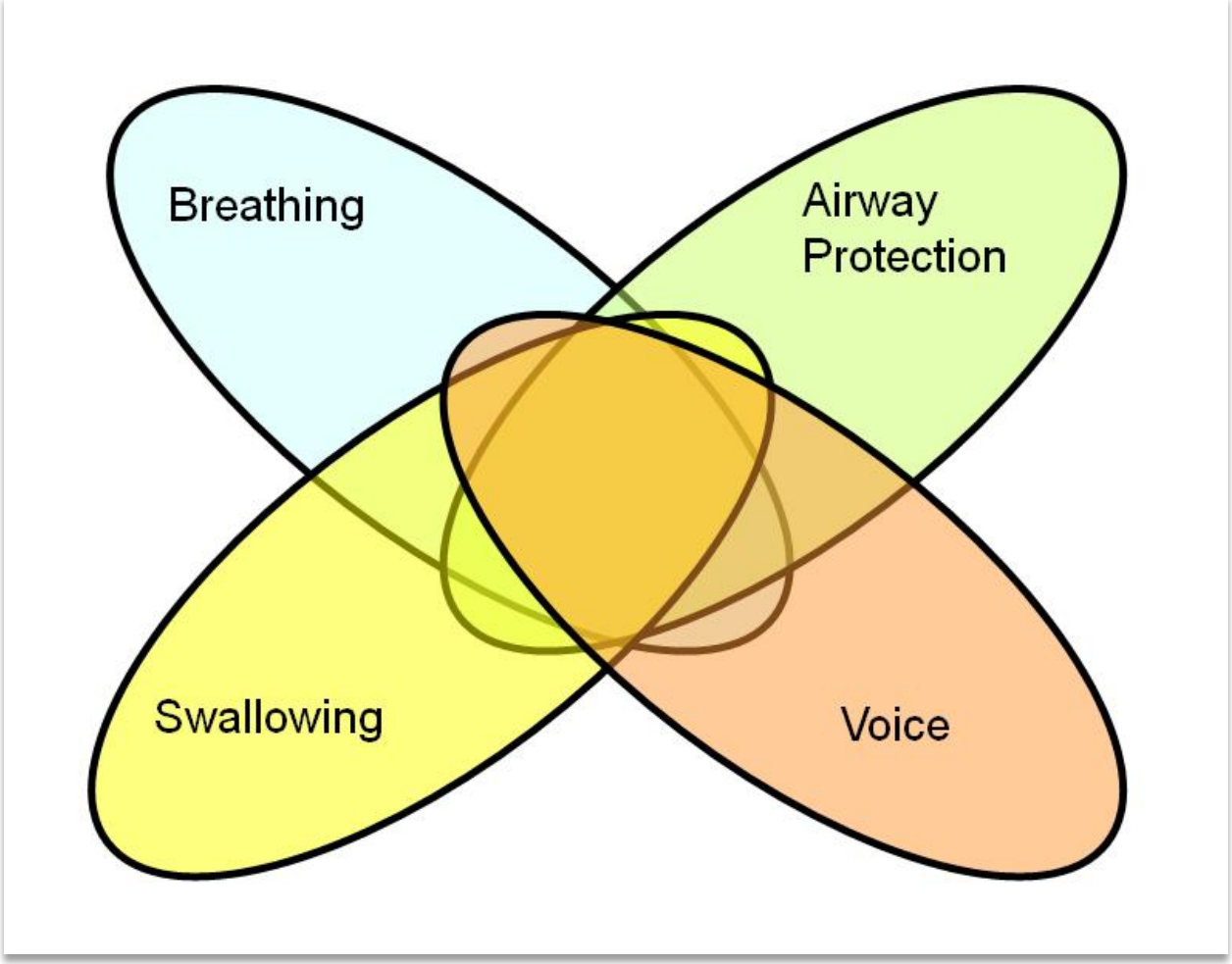
Zanoni DK et al. Oral Oncology 2019
MSK Unpublished Data, 2022

Principles of Treatment

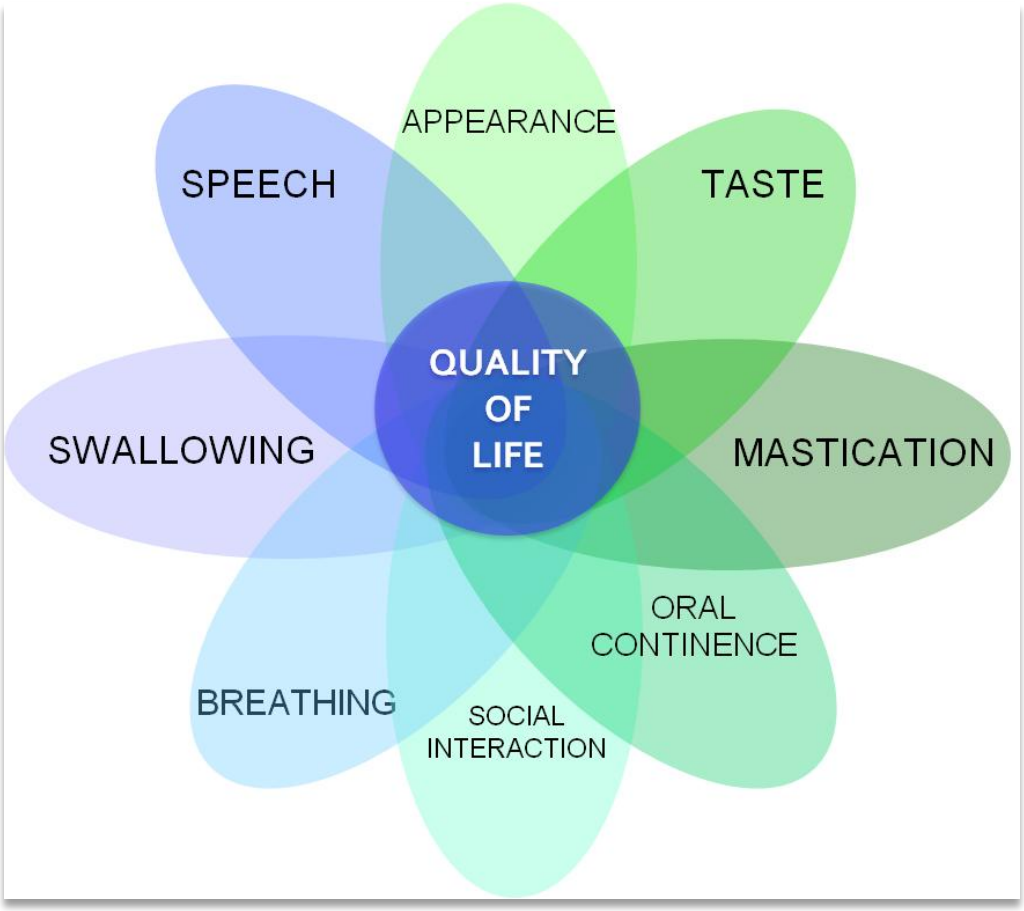
Combined modality for advanced cancers

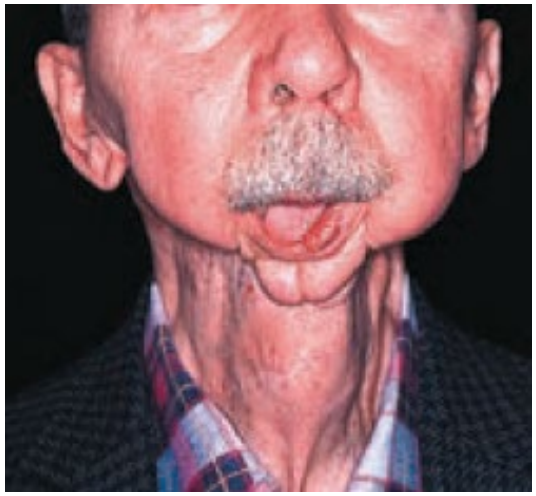


Treatment affects form & function

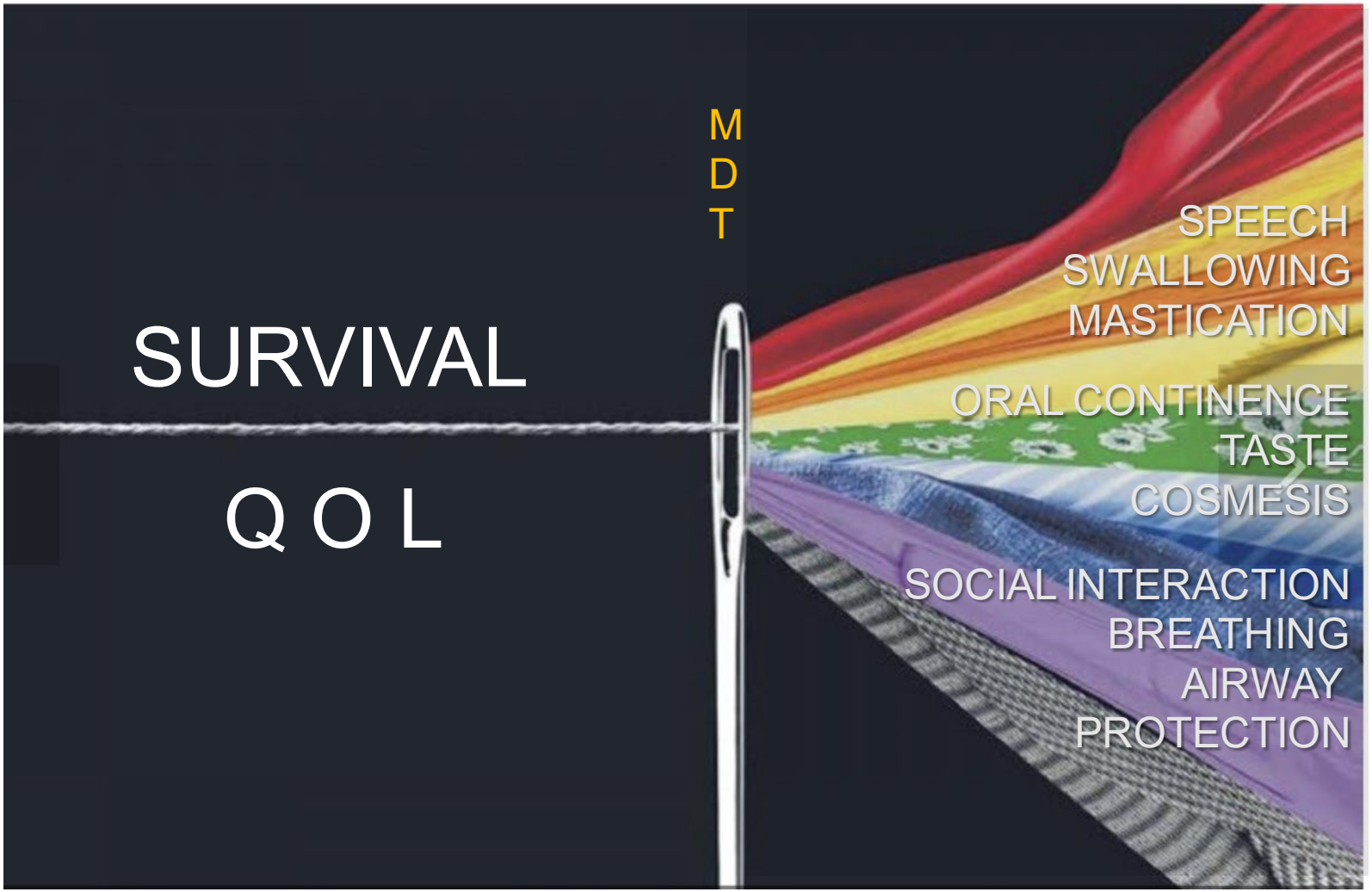


Morbidity in addition to mortality





Balance between Survival & QOL



Challenges in Management

Extent of Disease Evaluation
Neoadjuvant approaches
Surgical Resection
Surgical Margin Assessment
Reconstruction
Adjuvant therapy
Short and Long term Function & QOL

Case #2:
Locally Advanced Oral Cancer with Mandibular Invasion

Case Presenter

Dr. Robbie Woods
Fellow, Head & Neck Surgery
MSKCC, New York

Clinical History

- 56 year old male
- Light cigar smoker for 5 years, quit in 2000
- Drinks alcohol rarely
- Medical history: Dyslipidemia, hypertension, hypothyroidism, Hepatitis B, Herpes Zoster, Iron deficiency anemia, Vitamin D3 deficiency, Prediabetes, Androgen decline, Diverticular disease - Non complicated, Hemorrhoids, Nonfunctioning pituitary adenoma, Left forearm fracture x 2, Anal fissure, Hemorrhoids, Appendectomy

- Oral cavity leukoplakia since 2000
- First biopsy 2004 – mild dysplasia
- 2006 – Given interferon and bleomycin
- Biopsy 2007 – carcinoma in situ
  - Underwent left partial glossectomy and left selective neck dissection (supra-omohyoid)
  - Nodes negative for carcinoma.

Clinical History

- Multiple patches of leukoplakia 2012, with moderate dysplasia
- Photodynamic therapy late 2012
  - 80 Joules per second and 150 milliwatts per cm squared. Spot sizes were either 2 or 3 cm. Each spot treated for 8.5 minutes
- Difficult post phototherapy course
  - Floor of mouth fibrosis, reduced tongue mobility, alveolar bone necrosis with loose teeth, gingival recession and detachment, xerostomia, right submandibular sialadenitis
- Persistent patches of leukoplakia

Clinical History

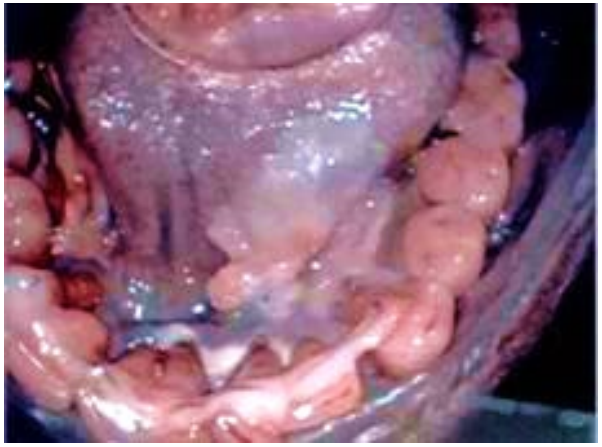
- Increased areas of leukoplakia which began reoccurring in 2016 and thicker in appearance
- Loose teeth

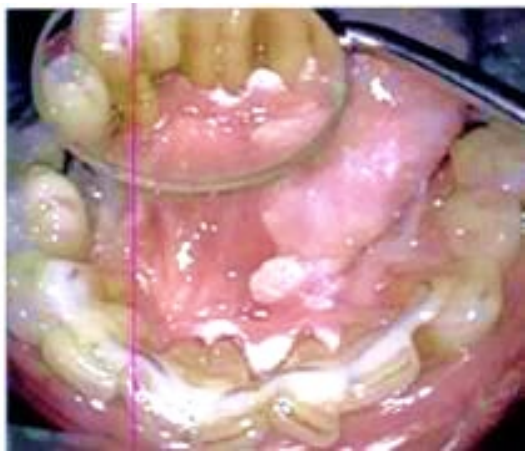
Biopsies in late 2017

- **Right vestibule - Invasive squamous cell carcinoma**, keratinizing, well to moderately differentiated
- Right floor of the mouth mucosa - Squamous epithelium with at least moderate dysplasia
- **Right tongue - Well differentiated squamous cell carcinoma**

Presentation at MSK

- No trismus
- Limited protrusion and limited side to side mobility of the tongue.
- Extensive areas of leukoplakia along the entire floor of mouth bilaterally, and anterior to the incisors.





Invasive SCC Right FOM

- Infiltrative ulcerated lesion right floor of mouth
- Adjacent loose teeth, destruction of the lingual plate of the mandible
- Medial extension onto the ventral right lateral tongue merging with the benign-appearing thick verrucous leukoplakia
- No palpable neck nodes



Extent of Disease Work Up

Radiologic Imaging

Local Extent of Disease in Oral Cavity
Neck Evaluation
Distant Metastases

Imaging of Choice for Locoregional EOD

A. Panorex
B. CT with contrast
C. MRI
D. PET scan
E. All of the above

ARS #1

Imaging of Choice for Locoregional EOD

A. Panorex

B. CT with contrast

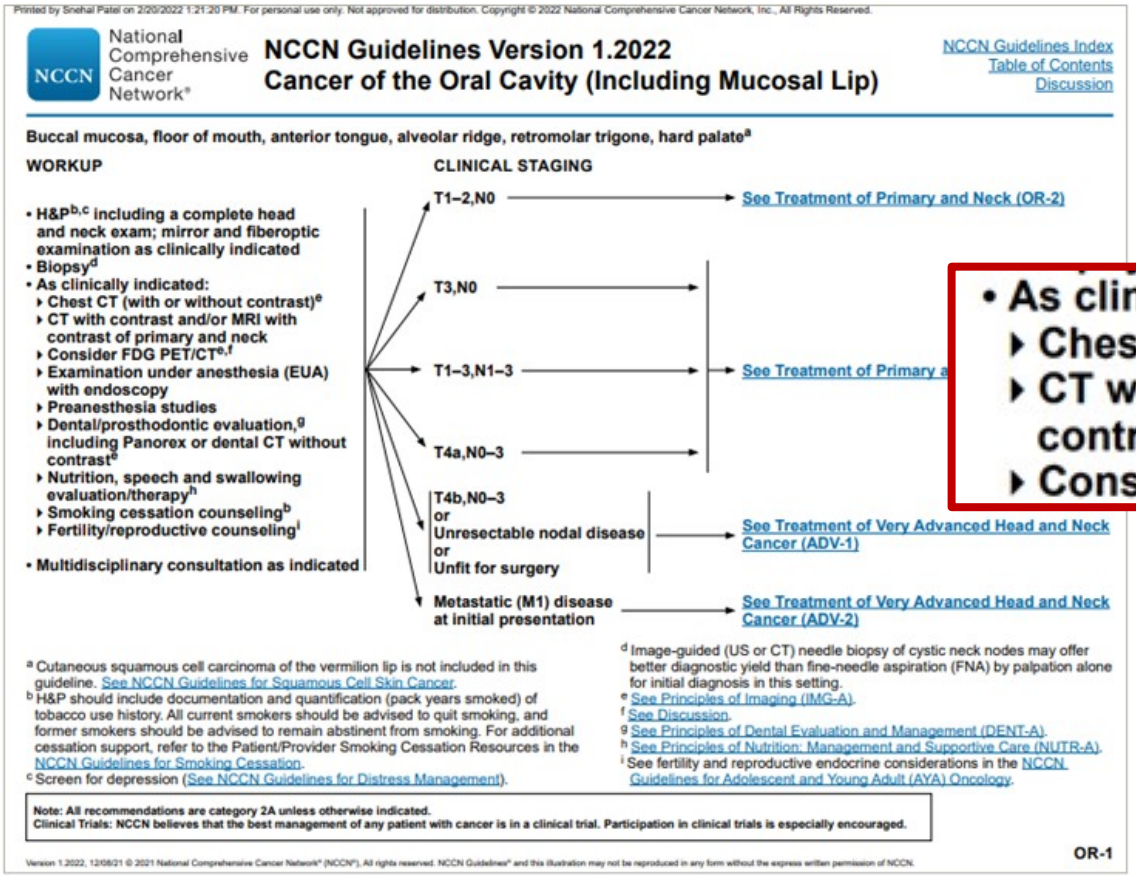
C. MRI

D. PET scan

E. All of the above

ARS #1

NCCN Guidelines



National Comprehensive Cancer Network®

NCCN Guidelines Version 1.2022
Cancer of the Oral Cavity (Including Mucosal Lip)

NCCN Guidelines Index
Table of Contents
Discussion

Buccal mucosa, floor of mouth, anterior tongue, alveolar ridge, retromolar trigone, hard palate[a]

WORKUP

- H&P[b,c] including a complete head and neck exam; mirror and fiberoptic examination as clinically indicated
- Biopsy[d]
- As clinically indicated:
  - Chest CT (with or without contrast)[e]
  - CT with contrast and/or MRI with contrast of primary and neck
  - Consider FDG PET/CT[e,f]
  - Examination under anesthesia (EUA) with endoscopy
  - Preanesthesia studies
  - Dental/prosthodontic evaluation,[g] including Panorex or dental CT without contrast[e]
  - Nutrition, speech and swallowing evaluation/therapy[h]
  - Smoking cessation counseling[b]
  - Fertility/reproductive counseling[i]
- Multidisciplinary consultation as indicated

CLINICAL STAGING

- T1–2,N0 → See Treatment of Primary and Neck (OR-2)
- T3,N0 →
- T1–3,N1–3 → See Treatment of Primary a
- T4a,N0–3 →
- T4b,N0–3 or Unresectable nodal disease or Unfit for surgery → See Treatment of Very Advanced Head and Neck Cancer (ADV-1)
- Metastatic (M1) disease at initial presentation → See Treatment of Very Advanced Head and Neck Cancer (ADV-2)

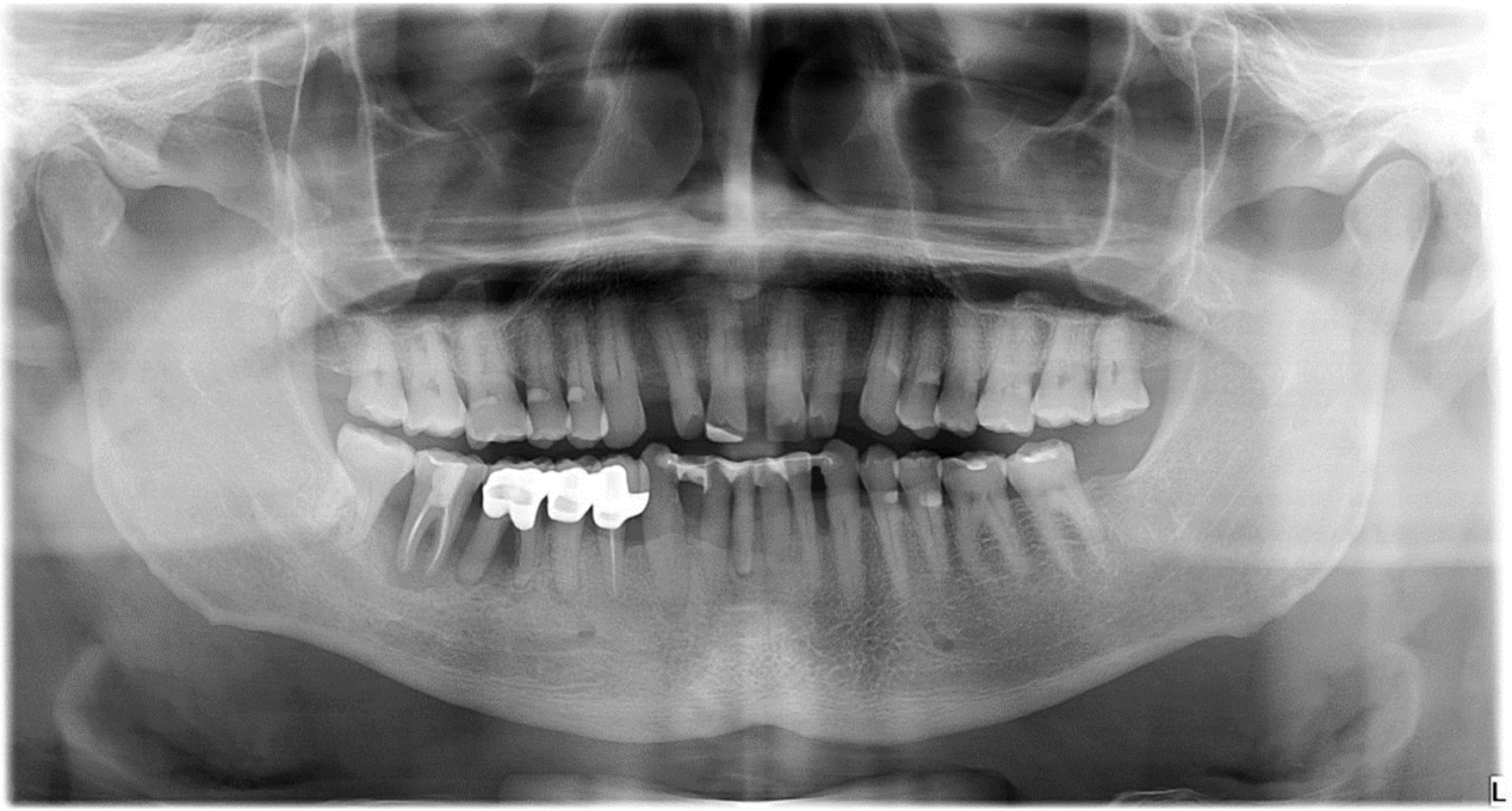
[a] Cutaneous squamous cell carcinoma of the vermilion lip is not included in this guideline. See NCCN Guidelines for Squamous Cell Skin Cancer.
[b] H&P should include documentation and quantification (pack years smoked) of tobacco use history. All current smokers should be advised to quit smoking, and former smokers should be advised to remain abstinent from smoking. For additional cessation support, refer to the Patient/Provider Smoking Cessation Resources in the NCCN Guidelines for Smoking Cessation.
[c] Screen for depression (See NCCN Guidelines for Distress Management).
[d] Image-guided (US or CT) needle biopsy of cystic neck nodes may offer better diagnostic yield than fine-needle aspiration (FNA) by palpation alone for initial diagnosis in this setting.
[e] See Principles of Imaging (IMG-A).
[f] See Discussion.
[g] See Principles of Dental Evaluation and Management (DENT-A).
[h] See Principles of Nutrition: Management and Supportive Care (NUTR-A).
[i] See fertility and reproductive endocrine considerations in the NCCN Guidelines for Adolescent and Young Adult (AYA) Oncology.

Note: All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

- **As clinically indicated:**
  - **Chest CT (with or without contrast)[e]**
  - **CT with contrast and/or MRI with contrast of primary and neck**
  - **Consider FDG PET/CT[e,f]**

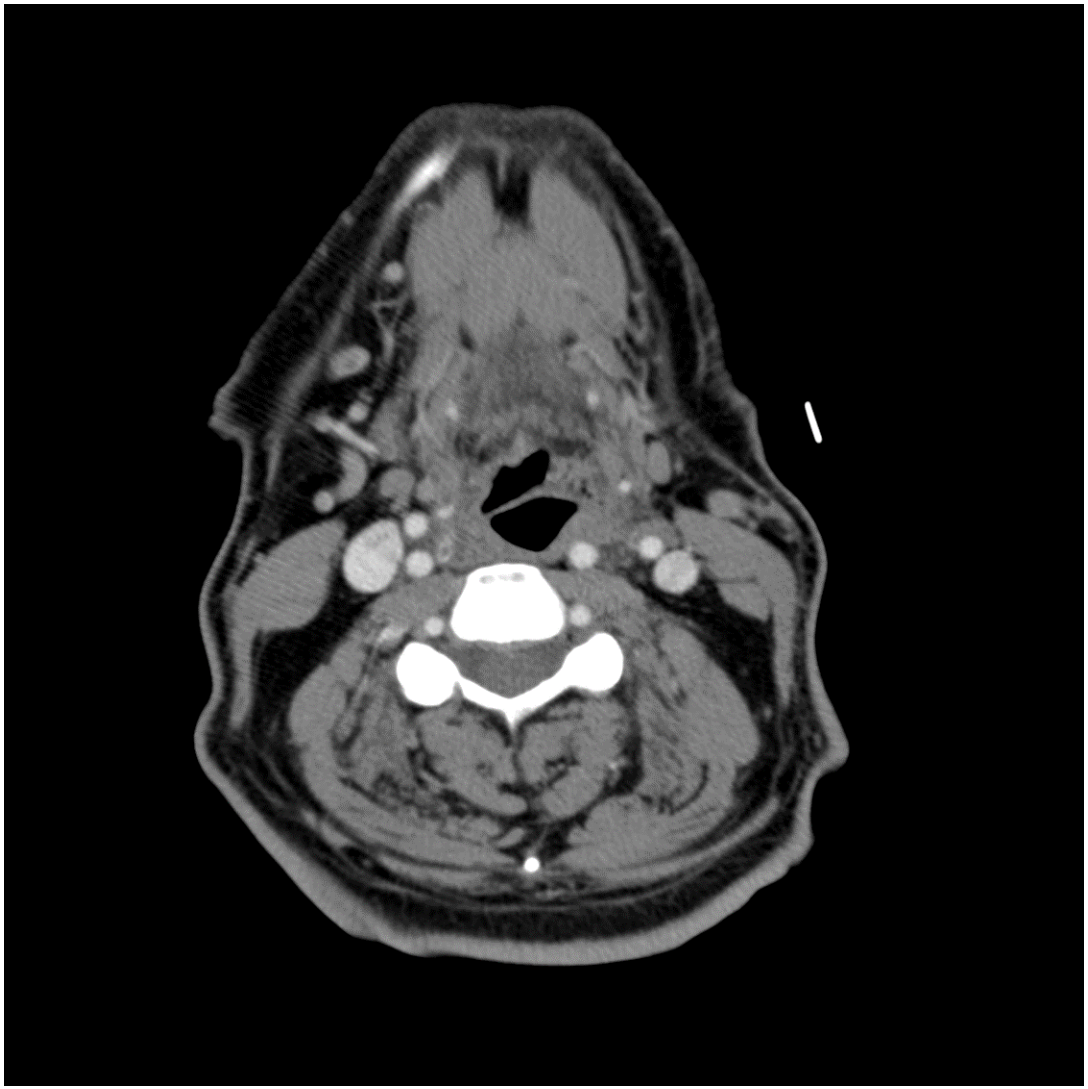
NCCN Clinical Practice Guidelines in Oncology
Version 1.22 – December 8, 2021

Panorex

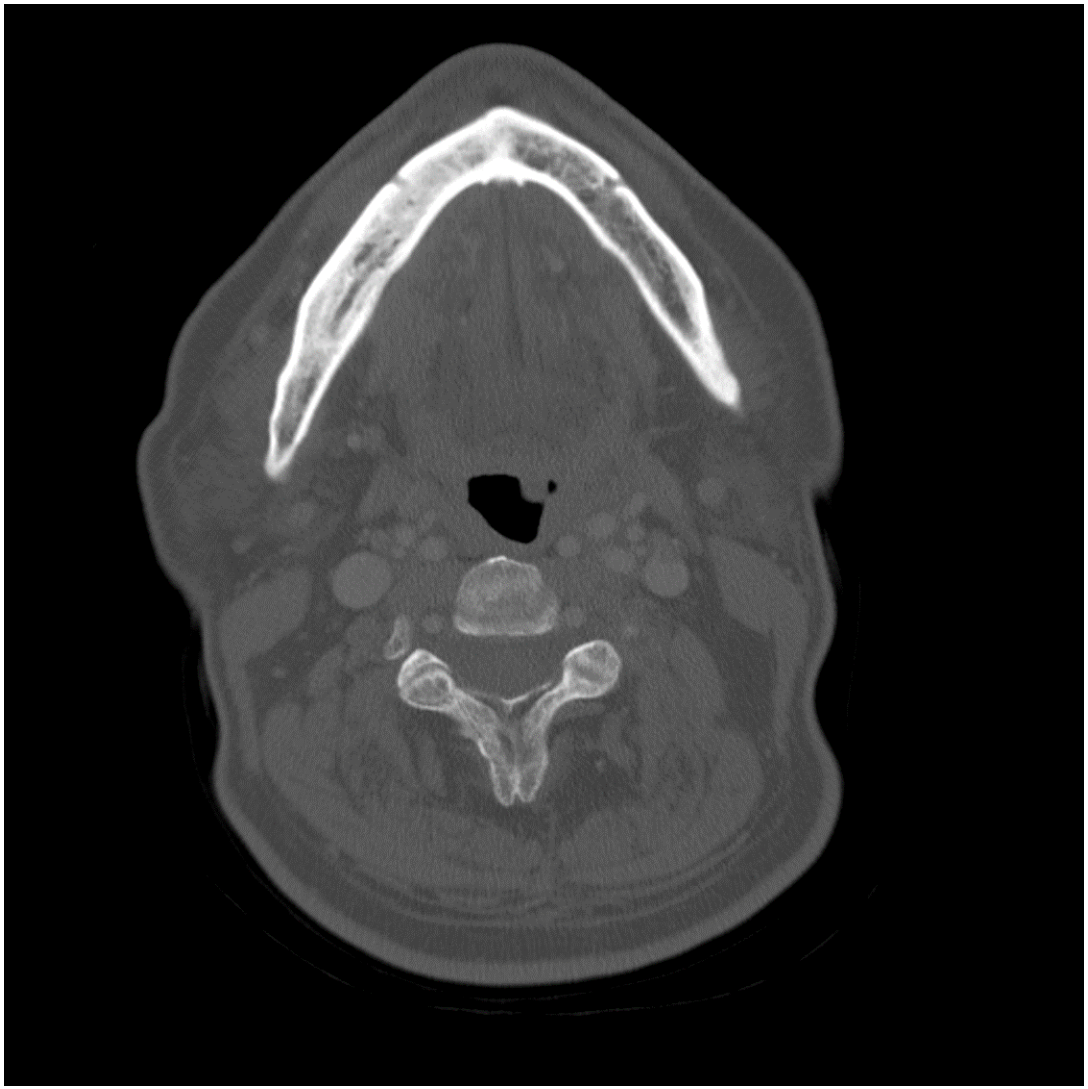


For preop dental assessment – optimize dentition for postop RT

Contrast-Enhanced CT



Contrast-Enhanced CT



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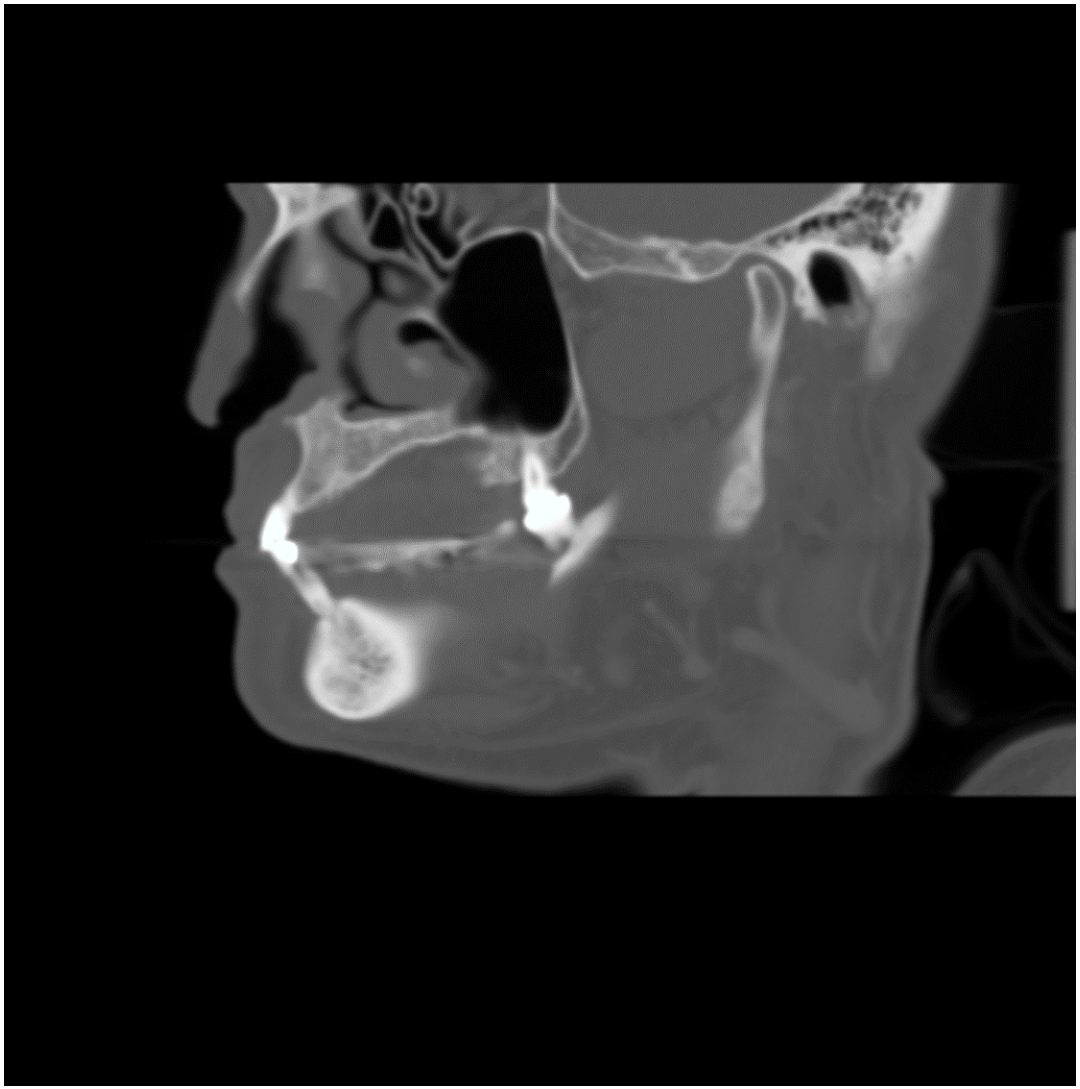


Summary of Clinical Problem

- cT4N0 SCC of Right FOM/Ventral Tongue
- Background of premalignant lesions and CIS over 17 years
- Healthy male with no major comorbidity
- Previously treated with IFN/Bleomycin and PDT
- Severe oral fibrosis & field change

Management

What is the R_x of Choice?

A. Surgery ± Adjuvant treatment

B. Primary RT or CRT

C. Neoadjuvant chemo + Surgery ± Adjuvant treatment

ARS #2

What is the R_x of Choice?

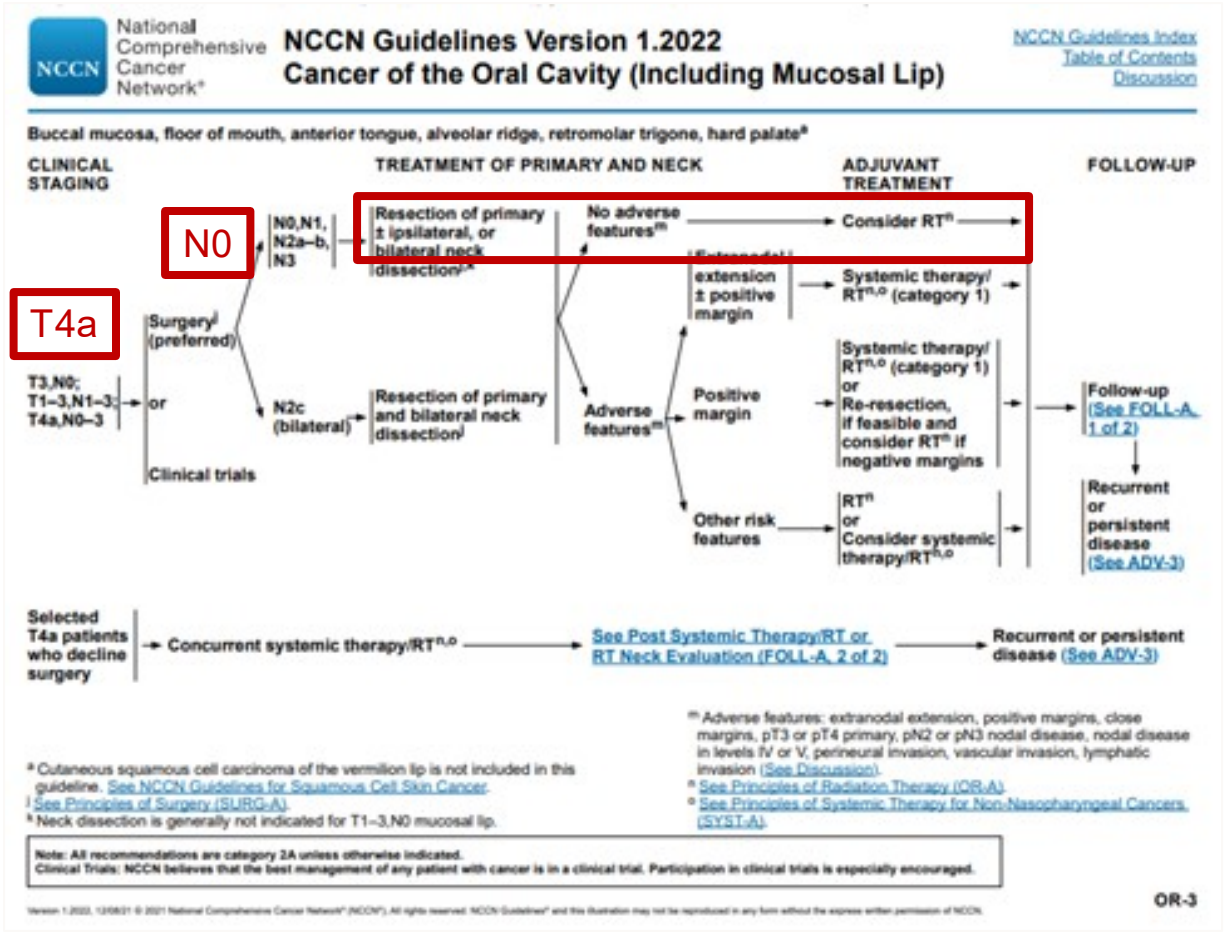
A. Surgery ± Adjuvant treatment

B. Primary RT or CRT

C. Neoadjuvant chemo + Surgery ± Adjuvant treatment

ARS #2

NCCN Guidelines



Surgery ± Adjuvant Treatment

NCCN Clinical Practice Guidelines in Oncology
Version 1.22 – December 8, 2021

Neoadjuvant Options

Dr. Sarbani Ghosh
Radiation Oncologist
Tata Memorial, Mumbai

Dr. Prathamesh Pai
Surgeon
Tata Memorial, Mumbai

Dr. David Pfister
Medical Oncologist
MSKCC, New York

75% Locally Advanced OSCC

25% Locally Advanced OSCC

Surgical Resection

Presurgical Optimization

- Multidisciplinary input
- ERAS pathway
- Psychosocial interventions
- Smoking cessation
- Alcohol withdrawal
- “Train for a marathon in less than 2-3 weeks”

Multidisciplinary Team Approach is Crucial

National Comprehensive Cancer Network®

NCCN Guidelines Version 1.2022
Team Approach

NCCN Guidelines Index
Table of Contents
Discussion

MULTIDISCIPLINARY TEAM

The management of patients with head and neck cancers is complex. All patients need access to the full range of support services and specialists with expertise in the management of patients with head and neck cancer for optimal treatment and follow-up. Outcomes are improved when patients with head and neck cancers are treated in high-volume centers.

- Head and neck surgery
- Radiation oncology
- Medical oncology
- Plastic and reconstructive surgery
- Specialized nursing care
- Dentistry/prosthodontics
- Physical medicine and rehabilitation (including therapy for lymphedema of the neck)
- Speech and swallowing therapy
- Clinical social work
- Clinical nutrition
- Pathology (including cytopathology)
- Diagnostic and interventional radiology
- Adjunctive services
  - Neurosurgery
  - Ophthalmology
  - Psychiatry
  - Addiction services
  - Audiology
  - Palliative care

SUPPORT SERVICES

Follow-up should be performed by a physician and other health care professionals with expertise in the management and prevention of treatment sequelae. It should include a comprehensive head and neck exam. The management of head and neck cancer patients may involve the following:

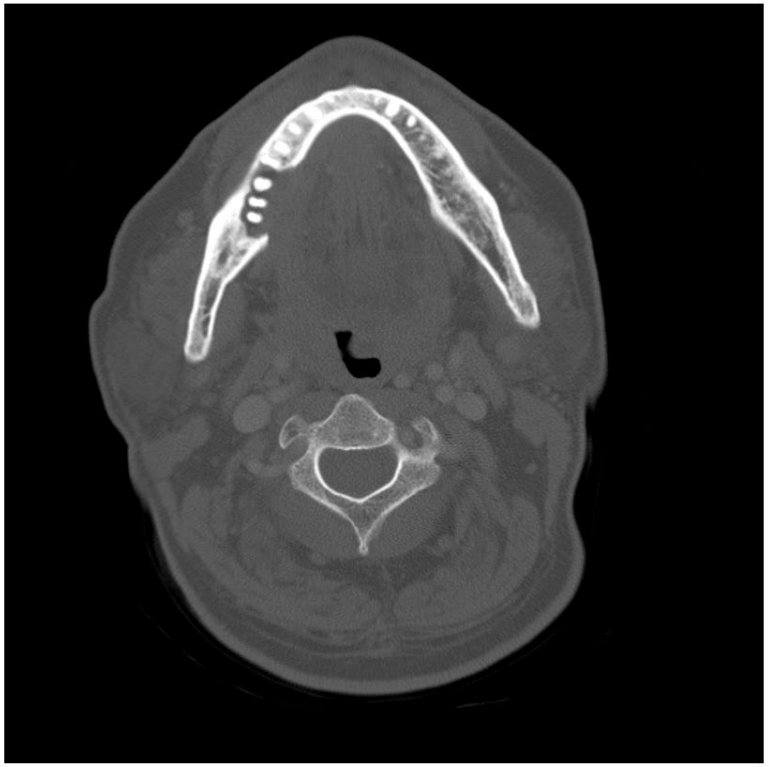
- General medical care
- Pain and symptom management (See NCCN Guidelines for Adult Cancer Pain)
- Nutritional support
  - Enteral feeding
  - Oral nutrition
- Dental care for RT effects
- Xerostomia management
- Smoking and alcohol cessation (See NCCN Guidelines for Smoking Cessation)
- Speech and swallowing therapy
- Audiology
- Tracheotomy care
- Wound management
- Depression assessment and management (See NCCN Guidelines for Distress Management)
- Social work and case management
- Care coordination
- Supportive care (See NCCN Guidelines for Palliative Care)

Surgical decisions that can affect outcome

- Extent of soft tissue resection
- Extent of bone resection
- Assessment of surgical margins
- Reconstruction of the surgical defect
- Management of the cN0 neck

Case #2

Contrast-Enhanced CT



Extent of Bone Resection?

A. Marginal Mandibulectomy

B. Segmental Mandibulectomy

C. Soft Tissue resection Only

ARS #3

Extent of Bone Resection?

A. Marginal Mandibulectomy

B. Segmental Mandibulectomy

C. Soft Tissue resection Only

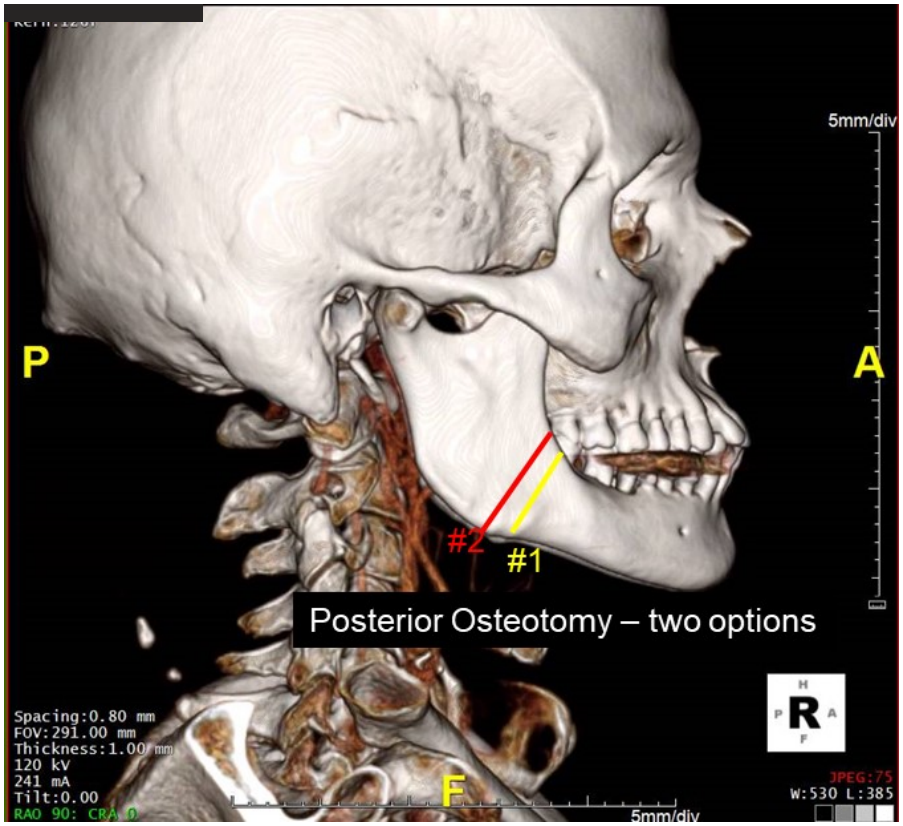
ARS #3

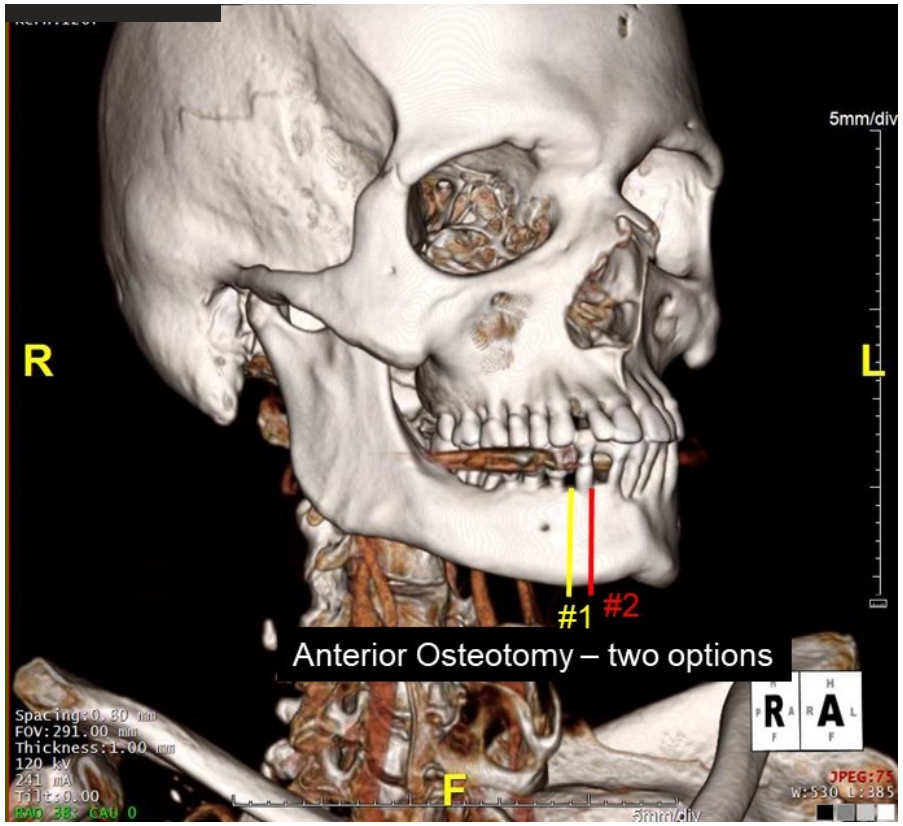
Virtual Surgical Planning

VSP advantages

- Preoperative planning of bone reconstruction
- Preoperative planning of dental implants
- Precise planning of bone resection
- Helps visualize surgical access in complicated situations

VSP for Mandibular Osteotomies

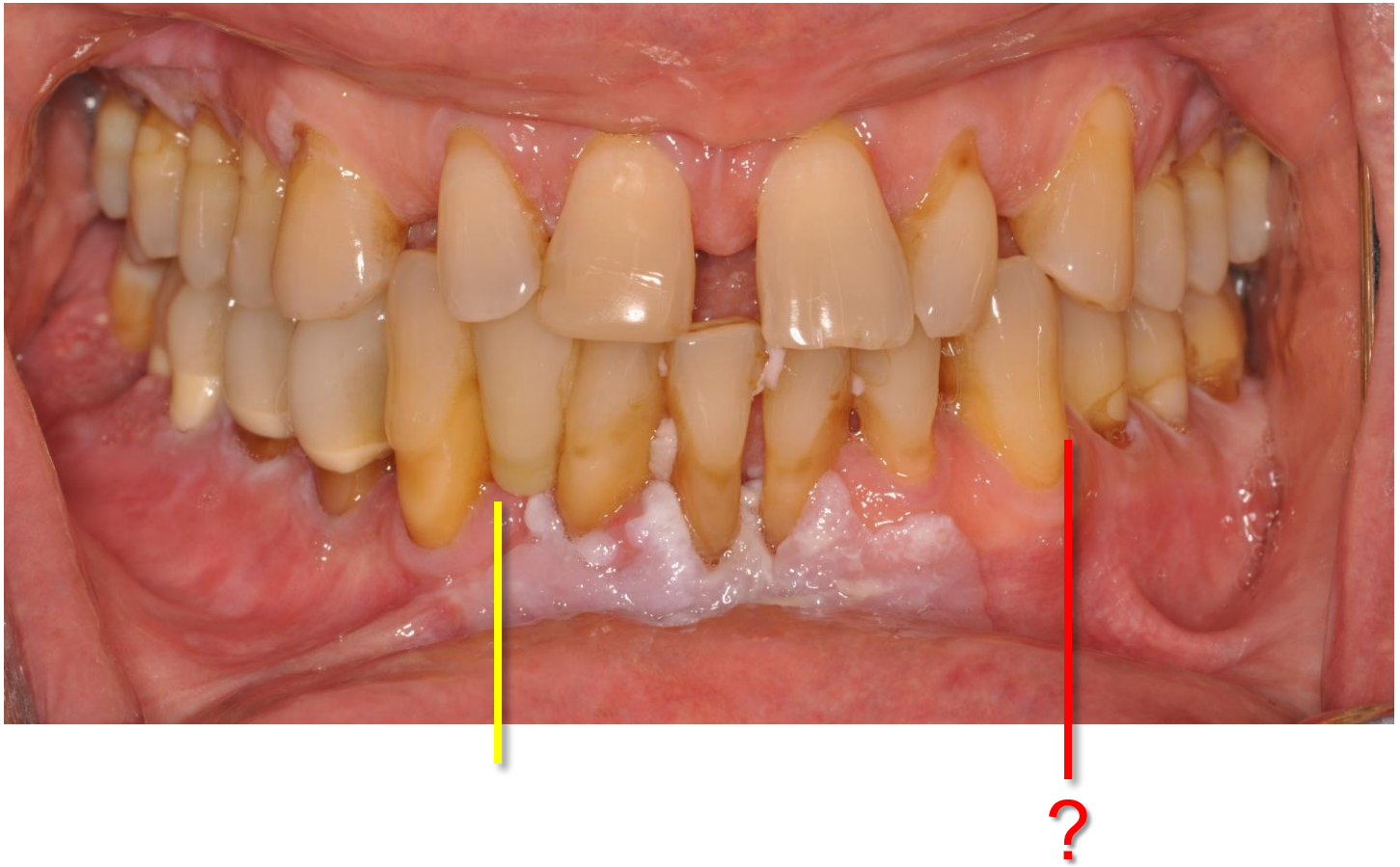




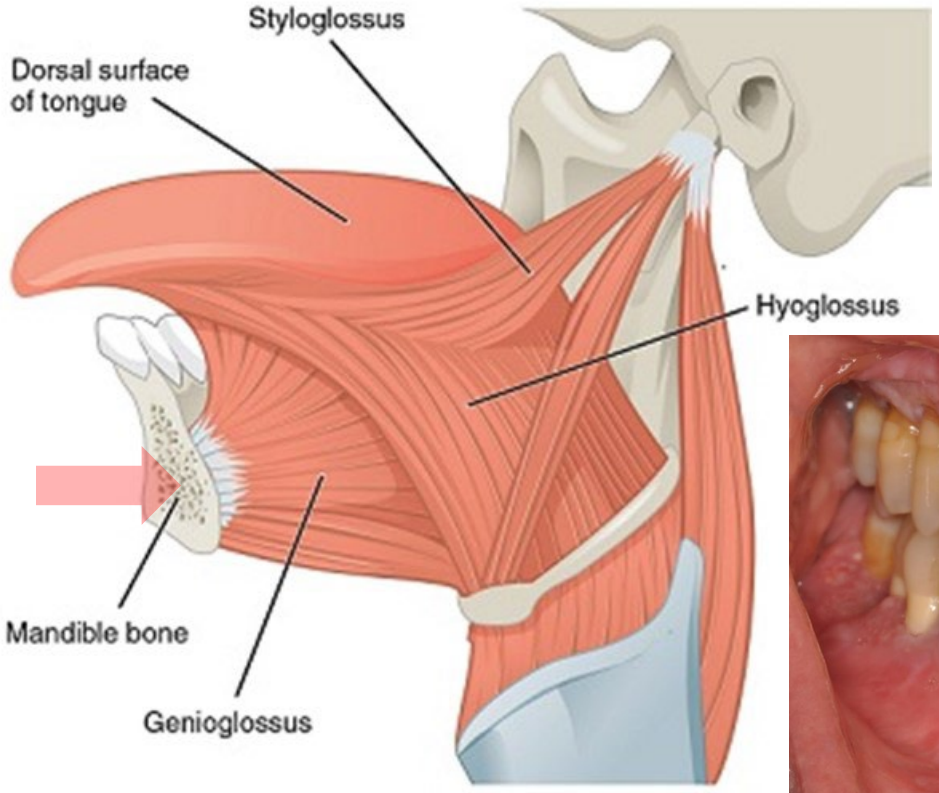
How would you manage this component of the lesion?

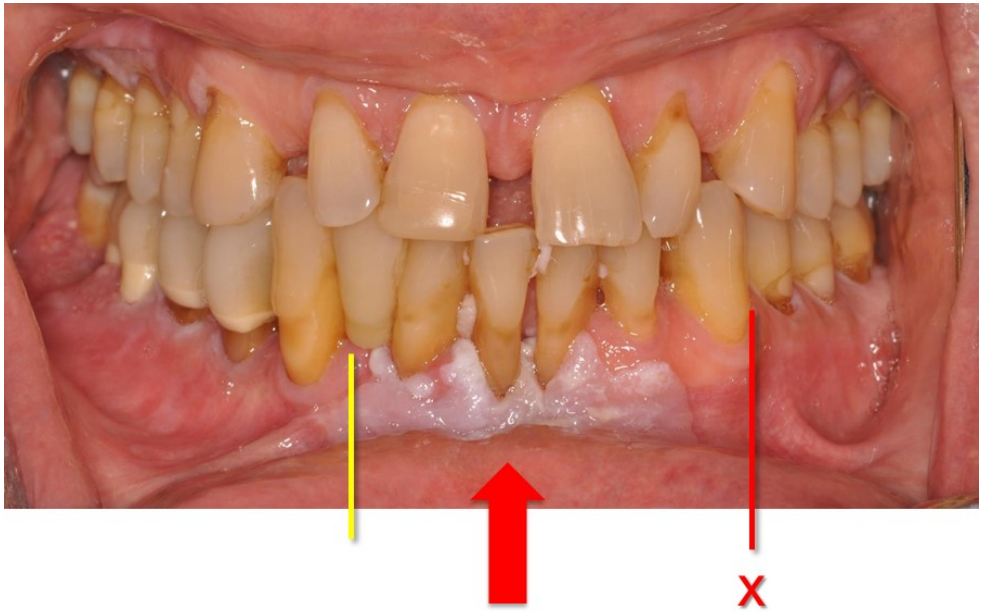
Projected Planes of Anterior Osteotomy

Include arch of mandible in segmental resection?

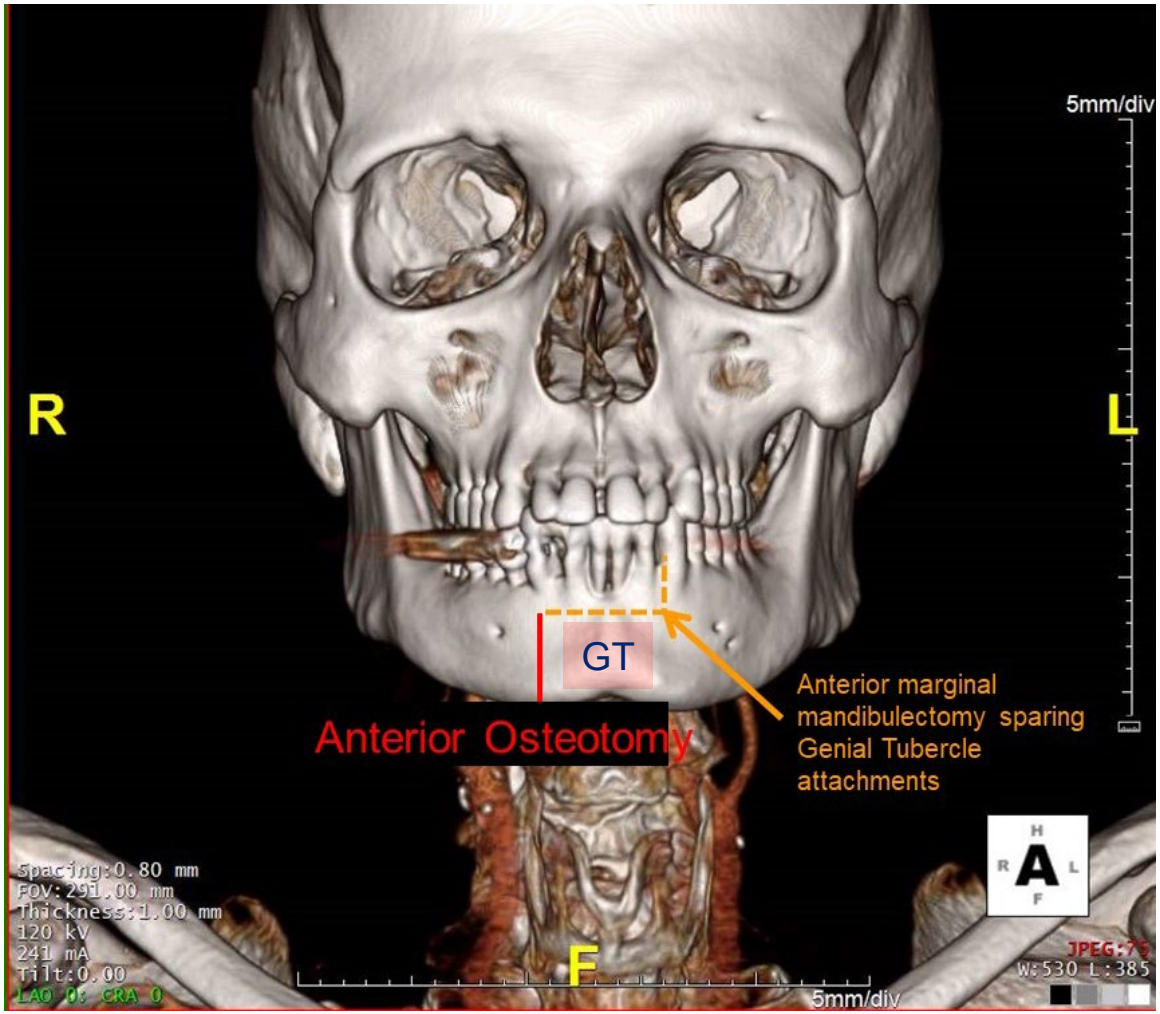


Functional Consequences of Resecting Genial Tubercle



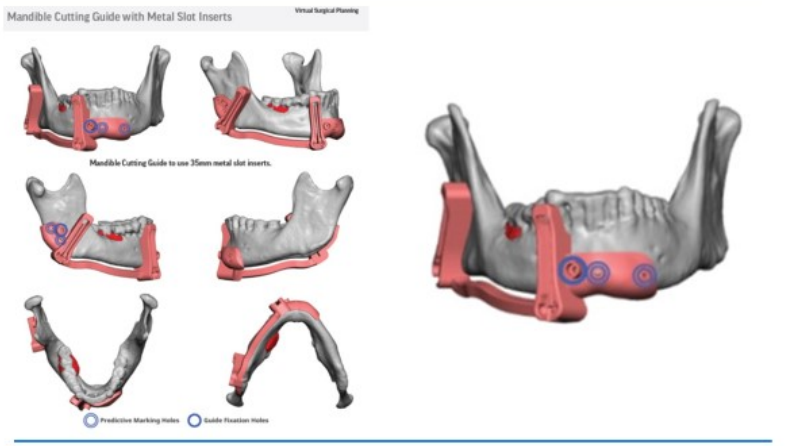


Add an Anterior Marginal Mandibulectomy



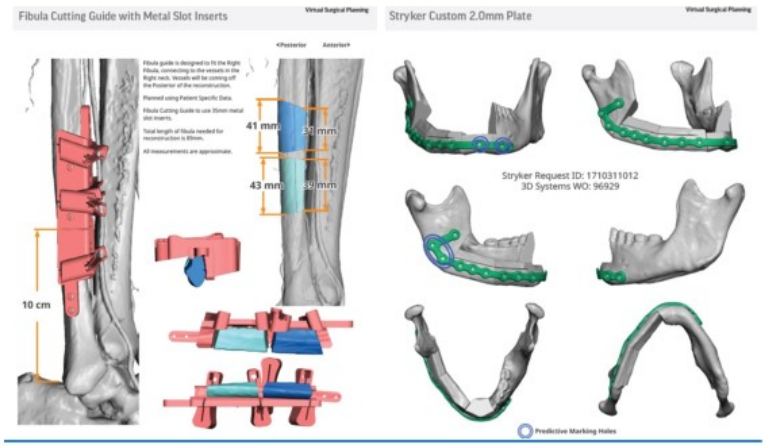
VSP Guided Resection and Reconstruction

VSP for Bone Resection

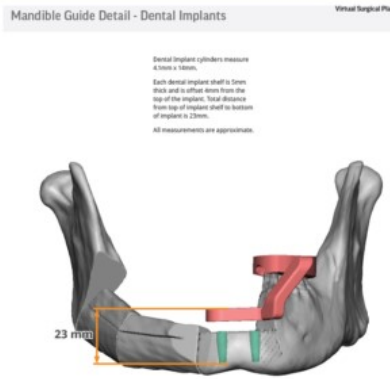


Memorial Sloan Kettering Cancer Center

VSP for Mandible Reconstruction



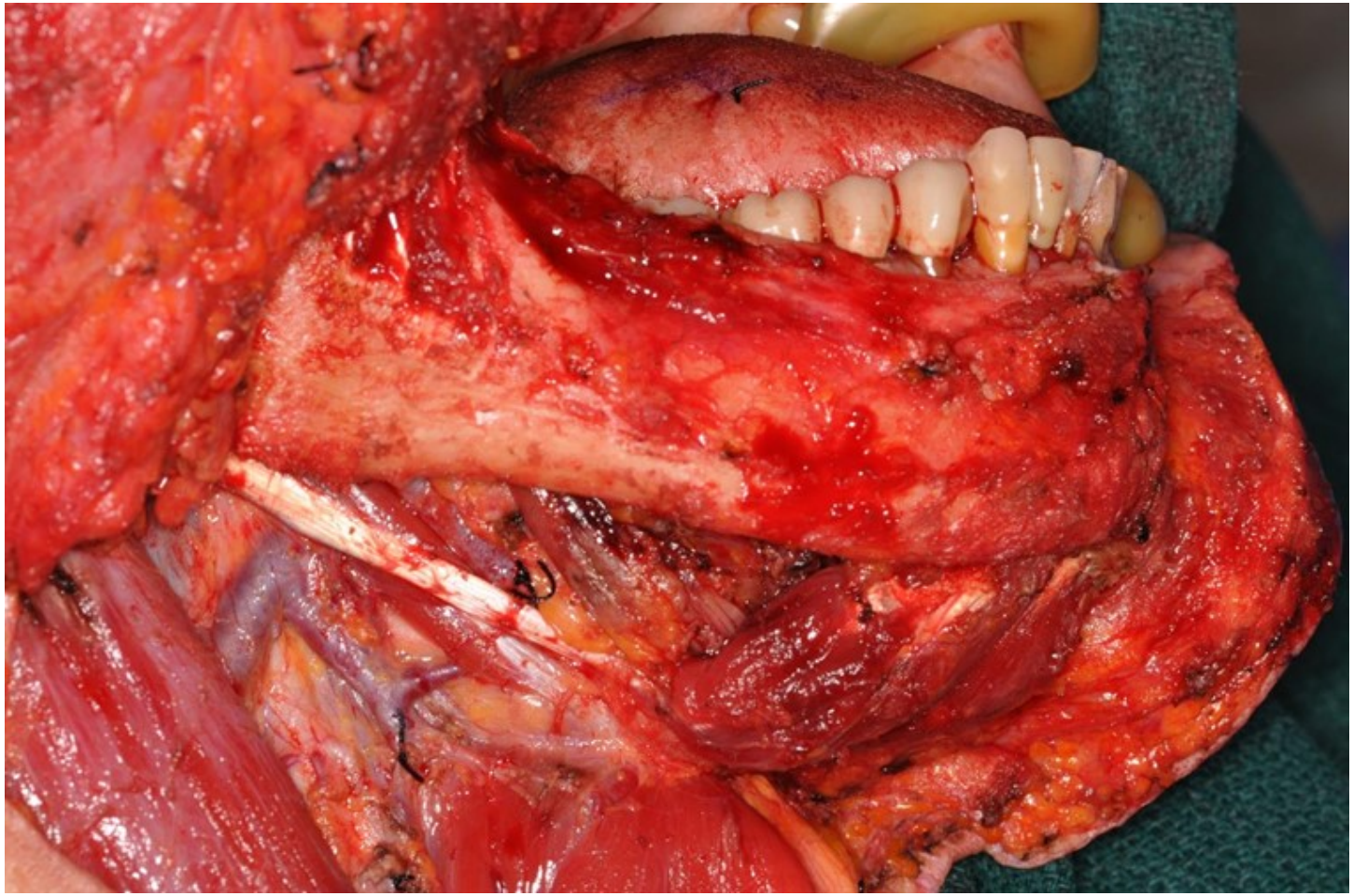
VSP for Dental Implant Placement



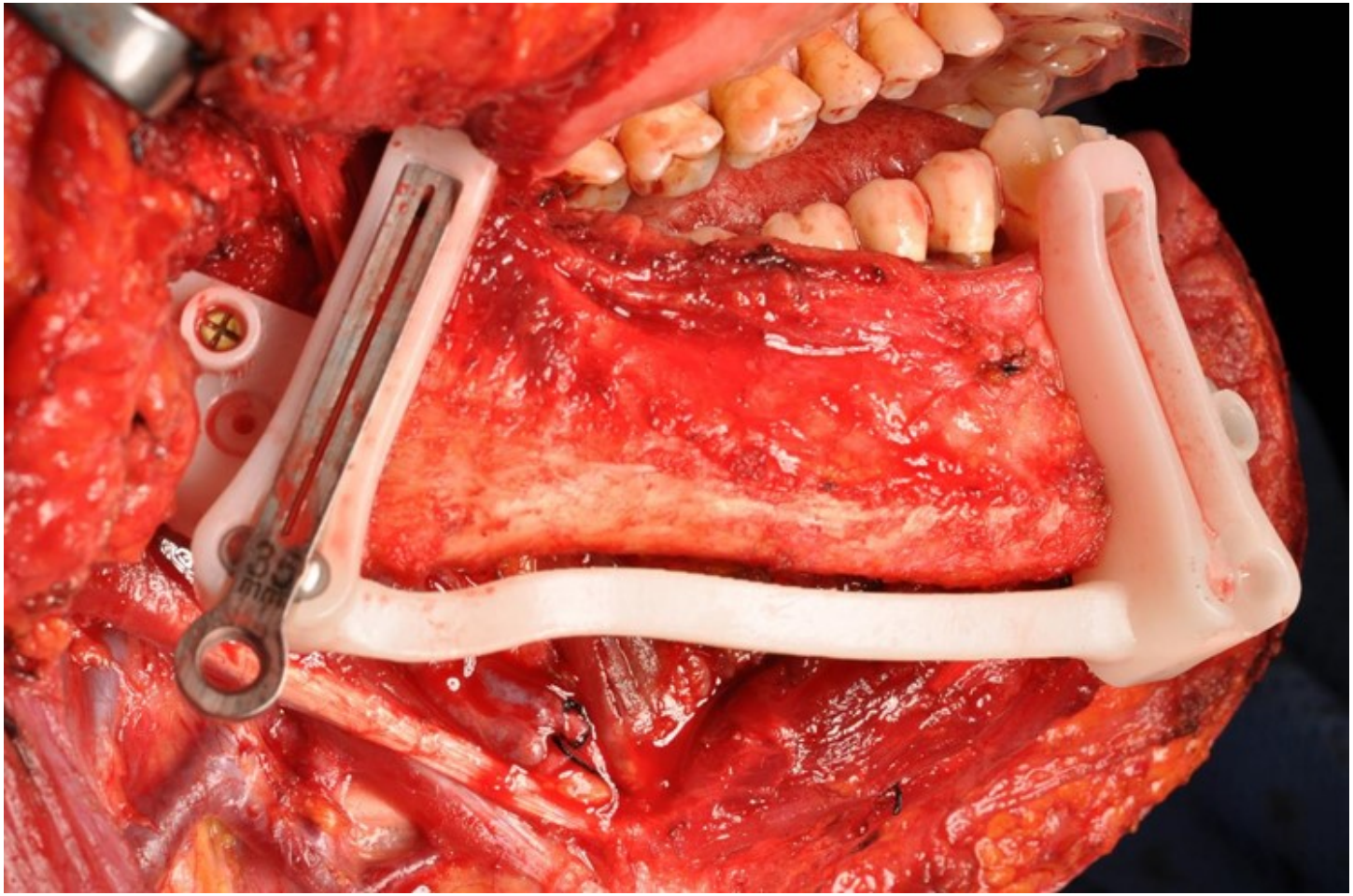
Memorial Sloan Kettering Cancer Center

Case #2
Surgical Procedure

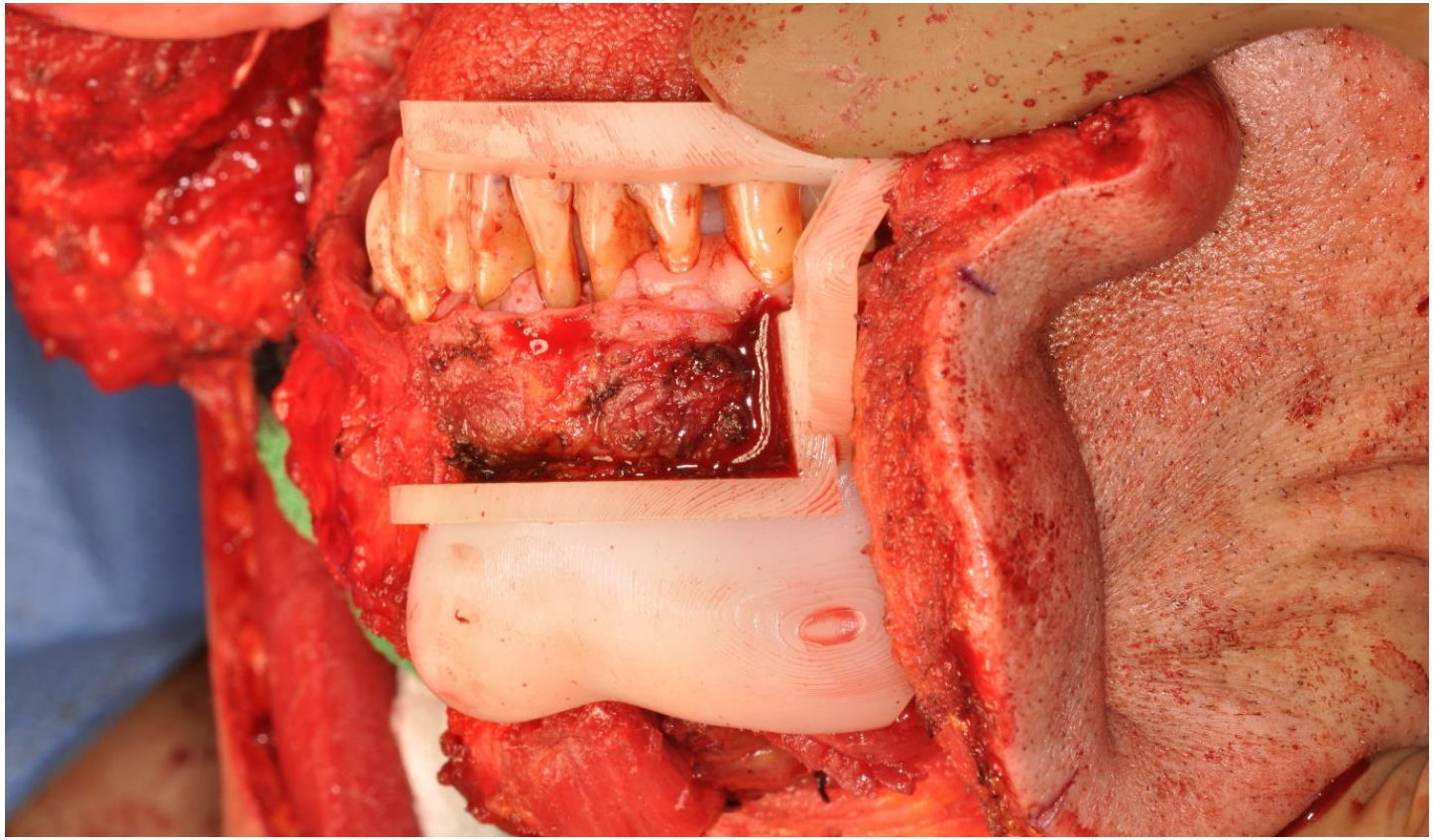
Lower Lip Split & Lower Cheek Flap Approach



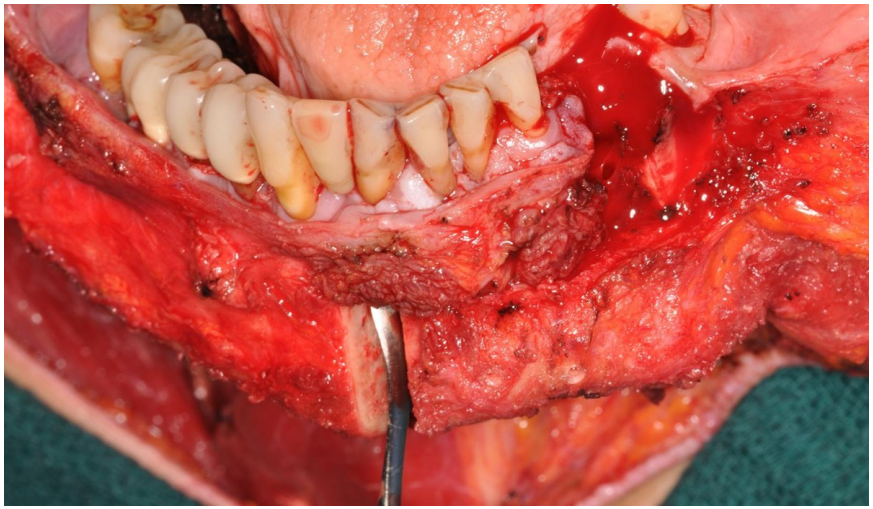
Segmental Mandibular Osteotomy Guides

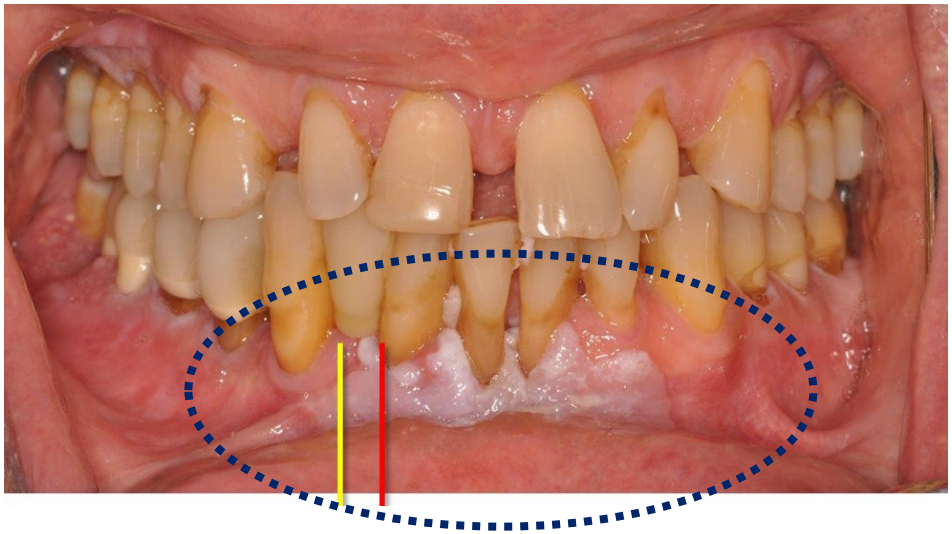


Marginal Resection Osteotomy Guide



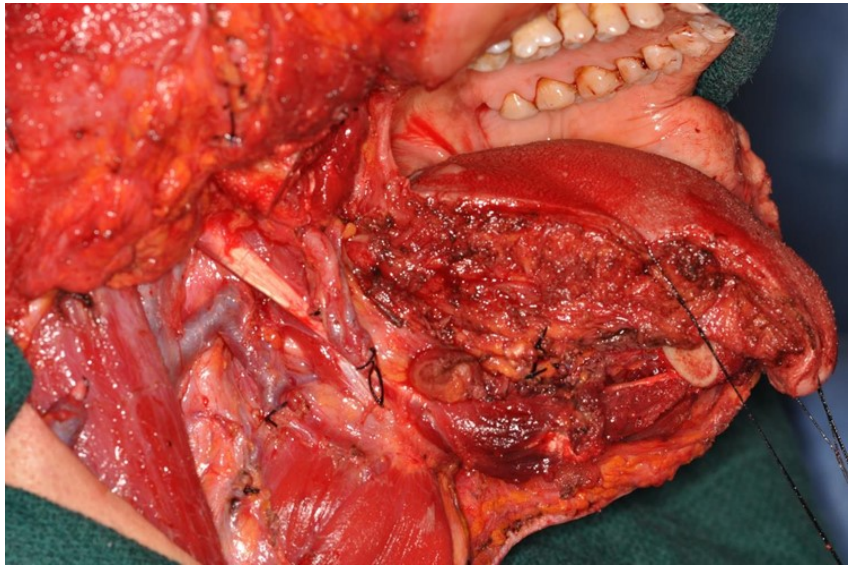
Segmental + Marginal Resection of Mandible

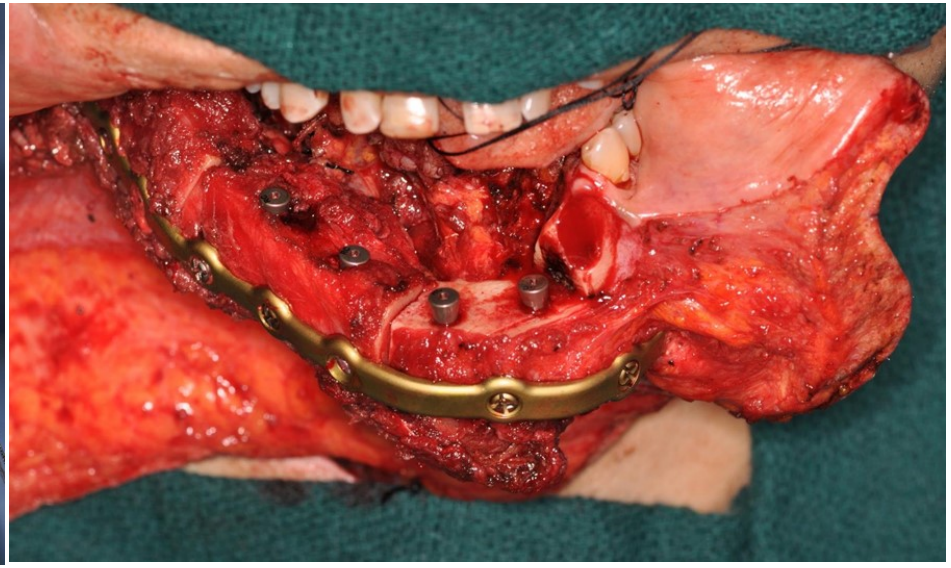




Marginal Mandibulectomy of Arch of Mandible for Superficial Lesion of Anterior Lower Gum

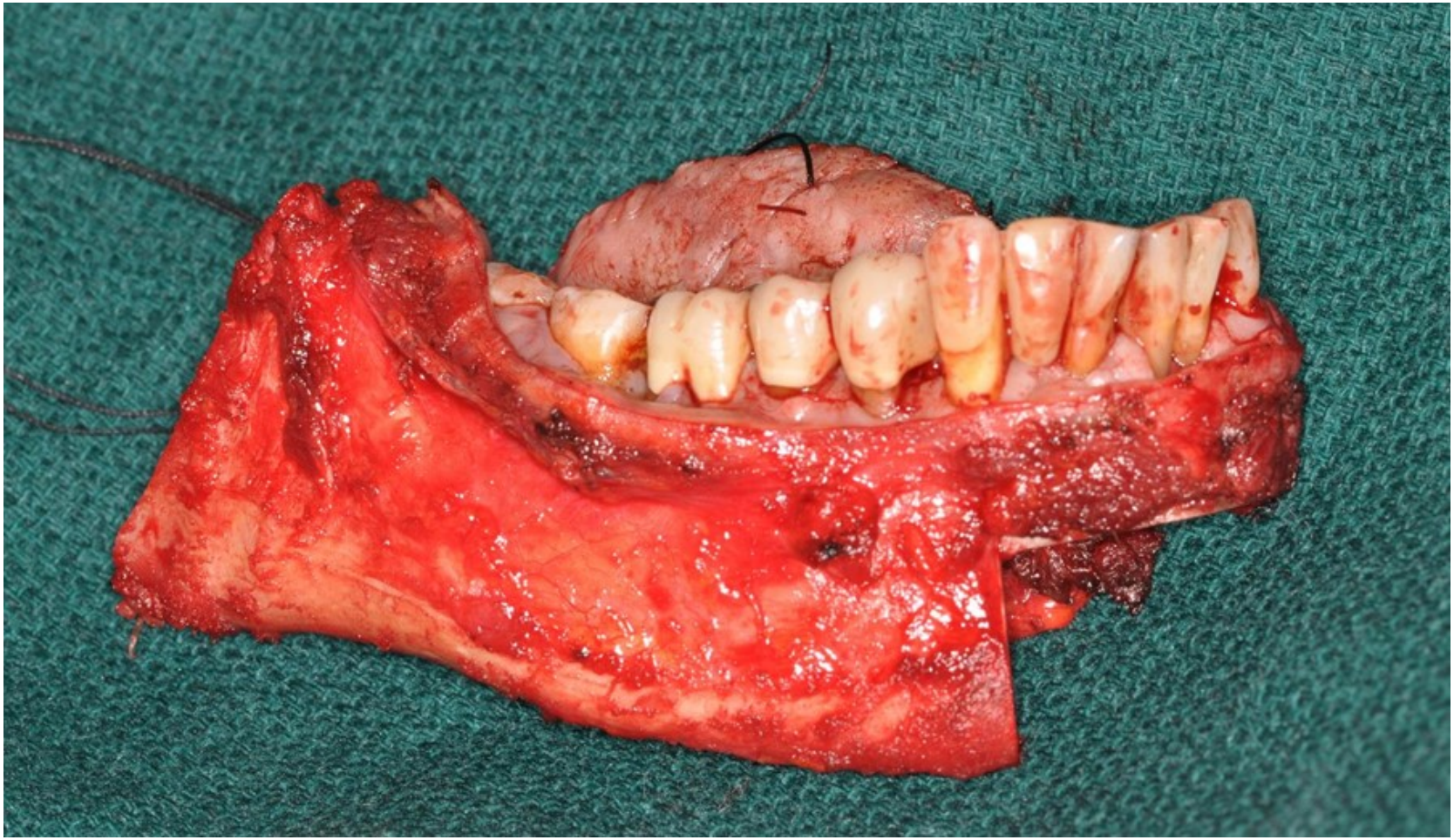
Surgical Defect & Fibula Flap Reconstruction





Right Segmental + Anterior Arch Marginal Mandibulectomy with Right Partial Glossectomy & Right Neck Dissection

Surgical Specimen of Composite resection



Surgical Pathology

- Right neck **levels II-IV: 41 benign nodes**
- Right neck **level I/perifacial nodes**:
  Metastatic SCC in 1/8 nodes, 1.8cm node with 0.6cm metastatic focus, no ENE

- Right segmental mandibulectomy with floor of mouth and right partial glossectomy:
  - Invasive squamous cell carcinoma, keratinizing, moderately differentiated
  - Greatest diameter is 1.9 cm, maximal thickness 0.8 cm
  - Tumor Location: Floor of mouth
  - Invades skeletal muscle and bone
  - No tumor necrosis, vascular invasion or multicentricity
  - **Perineural Invasion identified**
  - **Pattern of Invasion: Invasive islands**
  - In situ carcinoma identified
  - Non-neoplastic mucosa exhibits keratosis
  - **Bone Invasion: Involves medullary space**

- **Margins**: Free of invasive/in situ carcinoma, invasive carcinoma 2.3mm from closest deep margin. Bone margins benign

- **pT4a N1**

Histopatholgic Assessment is

A. Objective, Consistent & Accurate representation of Tumor Biology
B. Prognostically independent of other host factors
C. Best interpreted in multidisciplinary discussion for each individual patient

ARS #4

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ARS #4

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pT4a N1

Adjuvant Management

A. Postoperative Radiation Therapy

B. Postoperative Chemoradiation Therapy

C. Observation

ARS #5

Adjuvant Management

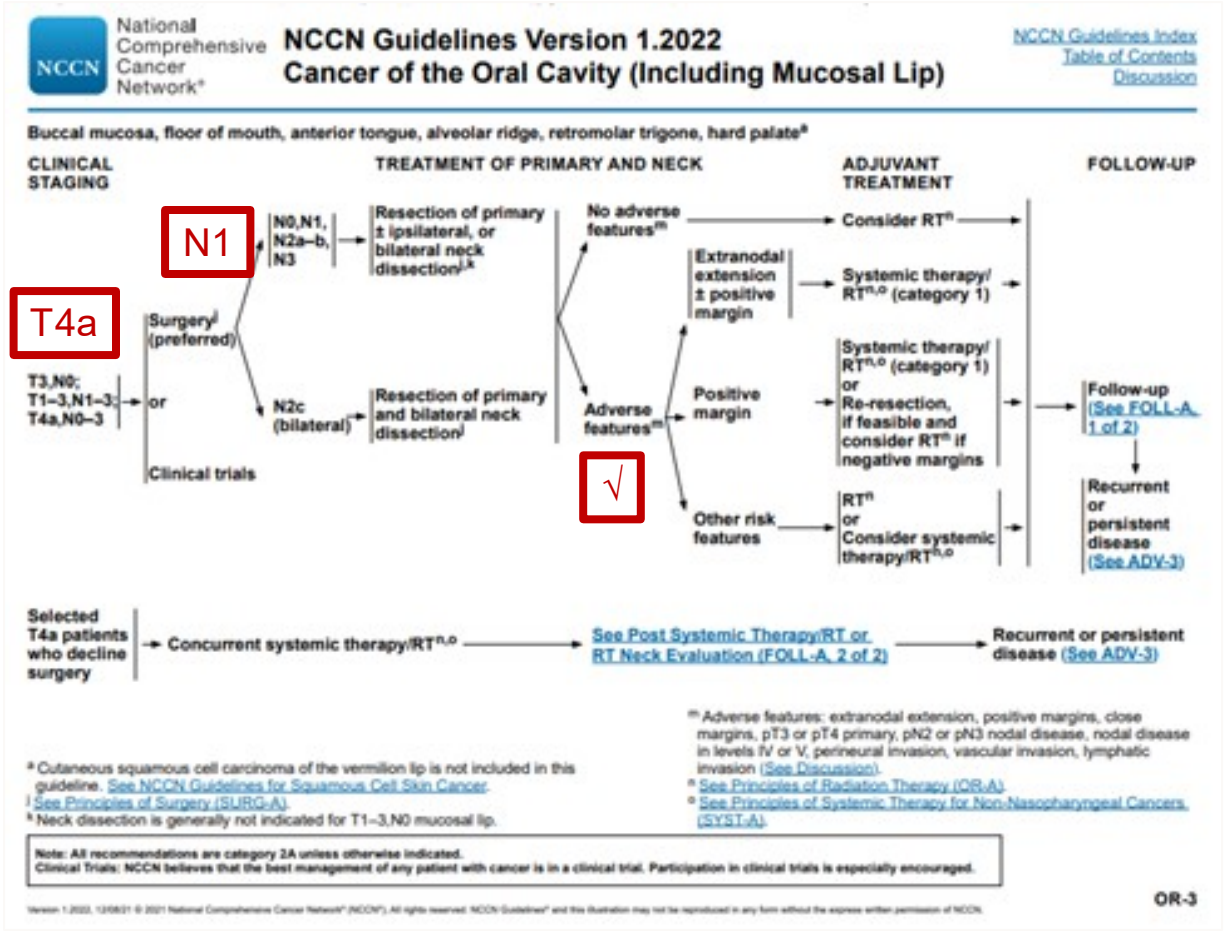
A. Postoperative Radiation Therapy

B. Postoperative Chemoradiation Therapy

C. Observation

ARS #5

NCCN Guidelines



Postop CRT

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Version 1.22 – December 8, 2021

Expert Panel Opinion

Adjuvant Management

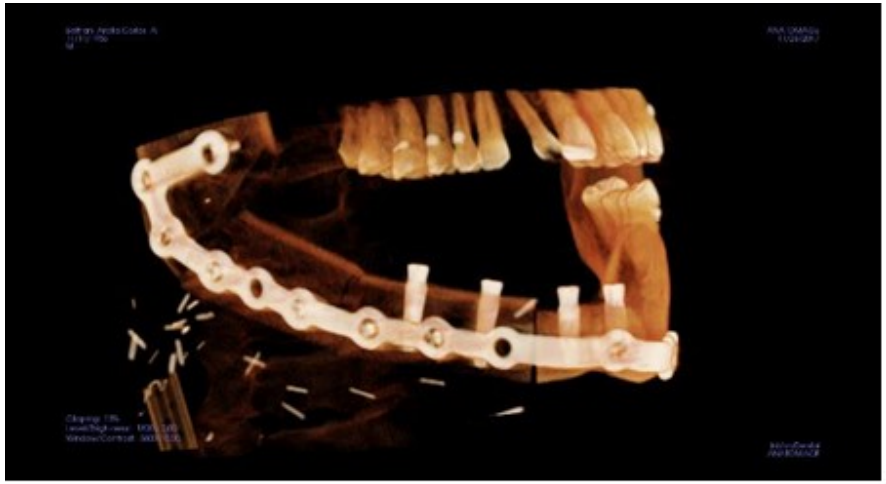
A. Postoperative Radiation Therapy

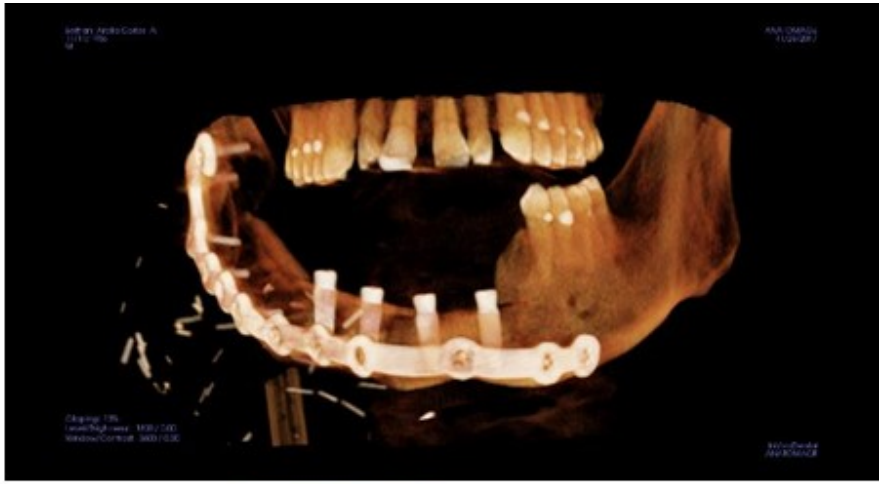
B. Postoperative Chemoradiation Therapy

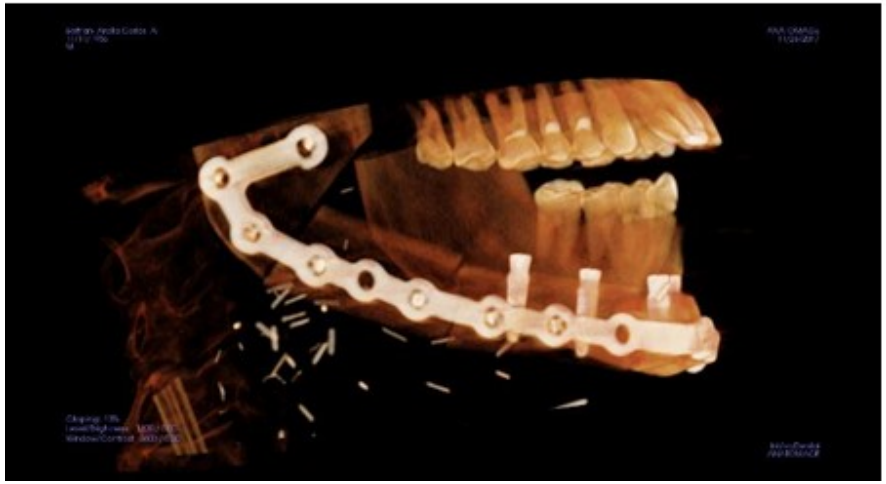
C. Observation

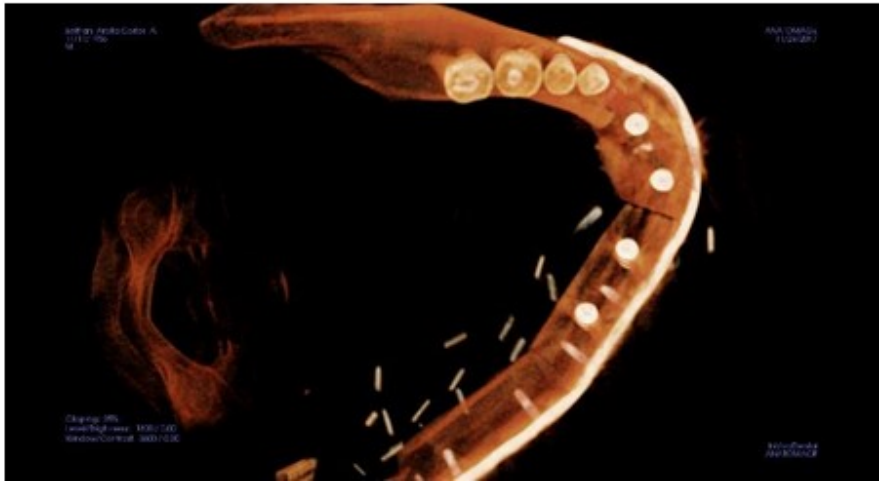
ARS #5

1 month Postop

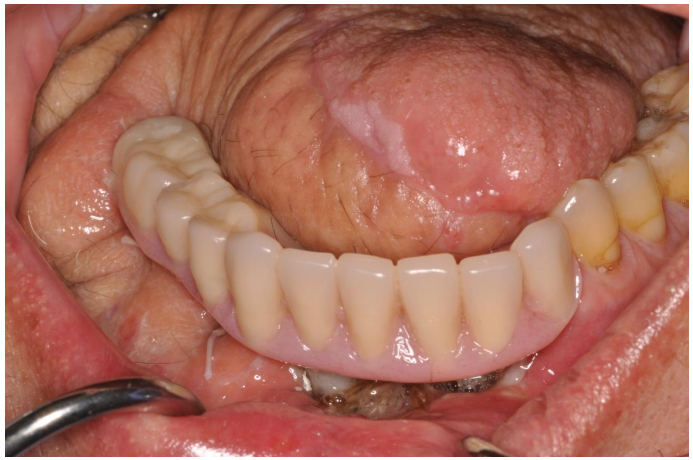




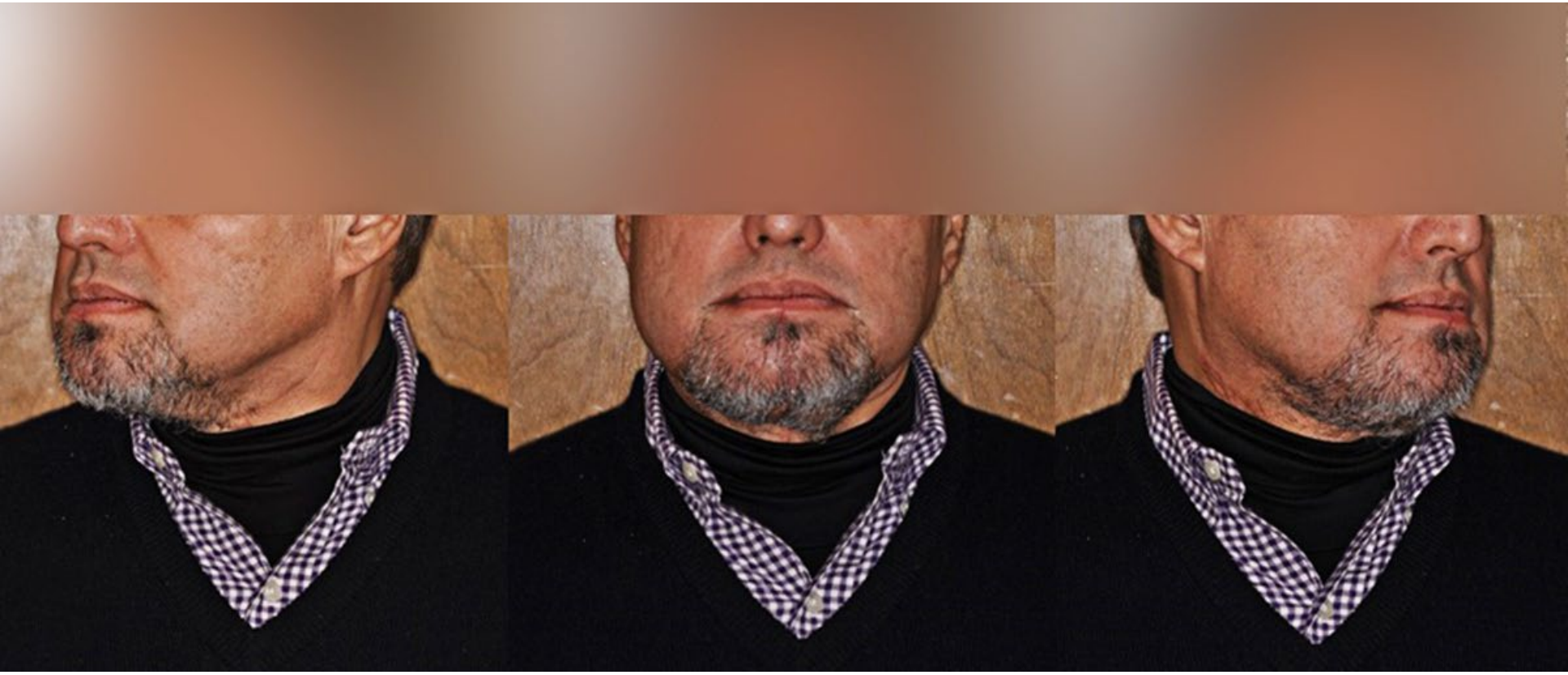




3 months Postop

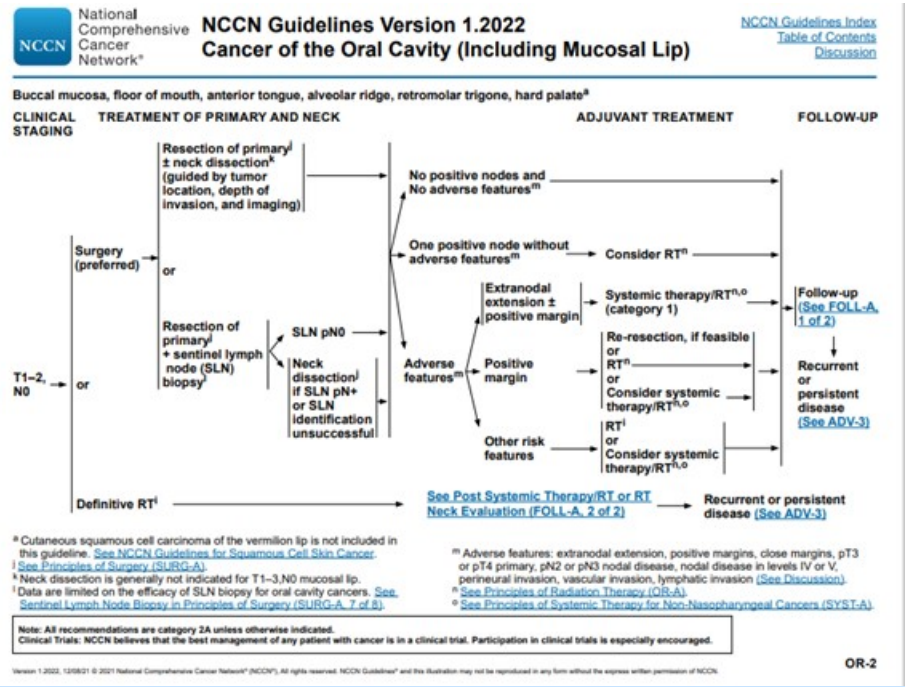


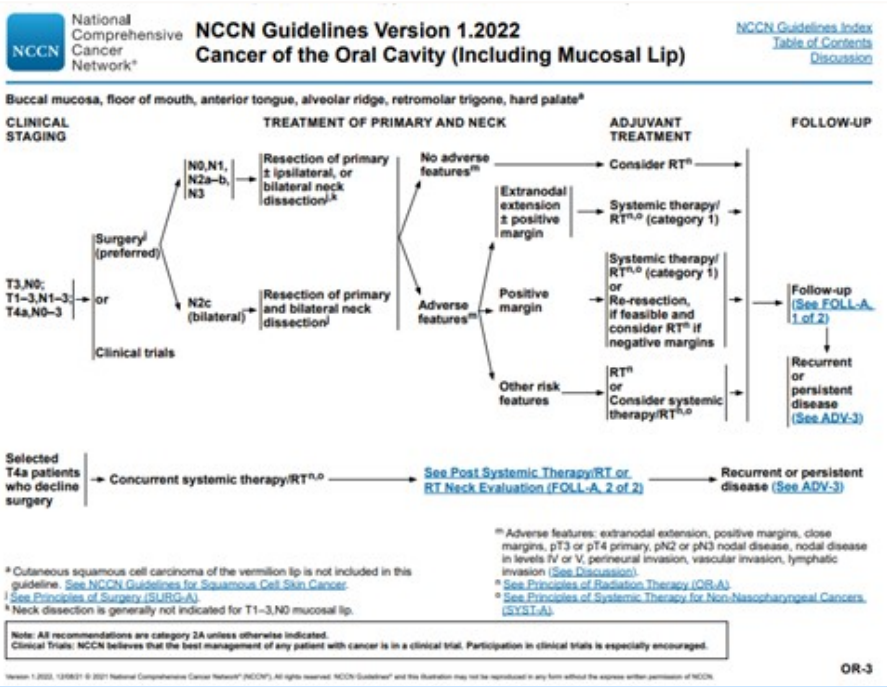
18 months Postop



Final Comments

Concluding Remarks





Careful selection for each individual situation in **multidisciplinary consultation** based on
risk versus benefit assessment

Optimal treatment outcomes depend on

- An experienced MultiD Team
- Understanding the interplay of multiple host and tumor characteristics in each patient
- Awareness of tumor-host biology and
- Good clinical judgment

Novel approaches to improve outcomes

- Early Detection & Prevention of OSCC
- Intraoperative *in vivo* imaging for margin mapping
- Neoadjuvant immuno/chemotherapy
- More precise treatment selection
- Minimizing side effects of treatment
- Early detection & prevention of recurrences/subsequent primaries

Multidisciplinary Tumor Board on Oral Cancer: MSKCC & Tata Memorial

Friday February 25th, 2021

7:00-8:30 PM IST | 8:30-10:00 AM EST

An MSKCC (Chennai) Educational Series

Memorial Sloan Kettering Cancer Center

TATA MEMORIAL CENTRE

powered by iCliniq

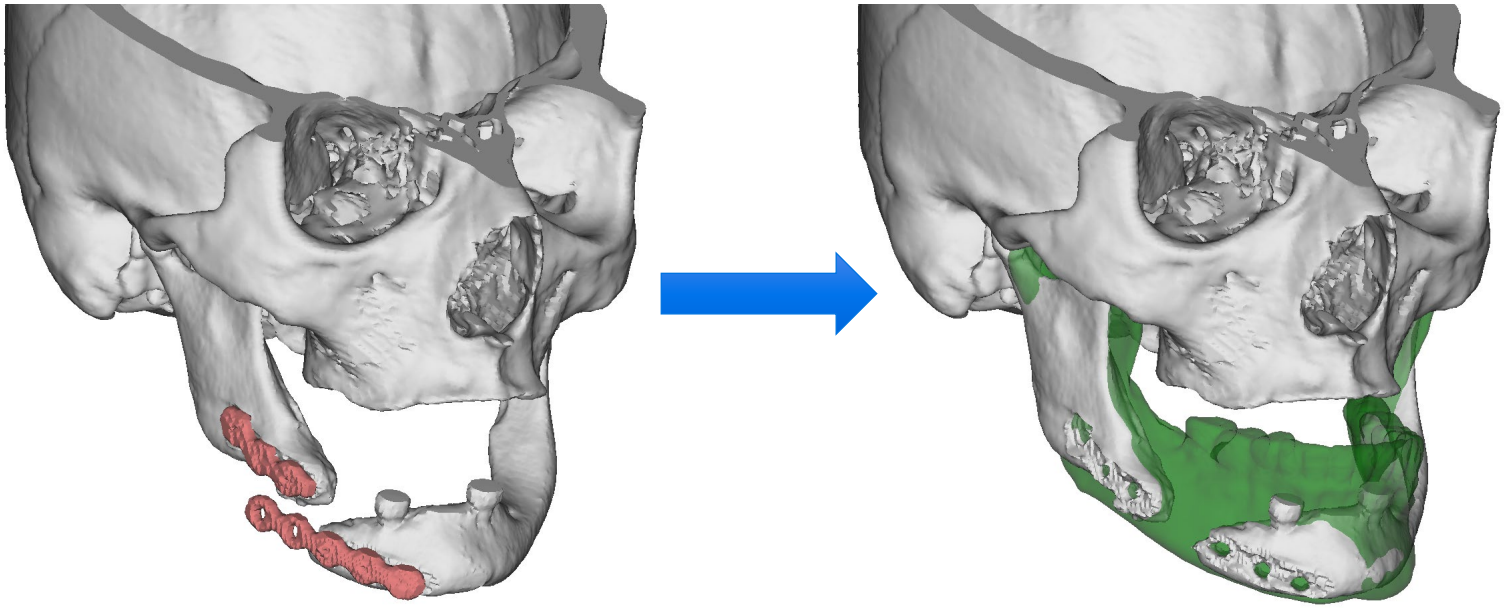
Dr. Jatin Shah
Surgical Oncologist;
Elliot W. Strong Chair,
Head and Neck Oncology
MSKCC New York

Sir Murray Brennan
Senior Vice President
International Programs
Fmr. Chair of Surgery
MSKCC New York

Dr. Mrinal Gounder
Medical Oncologist
Physician Ambassador
to India/Asia
MSKCC New York

Dr. Varadarajan Kumar
Chief, Medical Oncologist
MSKCC India (Chennai)
mskccindia@iclinq.com

Modern Mandible Reconstruction: CAD/CAM



Evan Matros, MD, MPH
Microsurgery Fellowship Director
Associate Attending, Memorial Hospital

Disclosures

None

Objectives

- Use clinical case examples to:

  – Demonstrate pearls for CAD/CAM technique optimization
  – Highlighting advantages of CAD/CAM over traditional methods

Aesthetic Improvements in Free-Flap Mandible Reconstruction

David A. Hidalgo, M.D

New York, N.Y.

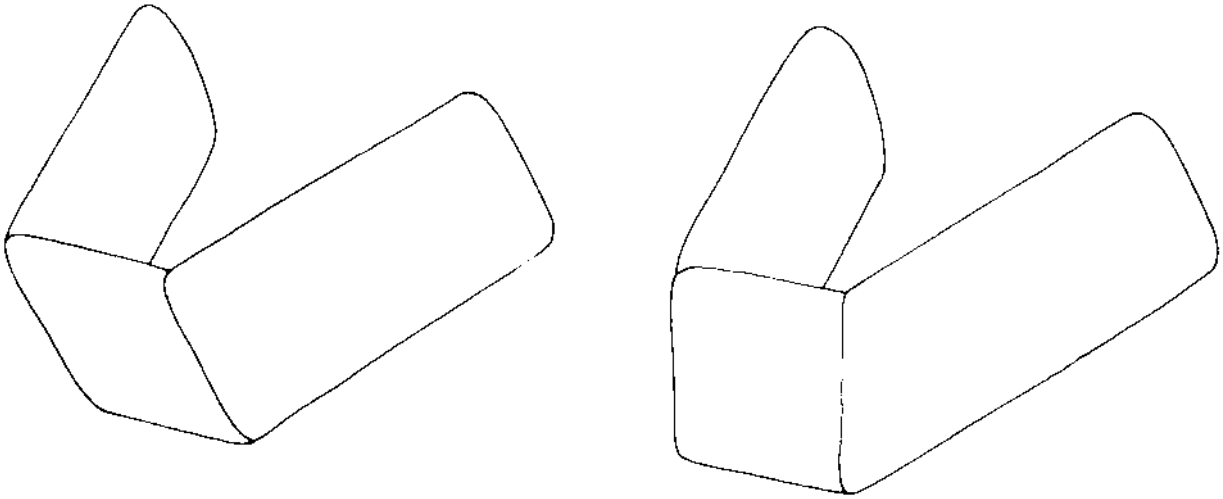
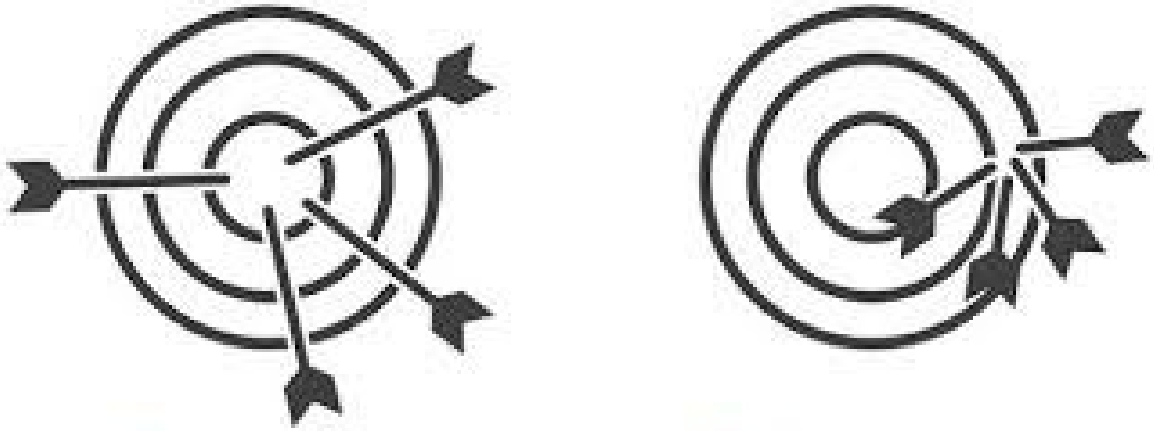


FIG. 2. (*Left*) Incorrect relationship of the anterior segment to the body segments. (*Right*) Correct orientation.

VSP is the next level of refinement

1. Technique Optimization

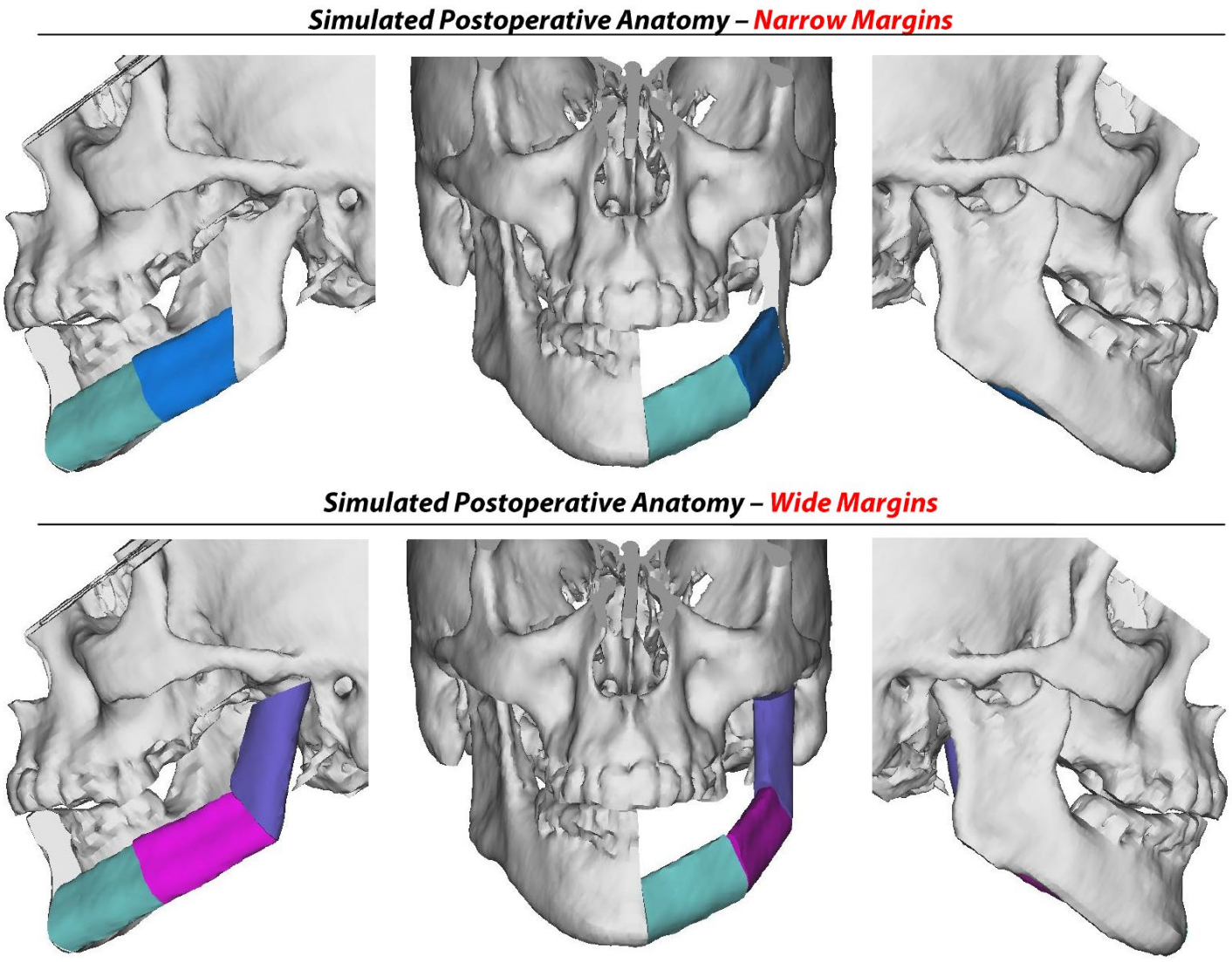


Accuracy Vs Precision

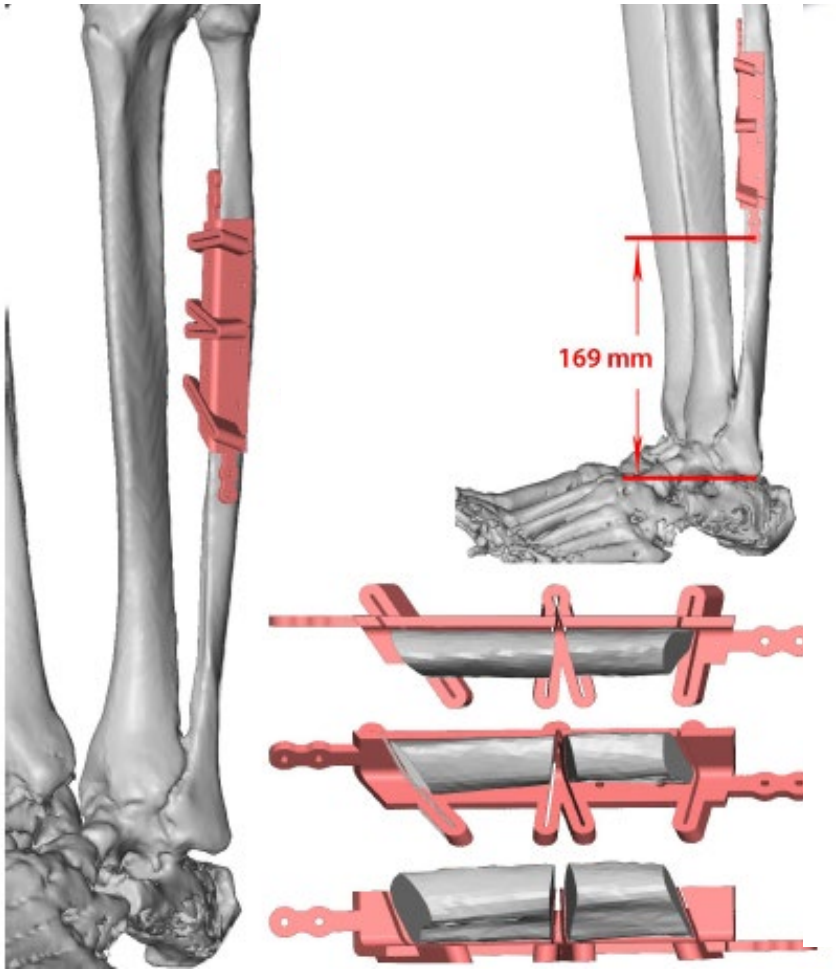
I can make a perfect osteotomy 100 times, but if its in the wrong location….

….VSP ensures both anatomic accuracy and osteotomy precision

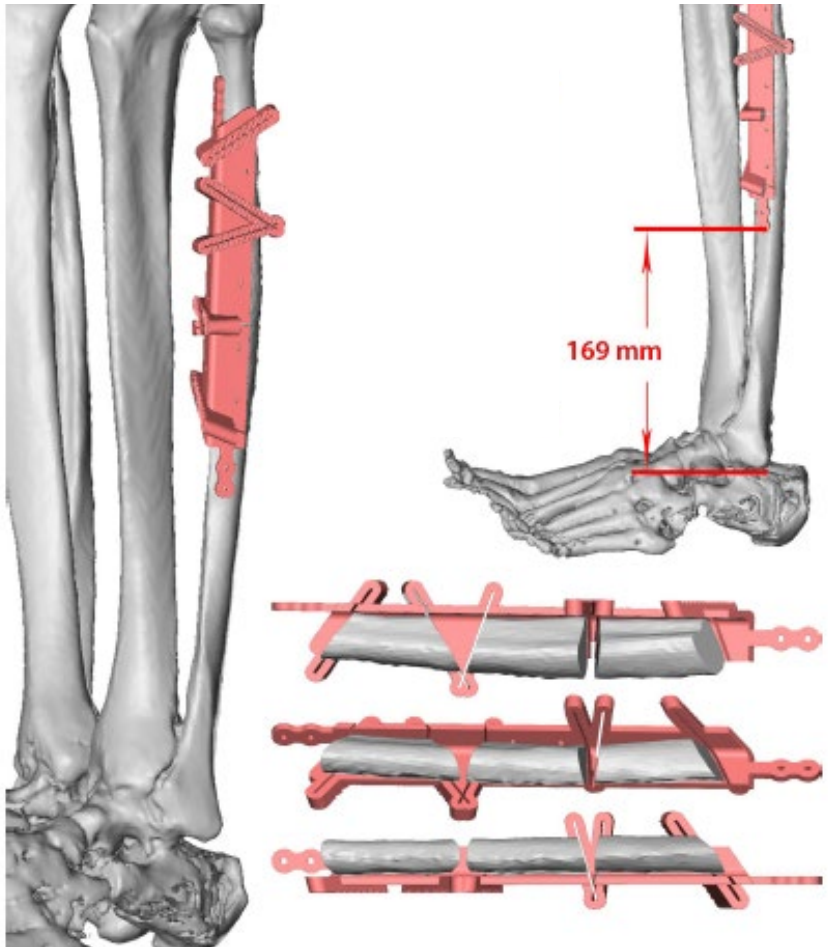
Always have a back-up…



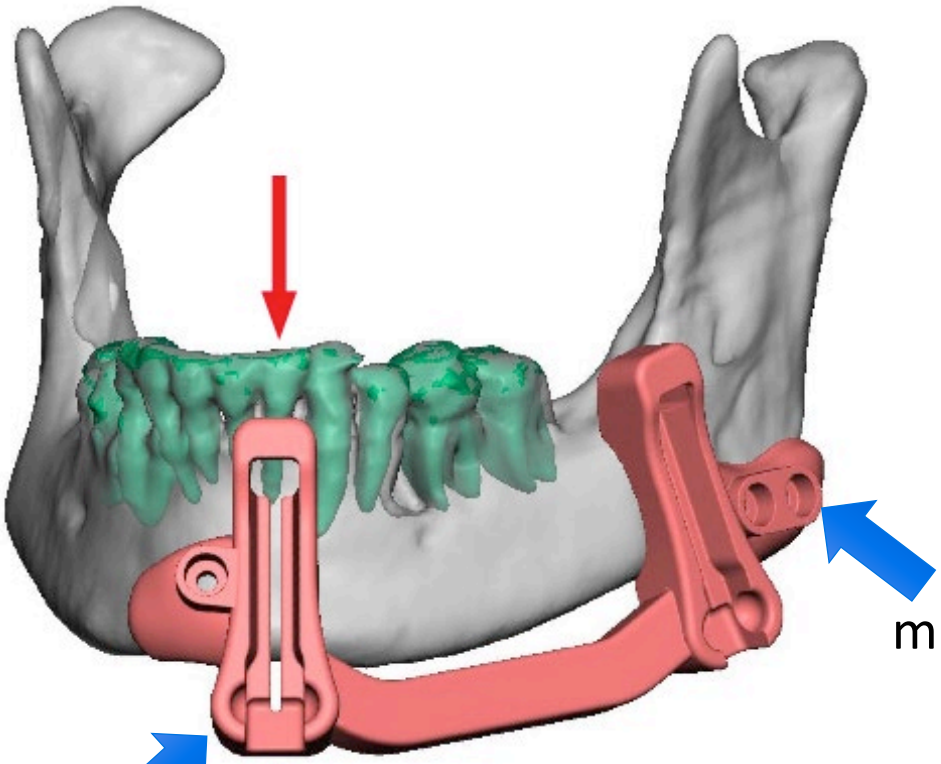
Narrow margin plan



Wide margin plan



Design mandible guide to fit unique topographic features

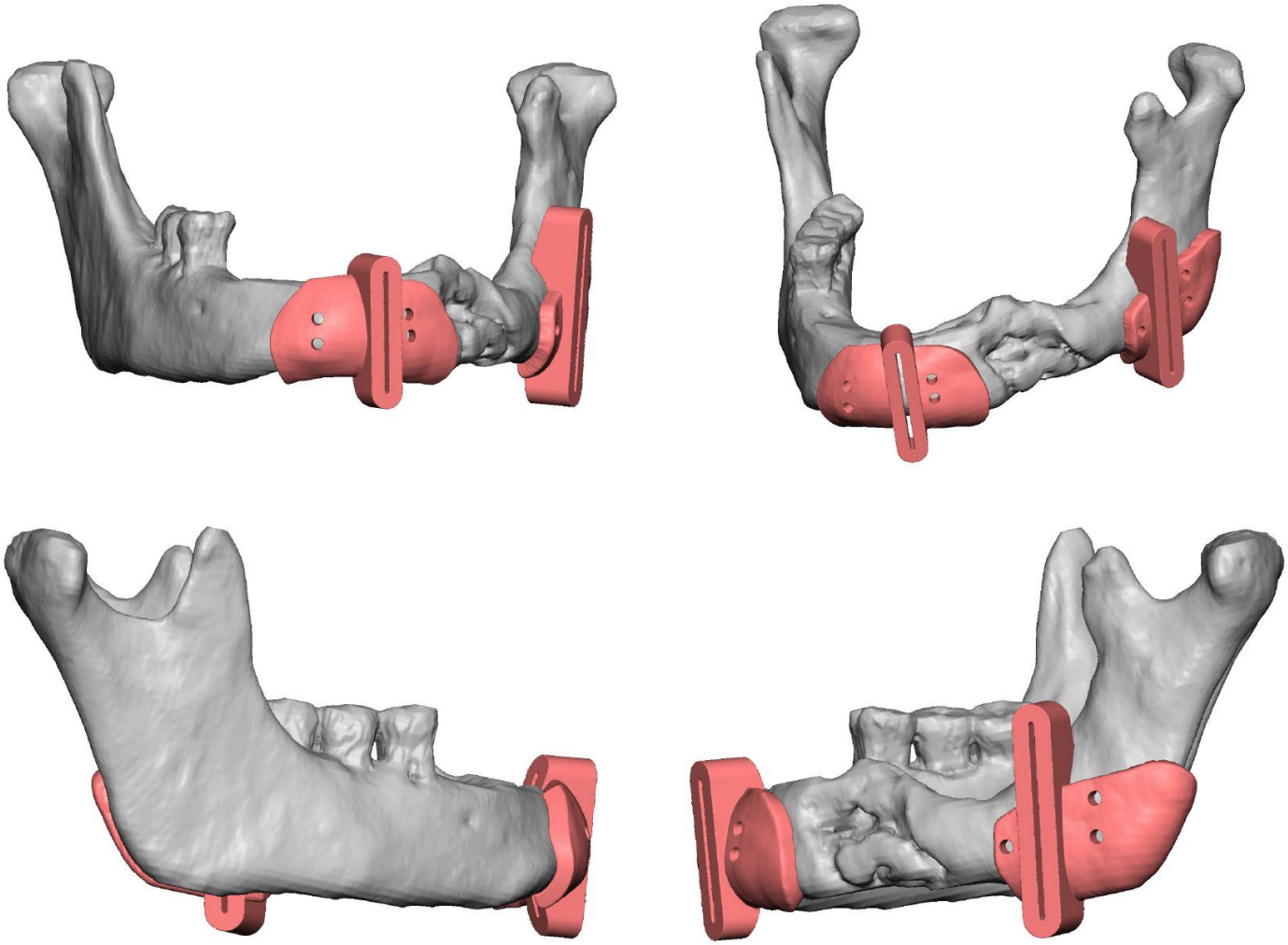


mandibular angle

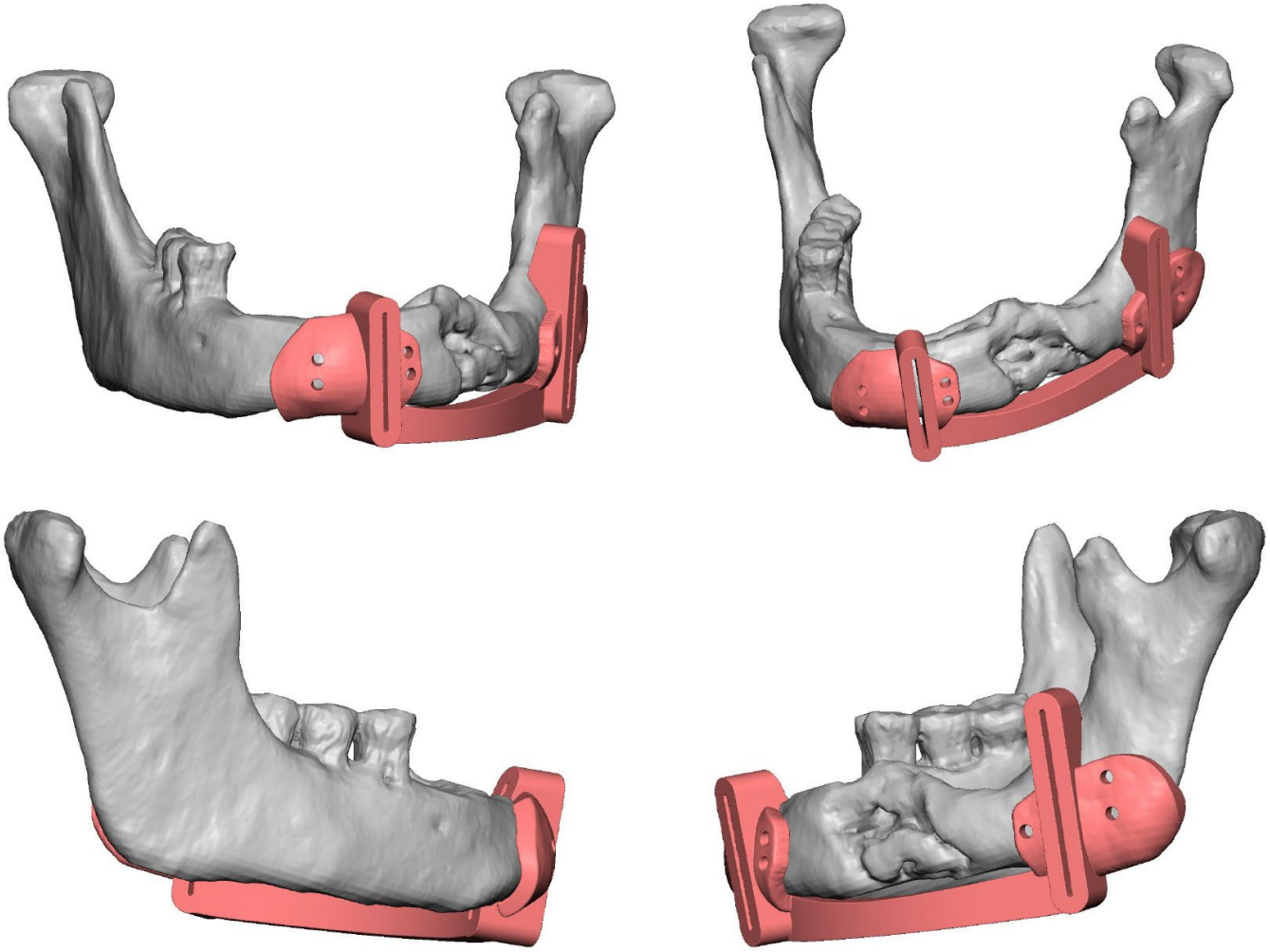
tooth roots

*May require additional soft tissue mobilization

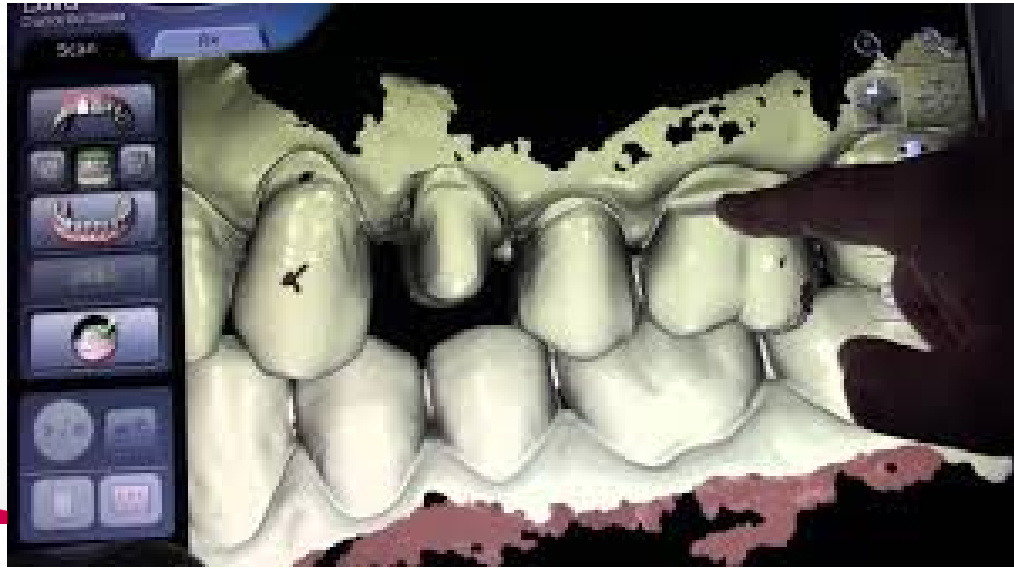
Edentulous patients?



Use connected guide

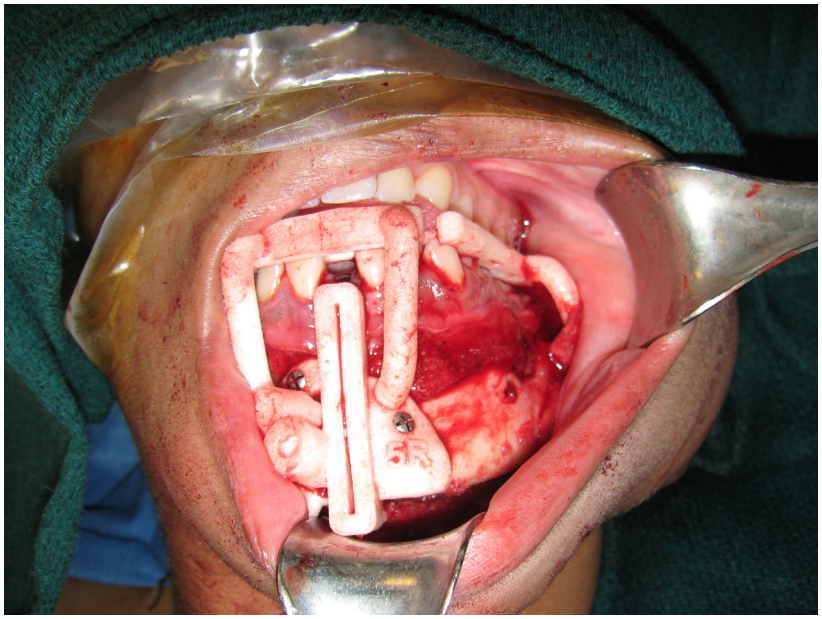


3-D Intraoral Scanner

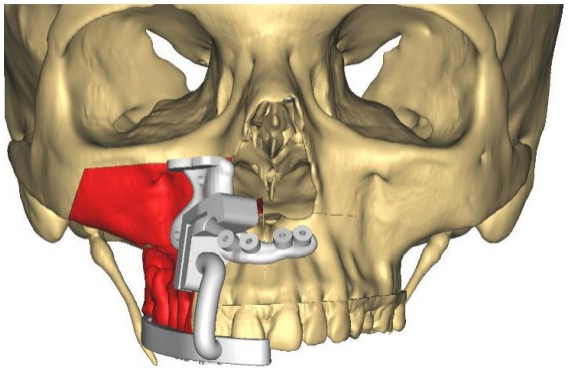


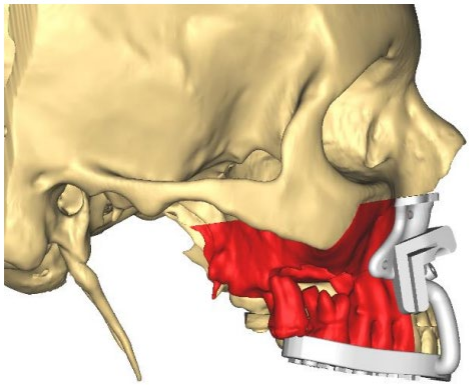
Preferred Technique: Occlusion Based Guides

Mandible

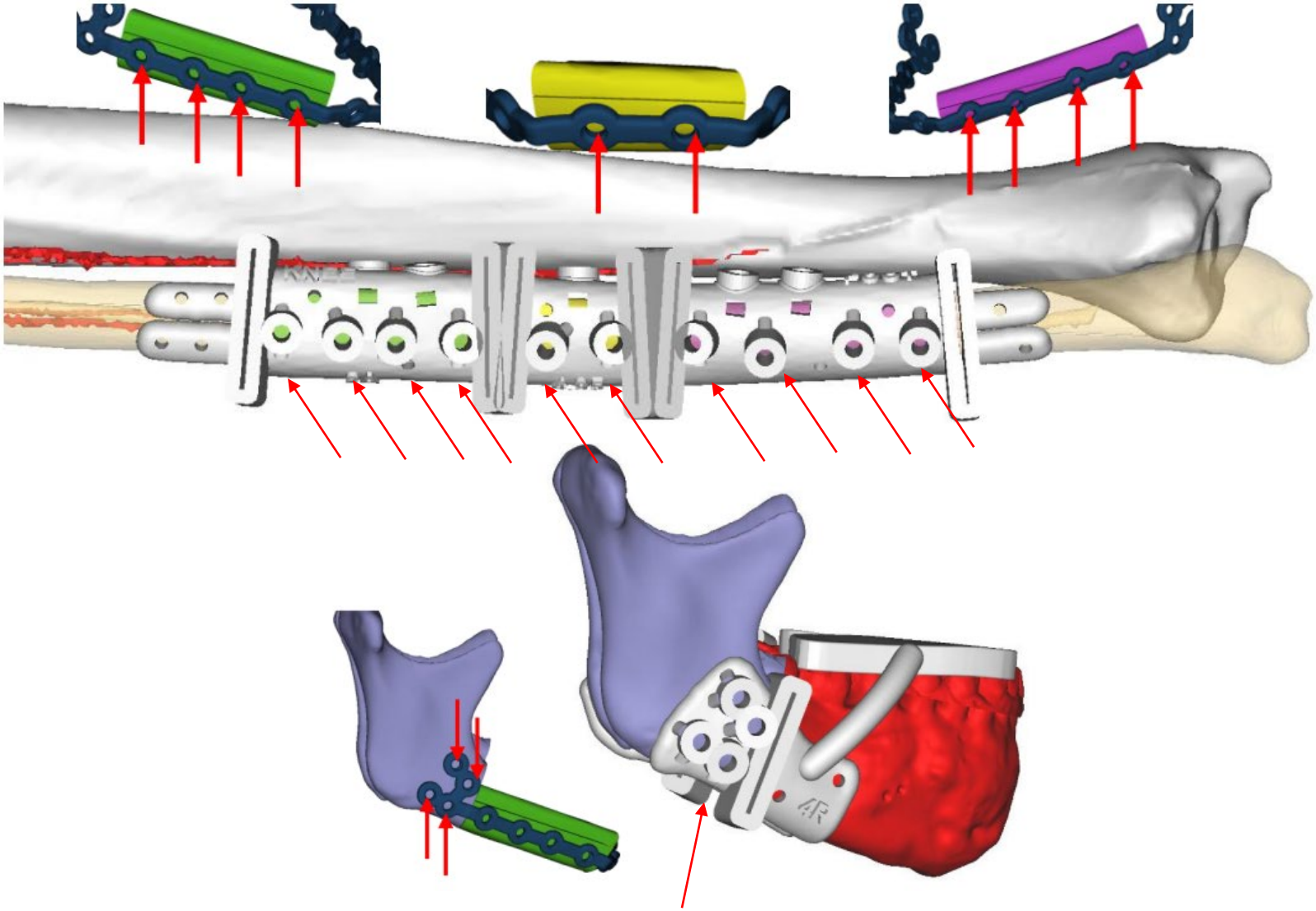


Maxilla



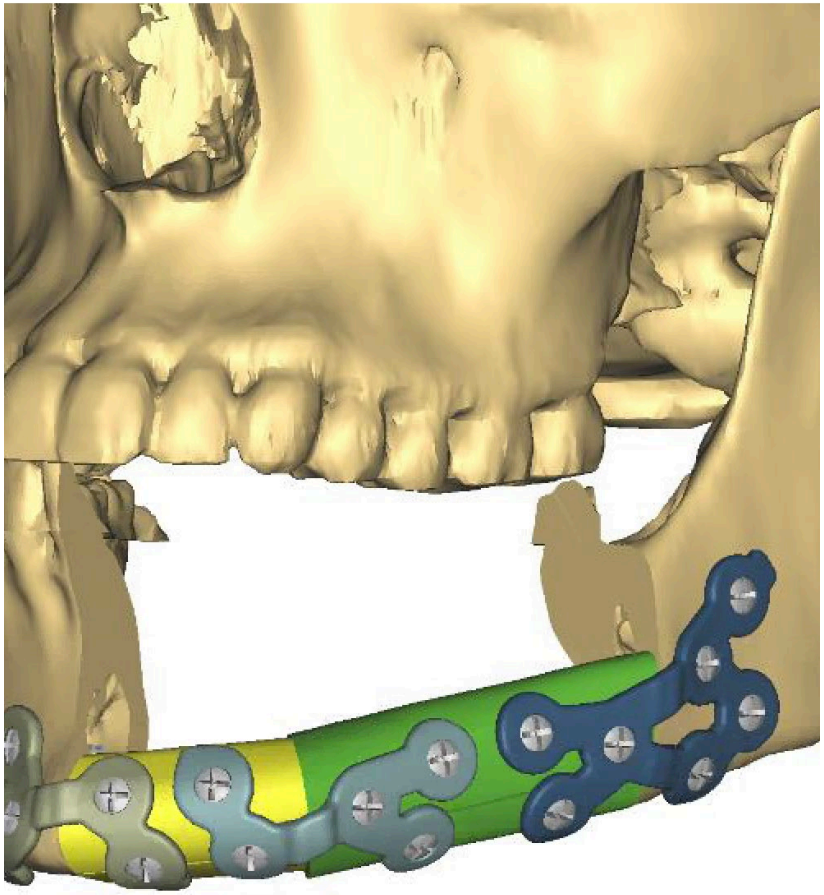


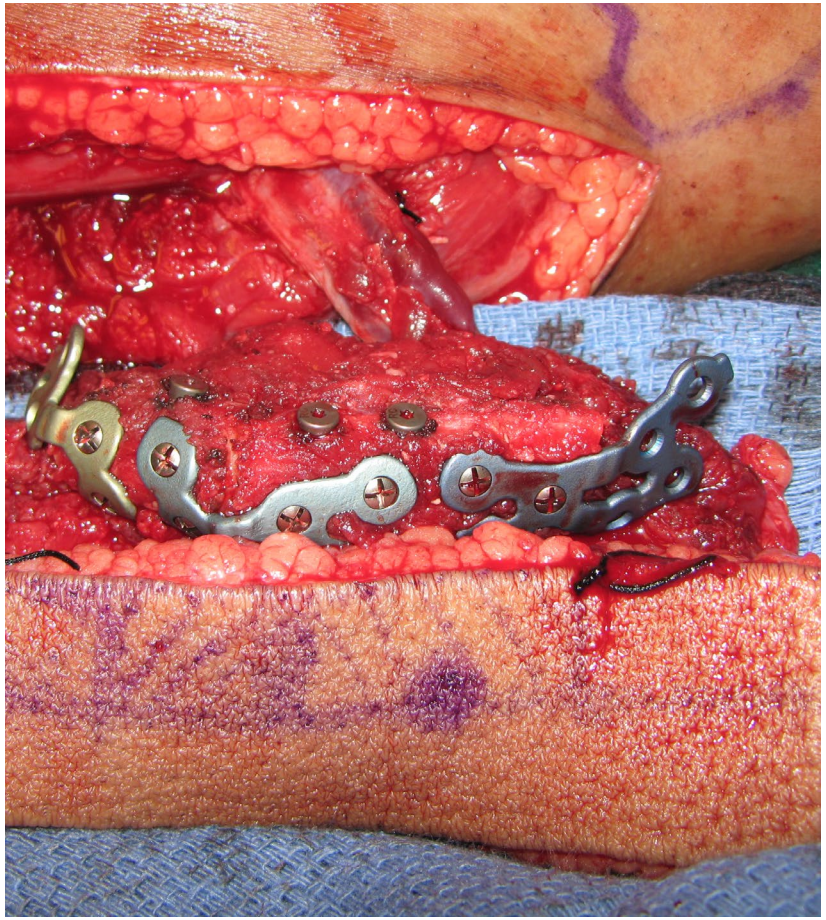
Predrilling Cylinders: Fibula, Mandible

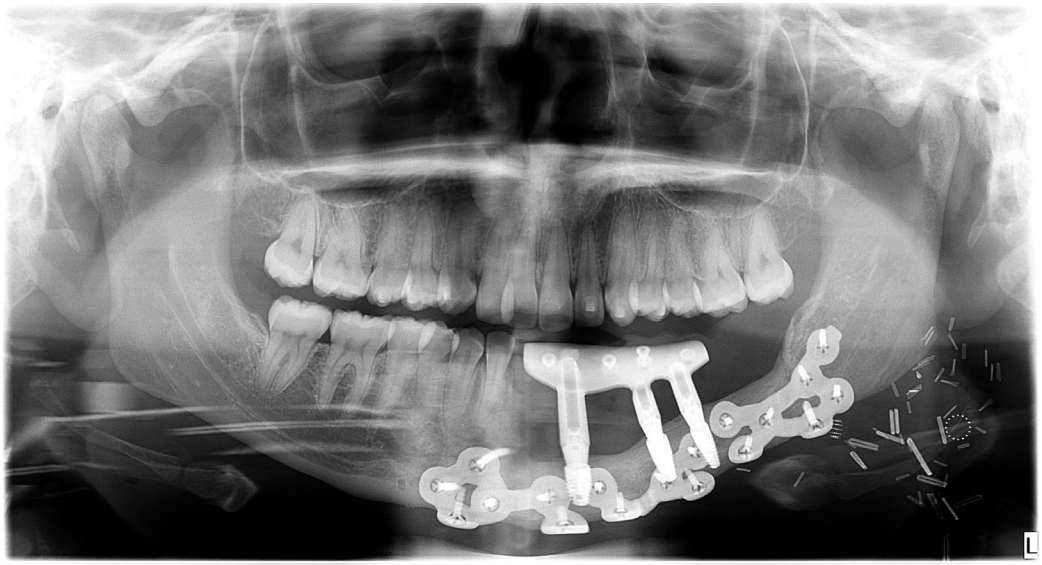


2. Customized Hardware & Precision Oncology

Ameloblastoma: 17 yo female

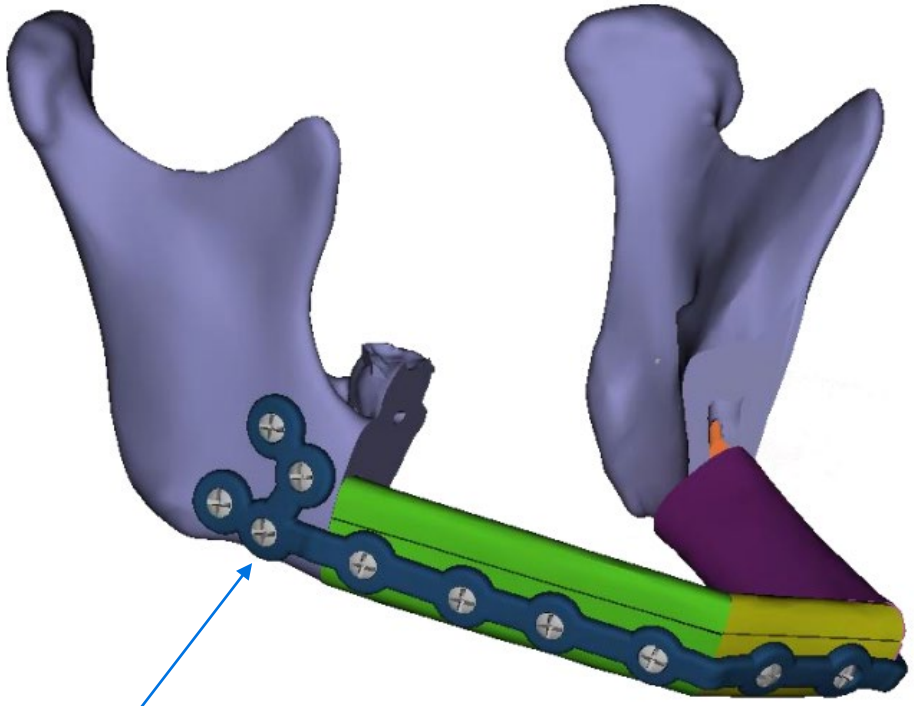






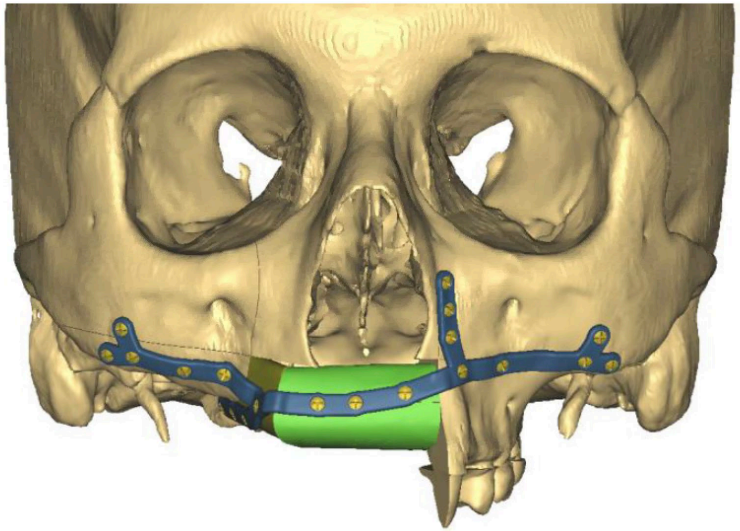
Designer Hardware ☺

Maximize condyle fixation

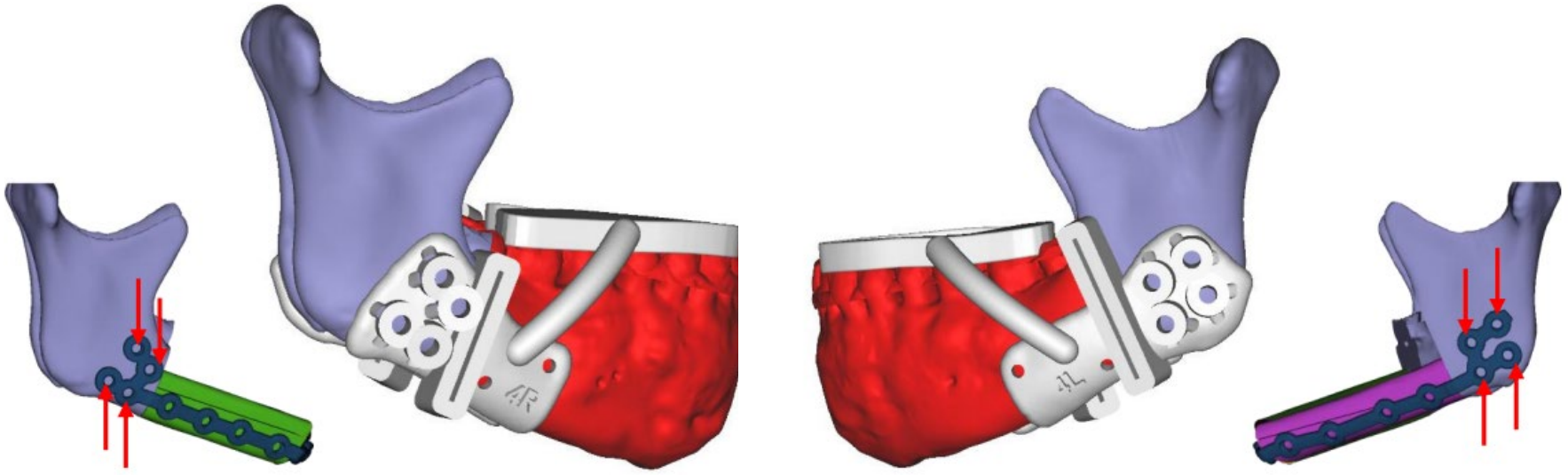


Thick bone
Maximize fixation here, not more posterior.

Plate design captures the maxillary buttresses (thick bone)

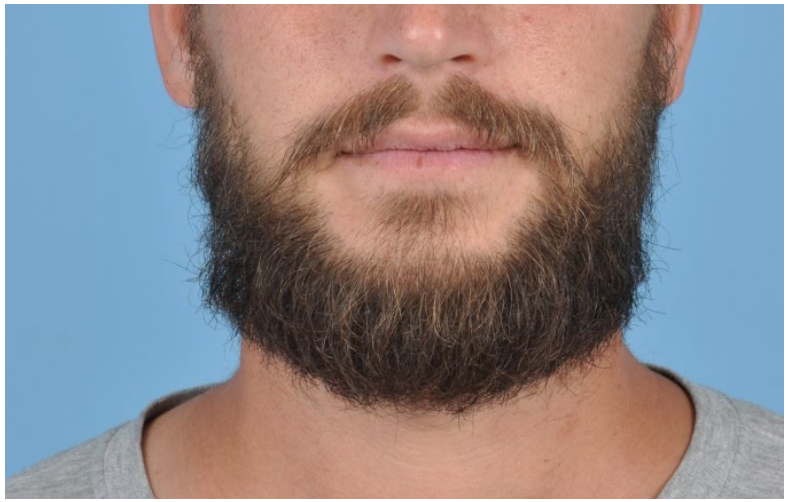


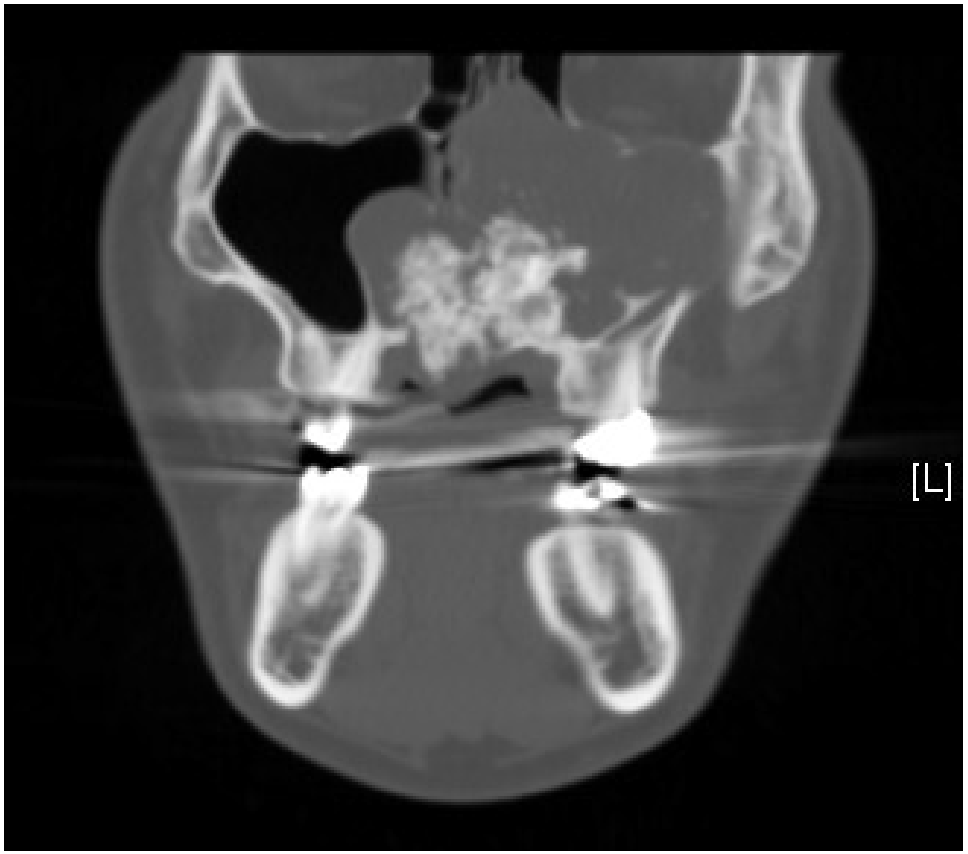
Guided Resection: Ossifying Fibroma



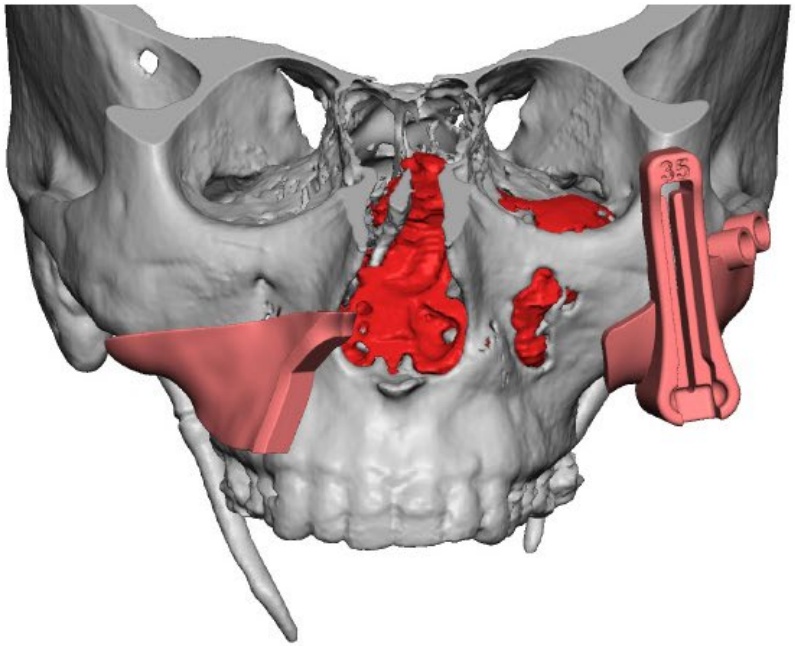
- More distal resection on the left
  - Implications for fixation

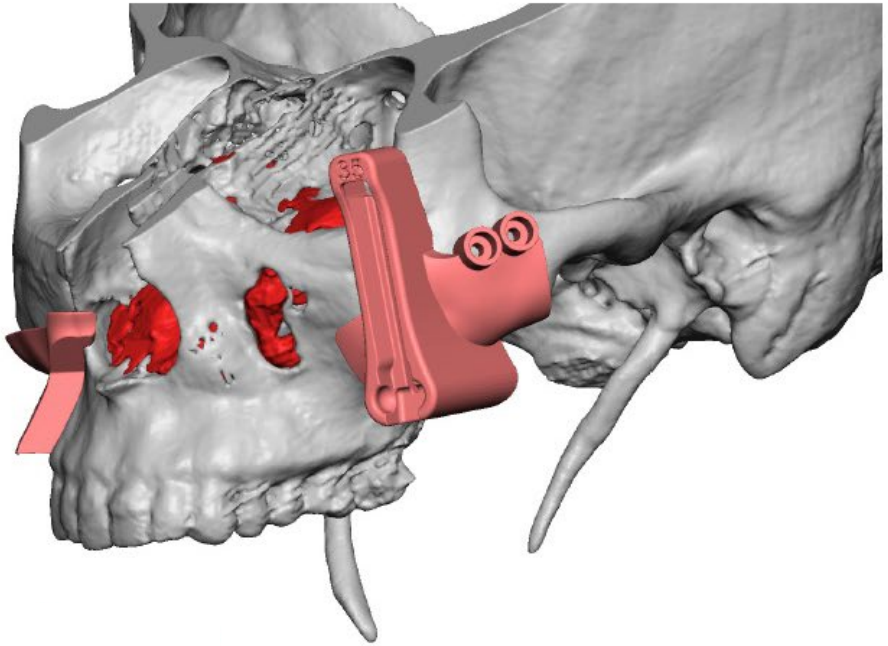
Guided Resection:
Chondrosarcoma





Guided Resection: Accurate and Precise Oncology

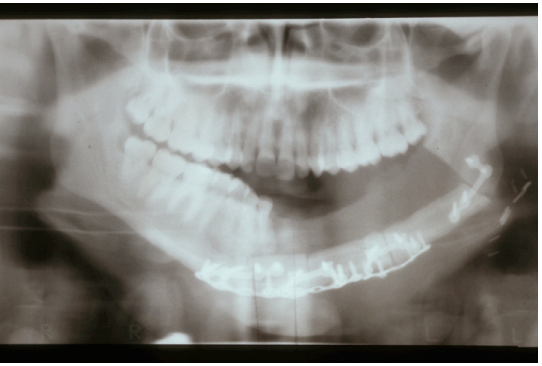


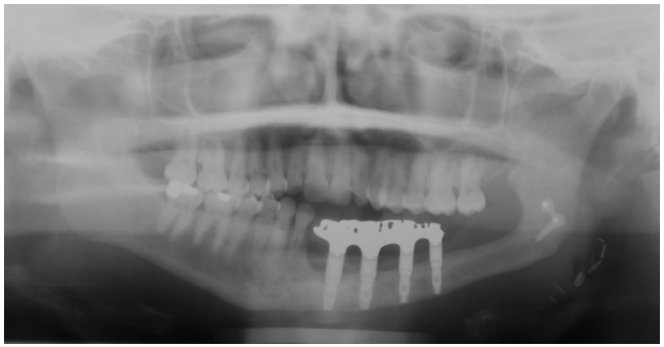


3. Immediate Dental Implants

Conventional Approach

1.Fibula Flap





2. Removal of Hardware

3. Placement of Dental Implants

4. Permanent Prosthesis

Dental Implant Survival in Vascularized Bone Flaps: A Systematic Review and Meta-Analysis

- Implant survival in non-radiated flaps was 94 %
- Implant survival placed before XRT was 88%
- Implant survival placed after radiation was 81%

p =.012

→ Place Implants Prior to XRT

Plast Reconstr Surg 2020 Sep;146(3):637-648

OPEN

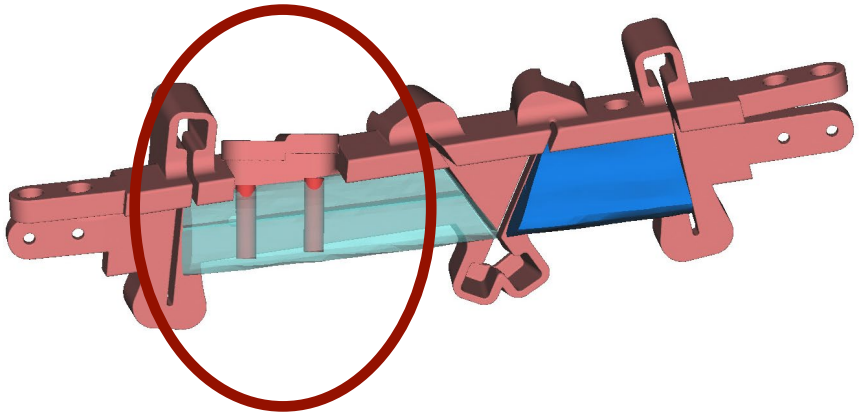
PRS GLOBAL OPEN

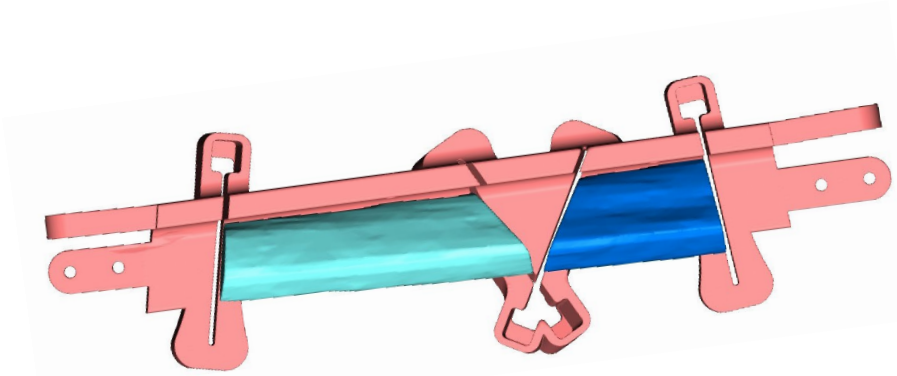
IDEAS AND INNOVATIONS

Pediatric/Craniofacial

Immediate Dental Implantation in Oncologic Jaw Reconstruction: Workflow Optimization to Decrease Time to Full Dental Rehabilitation

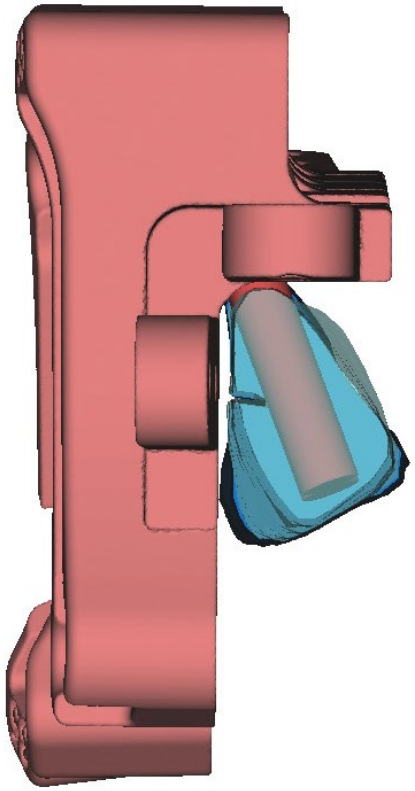
Implant Guide vs. Conventional Guide



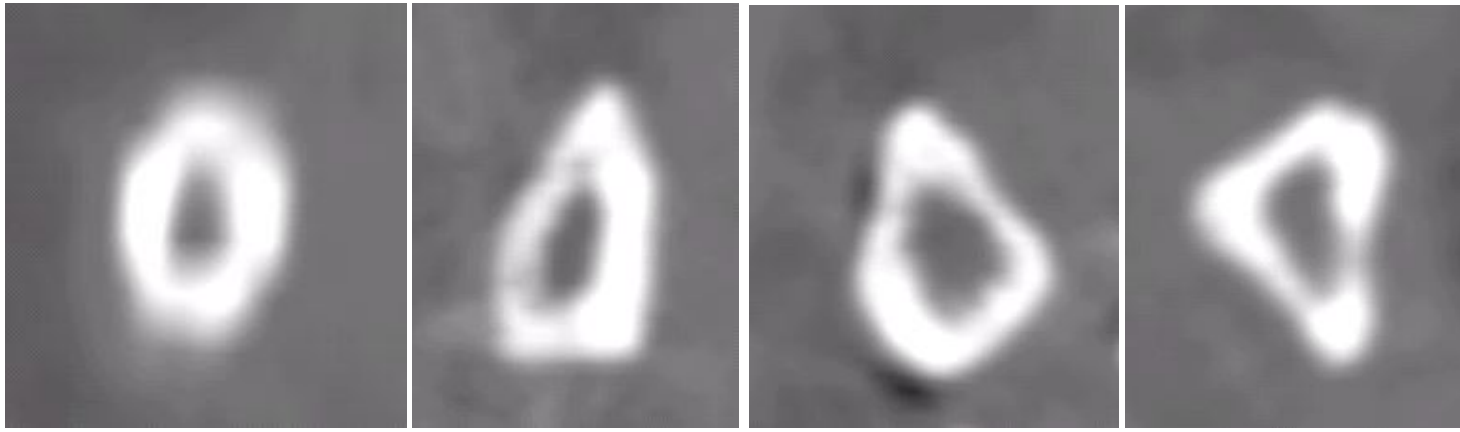


Plast Reconstr Surg Glob Open. 2019 Jan 14;7(1):e2100.

Fibula Changes Shape and Direction Along Its Course



Cross section of guide with implant in place

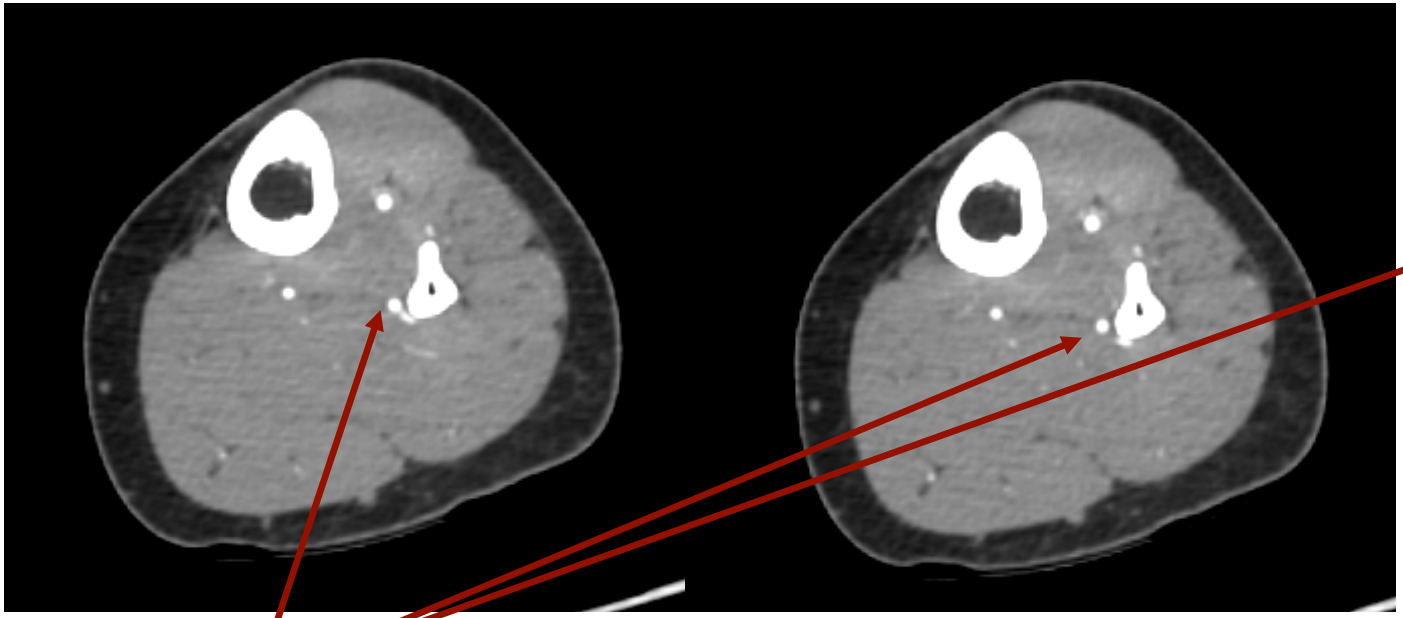


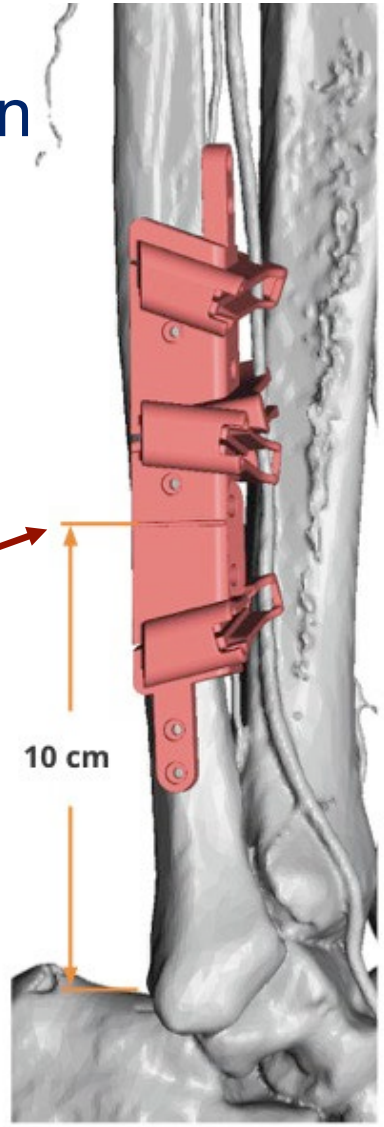
Oval Pentagonal Quadrilateral Triangular

**If the correct portion of the fibula is not used, as identified in the modeling session by the perforator, the guide will not adapt properly → malposition of dental implant
Important for single segment reconstructions

Planning Session: Technical Considerations

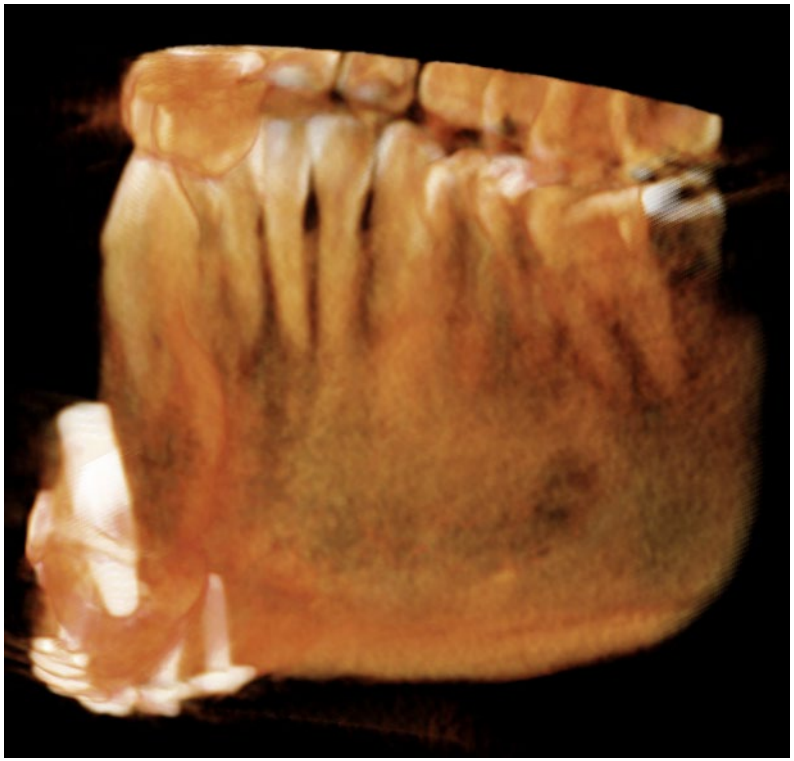
Placement of fibular cutting guide based on location of septocutaneous perforator



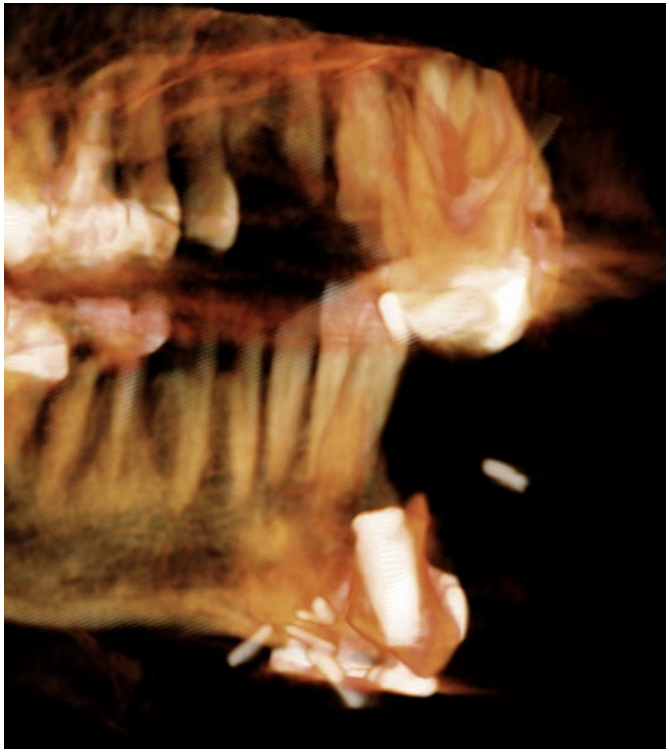


Preoperative CTA of LE outlining perforator. Osteotomies are planned to include the perforator.

Dental Implants



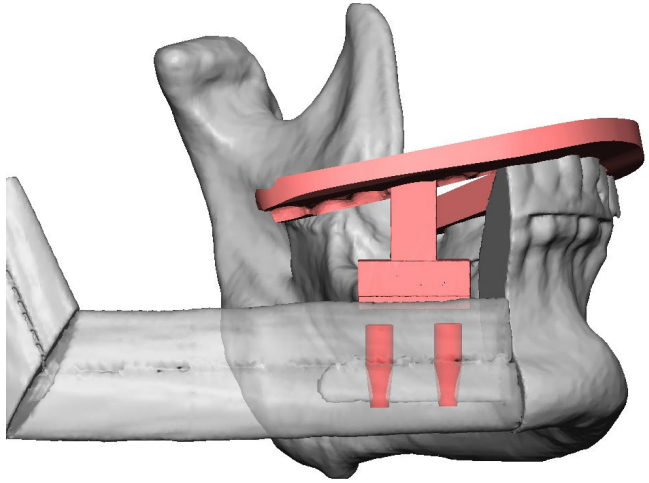
Buccal Rotation

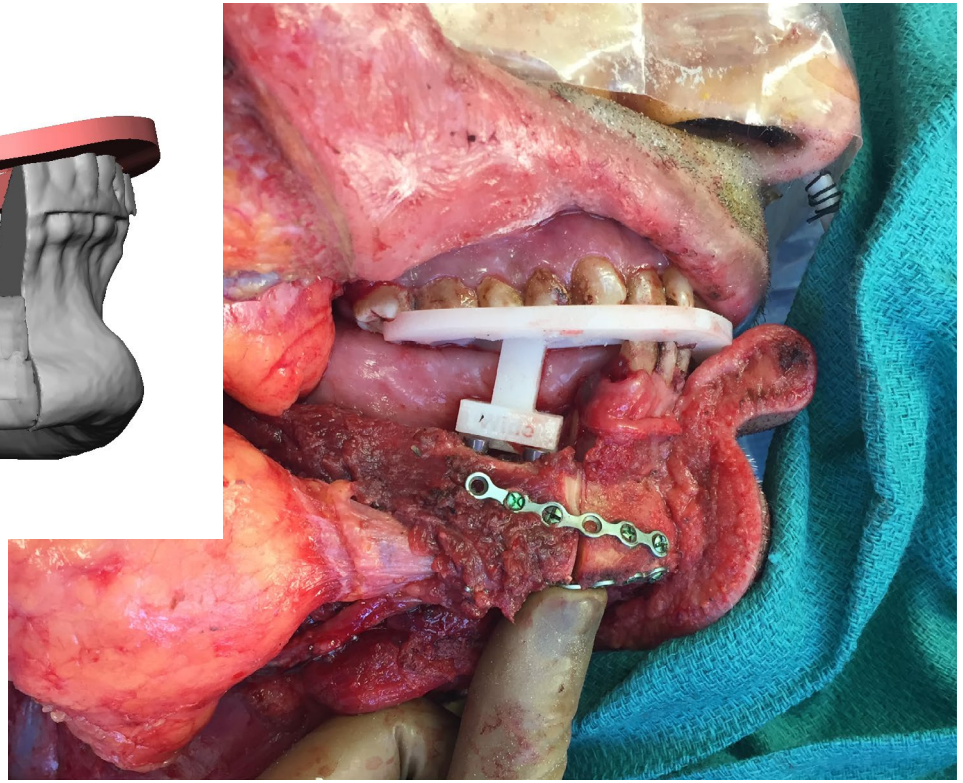


Lingual Rotation

Beware: Implant Angulation

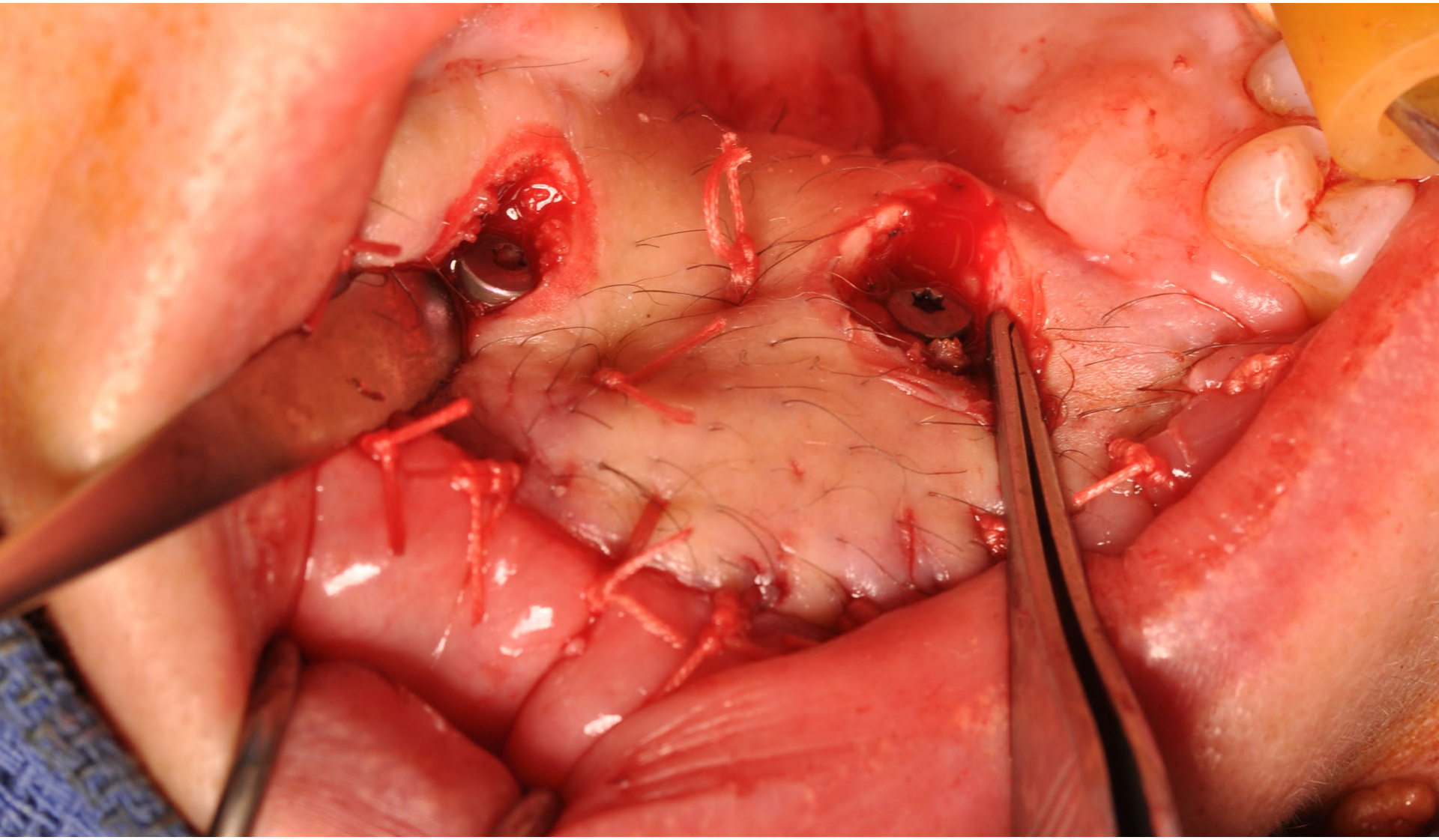
Custom Fabricated Splint Applied to Ensure Proper Orientation of Implants Prior to Rigid Fixation



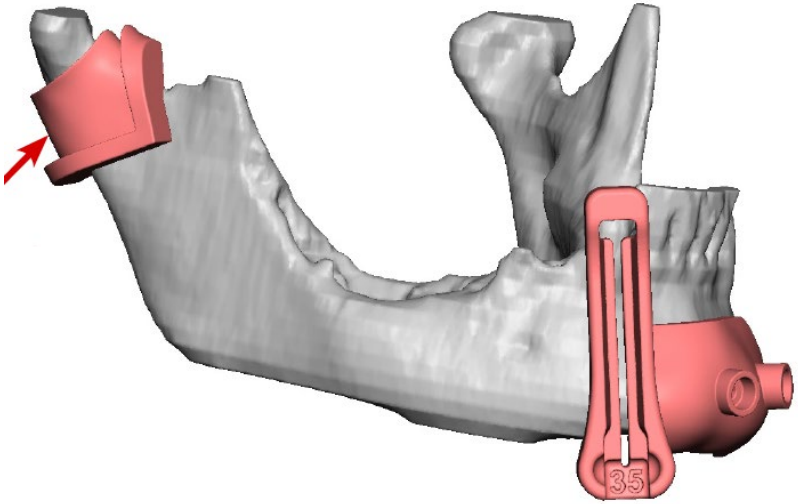


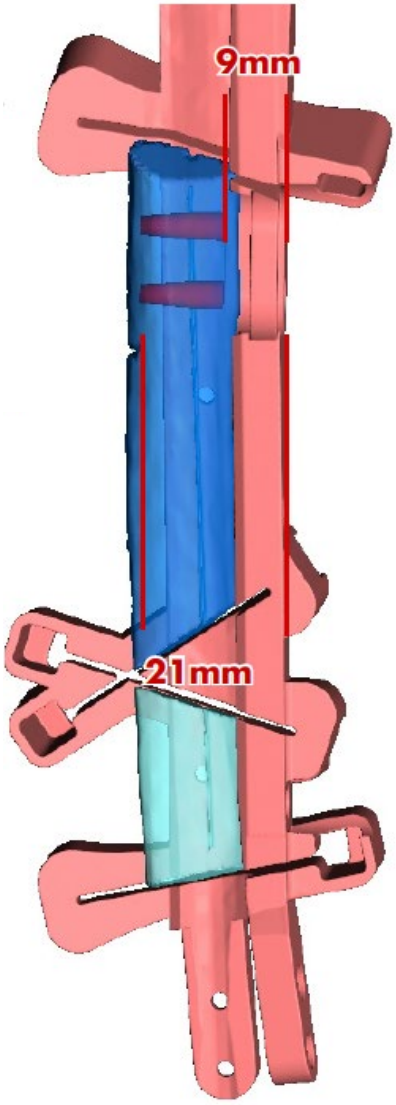
- Pre-fabricated splint helps to avoid lingual or buccal rotation of the fibula
- Custom plates help as well

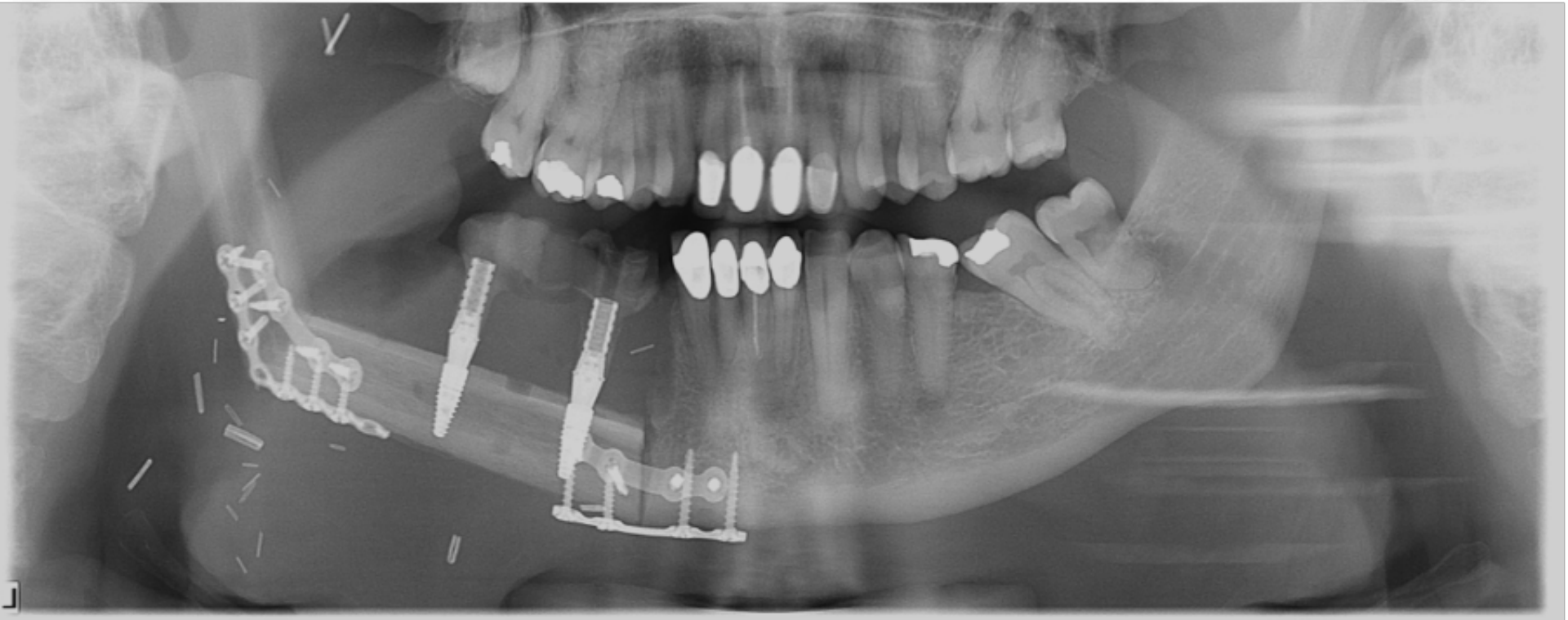
Vestibuloplasty: ~3-4 Weeks Postop



Hemi-mandible Virtual Plan





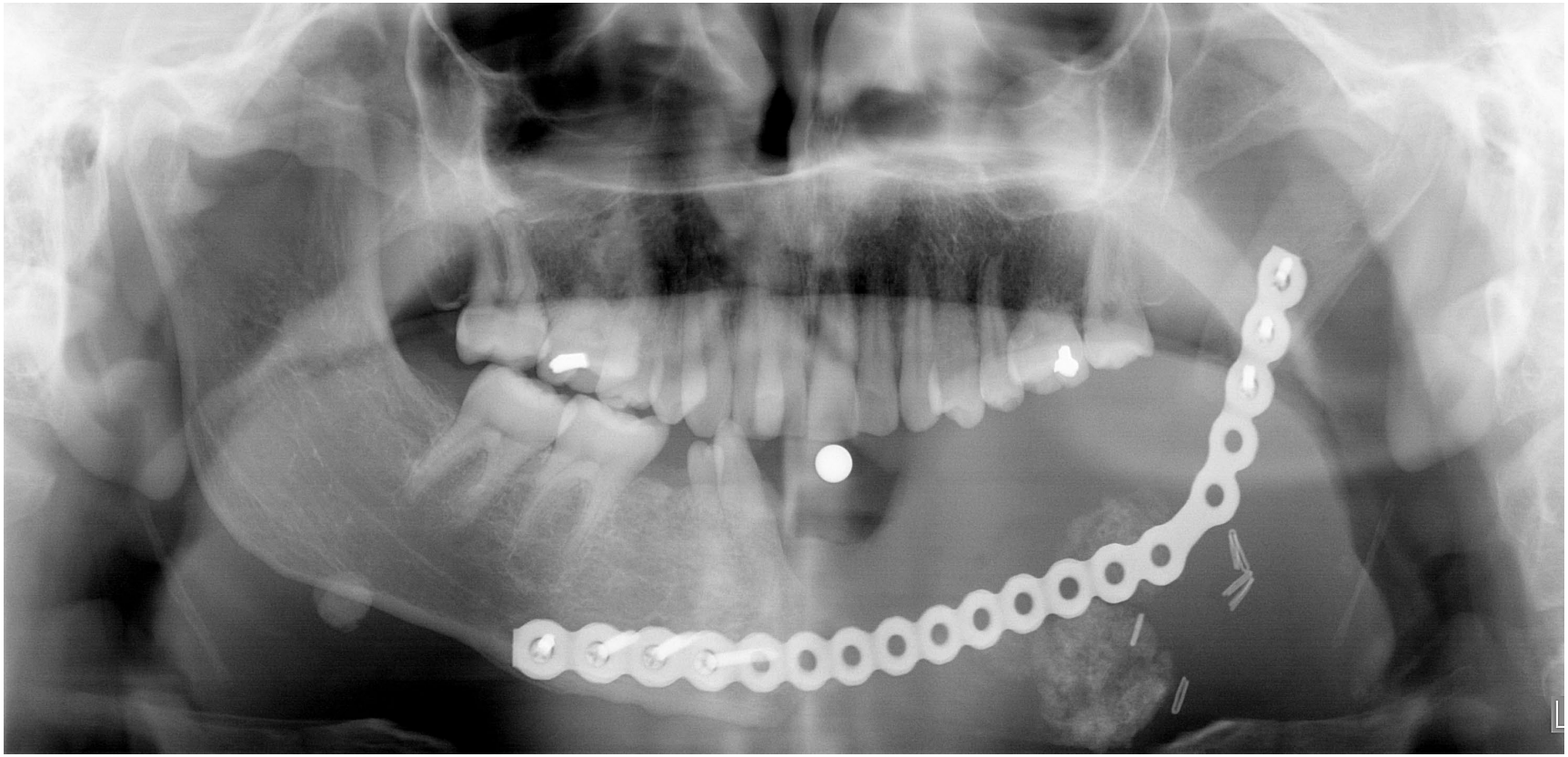


4. Delayed Reconstruction

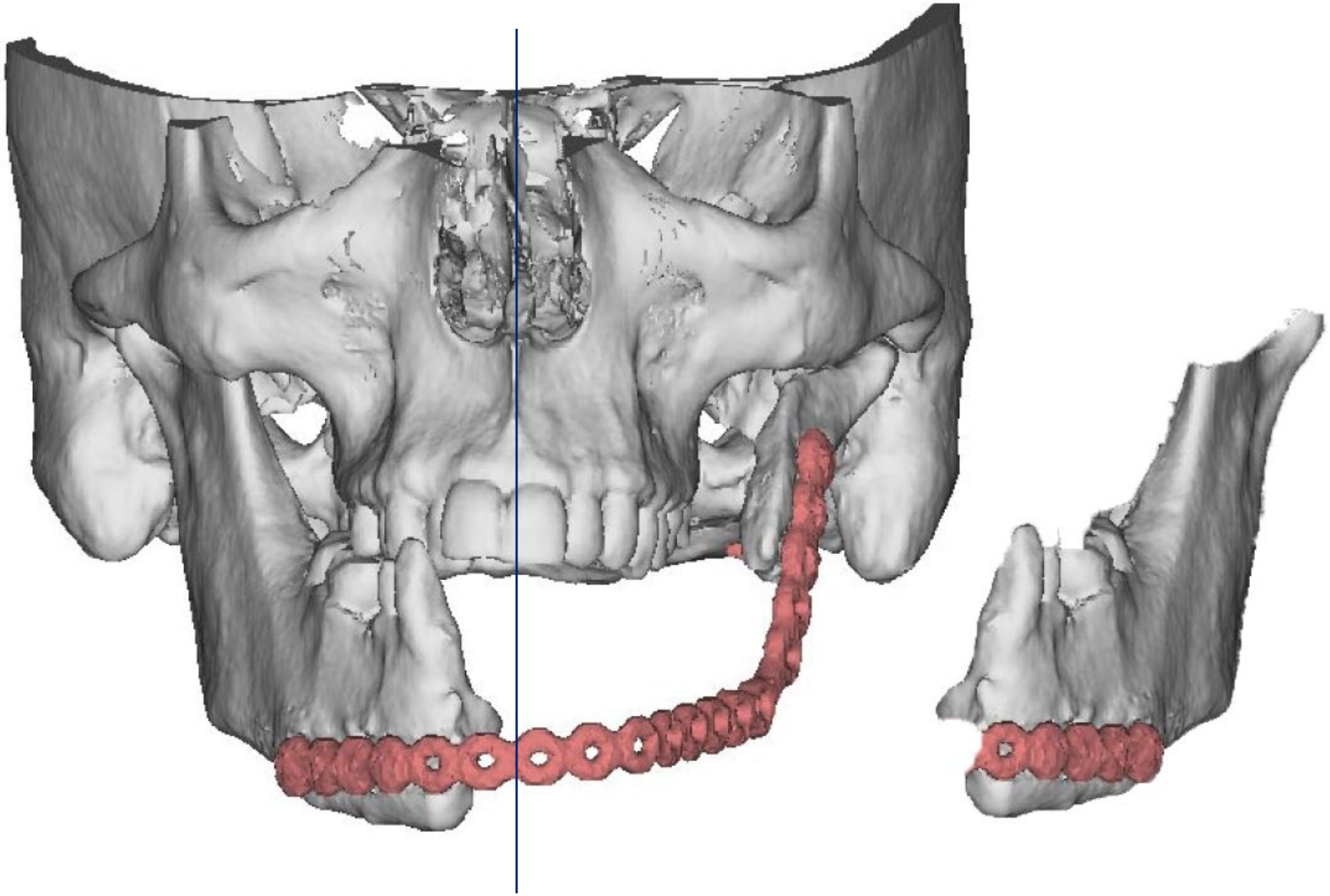
Delayed Reconstruction

The absence of anatomic landmarks and references makes delayed reconstruction challenging

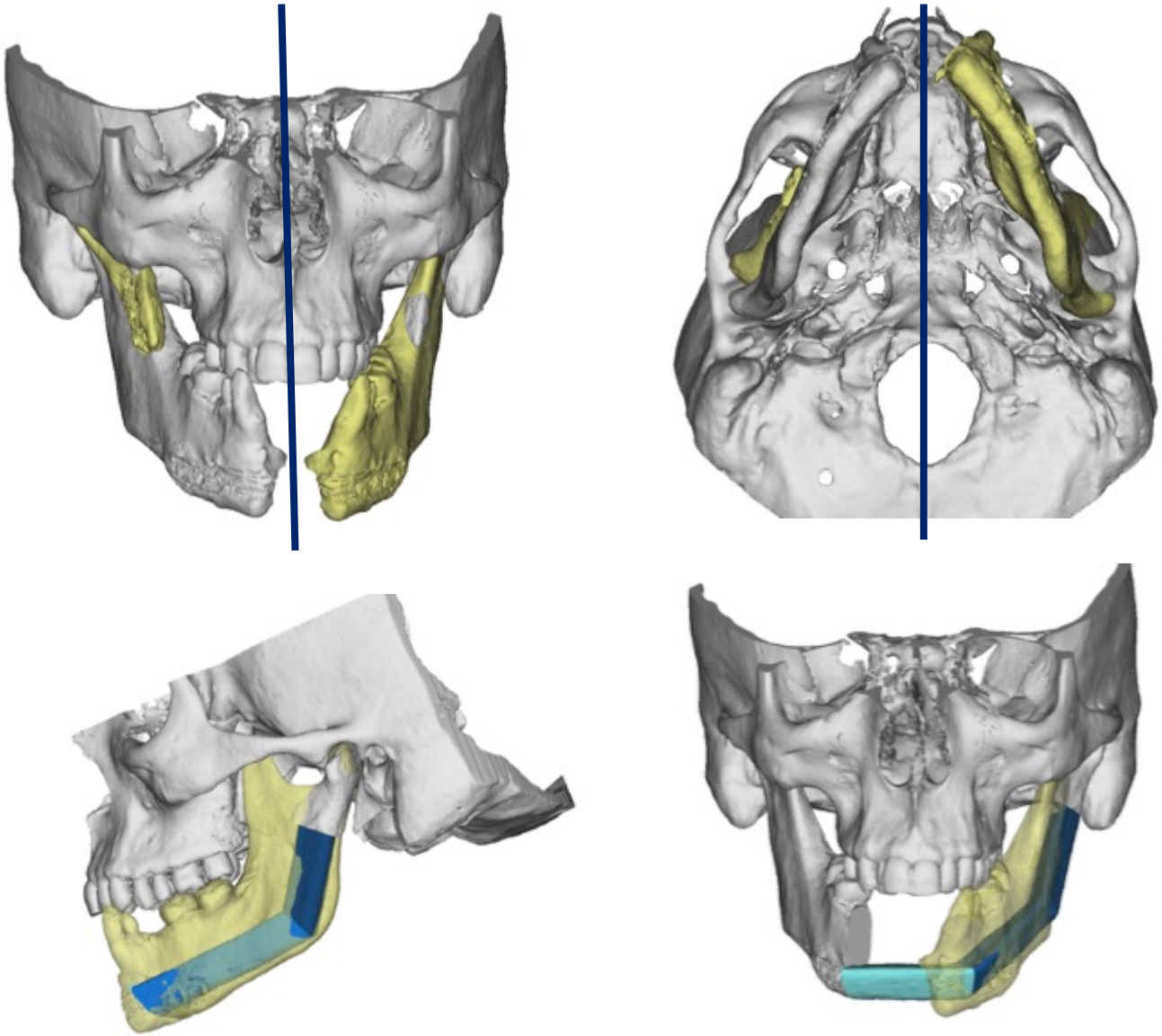
Recurrent Osteosarcoma

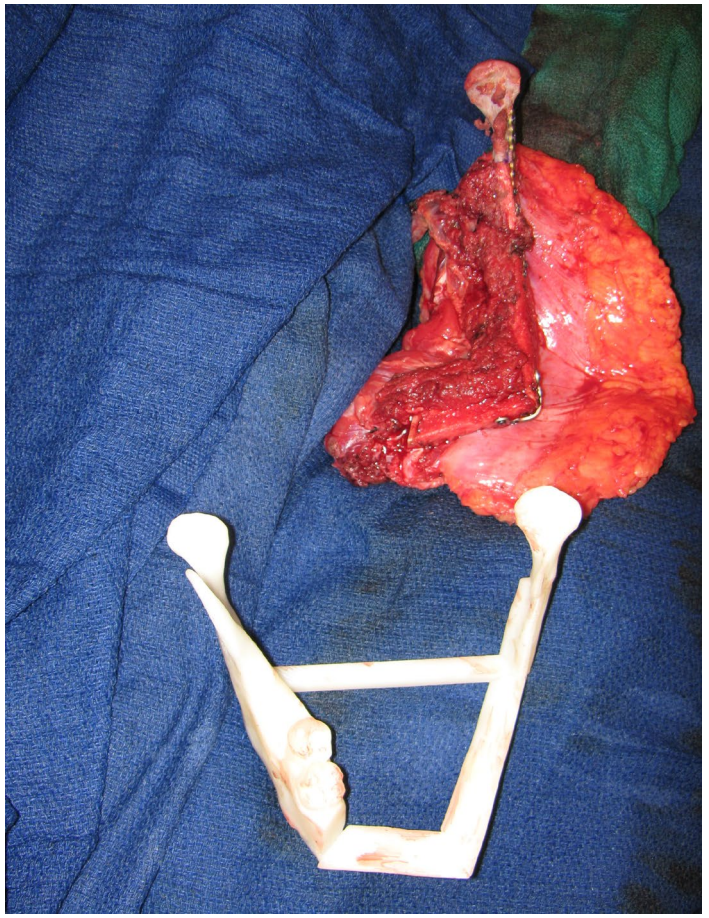


Correction using Mirrored Anatomy

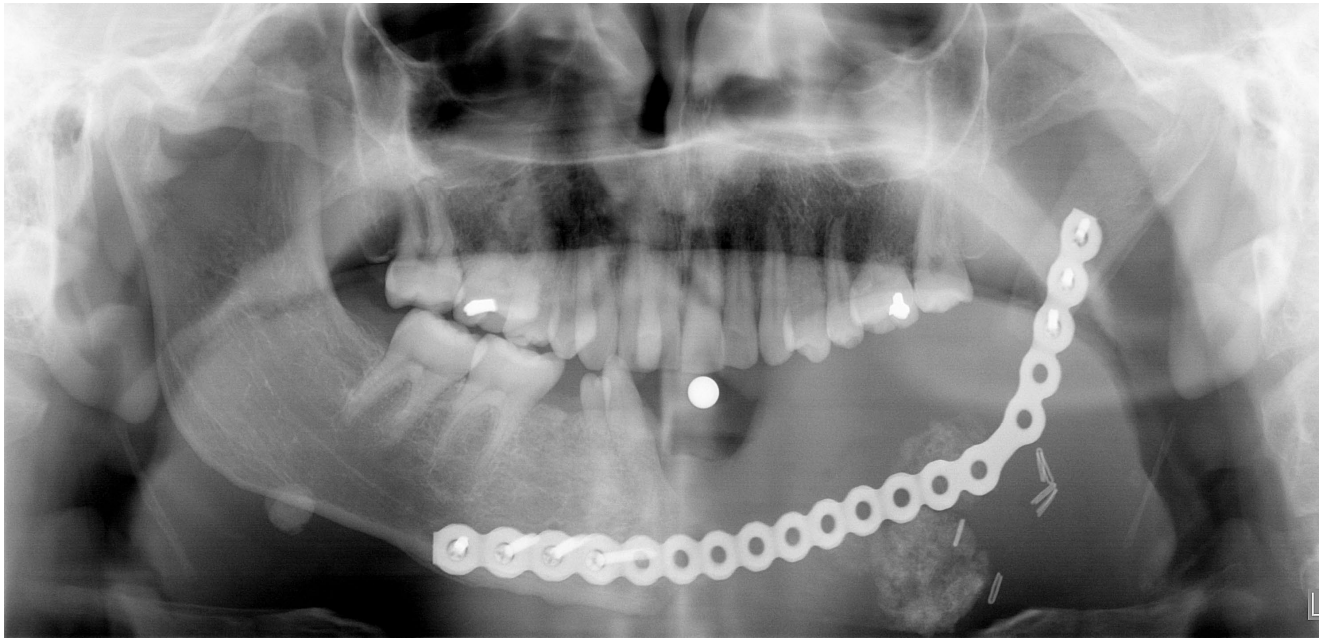


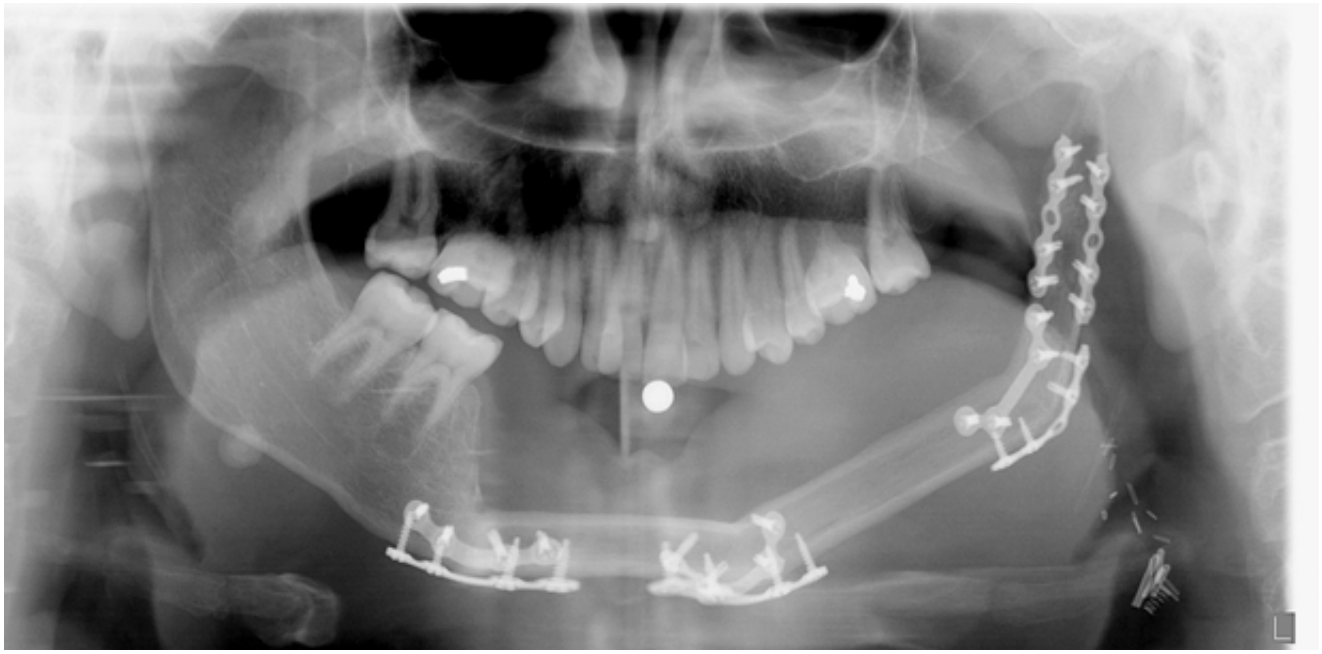
Mirroring

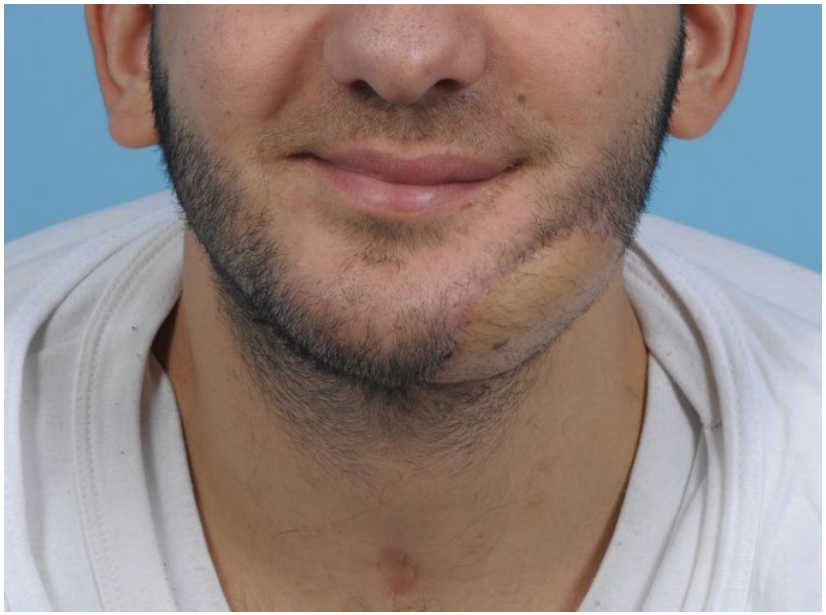




The reconstruction becomes a reference…and orients the remaining segments

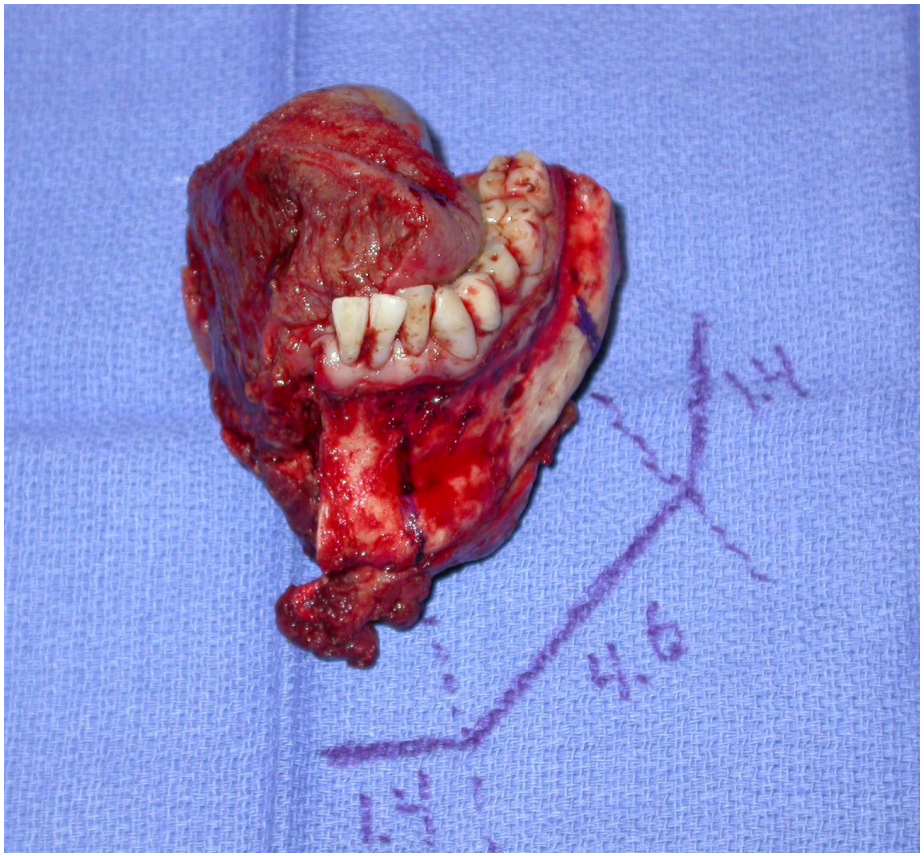


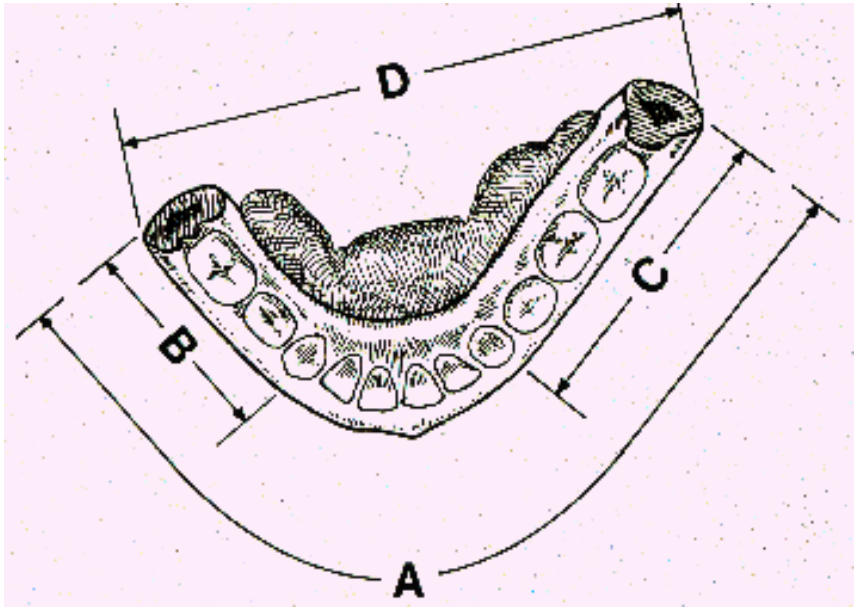




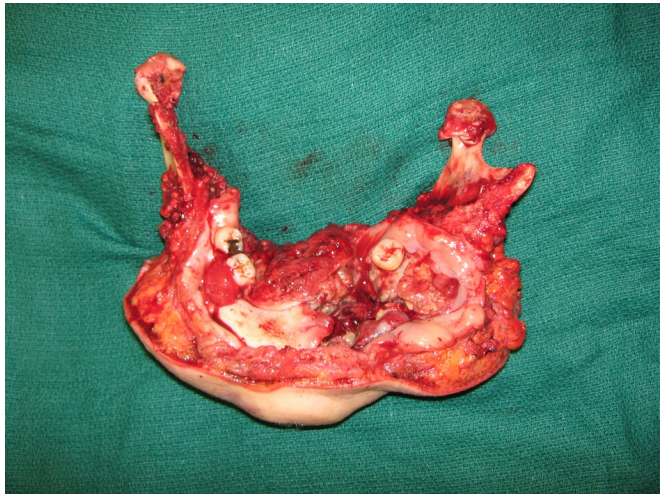
5. Specimen distortion & Anterior defects

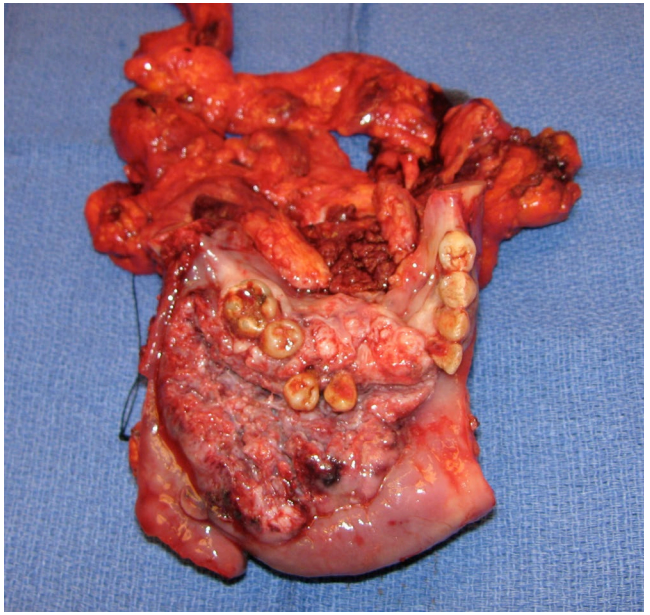
Specimen measurement

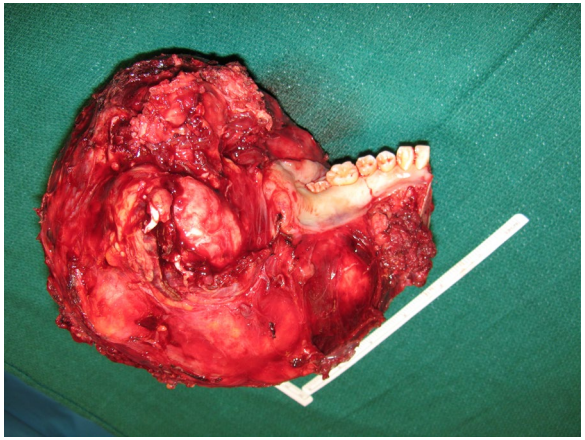


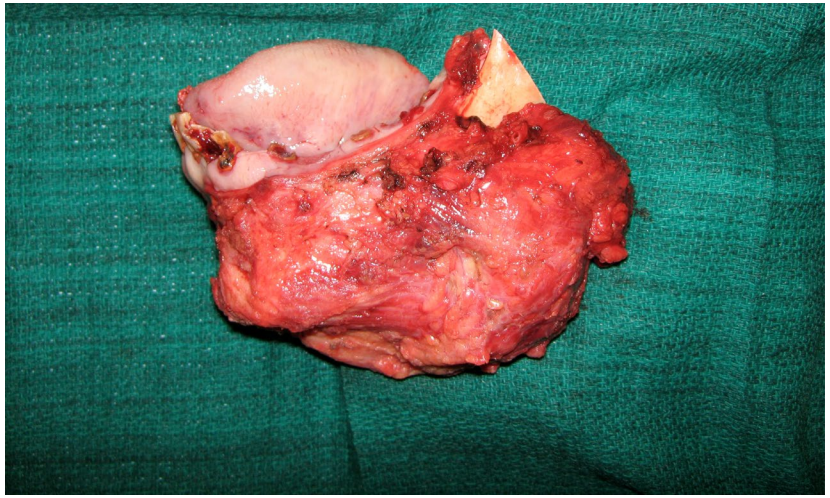


Inaccurate specimen measurement

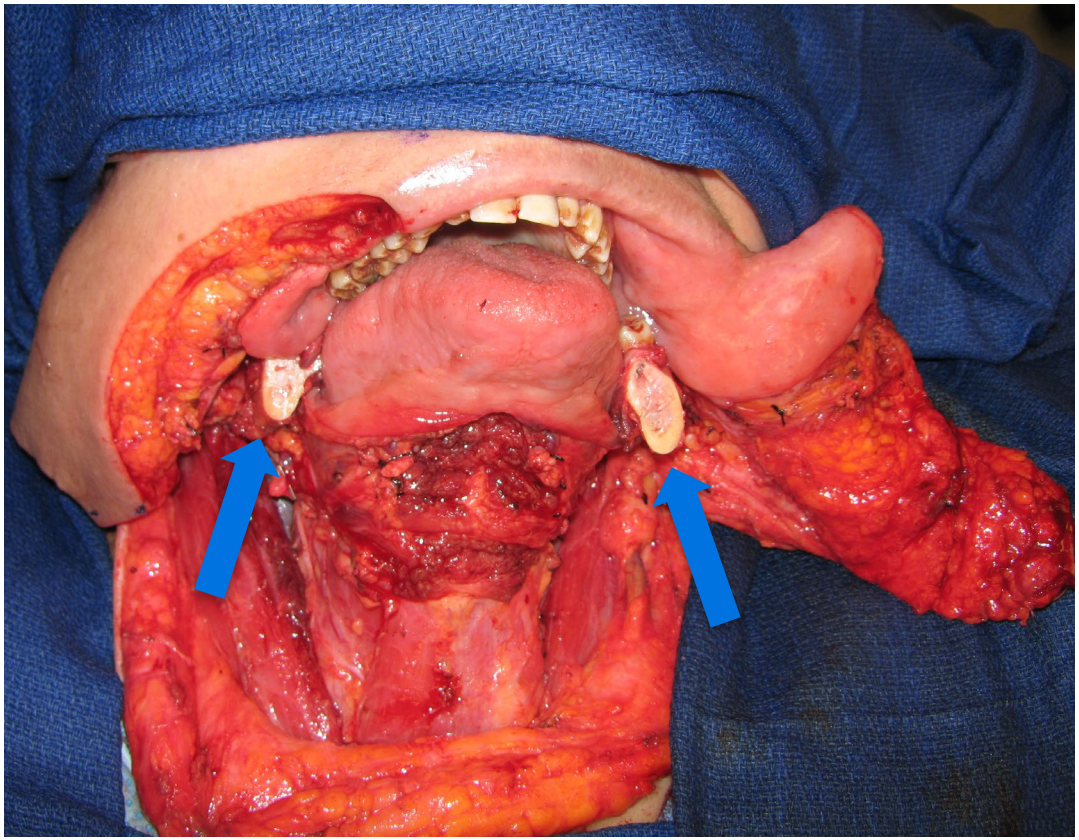






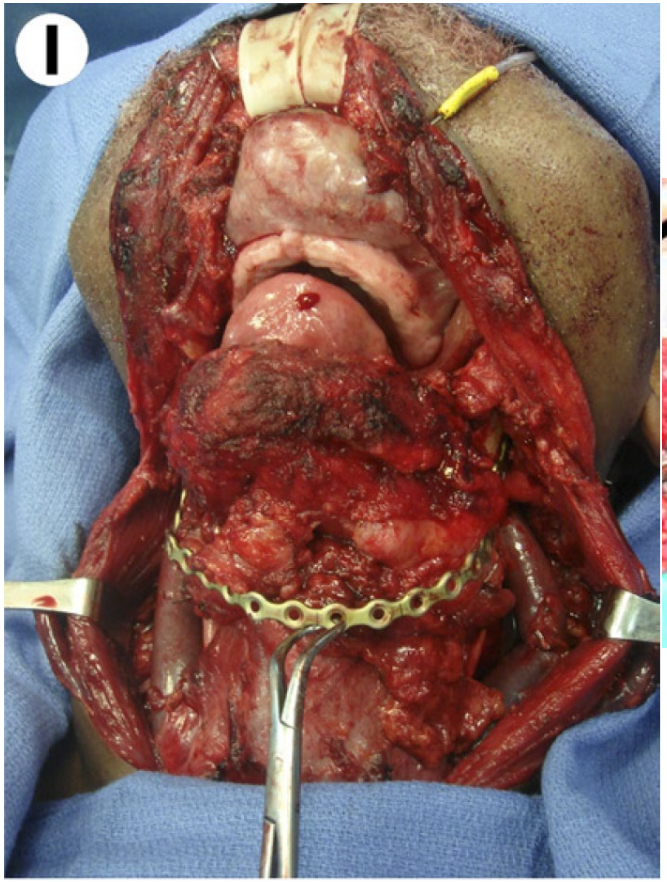


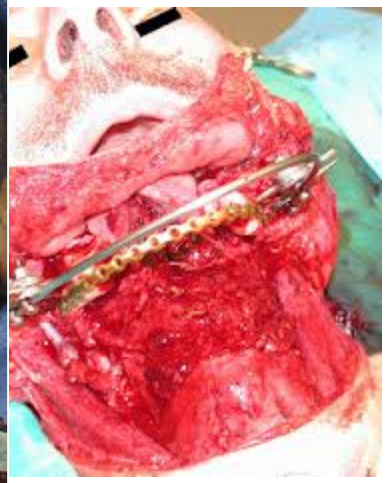
Anterior Defects



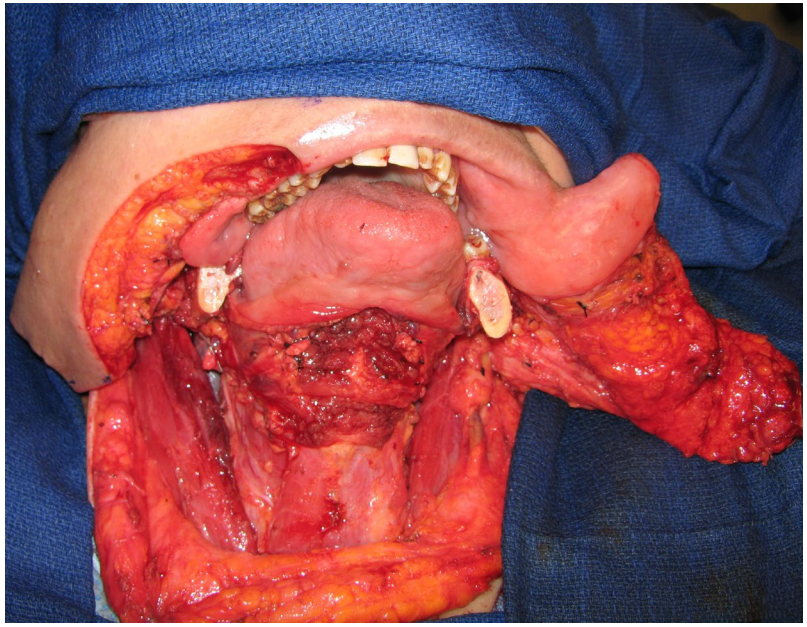
- Inability to maintain dental occlusion results in free floating posterior segments

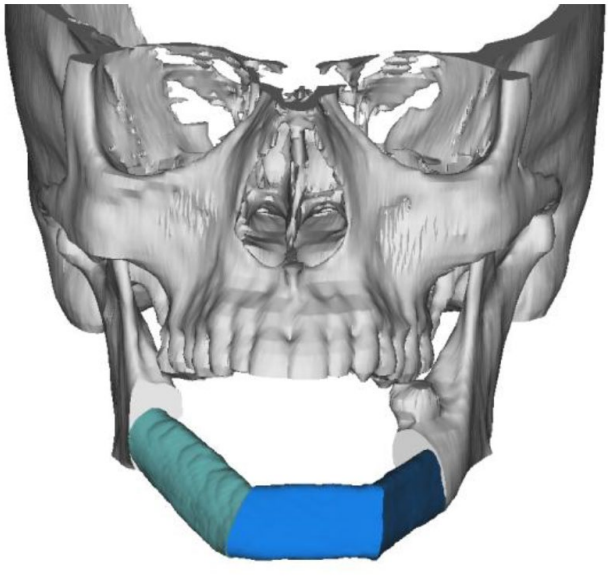
External Fixation?



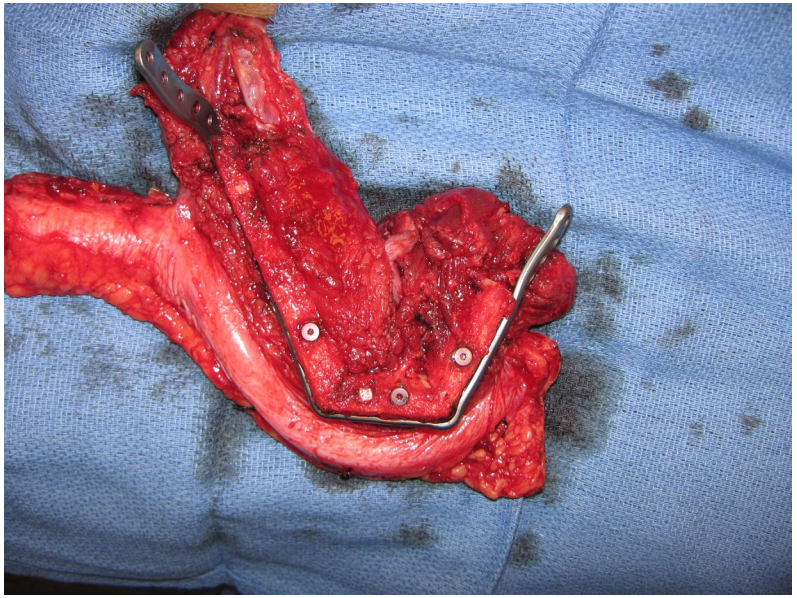


From Hirsch et al. J Oral Max Surg 67:2115 2009

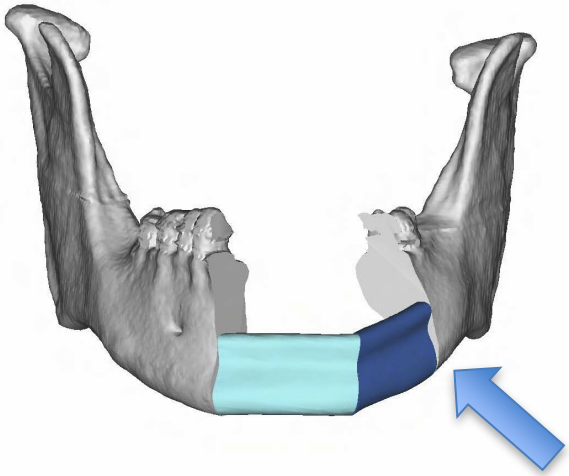


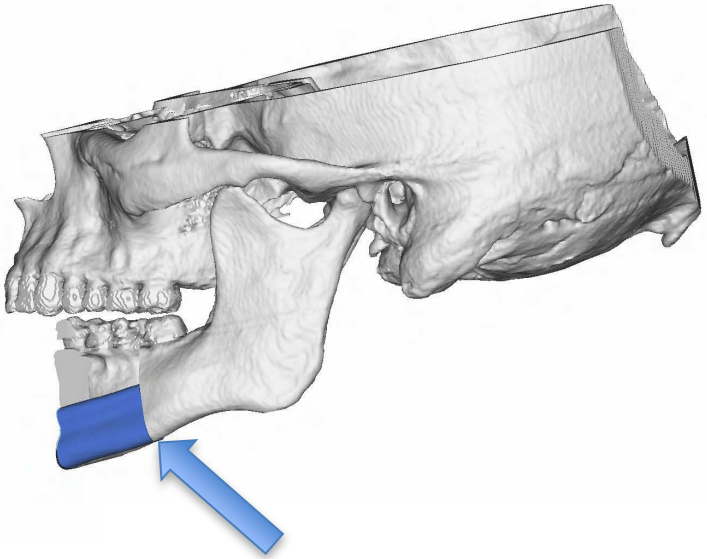


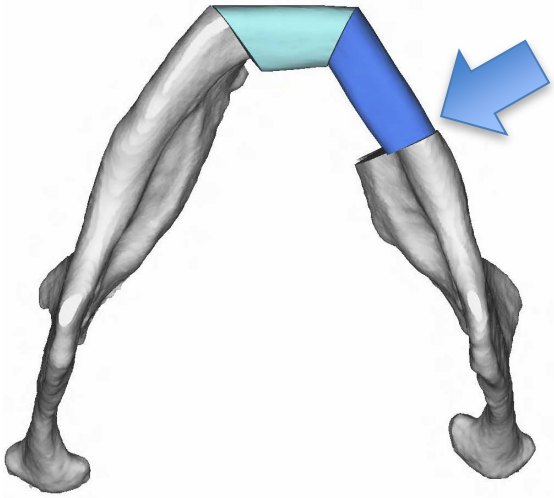
The reconstruction fits the defect like a lock and key…
…the reconstruction orients the posterior segments
….no need for fixation or specimen measurement

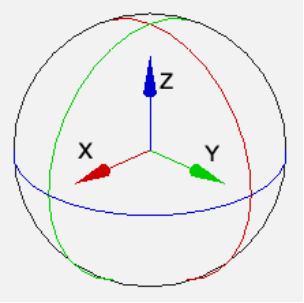


6. Osteotomies in three planes



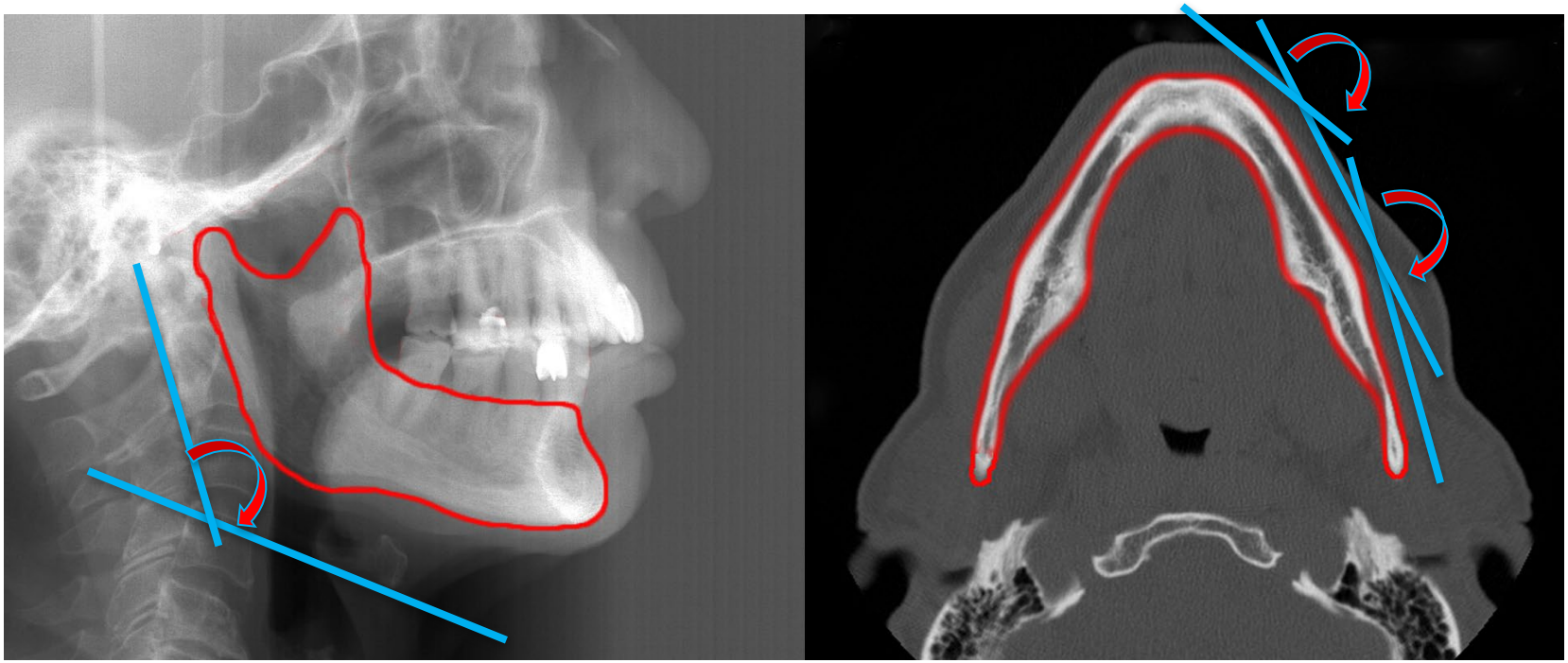




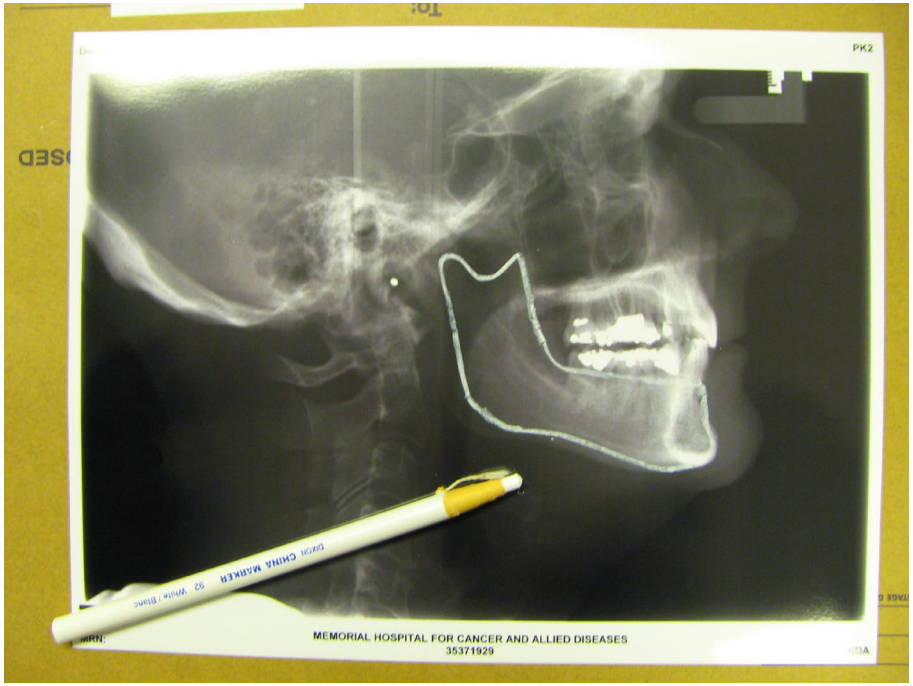


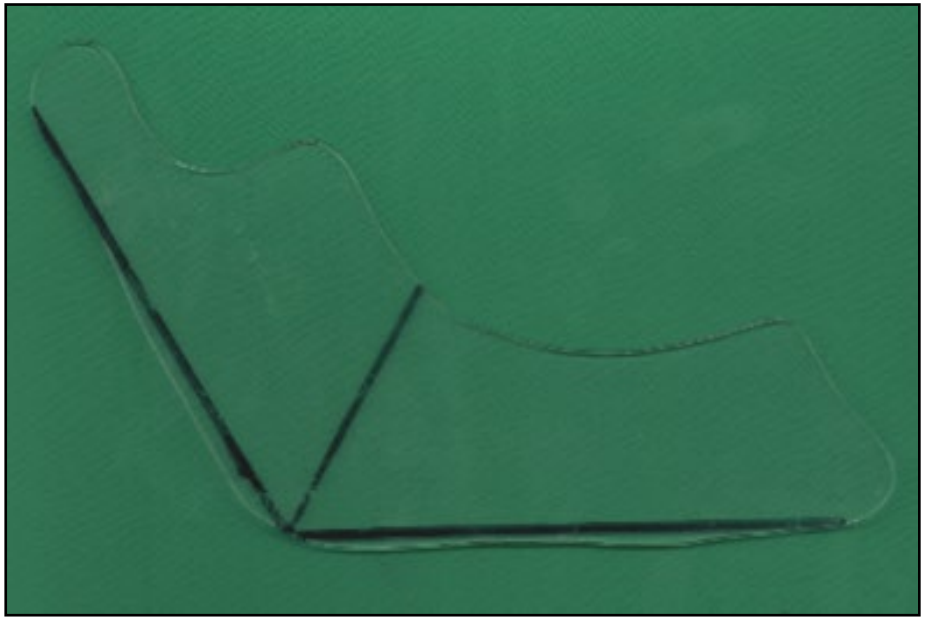
- Mandible trajectory is inferior and lingual
- Cutting guides allow for adjustment in 3 axes
- Cannot be easily replicated with 2-D techniques

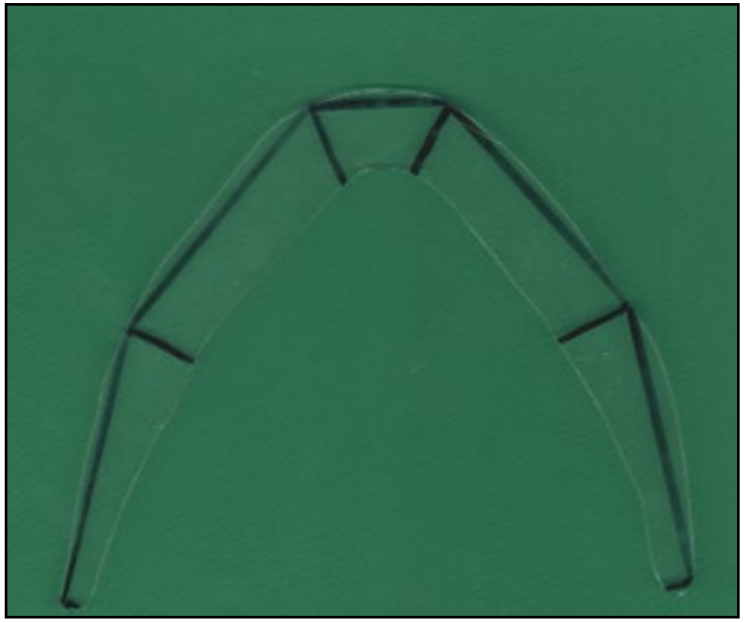
2-D Acrylic Templates

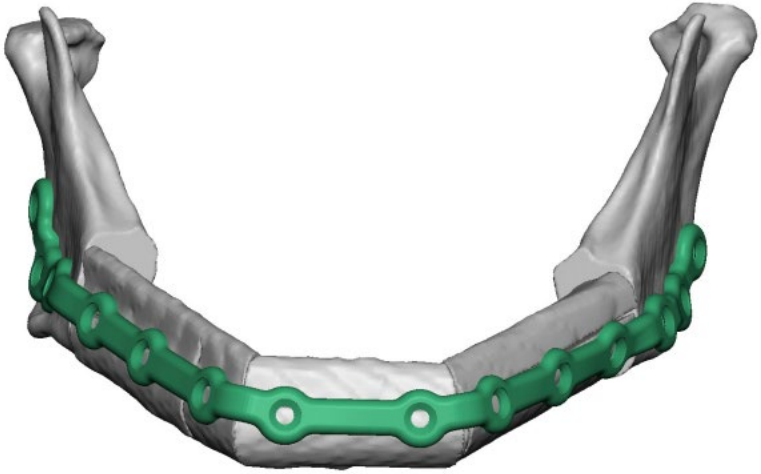


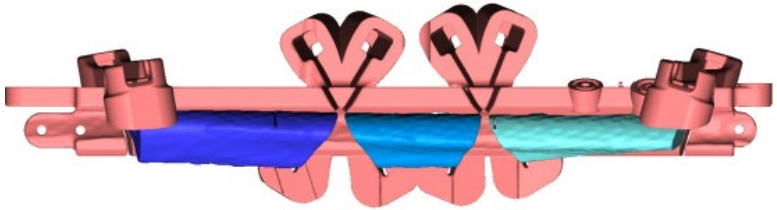
Lateral cephalogram for mandibular angle
1:1 CT for body and parasymphaseal angles

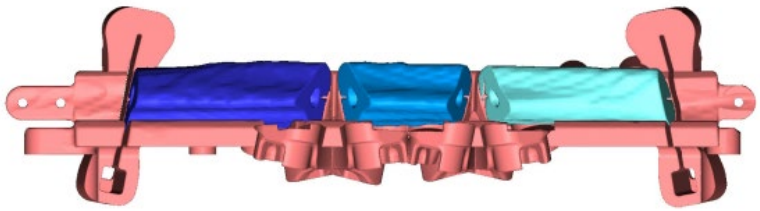

PK2
MEMORIAL HOSPITAL FOR CANCER AND ALLIED DISEASES
35371929

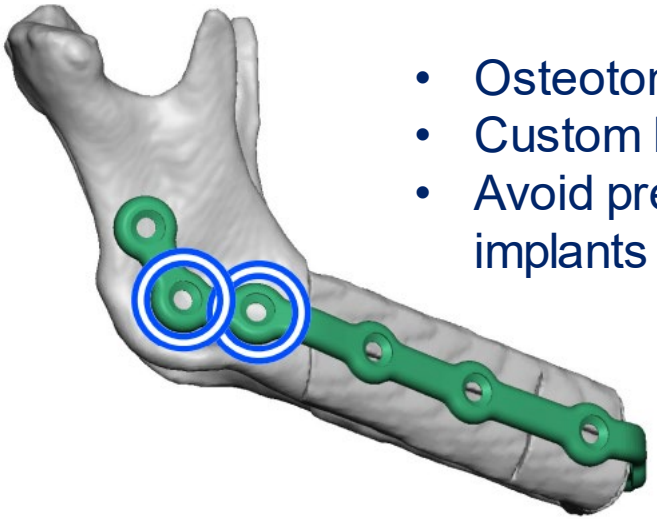






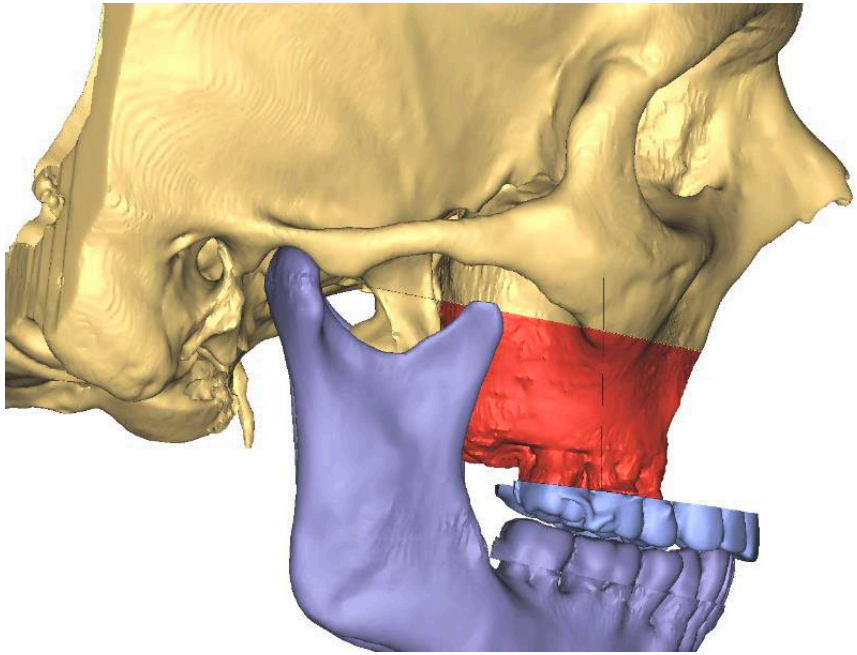


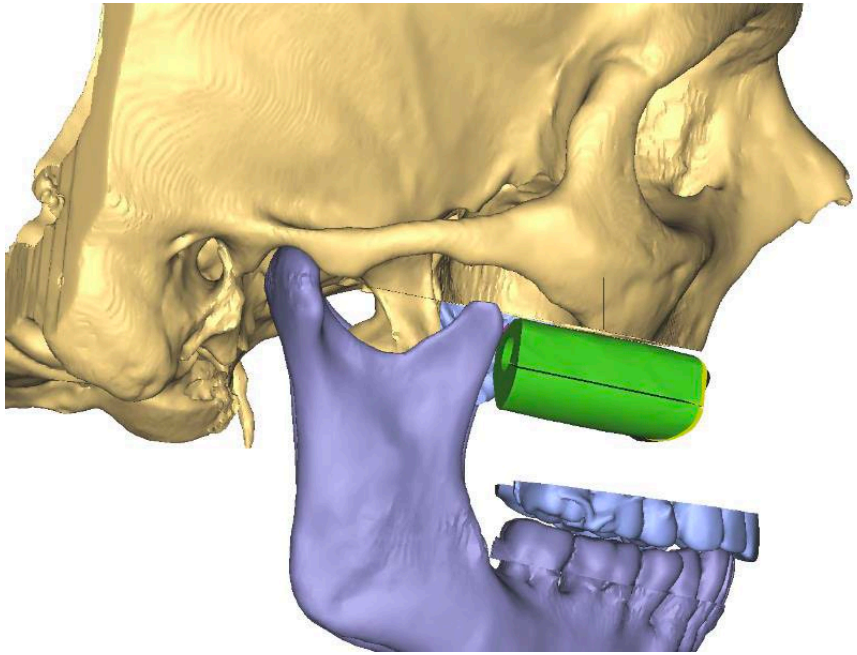




- Osteotomy guides allow 3-D cuts
- Custom hardware also controls Z-axis
- Avoid premature posterior bite for implants

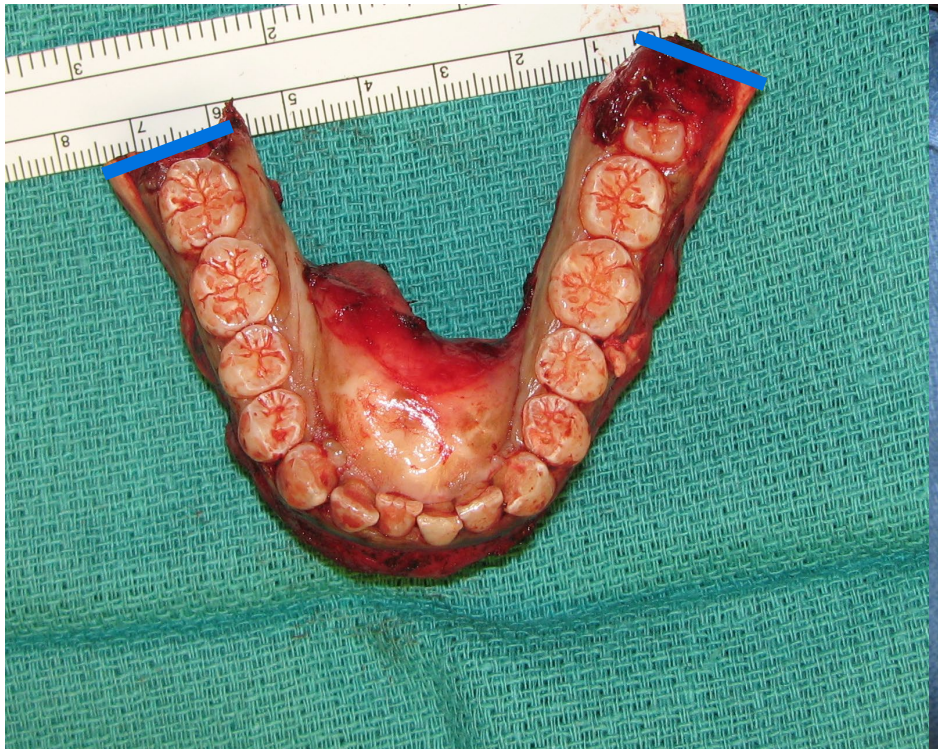
Maxilla

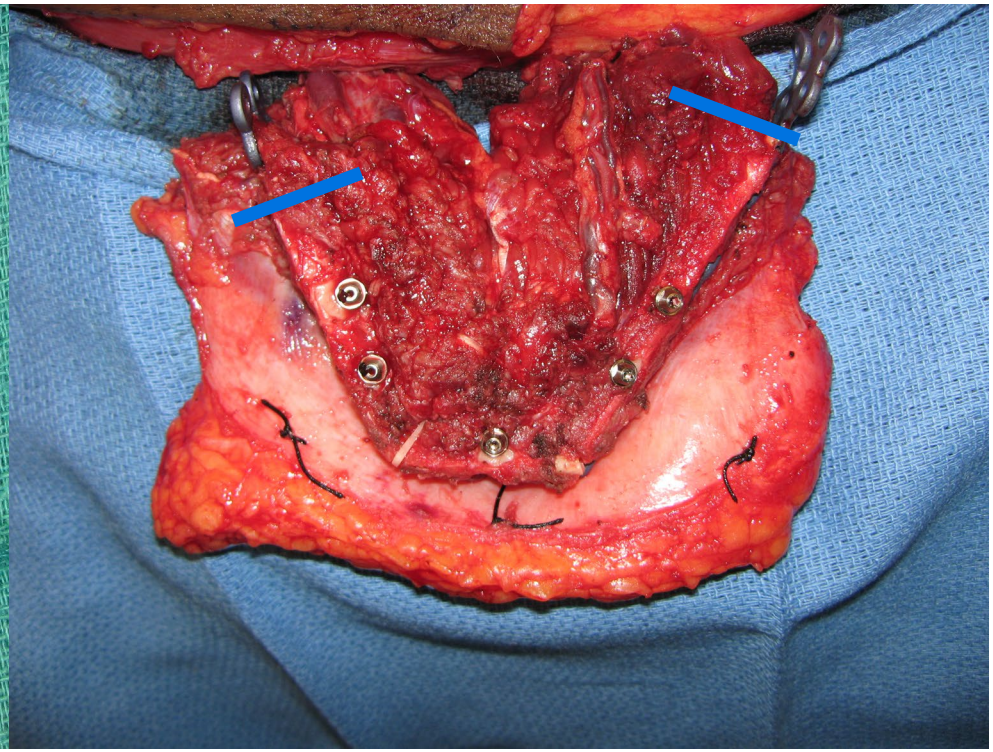





Thank You

The Reconstruction is ACCURATE





- No need for specimen
- Lateral Segments are aligned
- No IMF