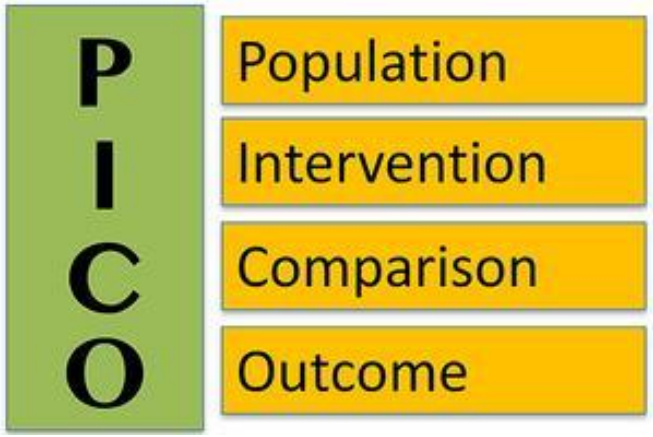
D3: Sara Connell
Clinical Question and PICO

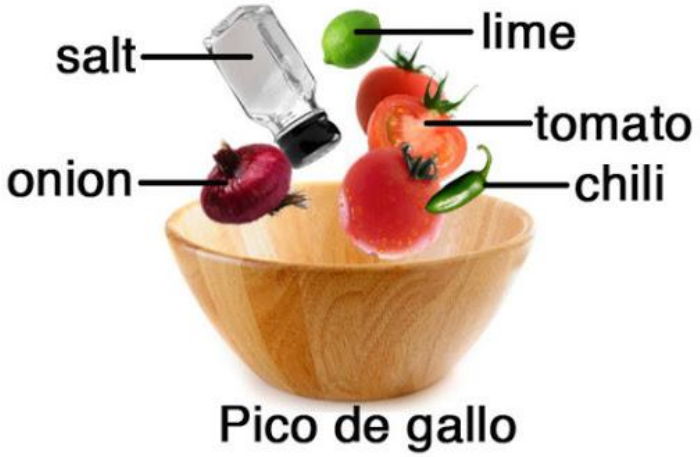
CLINICAL QUESTION

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

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

review

- 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

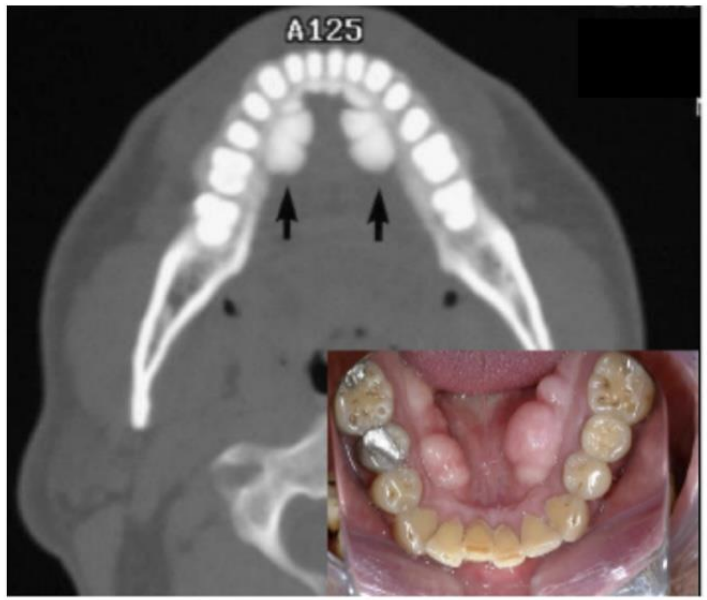


Fig.1

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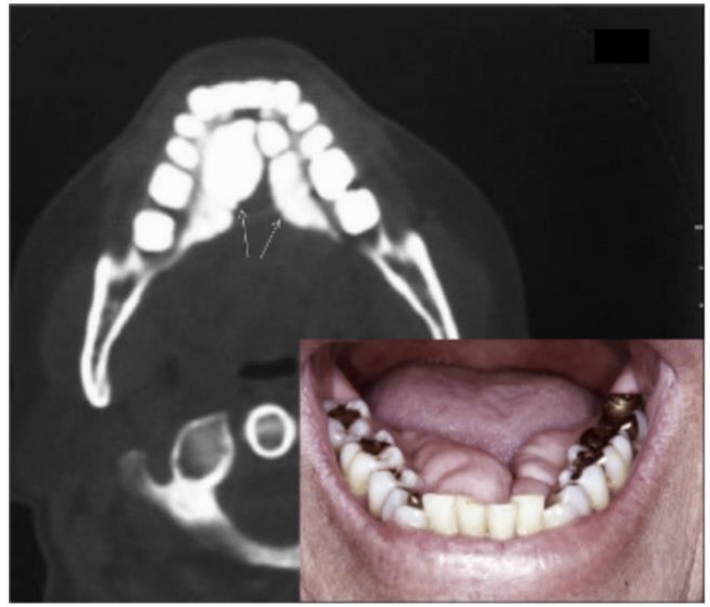

Fig.2

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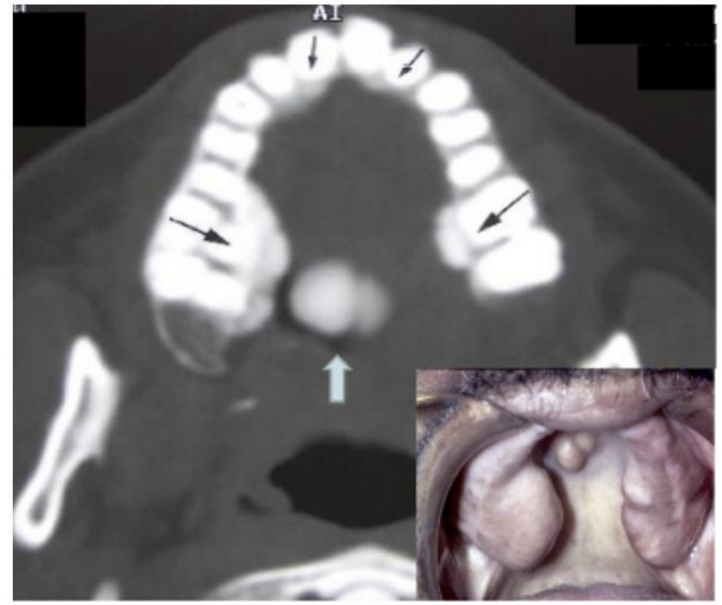

Fig.3

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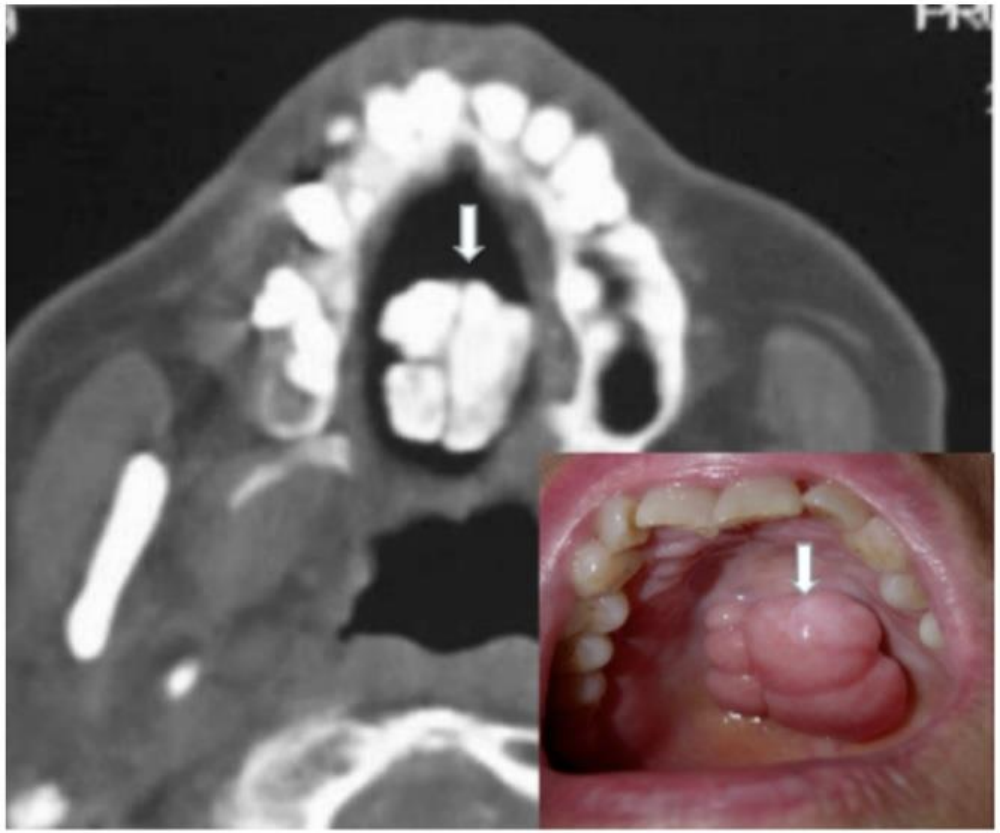

Fig.4

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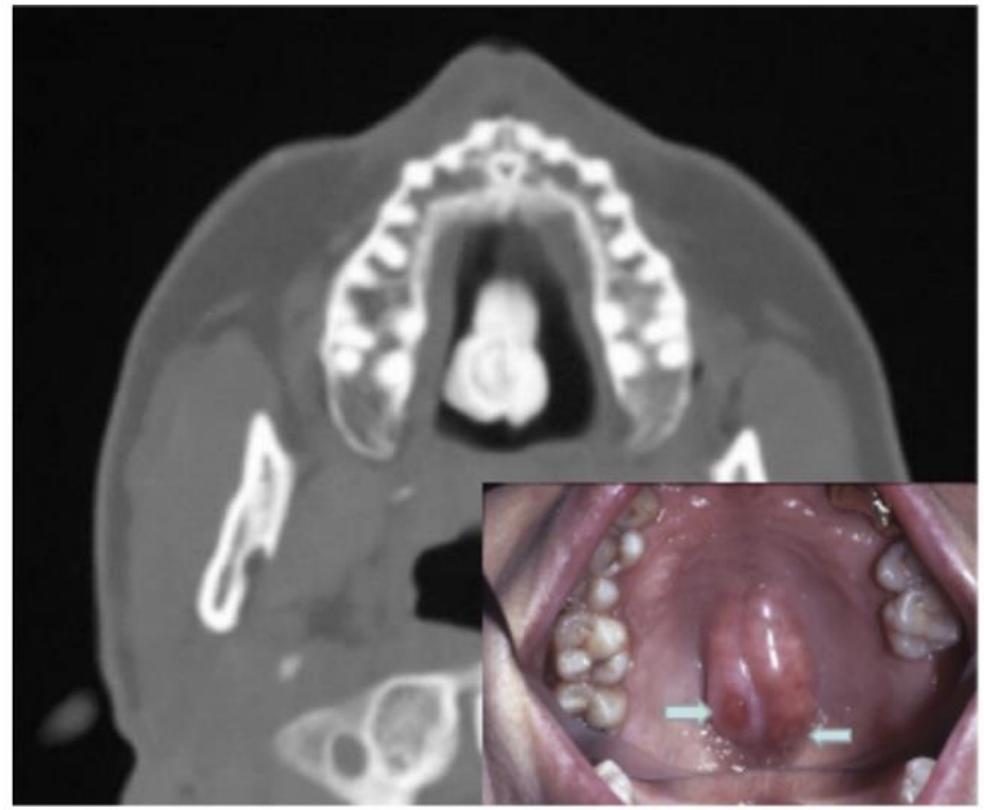

Fig.5

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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

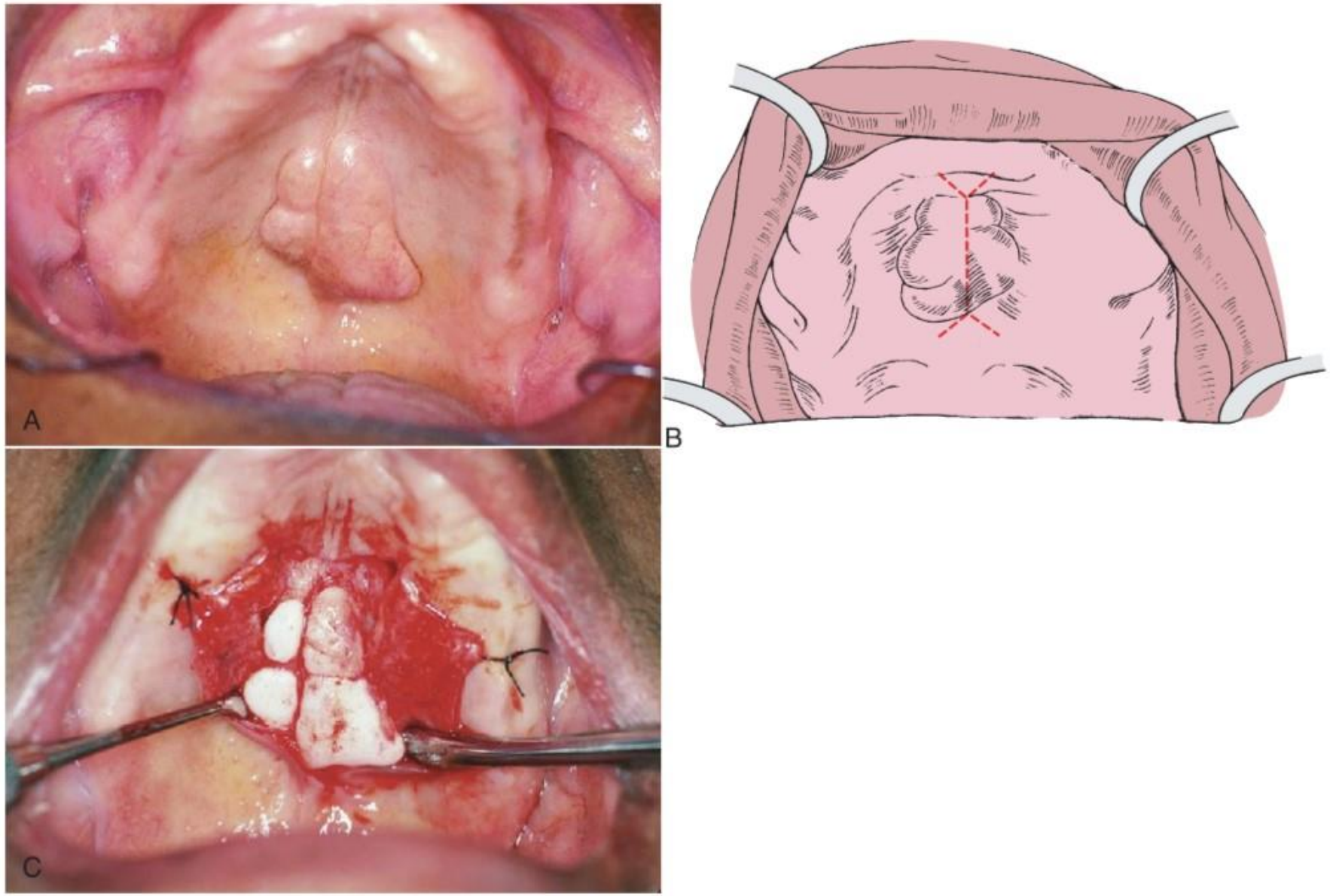

Figure 13-15 Removal of palatal torus. **A,** Typical appearance of maxillary torus. **B,** Mid-line incision with anteroposterior oblique releasing incisions. **C,** Mucoperiosteal flaps retracted with silk sutures to improve access to all areas of torus. Removal of palatal torus.

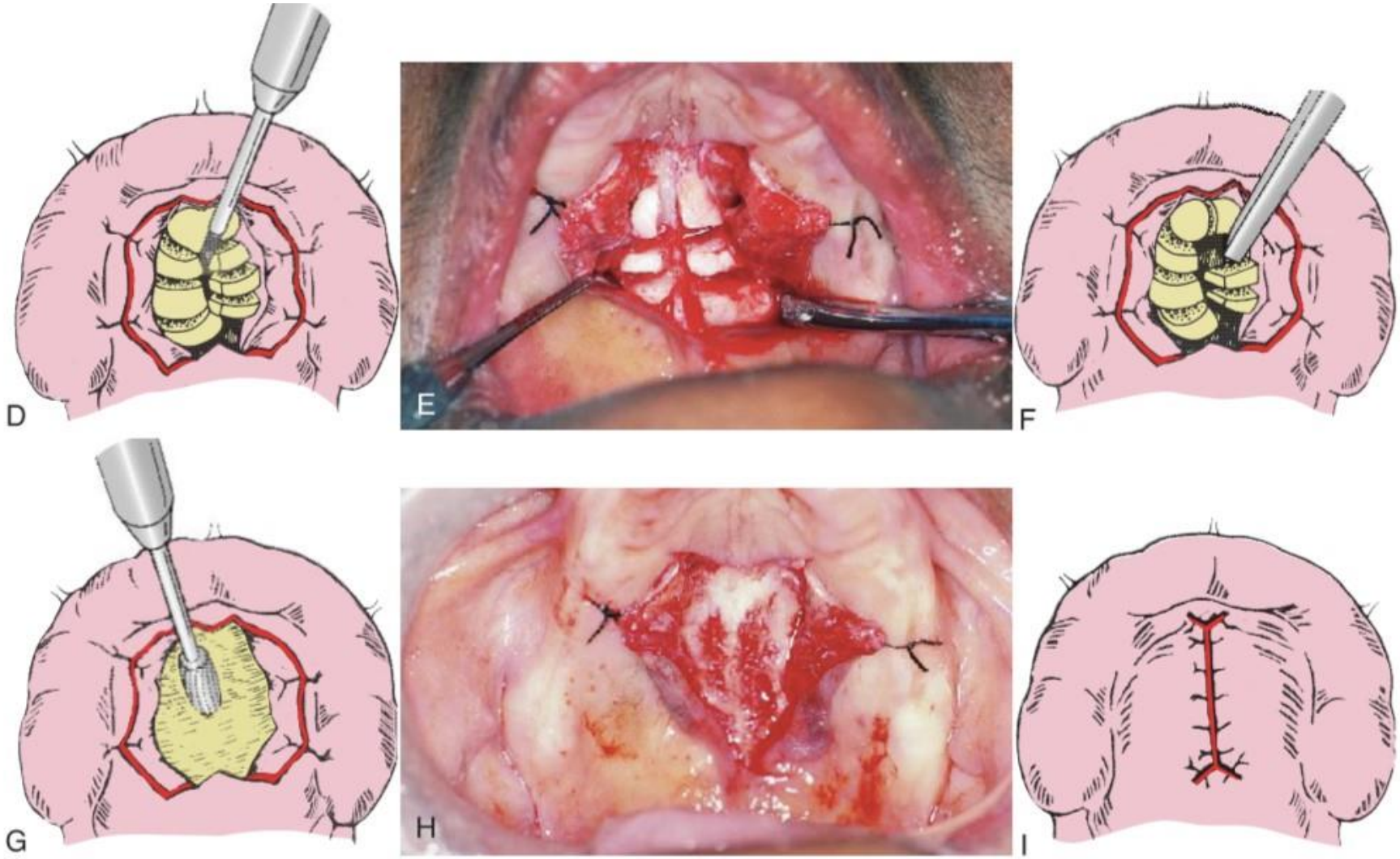

Figure 13-15, cont'd **D** and **E,** Sectioning of torus using fissure bur. **F,** Small osteotome used to remove sections of torus. **G** and **H,** Large bone bu used to produce the final desired contour. **I,** Soft tissue closure.

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

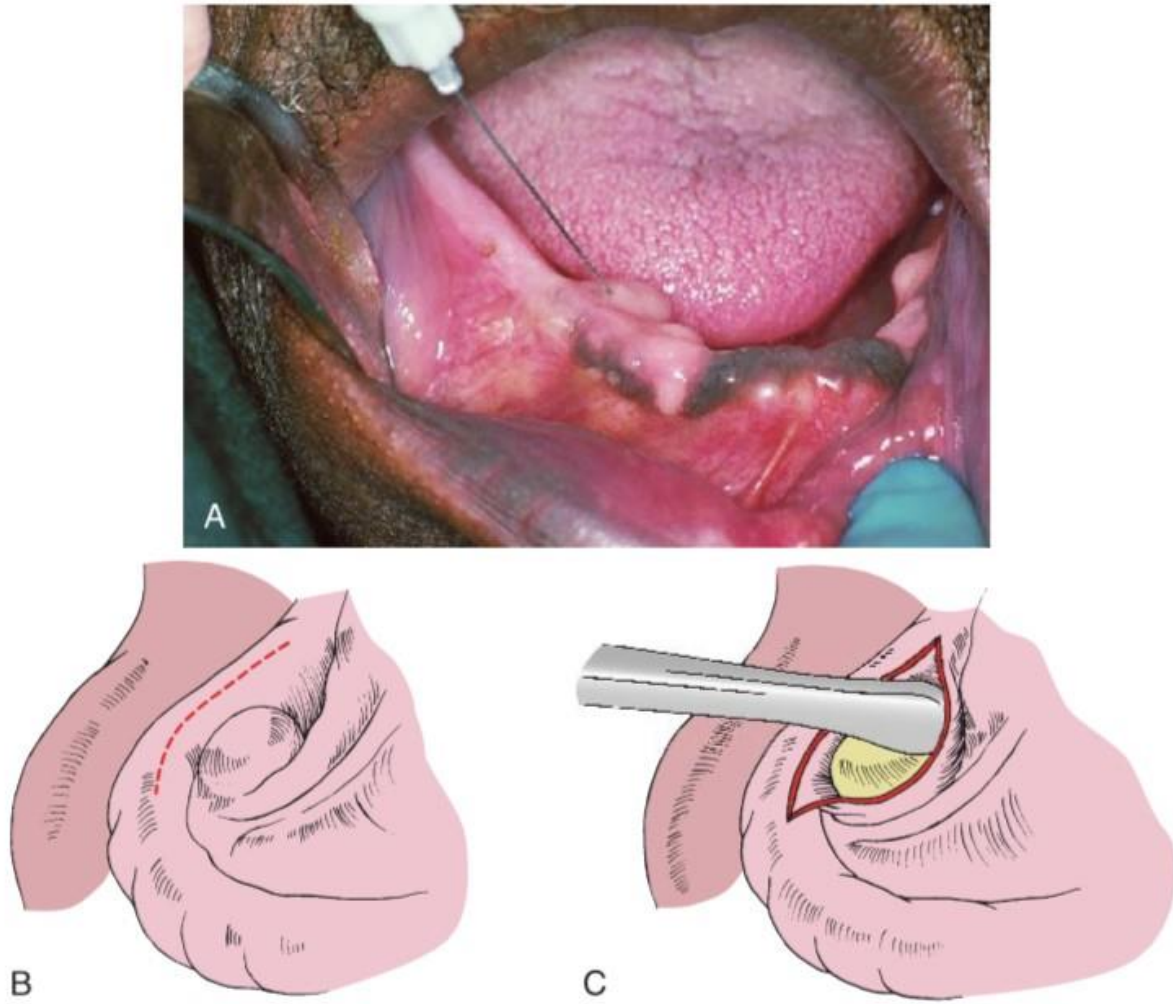

Figure 13-16 Removal of mandibular tori. **A,** After block, local anesthetic is administered; ballooning of thin mucoperiosteum over area of tori can be accomplished by placing bevel of local anesthetic needle against torus and injecting local anesthetic subperiosteally. (This greatly facilitates reflection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

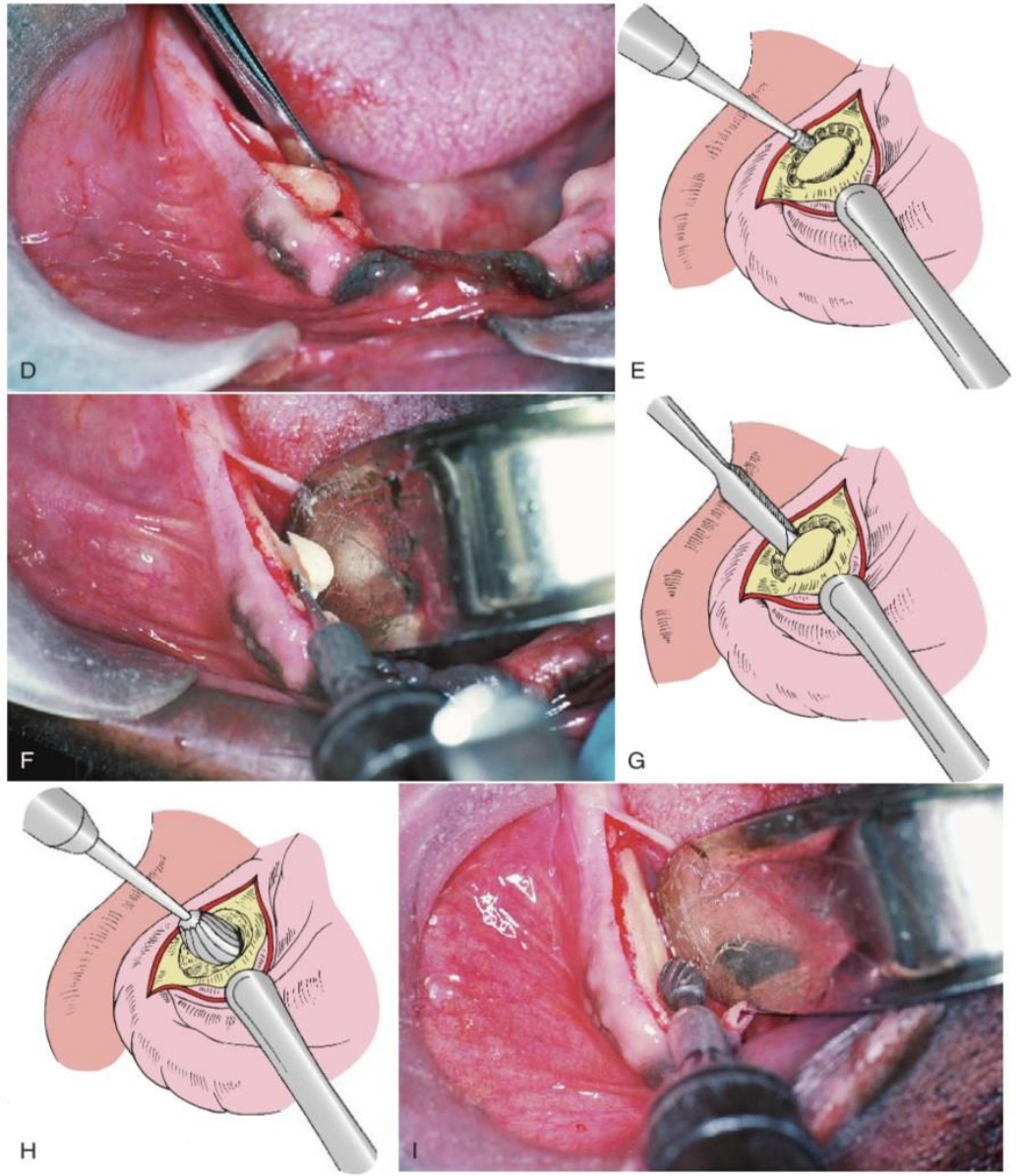

Figure 13-16, cont'd **D,** Exposure of torus. **E** and **F,** Fissure bur and handpiece used to create small trough between mandibular ridge and torus. **G,** Use of small osteotome to complete removal of torus from the mandible. **H** to **I,** Use of bone bur and bone file to eliminate minor irregularities.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

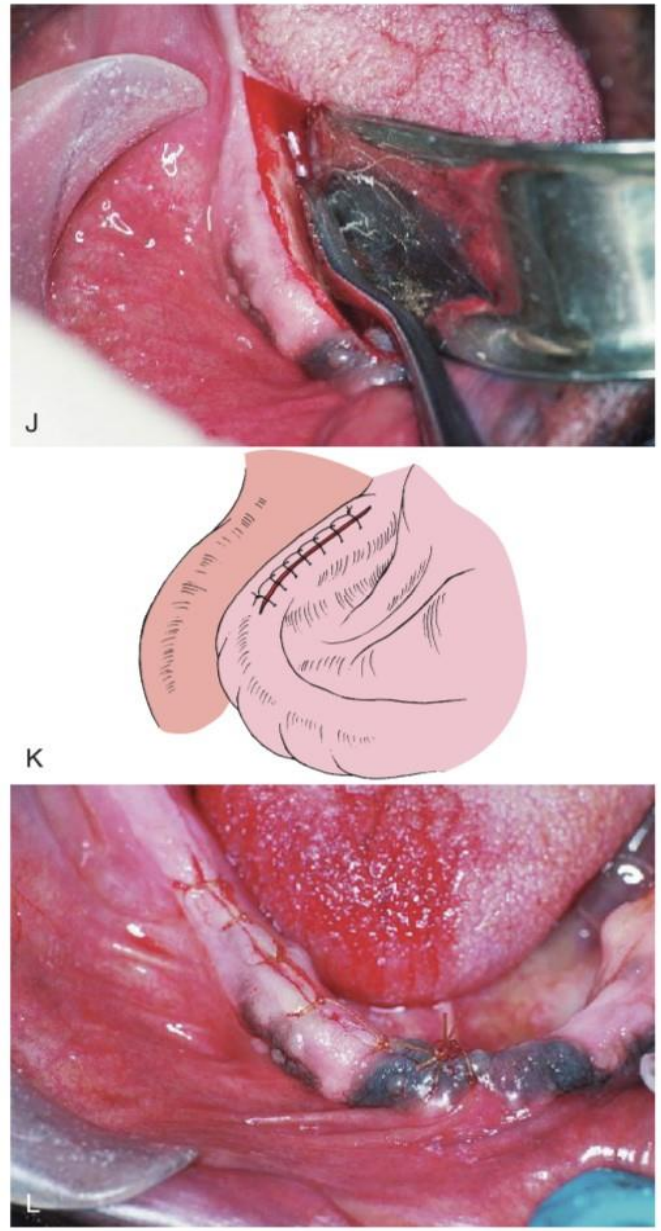

Figure 13-16, cont'd **J,** Use of bone bur and bone file to eliminate minor irregularities. **K** and **L,** Tissue closure.

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 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, including prosthetic interference

D3 CONCLUSIONS

- How does the evidence apply to the patient?
  - Patient has torus mandibularis and torus palatinus that 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