Background

Most articles agree that tori are the result of both genetic and environmental factors like occlusal stress, although there is room for argument.· Buccal tori are less commonly encountered than torus palatinus and torus mandibularis." In most individuals, tori present no problem. Some of the reasons for removing a torus are as follows:

- eliminating an impediment to adequate home care
- reducing recurring trauma from tooth brush or food
- placement of removable prosthetic devices
- periodontal surgery (access to bony defect or physiologic contour of remaining alveolar ridge)
- excising a food trap (between lingual mandibular tori that very nearly approximate one another, or beneath the bulge of the torus, either facial or lingual)
- cosmetic considerations.

Studies note varying percentages of occurrence in different ethnic populations as well as between the sexes. A common finding is an increase in occurrence and size with age. A main consideration when determining a removal technique is generation of heat which could result in bone sequestration and delayed healing. Studies have shown that the erbium family of lasers can remove and contour bone safely and effectively, and one study found that the laser can produce better and faster healing when compared to conventional surgical instruments.·

Pretreatment

A. Outline of Case

1. Patient History and Clinical Description

The presented patient is a 46-year-old male Caucasian with no contributing medical history. Projecting facially from the mandibular alveolar ridge adjacent to tooth #19 (lower left first molar), a bulging exostosis appeared as though the patient had an object in his buccal vestibule when viewed with his mouth closed.

His chief complaint was the grief he received from his wife. She accused him of using smokeless tobacco, which he did, but only when she was not around. Thorus had been present for a number of years, slowly enlarging. The patient noted that on occasion, a piece of food would get caught beneath the bony protrusion. The food was easily dislodged, either with a swish of liquid or with digital manipulation.

This could be referred to as a cosmetic torus removal. Figures 1 and 2 show the existing torus.

2. Radiographic Examination and Hard Tissue Status

Periodontal bone health and level were excellent. The area of the exostosis is clearly evident on the panoramic radiograph as a highly radiopaque area measuring 17 mm by 15 mm. This lesion of moderately dense cortical bone is more normally found on the lingual of the mandible and the midline of the maxilla. It has been postulated that such growths are a response to excessive occlusal forces that result in stress within the bone. Increase in the density or thickness of the lamina dura was not noted, nor was an increase in the thickness of the periosteal ligament space seen in this case.

The patient had a very pronounced canine guidance with slight incisal wear. No facets were present on the posterior teeth. Balancing (nonworking) contacts were absent. The patient did not note any symptoms of nocturnal bruxism or clenching. Both right and left TMJ were normal.

3. Soft Tissue Status

Periodontal health was good, and home care was fair. A slide viewed on a phase microscope revealed a very high number of spirochetes and only a few motile...
short rods. Numerous white blood cells were present.

Six-shape-tooth screening revealed all sulci to be less than or equal to 3 mm with the exception of the interproximal areas of the upper molars, which were up to 4 mm.

The etiology of gum disease and its progression were explained along with recommendations for home care.

B. Diagnosis and Treatment Plan

1. Provisional Diagnosis

A large buccal torus (exostosis) adjacent to tooth #19.

2. Treatment Plan Outline

Local anesthesia will be achieved with 4% Articaine (Septocaine) with epinephrine at 1:100,000. Incision through mucosa overlying the exostosis is planned to be accomplished with an Er:YSGG laser. The resultant flap will be reflected beneath the bone projection. Excess of the incision onto the adjacent alveolus will be unnecessary, as adequate access should be afforded with this minimal cut. The bony growth will be sectioned with the laser. Any rough edges will be removed with the laser and hand files, if necessary. The wound will be sutured. The patient will be scheduled for a 24-hour postoperative evaluation.

3. Treatment Alternatives

Conventional scalpel incision and reduction with a rotary instrument is an option.

4. Indications

a. Treatment

Removal of the bony growth will accomplish two objectives:

- Eliminate the apparent budge in the patient's cheek, which was his chief complaint
- Allow better toothbrush access to the facial margin of the crown on the lower first molar for improved home care.

The bony mass will continue to enlarge and become more noticeable if not removed.

b. Laser

Utilizing a laser as opposed to a metal blade and rotary instruments results in superior healing with a much lower potential for unintentional trauma to adjacent tissues. This has been a consistent finding in the experience of the author, who has used both laser and rotary instruments.

c. Wavelength

The erbium wavelengths (Er,Cr:YSGG at 2780 nm and Er:YAG at 2940 nm) will allow incision in soft tissue and bone with a single wavelength. With proper tip placement, the laser also has a net cooling effect, which minimizes heat buildup. Without the cooling effect, the heat buildup could result in delayed oseous healing and possible sequestration of any devitalized bony fragments.

5. Contraindications

a. Treatment

There are no contraindications for treatment, but there are precautions which will be discussed in the next section.

b. Laser

With proper understanding of the limitations and operating parameters of a laser, there were no contraindications for this procedure for this patient.

c. Wavelength

The 2780 nm wavelength is ideal in this situation where one laser could be used for hard and soft tissue aspects. However, another wavelength could have been used for the soft tissue incision that would have produced less bleeding. But the bleeding is a minor problem in this case as the tissue is stretched very thin over the exostosis, and there is no rich underlying vascular bed with which to be concerned.

Currently, the erbium class of lasers (Er,Cr:YSGG at 2780 nm and Er:YAG at 2940 nm) are the only wavelengths suitable for bone ablation. A severely delayed oseous healing response when CO2 (10,600 nm) and Nd:YAG (1064 nm) lasers were used for osteotomies has been reported12. It should be noted that osteotomies are not clinical indications for use with either the CO2 or Nd:YAG laser.

6. Precautions

a. Severing the Reflected Flap

The flap is reflected down and beneath the bony projection, thus eliminating the resultant flap will be reflected beneath the bone projection. Excess of the incision onto the adjacent alveolus will be unnecessary, as adequate access should be afforded with this minimal cut. The bony growth will be sectioned with the laser. Any rough edges will be removed with the laser and hand files, if necessary. The wound will be sutured. The patient will be scheduled for a 24-hour postoperative evaluation.

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Water spray constantly flushing over the bony target. The water spray is an effective coolant. If the water is not constantly flushing the target tissue, heat buildup will increase, potentially to the level of char formation and necrosis, keeping the tip out of contact with the bone will allow an adequate amount of water to flow around the target tissue, and the heat sink effect of the water spray will be maximized.

d. Air Embolism

Whenever pressurized air is used around a surgical site, there is always the danger of an air embolism. This displacement of air, which may carry microbes and surgical debris deep within adjacent tissue along facial planes, can result in complications including deep infections, delayed healing, and postoperative pain.
In this instance, the tissue was firmly attached to the alveolus apical to the torus, creating a closed space. The air must be directed away from the bottom of the space, and the pressure should be low as possible to help minimize this potential complication.

7. Informed Consent
Verbal informed consent was obtained from the patient and noted in the chart.

Treatment
A. Treatment Objective
The primary objective was to remove a facial mandibular torus (exostosis) with a minimal of procedural and postoperative discomfort while achieving an optimal healing response. This was done with a single laser wavelength capable of ablating soft tissue and bone.

B. Laser Operating Parameters
This procedure was accomplished with an Er:Cr:YSGG laser (Waterlase YSGG, Biolase Technology Inc., San Clemente, California), a free-running pulsed laser at a wavelength of 2780 nanometers. Absorption of this wavelength by water and hydroxyapatite enables its use on soft tissue as well as enamel, dentin, decayed tooth structure, and bone.

A zirconium fluoride trunk fiber delivers the photons through a handpiece loaded with a fiber tip of either sapphire or zirconium. The tips are of varying diameters and lengths.

Operating at 20 Hz, this laser delivers a pulse energy of 25 or 37.5 millijoules with a pulse duration of 145 microseconds when the power setting is 0.50 or 0.75 Watts (the conventional soft tissue setting). At the higher 1.50-Watt setting and a sapphire tip used in this case, the pulse energy will be 75 millijoules. Pulse energy is 158 millijoules for the 3.50-Watt setting (for bone in this case) with the Z-6 tip due to a reduction of actual power emitted from the zirconium tips. This reduction also varies with tip diameter. The "6" in the Z-6 refers to the tip’s 600-micron diameter. The dentist choses the tip and settings to achieve the optimal effect.

C. Treatment Delivery Sequence
1. Anesthesia
Articaine HCl 4% with epinephrine at 1:100,000 is used for a mandibular block (3/4 of 1.8 ml carpule). The remaining 1/4 carpule is used for the long buccal.

2. Soft Tissue Incision
A 6 mm T-4 sapphire tip (400-micron tip diameter) is inserted into the handpiece with the laser set to deliver 7% water and 11% air. The power is set at 1.50 Watts so the incision will be made completely through the mucosa and periosteum. This higher setting will result in a line of ablation slightly cut into the bone.

The tip is placed in light contact with the tissue and slowly drawn along the planned incision line. This portion should take no longer than 2 minutes to perform. The incision design is in the shape of the letter T (Figure 3) to allow the flap to be reflected beneath the torus. This design will preserve a maximum amount of tissue for the final closure.

3. Hard Tissue Incision
Once the flap is reflected, the tip is changed to a Z-6 (14 mm long). The power is changed to 3.30 Watts with the water at 40% and the air at 50%. The osseous incision line is kept wide, allowing sufficient water and air to reach the advancing tip. If the incision is extremely narrow, insufficient coolant will be present and there is a chance of producing excessive heat. Figure 4 shows the osseous sectioning with the laser.

Just before completely separating the exostosis, a #46 exodontia elevator is placed in the opening and slightly rotated. If no movement is seen in the torus, the laser-assisted incision is advanced slightly, with caution taken to avoid cutting off the tissue flap which has been reflected beneath the torus. The elevator is reinserted and rotated once again.

After the torus is fractured away, the rough edges of the surgical site are contoured and smoothed with a combination of hand files and the laser. The power is reduced to 1.75 Watts and the water is reset at 30% and the air at 40%. The Z-6 tip is used for bone contouring.

After the bony margins are smooth, the flap is lifted occlusally and positioned over the exposed bone. The excess soft tissue is trimmed away with the laser power set at 0.50 Watts, water at 7%, and air at 11%. The T-4 sapphire tip is placed in contact with the tissue and moved along the desired incision line. Treatment time for the osseous portion was about five minutes.

The osseous specimen, approximately 10 x 15 mm, shows no evidence of excessive thermal energy application (Figure 5). The specimen could be then submitted for pathologic examination; however, this is not the usual excisional biopsy technique and some of the tissue has been lost.

A 4-0 silk suture is utilized for closure (Figure 6). The entire time for the complete procedure was approximately 20 minutes.
The patient was scheduled in 24 hours for follow-up and again in 8 days for suture removal.

D. Treatment Records
The treatment records reflect the treatment outlined above. In addition, a note was made that everyone in the treatment room had worn the appropriate protective eyewear.

E. Postoperative Instructions
The patient was instructed to continue with his normal activities with the exception of avoiding the surgical area when brushing or eating for 48 hours.

F. Complications
There were no immediate postoperative complications. At the 24-hour postoperative evaluation (Figure 7), the patient stated that he had taken one Vicoprofen prior to retiring for the night because he did not want to wake up with any pain. That was the only analgesic he took, and he said he felt he probably did not even need to take that.

Follow-Up Care

A. Assessment of Treatment Outcome
At the suture removal appointment 8 days later, the patient commented that he felt discomfort only when he poked at the area. Examination revealed that he did in fact poke a great amount. This digital pressure was sufficient to tear the flap from the sutures. Granulation tissue had completely covered the denuded area because of the great vascularity of the exposed cancellous bone (Figures 8 and 9).

B. Complications
The decision was made to allow the wound to complete the epithelization process and then use the laser to trim off the bunchied-up areas. The patient was seen in 2 weeks for evaluation and again in 30 days to remove the excess tissue (Figure 10).

The area healed with a rugae-like appearance due to the bunching of the flap. This excess tissue was removed with the laser set at 0.50 Watts, 7% water and 11% air. No anesthetic was required. The T-4 sapphire tip was lightly moved over the fibrous ridges. No bleeding was produced as the ablation only extended minimally beyond the nonvascular epidermis. Figure 11 shows the finished soft tissue contour achieved with the laser.

C. Long-Term Results
At 10 months, the area had healed very nicely (Figure 12).

D. Long-Term Prognosis
The results were excellent. The patient experienced no sequestration of any bony fragments.

The Er:YGGG laser is an excellent instrument to remove bony protruberances with a minimum of patient discomfort and an optimal healing experience. The net cooling effect of the delivery system prevented any excessive heat buildup that might have resulted in charring, bone necrosis, tissue sloughing, and delayed healing. This wavelength has proved to be an asset when any alveolar bone is removed in a general practice.

Bibliography


