BONY EXOSTOSES

EVIDENCE BASED DENTISTRY ROUNDS
ORAL SURGERY
GROUP 4B-3
11/18/2020

ROUNDS TEAM

- **Group Leader: Dr. Grady**
- **Specialty Leader: Dr. Almeida**
- **Project Team Leader: Kelsey Godfroy**
- **Project Team Participants: Sara Connell, Dillon Cea, Trey Gullickson**

PATIENT

- 80 years old
- Female
- Caucasian
- Chief Complaint: "Our dentist is getting too expensive"

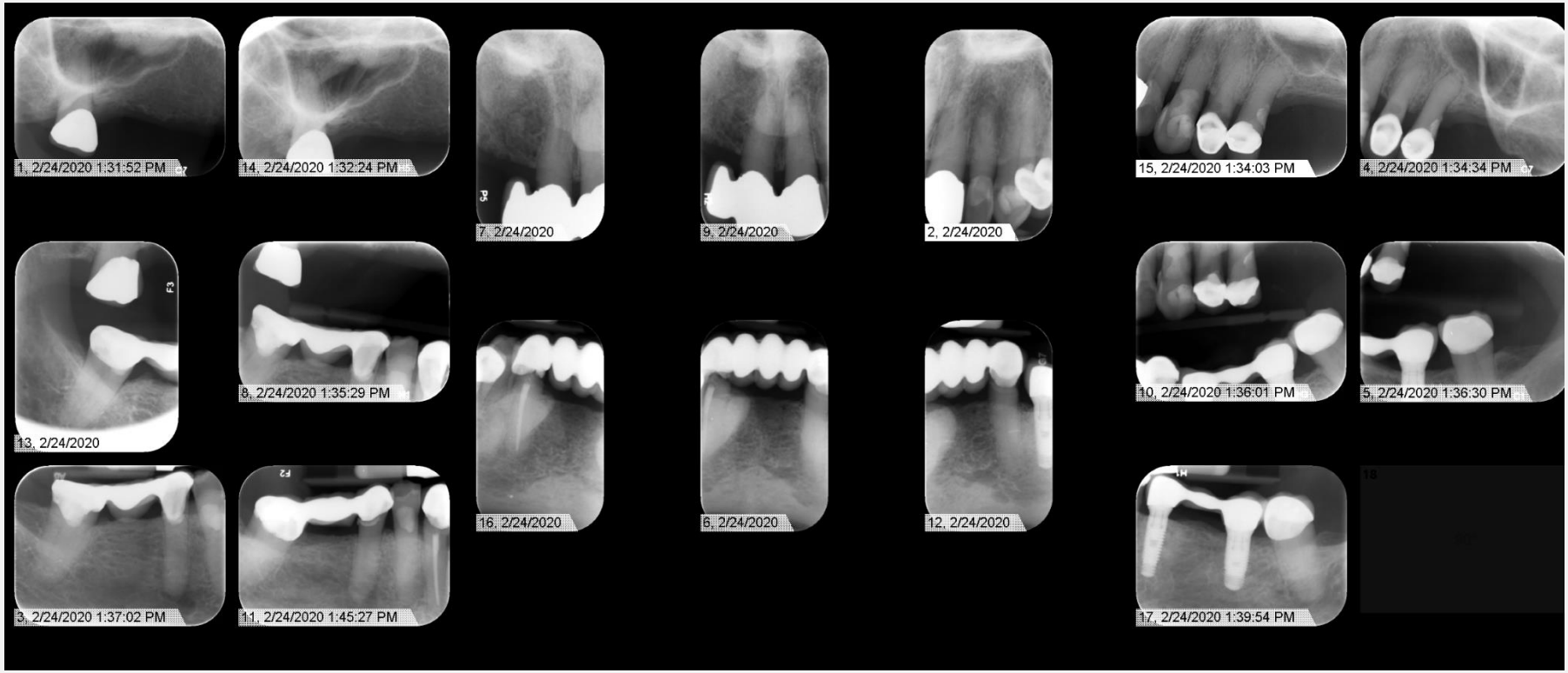
MEDICAL HISTORY

- Dementia
- Bipolar/Manic Depression
- Medications
  - Quetiapine 300 mg
  - Quetiapine 100 mg
  - Donepezil 10 mg
  - Bupropion HCL 100 mg
  - Clonazepam 0.5 mg
  - Omega 3-dha-epa-fish oil 300 mg

DENTAL HISTORY

- Previous established dental home.
- History of extractions, implants, and bridges.
- Multiple restorations have been “patched.”
- Brushes once a day and flosses once a day

RADIOGRAPHS



RIGHT SIDE


1, 2/24/2020 1:31:52 PM
14, 2/24/2020 1:32:24 PM
13, 2/24/2020
8, 2/24/2020 1:35:29 PM
3, 2/24/2020 1:37:02 PM
11, 2/24/2020 1:45:27 PM

LEFT SIDE


15, 2/24/2020 1:34:03 PM
4, 2/24/2020 1:34:34 PM
10, 2/24/2020 1:36:01 PM
5, 2/24/2020 1:36:30 PM
17, 2/24/2020 1:39:54 PM
18

ANTERIOR


7, 2/24/2020
9, 2/24/2020
2, 2/24/2020
16, 2/24/2020
6, 2/24/2020
12, 2/24/2020

RADIOGRAPHIC FINDINGS

- Bilateral mandibular tori
- #27 recurrent decay
- #28- calcified canal
- #29- PARL

CLINICAL FINDINGS

- Missing teeth #1, 3, 4, 5, 6, 7, 14, 15, 16, 17, 20, 23, 24, 25, 26, 30, 32
- #2-PFM
- #7 pontic
- #8,9-PFM Maryland bridge
- #10-FL Resin
- #11-FL Resin
- #12-PFM and abfraction
- #13-PFM and B Resin
- #18-PFM
- #19-21 PFM implant bridge
- #22-27 PFM bridge
- #22-F Resin
- #27-F Resin
- #28-B Resin
- #29-31 PFM bridge

CLINICAL PHOTOS

CLINICAL PHOTOS

SPECIFIC FINDINGS

- Failing restorations
- Poor oral hygiene
- Palatal and bilateral mandibular tori

PERIODONTAL CHARTING

																MOBILITY
	1															FURCA
	P P P						P P	P P	P P	P P	P P	P P				PLAQUE
								B	B							BOP
	3 3 3					4 4 4	4 4 4	5 5 5	3 3 3	2 2 2	3 3 3	3 3 3				MGJ
	3 3 4					2 2 4	2 2 3	3 2 3	3 2 3	3 2 3	3 2 5	9 8 9				CAL
	3 3 4					2 2 4	2 2 3	3 2 3	3 2 3	3 2 3	3 2 5	5 3 4				P.D.
	0 0 0					0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	4 5 5				FGM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	0 0 0					0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1 1 1	2 3 4				FGM
	3 3 4					3 3 5	5 3 4	4 3 3	3 3 4	5 3 6	6 3 5	5 4 4				P.D.
	3 3 4					3 3 5	5 3 4	4 3 3	3 3 4	5 3 6	7 4 6	7 7 8				CAL
																MGJ
																BOP
	P P P						P P	P P	P P	P P	P P	P P				PLAQUE
																FURCA
																PROGNOS

PERIODONTAL CHARTING

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	
																PROGNOS
																FURCA
	P P		P P	P P	P P					P P	P P		P P	P P		PLAQUE
				B	B											BOP
	4 4 4													4 4 4		MGJ
	4 3 4	0 0 0	5 4 5	3 2 4	5 5 6		0 0 0	0 0 0	0 0 0	7 6 8	4 2 3	0 0 0	3 4 3	3 3 3		CAL
	3 2 3		3 2 3	3 2 4	4 2 3					3 2 4	4 2 3		3 3 3	3 3 3		P.D.
	1 1 1	0 0 0	2 2 2	0 0 0	1 3 3		0 0 0	0 0 0	0 0 0	4 4 4	0 0 0	0 0 0	0 1 0	0 0 0		FGM
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	
	1 1 2		0 0 0	1 3 1	1 2 2		0 0 0	0 0 0	0 0 0	2 2 2	0 0 0	0 0 0	0 0 0	0 0 0		FGM
	3 1 3		3 2 3	3 1 3	3 1 3					2 2 3	2 2 3		2 2 3	2 3 3		P.D.
	4 2 5		3 2 3	4 4 4	4 3 5		0 0 0	0 0 0	0 0 0	4 4 5	2 2 3	0 0 0	2 2 3	2 3 3		CAL
	3 3 3		2 2 2	3 3 3	2 2 2					2 2 2	2 2 2		1 1 1	2 2 2		MGJ
																BOP
	P P		P P	P P	P P					P P	P P		P P	P P P		PLAQUE
	1													1		FURCA
																MOBILITY

DIAGNOSIS

- AAP Stage III, Grade A
- Caries risk: very high (36)

PROBLEM LIST

- Home care
- Missing teeth
- Defective restorations
- Perio disease

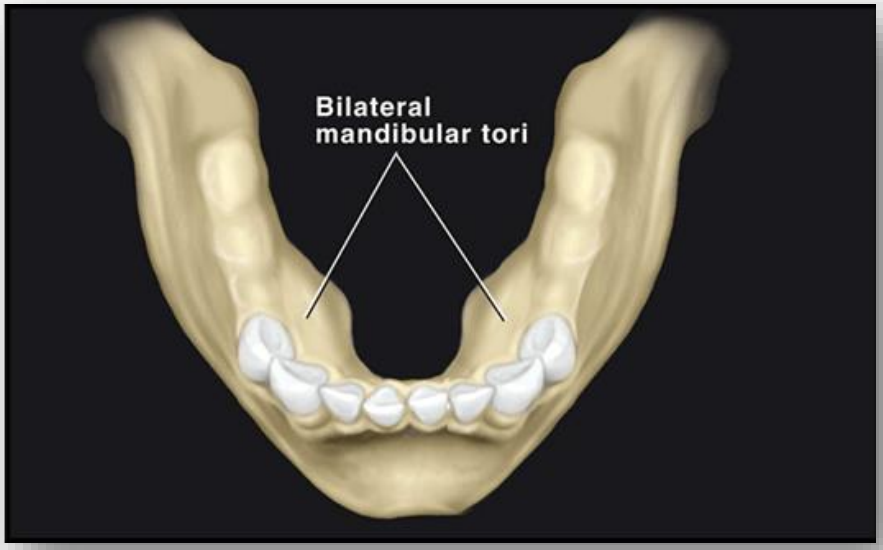
D1: WHAT IS A TORUS/BONY EXOSTOSIS?

- Bony Exostosis – abnormal, benign bone growth resulting in a lump or nodule
- Buccal Exostosis – buccal surface of either alveolar process
- Torus Mandibularis – lingual surface of the mandible
- Torus Palatinus – midline of the hard palate

Scully, C. (2012). Section 16: Lumps and swellings in the jaws. In *Oral and Maxillofacial Medicine - E-Book The Basis of Diagnosis and Treatment* (pp. 121-124). London: Elsevier Health Sciences.

D1: HOW DO THEY FORM?

- Excessive osteoblast activity
- Outgrowth of bone
- Localized



Depiction of bilateral mandibular tori. Adapted from "What are mandibular tori?" retrieved from: https://dentagama.com/news/what-are-mandibular-tori

Santhanakrishnan, M., & Rangarao, S. (2014). Mandibular Tori: A source of autogenous bone graft. *Journal of Indian Society of Periodontology, 18*(6), 765. doi:10.4103/0972-124x.147423

D2: POTENTIAL CAUSES FOR FORMATION OF TORI/BONY EXOSTOSES

- **Exact Etiology Unclear**
- **General Possible Causes:**
  - Masticatory hyperfunction
  - Continued bone growth
  - Genetic Factors
  - Environmental Factors (Diet)
- **Specific Possible Causes:**
  - TM: Torqueing action of the arch of the mandible
  - TP: Mild, chronic peri-osteal ischemia secondary to mild nasal pressures
  - BE: Lateral pressures from the roots of the underlying teeth
- **Genetic Factors:**
  - TM: Japanese, Spanish, and Ghanaian populations
  - TP: German, Norwegian, Croatian, Thai, and Malaysian populations

http://www.exodontia.info/Exostoses-Osteomata.html

Auškalnis A, Bernhardt O, Putnienė E, Šidlauskas A, Andriuškevičiūtė I, Basevičienė N. 2015. Oral bony outgrowths: prevalence and genetic factor influence. Study of twins. Medicina (Kaunas) [Internet]. [cited 10 Nov 2020]; 51(4):228-232. Available from: https://0-pubmed-ncbi-nlm-nih-gov.libus.csd.mu.edu/26424187/

Unterman S, Fitzpatrick M. 2010. Torus mandibularis. West J Emerg Med [Internet]. [cited 10 Nov 2020];11(5):520. Available from:

D2: TORI AND BONY EXOSTOSES

- **General Info:**
  - Early adult life
  - Grow slowly but most < 2mm
  - Unilateral or bilateral
  - Benign and usually asymptomatic
- **Reasons for Treatment:**
  - Most common: Interference with dental prothesis
  - Recurring ulceration
  - Contributes to periodontal condition
- **Chance for Reformation after Removal**

http://www.ghorayeb.com/BuccalExostosis.html

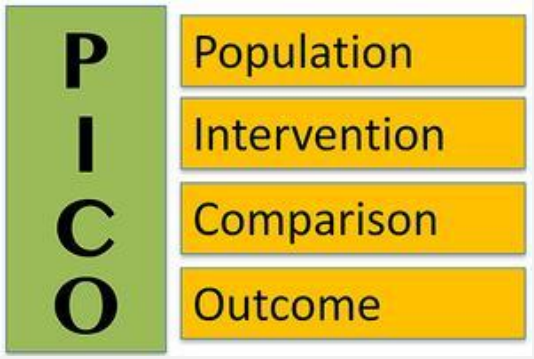
Auškalnis A, Bernhardt O, Putnienė E, Šidlauskas A, Andriuškevičiūtė I, Basevičienė N. 2015. Oral bony outgrowths: prevalence and genetic factor influence. Study of twins. Medicina (Kaunas) [Internet]. [cited 10 Nov 2020]; 51(4):228-232. Available from: https://0-pubmed-ncbi-nlm-nih-gov.libus.csd.mu.edu/26424187/
Unterman S, Fitzpatrick M. 2010. Torus mandibularis. West J Emerg Med [Internet]. [cited 10 Nov 2020];11(5):520. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3027453/

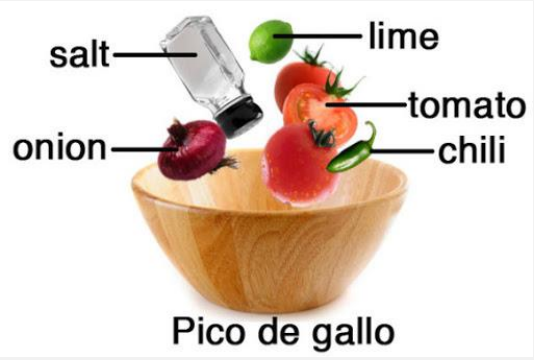
CLINICAL QUESTION

- In regard to tori/bony exostoses, what are the contraindications and surgical techniques for removal?

D3: P. I. C. O.

- P: Patients with tori/bony exostoses
- I: No removal of tori/bony exostoses
- C: Removal of tori/bony exostoses
- O: Minimize complications and improve fabrication and fit of removable partial dentures





PICO QUESTION

- In patients with tori/bony exostoses, what factors come into play to determine if leaving tori is safer vs removal to improve fabrication and fit of an RPD?

CLINICAL BOTTOM LINE

- When is it indicated to remove tori/bony exostoses and what are the contraindications to their removal?

SEARCH BACKGROUND

- Dates: 11/9/2020, 11/10/2020, 11/11/2020
- Database used: PubMed
- MESH terms: tori, torus, removal, bisphosphonates, osteonecrosis of the jaw

ARTICLE 1: TORUS LESIONS OF THE JAW: DIAGNOSIS AND CLINICAL IMPLICATIONS

Citation: Ghahremani, Gary G., Ghahremani, Zohreh K., Naimi, David R. , Torus Lesions of the Jaw: Diagnosis and Clinical Implications. International Journal of Clinical Practice. Sep 6 2020.

-Study Design: retrospective analysis: 17 patients

- Study Purpose: discuss diagnosis, implications, and complications of tori

ARTICLE 1 SELECTION

- Review previously published articles
- Listing of implications for torus removal as well as contraindications

METHOD AND LIMITATIONS

- Method: retrospective study of 17 patients with large symptomatic torus of mandible, maxilla, or hard palate. Excluded patients with small or asymptomatic torus in this study.
- Demographics and symptoms recorded, clinical photographs taken, referred to medical center for radiographical examination (computed tomography, radiographs from frontal and lateral), oral surgery consultations
- Electronic search PubMed 18 articles on etiology, prevalence, complications, and management of torus
- Limitations: very small patient base used in retrospective study. Ratio of women to men used in the study slightly higher than the reported prevalence, limited ethnic/racial groups used in this study compared to the published reports used

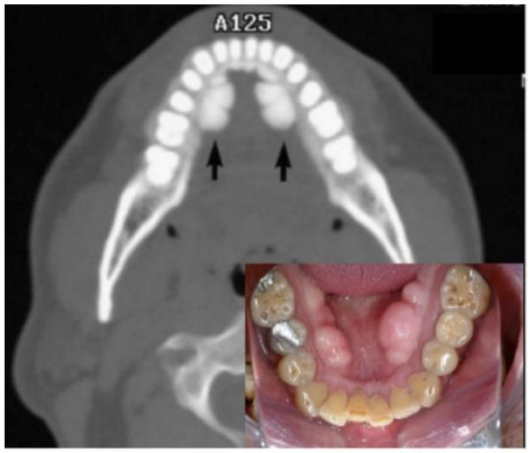


Fig.1

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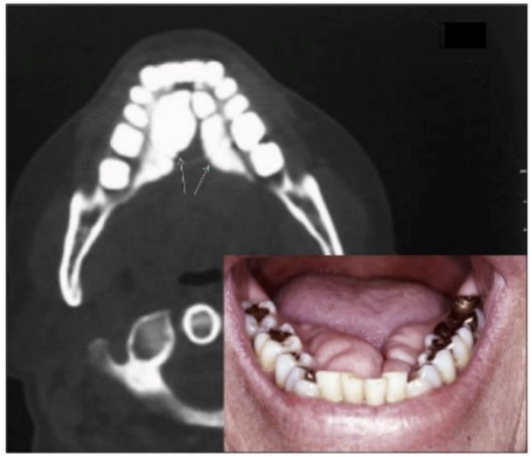

Fig.2

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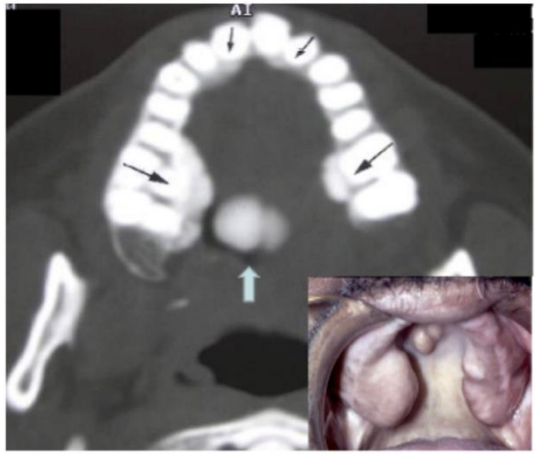

Fig.3

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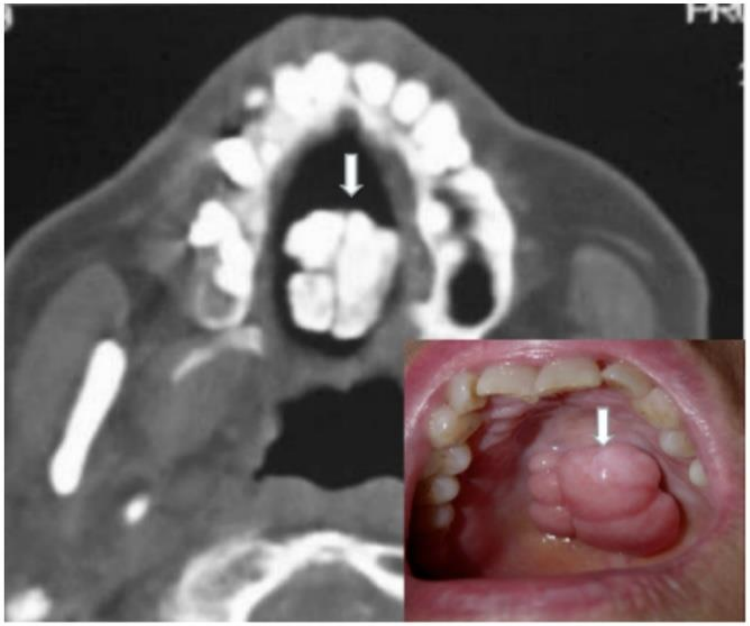

Fig.4

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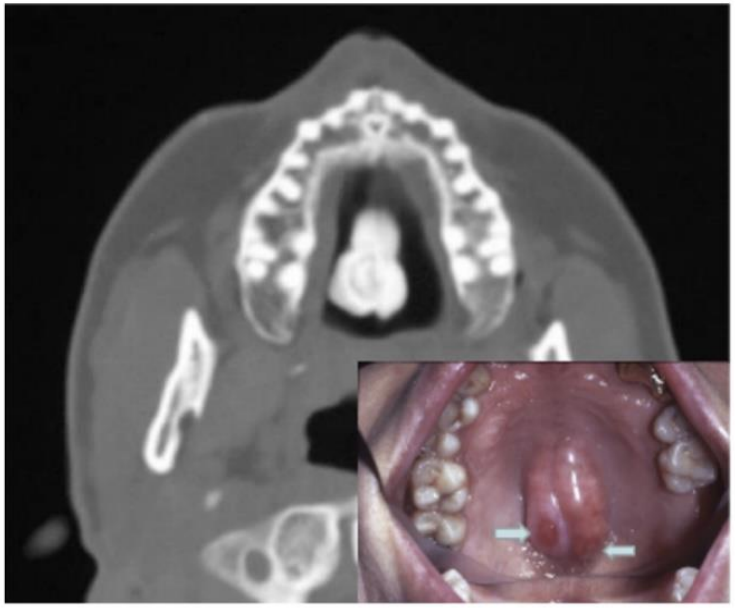

Fig.5

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RESULTS

- 11 women 6 men
- 6 torus mandibularis-3 men 3 women
- Rous palatinus-6 women 2 men
- Torus maxillarus-2 women 1 man
- 4 patients had surgical removal of torus-2 torus palatinus 2 torus mandibularis
- No patients had post op complications and all had complete resolution of symptoms obtained
- Patients who did not have surgery had follow ups over next 5-8 years with stable appearances and symptoms of tori

DISCUSSION

- Indications for removal: difficulty placing dentures, poor function of dentures, phonetic interference, mastication interference, trapping food and impairing proper oral hygiene (periodontal disease), compression and/or displacement of tongue (sleep apnea and snoring), mucosal laceration and inflammation due to trauma during mastication, osteonecrosis of torus in patients receiving bisphosphonates, interference of endotracheal intubation for general anesthesia, use in autogenous bone grafting in perio surgery

ARTICLE 2: CURRENT STATUS OF THE TORUS PALATINUS AND TORUS MANDIBULARIS

- Citation: Garcia, Andres, Gomez-Font, Rafael, Martinez-Gonzalez Jose Maria, Oviedo-Roldan, Lucia, Soto-Rivadeneira, Angeles. Medicina Oral, March 1 2010.
- Study design: review
- Study purpose: discuss etiology, diagnosis, treatment of tori and review literature on tori

ARTICLE 2 SELECTION

- Similar to article 1 but more extensive search and review of literature
- Cumulative review of published literature on indications for torus removal and possible complications of removal

METHODS

- Most prevalent reason for removal of torus: prosthetic need
- Another prevalent reason for removal: use in autogenous bone graft perio surgery, cyst surgery, implant surgery
- reasons for removal:
  - disturbances of phonation
  - limitations of masticatory mechanics
  - sensitivity to thin mucosal layer
  - traumatic inflammation
  - ulcer of traumatic origin
  - Retention of food remains
  - esthetic reasons
  - prosthetic instability
  - patients with cancerophobia
  - prosthetic treatment
  - source of autogenous bone graft

COMPLICATIONS OF REMOVAL

- Perforation of nasal cavities
- Palatine nerve damage and secondary anesthesia
- Bone necrosis due to poor refrigeration during surgical drilling
- Hemorrhage due to section of palatine arteries
- Dilaceration of palatine mucosa
- Palatine bone fracture
- Mandible fracture
- Hypoesthesia due to poor lower troncular technique
- Injection of anesthesia into blood vessels
- Swallowing or inhalation of bone fragments
- Devitalization of neighboring teeth
- Salivary duct injury
- Lingual nerve injury
- Mucosal laceration
- Poor adaptation of flap
- Post Op: hematomas, edema, suture opening, infection, bone necrosis, mucosal necrosis, neuralgia, scarring

MORE ON TORUS REMOVAL AND SURGICAL TECHNIQUES

- Textbook on Oral Surgery: Part III Chapter 13 Preprosthetic Surgery pages 209-215 used as resource in addition to research articles
- Figures 13-15, 13-16

- Mandibular torus:
  - Extremely large: interference with speech and tongue function
  - Rarely removed when no prosthetic need

- Maxillary torus:
  - Ulcerations from trauma, speech interference, prosthetic interference:
  - **Nearly all maxillary tori require removal for construction of full or partial dentures**
  - Small torus contraindicated for removal if small and no interference
  - Small torus indicated for removal if irregular, extremely undercut, or at posterior palatal seal

SURGICAL TECHNIQUES

- Maxillary tori
  - Anesthesia: bilateral greater palatine blocks, nasopalatine block, local infiltration
  - Incisions: linear at midline of torus, oblique vertical-releasing at one or both ends.
  - At times use full palatal flap: edentulous-incision at crest of ridge; dentulous-palatal sulcular incision
  - Removal: small base-osteome and mallet; larger:section using bur in rotary handpiece, then remove portions with osteoma, mallet, or rongeur, then smooth using large bone bur
  - Readapt tissue using finger pressure, tension free closure is goal
  - Suture by interrupted suture technique due to thin tissue
  - Pressure dressing placed over palatal vault to avoid hematoma

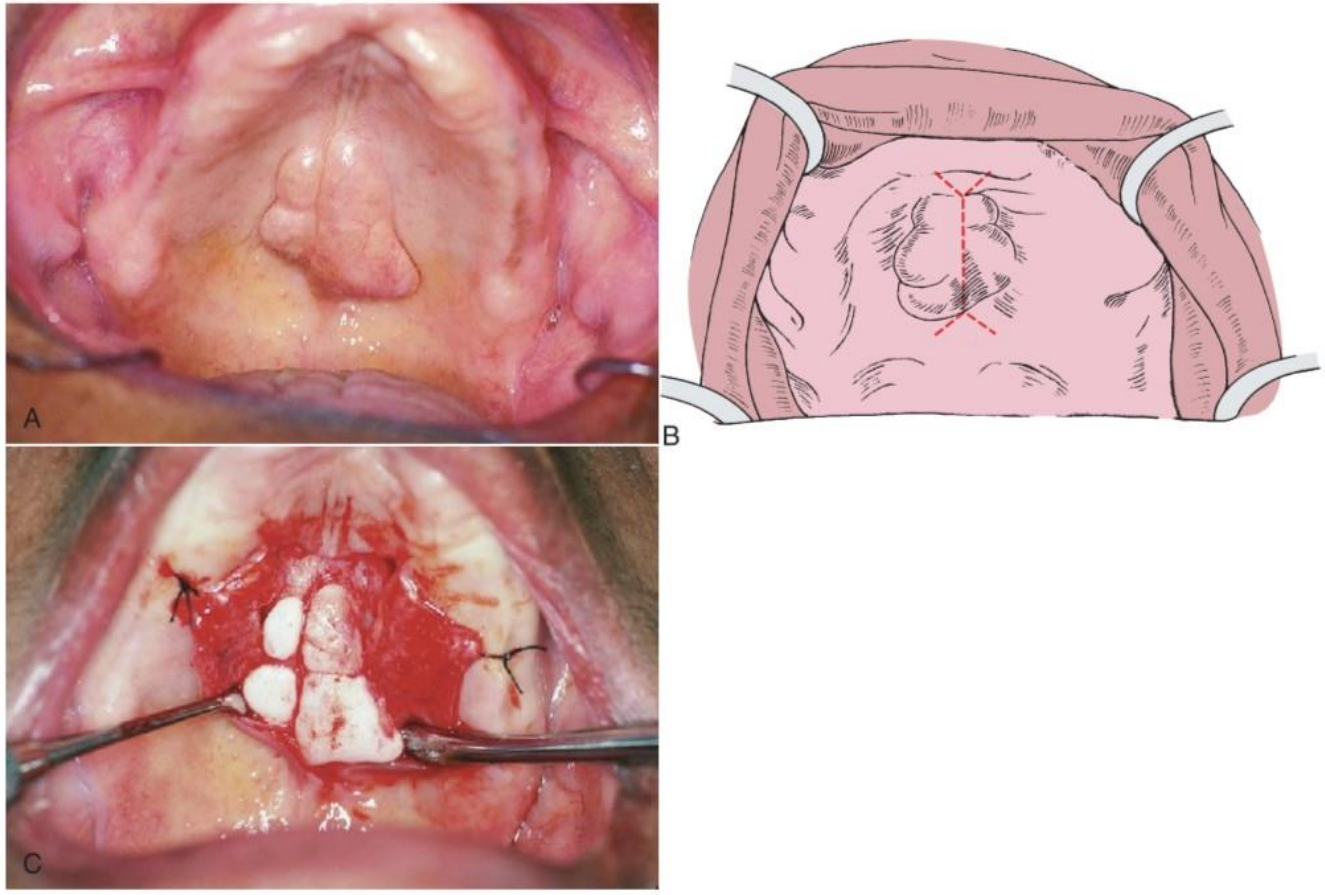


Figure 13-15 Removal of palatal torus. **A,** Typical appearance of maxillary torus. **B,** Mid-line incision with anteroposterior oblique releasing incisions. **C,** Mucoperiosteal flaps retracted with silk sutures to improve access to all areas of torus. Removal of palatal torus.

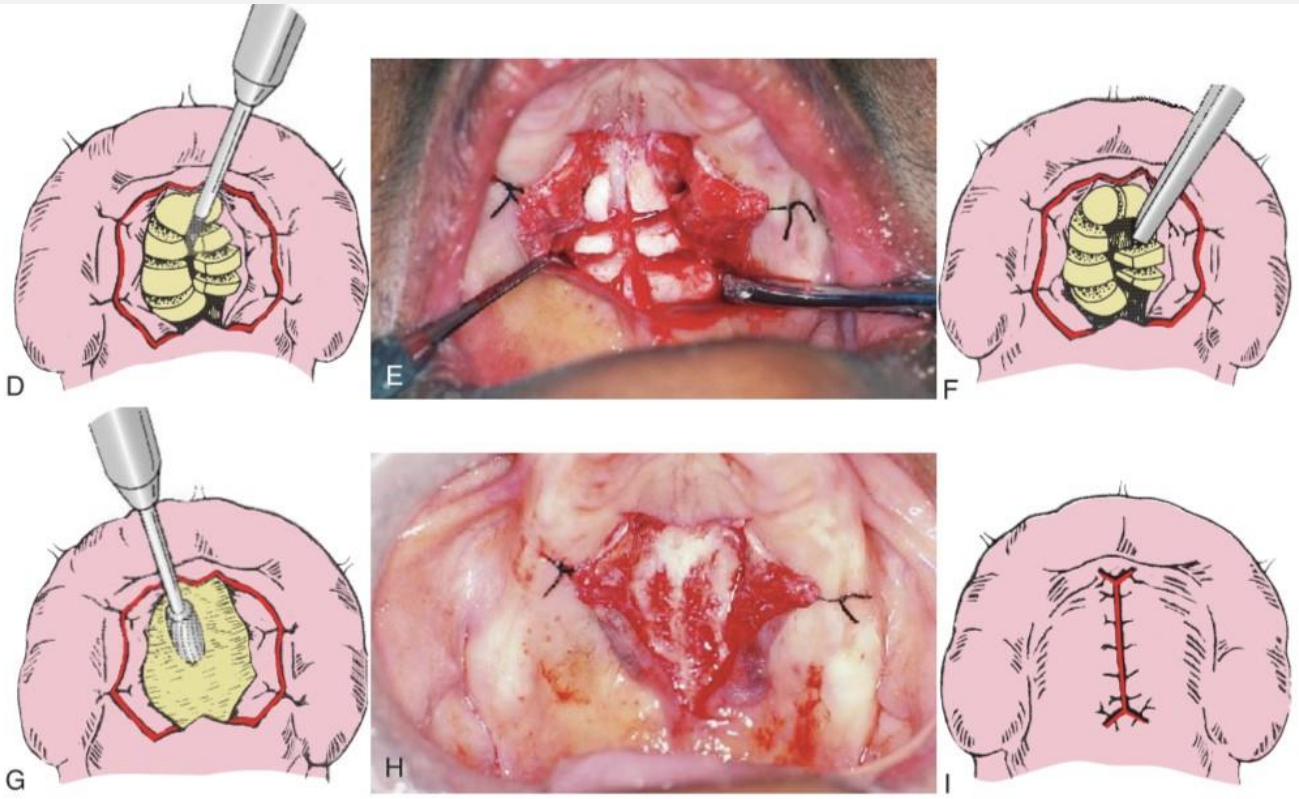


Figure 13-15, cont'd **D** and **E,** Sectioning of torus using fissure bur. **F,** Small osteotome used to remove sections of torus. **G** and **H,** Large bone bu used to produce the final desired contour. **I,** Soft tissue closure.

SURGICAL TECHNIQUES

- Mandibular tori
  - Anesthesia: Bilateral IAN and lingual nerve blocks
  - Incision on crest of ridge 1-1.5mm past tori
  - Leave small band of attached tissue at midline between anterior ends of incisions when removing bilateral tori-prevent hematoma and maintain lingual vestibule
  - Removal: small base-osteome and mallet, can trough using bur in handpiece then use osteome. Position osteome or bur trough parallel with medial aspect of mandible
  - Can use bur to deepen trough to allow instrument to lever against mandible and remove torus
  - Smooth using bone bur or file
  - Readapt tissue and suture using interrupted or continuous technique
  - Place gauze packs at floor of mouth

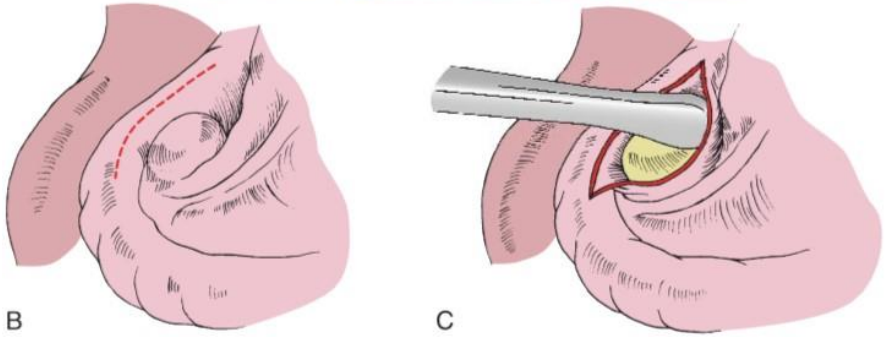


Figure 13-16 Removal of mandibular tori. **A,** After block, local anesthetic is administered; ballooning of thin mucoperiosteum over area of tori can be accomplished by placing bevel of local anesthetic needle against torus and injecting local anesthetic subperiosteally. (This greatly facilitates reflection of mucoperiosteal flap.) **B,** Outline of crestal incision. **C,** Exposure of torus. Removal of mandibular tori.

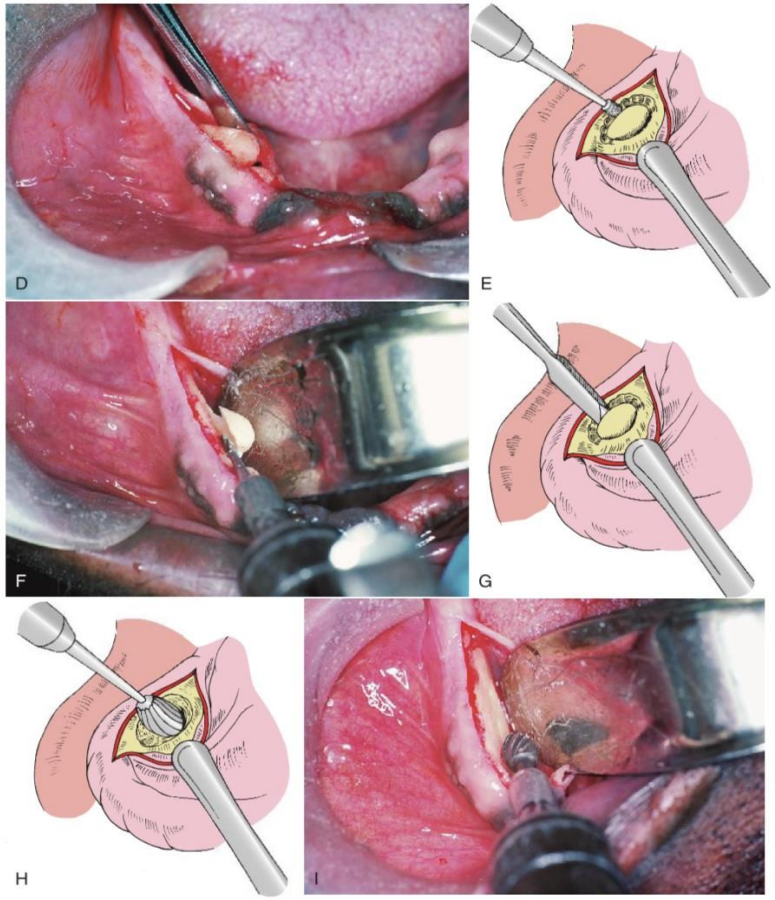


Figure 13-16, cont'd D, Exposure of torus. **E** and **F,** Fissure bur and handpiece used to create small trough between mandibular ridge and torus. **G,** Use of small osteotome to complete removal of torus from the mandible. **H** to **I,** Use of bone bur and bone file to eliminate minor irregularities. Removal of mandibular tori.

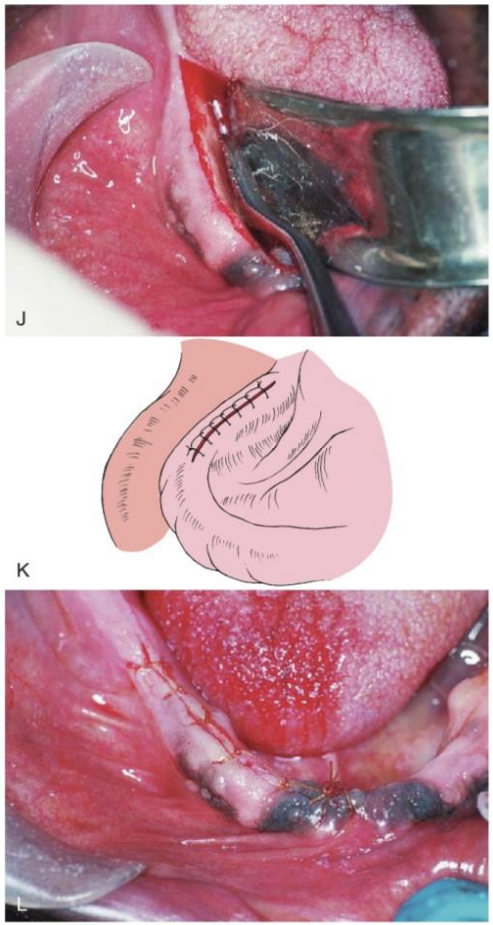


Figure 13-16, cont'd J, Use of bone bur and bone file to eliminate minor irregularities. **K** and **L,** Tissue closure.

ARTICLE 3: A REVIEW OF THE LITERATURE ON OSTEONECROSIS OF THE JAW IN PATIENTS WITH OSTEOPOROSIS TREATED WITH ORAL BISPHOSPHONATES: PREVALENCE, RISK FACTORS, AND CLINICAL CHARACTERISTICS

- Citation: Bernal, Myriam, Blumentals, William A., Kothawala, Prajesh, Miller, Paul, Pazianas, Michael. A review of the literature on osteonecrosis of the jaw in patients with osteoporosis treated with oral bisphosphonates: prevalence, risk factors, and clinical characteristics. Excerpta Medica 2007.
- Study design: Review
- Study purpose: describe the relationship between bisphosphonate use and development of osteonecrosis of the jaw
- Selection: address contraindication of removal of torus in patients with bisphosphonate treatment of osteoporosis

METHODS

- searched MEDLINE, the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and EMBASE
- Used articles published from 1966 to September 2006
- Titles with terms osteonecrosis of the jaw in conjunction with bisphosphonates, alendronate, risedronate, ibandronate, etidronate, clodronate, zoledronic acid, or pamidronate.
- Article criteria: bisphosphonates for the treatment of osteoporosis only; reported data included baseline characteristics of the study population, characteristics of bisphosphonate treatment, clinical features of ONJ, treatment protocol used to manage ONJ, prevalence of ONJ in patients with osteoporosis treated with bisphosphonates;
  - publication involved case reports, case series, observational studies

RESULTS AND CONCLUSION

- 11 publications reporting 26 cases of ONJ in patients receiving bisphosphonates
- The most commonly affected site: mandible (16 patients), second: maxilla (6 patients).
- 18 (78%) were aged >or=60 years
- only 3 (13%) were men
- 15 patients with a history of invasive dental treatment, 12 **(80%) had undergone dental surgery or experienced dental trauma at the site of ONJ**
- no clear relationship between the duration of bisphosphonate treatment and the development of ONJ was observed
- Conclusion:
  - relative prevalence of ONJ in patients receiving bisphosphonates for treatment of osteoporosis is low
  - Age of 60+ years, female sex, previous invasive dental treatment most common characteristics of those who developed ONJ
  - not possible to draw further conclusions about association between oral bisphosphonate use and ONJ in the identified studies because of incomplete reporting and the presence of confounding factors

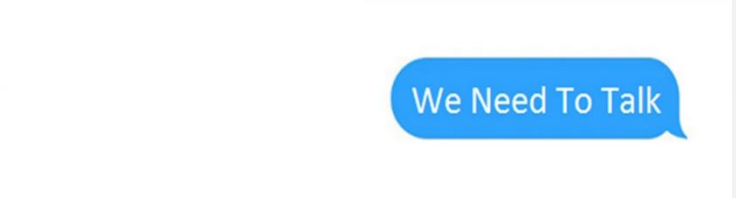
LEVELS OF EVIDENCE

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT
- ☐ **2a** – Systematic Review of Cohort Studies
- ☐ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- ☑ **4a** – Systematic Review of Case Control Studies
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

STRENGTH OF RECOMMENDATION TAXONOMY (SORT)

☑	**A** – Consistent, good quality patient oriented evidence
☐	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

D3 DISCUSSION



- Risks of removal may outweigh benefits depending on each case
- If tori are small, asymptomatic: indication for conservative treatment and observation
- With IV and oral bisphosphonate use, invasive dental treatment and oral surgery including removal of tori may cause osteonecrosis of the mandible or maxilla

- There are many indications for the removal of large or symptomatic torus

D3 CONCLUSIONS

- How does the evidence apply to the patient?
  - Patient has torus mandibularis and torus palatinus-inhibit the proper fit and fabrication of maxillary and mandibular rpds.
  - Due to financial and hygiene concerns, rpds are indicated for treatment
- How will advise D4?
  - Considering patient's current medications, diagnoses, size of tori, and treatment plan implications, removal of tori is indicated

CONCLUSIONS: D4

Based on your D3's bottom line recommendations, how will you ***advise*** your patient?

- Recommended treatment is tori removal and P/P

How will you ***help*** your patient?

- Assure the patient that tori removal is safe

DISCUSSION QUESTIONS

- What makes an individual susceptible to having tori/bony exostoses?
- Can tori be related to any other oral functional habits and does their size then tend to progress in size with age?
- Are there demographic factors that are correlated with tori/bony exostoses?
- After removal is there a possibility of the tori reoccurring over time?
- Are there any environmental or external factors that contribute to tori/bony exostoses such as smoking, preexisting conditions, etc.?
- Are tori ever left alone to create a retention source if the patient is lacking other areas of retention?
- Can stressors from the surrounding oral cavity contribute to the reformation of tori?

DISCUSSION QUESTIONS

- How common are bone spurs with tori removal?
- What is the prevalence of tori/bony exostoses in the population?
- Is it possible for tori/bony exostoses to resorb by themselves?
- Are tori exclusively benign or are they often associated with pathologies?
- In patients where removal of tori/bony exostoses is contraindicated, what treatment is recommended for them, if at all?
- What are complications that can occur during removal of tori?
- Do tori always need to be removed? If not, what cases require removal?
- Would maxillary tori or mandibular tori be more likely to negatively affect the fit of an RPD? At what point would these tori be considered too large for RPD?

THANK YOU