This issue of Wavelengths once again spotlights the erbium “family” of lasers, this one featuring soft tissue surgery. The reader might remember that there are two distinct wavelengths that have indications for use for both hard and soft tissue treatment; they are being discussed together because of their similar properties.

By way of review, Er,Cr:YSGG (2790 nm) has an active medium of a solid crystal of Yttrium Scandium Gallium Garnet that is doped with both Erbium and Chromium. Er:YAG (2940 nm) has an active medium of a solid crystal of Yttrium Aluminum Garnet that is doped with Erbium. Both wavelengths are near the boundary of the near-and mid-infrared, invisible, and nonionizing portion of the electromagnetic spectrum.

Free-running pulsed is the emission mode of both wavelengths. The pulse width of most instruments is in the range of 200-300 microseconds; however, there is a 1000 microsecond pulse available. The current world market offers Er:YAG laser devices that have the laser energy delivered in a hollow waveguide, through an articulated arm, or in a fiberoptic bundle; the Er,Cr:YSGG instrument uses a fiber. The laser light is then directed through a handpiece and interacts with the target tissue. Some devices utilize a rigid glass tip that is used in very light contact, and other instruments are used in a noncontact mode.

On those devices that utilize a fiber delivery system, there is a concentric air-cooled system surrounding a large diameter glass core, making this delivery system somewhat less flexible than the optic fibers of the argon, diode, or Nd: and Ho:YAG lasers.

These two erbium wavelengths have the highest absorption in water of any dental laser wavelength (Figure 1) and the least depth of penetration into water (Figure 2). These two characteristics help determine the soft tissue indications for use of these instruments. The shallowness of the penetration of the laser light means that there is very high absorption at the surface of the target tissue, and since there is a large water component in most soft tissue, there is rapid and efficient ablation.

The small amount of penetration can be a disadvantage for hemostasis. Sufficient temperature rise is necessary to sear and subsequently seal an open capillary by desiccation and contraction of the vessel wall; because some vessels are at some distance from the tissue surface, there can be persistent bleeding with the use of these erbium devices. Further, these two wavelengths are not particularly absorbed into pigmented tissue or hemoglobin. Persistence is necessary to achieve coagulation by vaporizing the water and letting the blood components congeal. Both erbium wavelengths can be used very successfully for soft tissue procedures as long as there is protection afforded to any dental hard tissue that lies just beyond the surgical site. Of course, if there is some soft tissue impinging on a hard tissue lesion, these instruments are ideal for treatment. In cases of soft tissue surgery, the water spray is turned off.

The following clinical cases will demonstrate the soft tissue applications of Er,Cr:YSGG and Er:YAG lasers.
Er:YAG Laser Preparation of Class V Restoration with Soft Tissue Reflection

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Case Overview
Soft tissue reflection and caries removal were performed at the same appointment using no anesthetic on a subgingival carious lesion in a difficult-to-visualize location. The magnification and illumination provided by the surgical operating microscope allowed for judicious removal of both hard and soft tissue with an Er:YAG laser.

Pretreatment
A. Diagnostic Tests
1. Clinical Examination
75-year-old retired aviation physician with no medical abnormalities or concerns. Patient currently not taking any medications.

Dental History: Multiple carious teeth with multiple edentulous spaces present.

Fair-to-poor oral hygiene with daily flossing and brushing present. Generalized periodontal pocketing of 3-4 mm with generalized recession of 1-4 mm. Mobility present on several teeth in posterior sextants. Adequate attached tissue, furcations not present.

Class 3 malocclusion present with negative overjet and negative overbite present. No signs of temporomandibular joint dysfunction or neuromuscular disorder.

2. Tooth Vitality
All teeth tested vital relative to thermal assessment, percussion, and healthy apices on radiographs with the exception of teeth #6, 9, 12 and 13. The upper right canine and upper left first premolar had extensive carious lesions and tested as irreversible pulpitig cases when stimulated with cold (Frigident). The upper left central incisor had completed previous endodontic therapy. Tooth #13 had large carious lesions and tested nonvital to thermal (cold assessment).

3. Hard Tissue Tests
Numerous carious teeth requiring treatment or extraction. Pathological mobility of Grades 1 to 2 on teeth #13, 16, 24 and 25. Tooth #13 tested positively to percussion tests.

4. Radiographic Exam
A series of 10 periapical films were taken and the radiographs revealed carious lesions on teeth #1, 6, 11, 12, 13 and 16 in the maxillary arch. In the lower arch caries was located only on tooth #25. Bony lesions (periapical pathology) were noted on tooth #13; otherwise bone density was noted to be normal.

5. Soft Tissue Tests
As noted on the dental chart, periodontal probing showed pockets to be between 1-4 mm with localized gingival bleeding. Recession was noted to be between 1-5 mm, and mobility was noted on four teeth greater than normal. No furcations were present and no problems with attached tissue were noted.

6. TMD Tests
TMD testing was within normal limits to all ranges of movement. No signs of clicking, tenderness to palpation, deviations on opening, or crepitus were noted. Patient had full range of movement in all directions despite his severe Class 3 malocclusion and missing posterior dentition.

B. Diagnosis
1. Diagnosis
Cervical root surface caries on tooth #1 secondary to inadequate oral hygiene. The lesion was partially obscured by tissue overgrowth in the area, which would need to be retracted or reflected in order to demonstrate the full extent of the lesion.

2. Treatment Plan
Scaling, root planning, prophylaxis (rubber cup polishing of coronal tooth structure), oral hygiene instruction, and suggestions for home care improvement and daily fluoride rinses were completed.

Restoration of other carious lesions and the removal of unrestorable teeth were completed.

The patient preferred not to have his edentulous spaces restored as previous attempts to fabricate partial dentures had met with little success due to his Class 3 malocclusion and an inability to cope with the appliances themselves.

Treatment for the carious lesion on tooth #1 occurred subsequent to the above treatment. The treatment plan called for the removal of the overgrown cervical attached gingiva on the buccal surface of the upper right third molar. An Er:YAG laser for tissue reflection was to be used in a contact manner, without water spray, and in a cautious fashion so as to avoid iatrogenic damage to the dentin and cementum, thus preventing pitting these hard tissue areas with the laser. Subsequent to soft tissue removal with the laser, the full extent of the carious lesion could be visualized and treated with the hard tissue settings of the Er:YAG laser with water spray in non-contact fashion.

Careful placement of the laser in a perpendicular manner to the gingival cuff during soft tissue treatment, followed by a change in position near the end of the soft tissue removal to a more vertical and parallel-to-tooth-structure position would prevent the laser from touching the tooth structure.

Figure 1: Preoperative view.
Figure 2: Start of laser soft tissue procedure, showing initial orientation of handpiece tip.
Figure 3: Laser soft tissue procedure continuing, showing re-orientation of tip to remove tissue tag.
The attempt was to complete both procedures without local anesthetic, relying upon only topical anesthetic for pain control. Subsequent to removal of the carious lesion on the buccal surface, the tooth was to be restored with a composite restoration.

3. Possible Treatment Alternatives

The traditional means of caries removal involving handpieces and gingival retraction cord or electrosurgery could be used for treatment of this lesion. However, anesthetic would most likely be needed for this lesion. Gingival reflection with a dedicated soft tissue laser would be possible and might yield better hemostasis than the Er:YAG laser. The added time necessary to set up the soft tissue laser, and the corresponding increase in pulse duration which would necessitate anesthetic were negative sequelae should the dedicated office soft tissue laser (argon 514.5 nm) have been used.

The gingival tissue responded to hygiene measures positively, showing a marked reduction in inflammation, making the possible usage of the Er:YAG laser a possibility in this case.

Periodontal gingivectomy utilizing scalpels could also be considered in addition to electrosurgery for the soft tissue retraction.

4. Indications for Laser

This is an ideal case for the Er:YAG laser to be used for both soft and hard tissue treatment in one area. The lesion was moderate in size, the tissue was healthy, and the patient was excited about the opportunity to avoid anesthetic in this case. The laser is ideal for minimal soft tissue reflection around carious areas, with hard tissue caries removal of buccal decay being among the easiest treatments to complete with the Er:YAG laser.

5. Contraindications for Laser

Contraindications for laser gingivectomy and tissue alteration would include heavily inflamed pre-existing tissue with deep subgingival caries approaching the osseous level. Under these circumstances, periodontal osseous reflection with traditional caries removal with handpieces could be considered.

6. Informed Consent

The patient granted verbal and written consent for the treatment and was excited to have the laser and microscope used for his restoration.

Treatment

A. Objective

Remove the overgrown tissue selectively and remove the caries without anesthetic with the Er:YAG laser only.

B. Laser Operating Parameters.

An Er:YAG laser (DELight, Continuum Biomedical, Santa Clara, California), 2940 nm, 400 micron quartz fiber, 80-degree tip was used in pulsed mode (pulse duration of 300 millionths of a second) without water for reflection of the gingival tissue, and with energy settings of 20 Hz and 60 mJ for 2 minutes in total to remove the overlying tissue. Hard tissue settings began at 30 Hz and 100 mJ and progressed to 30 Hz and 60 mJ for deep decay removal and etching of the enamel surface. The laser was used for 5 minutes for the hard tissue component.

C. Treatment Sequence

The soft tissue was isolated with topical anesthetic (One Touch, Hagar) and a 400-micron quartz tip placed in the laser delivery system. Soft tissue reflection was completed in two stages. The initial removal of the soft tissue occurred by holding the quartz tip at a perpendicular angle to the attached overlying tissue. After a minute or so the depth of the cut was sufficient such that there was only a small tag of tissue remaining. The laser angulation was changed at this point to provide for a parallel-to-tooth-structure approach to remove the loose tag of tissue. After 45 seconds, the laser had removed the overlying tissue with minimal discomfort. Hemorrhage was minimal and easily controlled.

The 400-micron tip was then placed in a noncontact manner and the water spray was turned on for the caries removal portion of the treatment. The quartz tip was held approximately 0.5-1.0 mm away, and with slow circular movements and with laser settings of 30 Hz and 100-60 mJ, the caries was removed. After roughly 3 minutes, a small #4 bur in a slow-speed handpiece was introduced to the preparation to determine if complete caries removal had occurred. The laser was then used at settings of 30 Hz and 60 mJ to remove the smear layer produced by the laser and to etch the enamel cavosurface margin.

The preparation was etched with 37% phosphoric acid for 20 seconds, and a bonding agent (Prime and Bond NT, Kerr) was placed according to the manufacturer’s instructions. An argon laser (Dental 400, HGM, Salt Lake City, Utah) was used for 5 seconds to cure the bond, and a flowable composite (Tetric Flow shade A 3.5, Williams Ivoclar) was placed and cured with a 5-second argon laser cure. The laser curing disclosed a slightly subgingival shard of calculus which was removed with a curette. The restoration was polished and the patient dismissed following the final photographs.

D. Management of Complications

There were no complications. The patient reported minimal discomfort during a portion of the hard tissue procedure (slow-speed caries removal). Other than that, the patient was not uncomfortable at all during the procedure.

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Case Overview
The traditional treatment involving a maxillary frenectomy in children is often difficult since the usage of anesthetic can provide for challenges during treatment and complications postoperatively to the child. Traditional Z-plasty involves scalpels and sutures and a long, drawn-out procedure. An erbium laser frenectomy was completed in this 9-year-old child.

Pretreatment
A. Diagnostic Tests
1. Clinical Examination
9-year-old female with no sign of any medical abnormalities or concerns.

Dental History: Mixed dentition with maxillary and mandibular adult incisors present. Moderate caries rate with interproximal lesions present on five teeth: upper right, left and lower left first molars, and interproximal lesions on primary upper left molars. No evidence of periodontal disease, TMD, or neural muscular disorders. No previous dental restorations. Maxillary diastema of 2.5 mm between teeth #8 and #9 with a very high maxillary frenum attachment.

No evidence of periodontal disease, TMD, or neural muscular disorders. No previous dental restorations. Maxillary diastema of 2.5 mm between teeth #8 and #9 with a very high maxillary frenum attachment.

Class II Div 1 (full cusp on right, 1/2 cusp on left side), 70% anterior open bite (AOB) and 6 mm overjet.

2. Tooth Vitality
All teeth — including the moderately large curvaceous teeth in the upper left — tested vital to thermal assessment

3. Hard Tissue Tests
Caries discovered on interproximal of upper left primary molars and on occlusal surfaces of three of four permanent molars. A class II malocclusion with a maxillary diastema was noted.

4. Radiographic Exam
Bitewing radiographs and a panoramic radiograph showed caries as noted. All permanent teeth were accounted for, bone density was normal, and no signs of bony lesions were present. The development of the permanent dentition was progressing normally, and no supernumerary teeth were seen on the Panorex™.

5. Soft Tissue Tests
Soft tissue evaluation revealed a high maxillary frenum with no progression through to the palatal surface as dictated by blanching of the tissue being reserved to the facial of the tissue during retraction of the maxillary labrum. No blanching was observed between the incisors or on the palatal tissue. No evidence of connective tissue fibers connecting through to the palatal was observed.

6. TMD test
TMD testing within normal limits.

B. Diagnosis and Treatment Plan
1. Diagnosis
A high attachment of the maxillary frenum was partially responsible for a 2.5 mm maxillary diastema, and this frenum was deemed to not have a palatal extension to its connection.

2. Treatment Plan
A frenum release in the maxilla to allow for possible improvement in diastema closure without orthodontic appliances for financial concerns. Frenum release to be accomplished with the removal of the caries in the same appointment and with anesthetic for the frenum.

In discussing the treatment plan, the mother asked for anesthetic for the maxillary frenum, feeling that it might be quite sore for her daughter.

3. Possible Treatment Alternatives
The release of the maxillary frenum could be completed with traditional surgical removal including sutures and scalp Z-plasty. A more radical removal of interproximal fibers and also removal of a palatal triangular wedge was not indicated as the retraction of the upper lip provided blanching only on the labial and not lingual side. Soft tissue laser removal of the maxillary frenum was also a consideration with the possibility for better hemostasis.

4. Indications for Laser
The reduction of the high frenum attachment could be handled with the Er:YAG laser wavelength at moderate energy settings for the frenum release with predictable healing and a very low risk for complications.

5. Contraindications for Laser
Previous negative experiences with the laser or tremendous soft tissue removal where hemostasis might be a concern. Neither of these contraindications existed.

6. Informed Consent
Verbal consent was established with the patient and due to the minor age, written and verbal consent was received from the mother.

Treatment
A. Objective
The objective of treatment was to release the maxillary frenum with minimal anesthetic. Release of the maxillary frenum was planned in the hope that spontaneous reduction of the midline diastema would occur.

B. Laser Operating Parameters
An Er:YAG laser (DELight, Continuum Biomedical, Santa Clara, California), 2940
C. Treatment Sequence
Preoperative photographs were taken of the posterior primary teeth and the maxillary frenum. Topical and 1/2 carpule of Ultracaine (articaine hydrochloride 4%, 1:100,000 epinephrine) was infiltrated on either side of the frenum on the labial side. Due to the lack of blanching interproximally on both centrals and on the palatal aspect, the decision was to release the frenum fibers only on the buccal aspect secondarily.

A soft tissue pointed tip was placed onto the delivery system and the settings for the laser were 20 Hz and 80 mJ without water for removal of the maxillary frenum. The laser was used to remove all the fibers and slight hemorrhage did occur after releasing the last of the fibers. During the procedure, care was taken to remain in unattached tissue and to not remove periosteum or bone. Minor hemorrhage was easily controlled by firm pressure with gauze for 3-4 minutes.

The patient was dismissed once hemostasis was obtained and follow-up appointments were scheduled for the patient.

D. Management of Complications
There were no unusual intraoperative complications. The child and mother were pleased with the minimal anesthetic, and the patient reported minimal discomfort.

E. Surgical Prognosis
Prognosis is very good. At one month, the maxillary frenum release had resulted in some closure of the diastema and complete healing of the surgical site.

F. Treatment Record
Treatment was recorded with written documentation in the chart, radiographs, and digital photographs from a camera (Coolpix 990, Nikon) attached to the surgical operating microscope.

G. Patient Management
Following the procedure when the laser was used, extensive instructions were given to the mother of the patient regarding possible complications with the laser frenectomy. Patient was prescribed Advil liquid for children and advised to take 1 tsp 2-3 times per day, with a minimum of 6 hours between doses and no more than 3 tsp per day. Salt water rinses for the frenectomy surgical site were discussed.

H. Postoperative Instructions
The patient and her mother were given extensive instructions for post-treatment symptoms and for the management of the above medication.

Follow-Up Care
A. Side Effects and Complications
No unusual side effects or responses for the frenectomy were reported. The patient took 1 tsp of Children’s Advil liquid that evening. The following day and night the patient also required the liquid ibuprofen every 6 hours to control mild pain. The mother of the patient and the patient herself when returning for follow-up care responded how surprised they were with the lack of discomfort both during and after the procedure.

B. Assessment of Treatment
The patient returned for her first follow-up at one week. The frenectomy was healing very nicely.

At 2 weeks the patient returned for inspection of the maxillary frenum and healing had almost completed. Slight closure of the diastema was noted.

The 1-month and 3-month photographs of the teeth and frenum show complete healing and no complications at all.

C. Long-Term Results
At 3 months the soft tissue healing of the frenectomy was complete and closure of the diastema in the maxillary anterior region was occurring. Due to financial constraints, the parents of the patient are hoping that closure will occur naturally and decrease the possibility in the future for orthodontic care. The restorations of the primary molars have been uneventful despite their relative depth.

D. Healing Assessment
Total healing of both the soft tissues has occurred. All teeth involved in the procedures have remained vital with no indication clinically or symptomatically of pulpal damage. The maxillary frenum release has completed healed and the patient is pleased with the partial closure of her diastema.

E. Discussion
Dedicated soft tissue surgical lasers have been documented with frequency to be of great benefit to total frenectomies and to frenum release surgery. The Er:YAG laser, although primarily a hard tissue instrument, is able to ablate soft tissue rapidly and in most instances can achieve hemostasis. The potential benefits of utilizing one laser for minor soft tissue surgery in conjunction with hard tissue procedures include reducing setup and sterilization procedures, improving efficiency, and reducing the need for multiple appointments. The hard tissue capabilities of the Er:YAG laser for caries removal have been well documented.

In this case the dentist, staff and patient all benefit from being able to complete two procedures in one sitting with minimal anesthetic and minimal discomfort during surgery and postoperatively.

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This case shows an 8-year-old patient with an impinging maxillary frenum. An Er:YAG laser (DELight, Continuum Biomedical, Santa Clara, California) was used to remove the frenum attachment (Figure 1). The surgical tapered soft tissue tip was used at 30 Hz and an energy setting starting at 55 mJ and finishing at 100 mJ to recontour the interproximal soft and hard tissue. The power was 1.65-3.0 W, total treatment time 1 minute, no water spray (Figure 2). Local anesthesia was used. Figure 3 shows healing and tooth migration at 6 months postoperatively.

Er:YAG Laser Removal of Hyperplastic Tissue Due to Dilantin

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Pretreatment

A. Diagnostic Tests

1. Clinical Examinations
A 14-year-old male presented with severe gingival hyperplasia (Figure 1) due to required use of Dilantin™ because of seizures. No other drugs would control the patient from having seizures. Referred from general dentist since the patient was anxious about having the procedure completed with a scalpel. Past dental history revealed that the child had had a previous gingivectomy and was in significant pain for one week postoperatively. The patient’s parent requested the tissue be removed with a laser.

2. Radiographic Exam
Panoramic radiograph and bitewing radiographs indicated no other problems.

3. Soft Tissue Tests
Soft tissue had areas of pockets ranging from 5-10 mm due to enlarged gingival tissue in both the upper and lower maxillary and mandibular quadrants. Tissue was fibrotic and displayed little bleeding.

B. Diagnosis and Treatment Plan

1. Diagnosis
Severe gingival hyperplasia due to Dilantin.

2. Treatment Plan
Surgical removal of excessive hyperplastic tissue under local anesthesia in the dental office.

3. Possible Treatment Alternatives
Referral to periodontist for conventional therapy.

4. Indications
Use an Er:YAG laser to remove soft tissue.

5. Contraindications
Possible seizure.

6. Informed Consent
The parent and child were informed of potential for regrowth and postoperative discomfort. Informed consent was obtained.

Treatment

A. Objective
Use an Er:YAG laser to remove hypertrophic gingival tissue.

B. Laser Operating Parameters
A pulsed Er:YAG laser (DELight, Continuum Biomedical, Santa Clara, California) was used for treatment. Two visits were required. The maxillary arch was completed first (Figure 2) and one week later the mandibular arch was completed.

1. Wavelength: 2940 nm
2. Beam Diameter: Surgical 200-micron tip
3. Repetition Rate: 30 Hz
4. Energy: Varied between 55 and 120 mJ during treatment
5. Treatment Time: 20 minutes per arch.

C. Treatment Sequence
• All environmental safety checks were in order
• Protective eyewear placed on patient, assistant and operator.
• The patient was given 1.0 cc Septocaine™ infiltrated into hyper-
trophic tissue in the upper arch. The lower arch was completed without anesthesia.

- The area was tested for discomfort with an explorer in the upper arch.
- The laser was turned on and tested to assure power was set and water was emitted.
- The laser was set at 30 Hz, 55 mJ which was increased up to 120 mJ as needed (Figure 3).
- Postoperative instructions were given to the patient and parent. The patient was instructed to take ibuprofen if needed for any discomfort, rinse with warm salt water or Peroxyl rinse, and maintain good oral hygiene. No significant bleeding occurred and the area was left unpacked.

D. Management of Complications
The parent was called 3 hours after treatment and the patient was comfortable and reported no pain. The parent was called 24 hours after treatment and the patient still was in no discomfort. The area remained asymptomatic and upon examination 1 week after treatment, the child reported no pain and the area was healing well.

Follow-Up Care
A. Side Effects and Complications
One week postoperative there were no problems and the patient was told to return to the orthodontist for placement of wires.

B. Assessment of treatment
Postoperative healing was uneventful.

C. Long-Term Results
The patient should heal without any problems and the orthodontic treatment should proceed. There was concern that the tissue would regrow and the patient was kept on a monthly oral hygiene check. After 6 months the tissue showed some regrowth (Figure 4) and the patient underwent a second round of gingival recontouring. As long as the braces are on and the patient undergoes Dilantin therapy, the potential for regrowth appears likely. However, the patient did not experience any postoperative pain and was quite comfortable undergoing the procedure a second time.

D. Healing Assessment
The area appeared to have excellent initial healing.

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Erbium:YAG Laser Removal of a Fibrous Hematoma

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Pretreatment
Diagnostic Tests

1. Clinical Examination
A 53-year-old male, negative medical history. Dental history: Many restorations, some coronal coverage, missing all 3rd molars. Periodontal examination revealed localized gingivitis, all pockets 2-3 mm, some sites exhibited bleeding upon probing; oral hygiene was fair to good.

2. Tooth Vitality
All teeth tested vital except #5, 12, 30, and 31 which had previous endodontic treatment.

3. Hard Tissue Tests
No caries present, all restorations had intact margins.

4. Radiographic Exam
- All restorations had acceptable margins and contours
- No caries or bony lesions were noted
- Endodontically treated teeth healed well
- Periodontal tissues were normal.

5. Soft Tissue Tests
Oral cancer exam showed no apparent pathology intraorally.

On the lower left lip lingual to the wet-dry line border and adjacent to the lower left cuspid, a fibrous lesion, approximately 1 cm diameter, was present. The lesion was palpable yet firmly attached with no stalk and had a reddish appearance. The patient said it had been present for about 6 months.

6. Other
Occlusion was Class I with severe crowding in the anterior area, both upper and lower. The patient appeared to catch the lower left lip between the upper and lower incisor teeth.

B. Diagnosis and Treatment Plan

1. Diagnosis
A fibrous vascularized lesion, 8-10 mm in diameter, was present. The lesion was pal- pable yet firmly attached with no stalk and had a reddish appearance. The patient said it had been present for about 6 months.

4. Indications
For treatment: The continued presence of this traumatic fibrous lesion would cause the growth to increase in size because of the patient’s habit pattern and occlusion. For laser use: The laser could remove the lesion completely and, due to the shallow depth of penetration, would minimize scarring and possibly prevent regrowth.

5. Contraindications
For treatment: Possible scar formation allowing increase in fibrous tissue. For laser use: The erbium wavelength’s shallow depth of penetration produces less hemostatic effect. This lesion appeared highly vascularized.

6. Informed Consent
Informed consent was obtained from the patient.

Treatment

A. Objective
Complete excisional biopsy of the lesion using the laser.

B. Laser Operating Parameters
An Er:YAG laser (Delight, Continuum Biomedical, Santa Clara, California)
• Emission wavelength: 2940 nm
• A straight 600-micron diameter tip was used with no water spray
• Energy was 80 mJ per pulse, and the repetition rate was 30 Hz
• Total laser exposure duration was 30 seconds for the lesion removal and 4 minutes for hemostasis.

C. Treatment Sequence
• The lesion was measured with a periodontal probe and found to be approximately 9 mm in diameter, with no constriction at its base. It was firmly attached to the lip. (Figure 1)
• Topical anesthetic gel, 20% benzocaine, was applied for 20 seconds in the labial mucosal fold at the base of tooth #22, and then 10 mg of mepivacaine was injected with a 30 ga needle in the same location
• All laser safety protocols were in place
• A straight tip was placed on the laser delivery system, and the instrument was test fired
• Tissue forceps were gently placed on the distal aspect of the lesion to pull it while the laser tip was used in contact with the tissue, starting at the medial aspect (Figure 2)
• The laser was activated and the lesion was excised in 30 seconds (Figure 3)
• Considerable bleeding emanated from the fresh wound, and the laser was then held 1-2 mm from the wound surface and activated
• The tip was swept around the entire surgical site and the laser energy was absorbed on the surface of the wound until hemostasis was achieved 4 minutes later (Figure 4)
• Gauze was pressed on the lesion for 30 seconds at minute two and four, interrupting the laser procedure. The gauze pressure helped with coagulation
• The lesion was preserved for biopsy examination (Figure 5) and the patient was dismissed.

D. Management of Complications
There were no unusual complications. Hemostasis was expected to be somewhat difficult because of the limited coagulative ability of the erbium wavelength and the vascularity of the lesion and surrounding tissue.

E. Surgical Prognosis
Good, because the lesion was removed. Occlusal adjustment will help to reduce recurrence.

F. Treatment Record
Treatment, including laser parameters, was documented. The tissue specimen was biopsied, and a report issued.

G. Patient Management
Anesthesia was excellent, and the patient reported no discomfort.

H. Postoperative Instructions
The patient was told to carefully watch for any bleeding and was given directions for managing any bleeding. He was also told to avoid excessive movement of the surrounding soft tissue area for 2 days to ensure good clot formation. Dietary restrictions included rough and spicy foods. Over-the-counter analgesics were suggested.

Follow-Up Care
A. Side Effects and Complications
The patient reported no unusual discomfort and had no excessive bleeding.

B. Assessment of Treatment
The patient returned in two weeks and the area was healing nicely. The occlusal edges of the maxillary and mandibular incisors were adjusted and smoothed so that lip impingement would be minimized. The pathology report confirmed the diagnosis of a fibrous hematoma and the tissue borders indicated complete removal.

C. Long-Term Results
The 3-month postoperative photograph (Figure 6) shows complete healing.

D. Healing Assessment
The patient reports no lip biting at this time and the soft tissues have a normal appearance with no scar tissue.
Er,Cr:YSGG Laser Treatment of a Pulpal Exposure

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Pretreatment
A. Diagnostic Tests

1. Clinical Examinations
A 57-year-old female presented with sensitivity in the lower right second molar which had a full gold crown. The tooth was mobile, with a buccal swelling discharging through the pocket. The patient had full upper and partial lower acrylic dentures. She was aware of the dental problems and wanted to know if anything could be done to save the lowers. The existing dentures were 4-6 years old and were ill-fitting, therefore the patient was using fixatives all the time. The lower denture was used to replace missing lower anterior only, therefore posterior occlusion and support was nonexistent.

Generally healthy and had been on hormone replacement therapy for the past 2 years.

Dental History
The patient had lost her upper teeth earlier in life and had been wearing a full upper denture for some time. The existing dentures were worn down considerably. Being a dental phobic, she had accepted the easier solution, i.e., extractions of problematic teeth and almost resigned to having the rest of her teeth extracted.

2. Tooth Vitality
Teeth present were tested with an electric pulp tester, and with thermal stimulus at the lower right molar. All teeth except the lower left second premolar reacted normally to pulp testing. The lower left second premolar had been endodontically treated previously.

3. Hard Tissue Tests
No upper teeth were present. The lower left lateral incisor, canine, first and second premolars (Figure 1), lower right lateral incisor, canine, first premolar and second molar were the only remaining teeth. Both lower premolars had fractured or leaky restorations. The lower right second molar was mobile and tender to percussion and hypersensitive to hot and cold. The patient was warned of poor prognosis for this tooth which was in hyperocclusion with the upper denture. Calculus was present around most teeth. Vertical height was reduced but adequately maintained by the premolars.

4. Radiographic Exam
The lower right second molar exhibited radiolucency around the roots and periapical area. Bone damage was evident with bifurcation involvement. The root filling on the lower left second premolar appeared overfilled but symptomless. An area of radiolucency mesial to the apex could be the mental foramen. (not evident on all X-ray angles). The rest of the teeth showed a normal pattern of bone and no apical pathology.

5. Soft Tissue Tests
Buccal swelling and pocketing with discharge were present on the lower left molar area. The gingival and palatal tissues under the upper denture were slightly inflamed, and marginal gingivitis and calculus around the remaining lower teeth were also evident.

6. Other
Periodontal pocket depth charting was performed. Extensive pocketing around the lower right second molar ranged from 6 to 8 mm. Other teeth were within a range of 2-3 mm. Gingival recession around the anterior was evident. No TMD problems. The patient was aware of reduced vertical height.

B. Diagnosis and Treatment Plan

1. Diagnosis
Periodontal breakdown of the lower right second molar was extensive. Failed restorations in the lower left and right premolars. Oral hygiene was compromised. Upper and lower dentures were ill-fitting. Lack of posterior support and reduced vertical height.

2. Treatment Plan
Routine oral hygiene instruction and periodontal scaling (laser curettage). Muscle training/splint device to establish normal occlusal and muscular relations for 2-3 months, and replace with new upper and lower chrome cobalt dentures, with or without precision attachments. The lower right molar to be extracted as prognosis was doubtful due to periodontal breakdown and bone loss. Restore failed restorations in the lower left and right first premolars. Laser to be used for caries removal, decontamination, surface modification, and preparation for bonded composite filling after removal of old amalgam filling.

3. Possible Treatment Alternatives
Use of conventional rotary instruments or a combination with air abrasion for restoring failed restorations.

4. Indications for Laser
Caries removal, decontamination of cavity, and surface modifications for enhanced bonding of composite resin restorations in the lower left and right premolars. The idea of working without local anaesthetic appealed to the patient.

5. Contraindications for Laser
There were no direct contraindications for use of the laser except for the removal of the amalgam restoration which had to be done with conventional rotary instruments.

6. Informed Consent
The patient gave both written and verbal consent to the use of the laser. A leaflet explaining laser use was provided.

1. Power Settings
- Enamel: 3.5 to 4.5 W (175 to 225 mJ/pulse) Water 80% Air 88%
- Dentine: 1.0 to 2.0 W (50 to 100 mJ/pulse) Water 70% Air 80%
- Desensitising Mode: 0.25 to 0.50 W (1.25 to 2.5 mJ/pulse) No water Air 10%
- Soft Tissue: 0.50 W (2.5 mJ/pulse) Water 11% Air 30%
- Decontamination and Surface Cleansing Prior to Etching: 1.0 W (50 mJ/pulse) Water 70% Air 80%
- Hemostasis: 0.25 to 0.50 W (12.5 to 25 mJ/pulse) No water Air 9%
- Pulpal Exposure to Decontaminate and Cauterise Exposed Pulpal Horn: 0.25 W (12.5 mJ/pulse) Water 9% Air 20%

2. Beam Diameter: 600 microns

3. Repetition Rate: 20 Hz

4. Wavelength: 2780 nm

5. Pulse Width: 140 microseconds

7. Exposure Duration:
   - Tooth Surface Preparation: 5-8 minutes
   - Pulpal Exposure: 30 seconds
Treatment

A. Objective
Remove caries and modify enamel and dentine to provide enhanced bonding surfaces, and decontaminate the cavities after removal of amalgam restorations with rotary instruments.

B. Laser Operating Parameters
An Er,Cr:YSGG laser (Millennium Waterlase, BioLase Technology, San Clemente, California) with a wavelength of 2780 nm, a fixed pulse rate of 20 Hz and 600-micron Z tip was used in noncontact mode. Different settings were used for enamel, dentine and pulpal exposure, ranging from 4.5 W to 0.25 W. Water and air settings were adjusted as required.

C. Treatment Sequence
No local anaesthetic was used. Due to the patient’s slight claustrophobic nature and apprehension, a rubber dam was not used. Instead a “metrodent” wet sponge was used to isolate the lower left. The amalgam restoration was removed with conventional rotary instruments. The enamel surface was prepared with the laser followed by the dentine surface. Upon removal of caries, a small pinpoint exposure was noted (Figure 2). Magnification was used. The exposed pulpal horn was lased and total hemostasis was achieved (Figure 3). The pulpal horn was sealed with glass ionomer (Fuji bond). A normal acid etch bonding protocol was used and, due to loss of tooth structure, a fibre reinforcement was placed to strengthen the weakened enamel. The enamel cavity surface was bevelled with the laser at enamel settings. The composite restoration was placed (Figure 4).

D. Management of Complications
There were no complications for laser use, but due to pulpal exposure the patient was warned regarding possible postoperative complications, i.e., pain and symptoms. The patient was advised to use over-the-counter analgesics and call immediately in case of any problems. The patient was recalled 11 days later for a review, and electric pulp testing was within normal level (Figure 5). The patient reported no postoperative complications or pain. The tooth remained vital and the pulp was tested frequently at regular intervals of 2 weeks, 1 month, and 2, 4, 5 (Figure 6) and 6 months.

E. Surgical Prognosis
Good. Tooth has remained vital for more than 6 months.

F. Treatment Record
All laser settings and treatment provided were recorded on the patient’s card.

G. Patient Management
The patient is now very motivated and her oral hygiene is excellent. She was glad to keep most of her teeth. The extraction area was clean and healing was normal. The patient can now look forward to a better-fitting denture after the splint therapy; this will also give sufficient time for socket healing remodeling.

H. Postoperative Instructions
The patient was warned regarding possible endodontics on this tooth and in case of complications to contact the office immediately. Analgesics were to be taken if required. The patient reported no problems at follow-up appointments.

Follow-Up Care

A. Side Effects and Complications
No side effects or complications were reported and the patient was happy with treatment provided and more so that her remaining teeth could be saved.

B. Assessment of Treatment
The tooth has remained vital and functioning for more than 6 months. Evaluation was performed at 2 weeks and at 1, 2, 4, 5 and 6 months. The next stage of treatment, i.e., splint therapy, has been started.

C. Treatment Intervals
From initial consultation to provision of the restoration the elapsed time was about 12 weeks, but the patient was seen monthly for other routine perio treatment. After provision of the restoration and pulp capping, the patient was reviewed and vitality testing

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Laser Biopsy of a Fibroid Epulis Using an Er,Cr:YSGG Laser

William H. Chen, DMD, Granite City, Illinois

Pretreatment
A. Diagnostic Tests

1. Clinical Examinations
A 27-year-old woman came to our office for an emergency appointment complaining of gum swelling around teeth #2 and #3 due to periodontal abscess. Upon clinical exam, we also found hyperplastic gingival tissues in the facial interdental areas of #26 and #27. The lesion was pink, firm, and fibrous and was attached to the gingiva. It measured 10 x 12 mm in an oblong shape (Figure 1). There was some bleeding upon probing. The patient claimed that the lesion had been there for about six months and was asymptomatic. The periodontal abscess of #2 and #3 was treated with root planing, curettage, and chlorhexidine rinse. PenVK 500 mg, one tablet four times a day for 7 days, and Vicodin, one tablet every 4-6 hours as required for pain, were prescribed. The patient was reappointed for follow-up care of #2 and #3, and the lesion on #26 and #27. In the follow-up appointment, the perio abscess subsided and full-mouth X-rays were taken, with diagnosis of Type II periodontal disease and possible fibroma of the lesion facial to #26 and #27.

2. Hard Tissue Tests
Dental caries were found on the buccal surface of #30 and the occlusal surface of #32.

3. Radiographic Exams
Some vertical bone loss was noted in the interproximal area of #26 and #27 and some other areas due to periodontal disease. External root resorptions were noted in teeth #4, 8, 9, 23, 24, 25, 26.

4. Soft Tissue Tests
The lesion between #26 and #27 was found to be firm, fibrous and raised. Bleeding on probing was found around the #26 and #27 periodontal areas and other periodontally involved pockets.

5. Other
Mobility - no mobility was found on any tooth. Fucration - no fucration involvement was found on any tooth.

B. Diagnosis and Treatment Plan

1. Diagnosis
The lesion on the facial interdental area of #26 and #27 was diagnosed to be a fibroid epulis. The lesions on the buccal pit of #30 and the occlusal surface of #32 were diagnosed to be dental caries.

2. Treatment
Use an Er,Cr:YSGG laser to perform an incisinal and excisional biopsy of the facial lesion between #26 and #27, and send the specimen to the diagnostic lab for pathology study.

3. Possible Treatment Alternatives
Use scalpels and sutures to perform the biopsy instead of the laser.

4. Indications
An Er,Cr:YSGG laser can be used to perform surgery with better coagulation, better hemostasis, and greater postoperative comfort for the patient.

5. Contraindications
The laser must be used carefully near dental hard tissue, both tooth and bone, because of its interaction with those tissues.

6. Informed Consent
After thorough discussion and explanation of the benefits and indications of the laser, the patient gave verbal informed consent for the use of the laser.

Treatment

A. Objective
Remove the soft tissue lesion between teeth #26 and #27 for biopsy using an Er,Cr:YSGG laser.

B. Laser Operating Parameters:
A pulsed Er,Cr:YSGG laser (Millennium, BioLase Technology, San Clemente, California) was used for the biopsy procedure.

1. Power: 1.75 W, 30% air and 4% water for the first surgery; 1.25 W, 4% water
for the second surgery, 1.0 W with no water for hemostasis during both procedures.
2. Beam Diameter: 600-micron sapphire tip, using both noncontact and contact modes
3. Repetition Rate: 20 Hz
4. Wavelength: 2780 nm
5. Exposure Duration: Approximately 80 sec for the first surgery and 60 sec for the second.

C. Treatment Sequence
- Right mandibular block with long buccal infiltration was given using one carpule of 2% lidocaine with 1:100,000 epinephrine.
- Laser was test fired.
- High-volume evacuation was used.
- The outline of the lesion was made with the tip in noncontact mode about 90 degrees to the tissue surface (Figure 2).
- The depth of the lesion was determined by contact mode. The laser was then used to undermine and remove the specimen (Figure 3).
- The surgical site was coagulated to establish hemostasis (Figure 4).
- No suture was placed.
- Postoperative instructions were given.
- The specimen was sent to the lab for a definitive diagnosis.

The second surgery, one week later, was performed without local anesthesia, using noncontact mode for approximately 60 seconds (Figures 5-6).

D. Management of Complications
The lesion between teeth #26 and #27 was diagnosed to be a fibroid epulis, a very tenacious lesion. At one-week postoperative, there was still some remaining lesion, and additional surgery was required. The patient did not complain about any pain.

E. Surgical Prognosis
The fibroid epulis removal has a good prognosis. Recurrence of the lesion is possible. May require more radical removal of soft or even some hard tissue.

F. Treatment Record
Laser treatment procedures were recorded in the patient’s record, including laser glasses being worn.

G. Patient Management
The patient tolerated both procedures well. For the soft tissue biopsy, Vicodin was prescribed as needed.

H. Postoperative Instructions
Dietary recommendations were given. Application of ice to the surgical site (20 min on, 20 min off) was recommended for 3 hours. Analgesic was to be used if needed. Chlorhexidine rinse was prescribed to be used 3 days after post-op, rinsing twice a day. No antibiotic was prescribed.

Follow-Up Care
A. Side Effects and Complications
The lesion recurred and was lasered again without anesthesia. No complication was noted after the second procedure.

B. Assessment of Treatment
The pathologist confirmed the diagnosis of fibroid epulis. The patient was recalled for checking after 3 days (Figure 7), 10 days, 3 weeks, 1 month (Figure 8), and 3 months (Figure 9). The biopsy site has healed well.

C. Long-Term Results
Good for the fibroid epulis and excellent for the composite restorations. The patient has yet to start the periodontal therapy and the long-term condition may be affected by the untreated periodontal condition.

D. Healing Assessment
Excellent for the removal of the fibroid epulis.

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**March 4-5, 2003**

Sandestin, Florida

(During the 10th Anniversary ALD Conference)
Pretreatment

A. Diagnostic Tests

1. Clinical Examinations
A 27-year-old woman presented a hyperplastic mucogingival tissue distal to tooth #18. There were complaints of pain and swelling of the soft tissue distal to #18. The lesion was pink, firm and raised, measured 8 x 15 mm (Figure 1). It looked like a fibroma caused by the malocclusion of the second molars.

2. Tooth Vitality
All affected teeth were found to be vital.

3. Hard Tissue Tests
The hard tissue underlining the fibroma was firm without bony defect or cavity.

4. Radiographic Exam
Teeth #16, 17, 1 and 32 were congenitally missing. No signs of pathology noted distal to #18.

5. Soft Tissue Tests
The soft tissue lesion distal to #18 was found to be firm, fibrous, pink and raised, and measured 8 x 15mm. It looked like a fibroma caused by the malocclusion of the second molars. Periodontal condition was good. No signs of periodontal disease.

6. Other
No TMJ abnormality noted.

B. Diagnosis and Treatment Plan

1. Diagnosis
The lesion distal to #18 was a fibroma.

2. Treatment
An Er,Cr:YSGG laser was used to remove the fibroma distal to #18 with local anesthetic.

3. Possible Treatment Alternatives
Use scalpels and sutures instead of the laser.

4. Indications
Using the laser for the biopsy would provide accurate incision and excision. It would be better for hemostasis and allow better postoperative comfort.

5. Contraindications
If significant vascularity is present, hemostasis can be more difficult with this wavelength. Care must be taken when the laser energy is used near dental hard tissue because of the high absorbance.

6. Informed Consent
After thorough discussion and explanation of the benefits of the laser applications, the patient gave verbal informed consent for the procedures to be done by the laser.

Treatment

A. Objective
Remove the soft tissue lesion distal to tooth #18 for biopsy using an Er,Cr:YSGG laser.

B. Laser Operating Parameters
A pulsed Er,Cr:YSGG laser (Millennium, BioLase Technology, San Clemente, California) was used for the biopsy procedure.

1. Power: 2.50 W, 30% air, 4% water for the excision, and 1.25 W with no water for hemostasis.
2. Beam Diameter: 600-micron sapphire tip, using both the contact and noncontact modes

C. Treatment Sequence
• Left mandibular block with long buccal infiltration was given using one carpule of 2% lidocaine with 1:100,000 epinephrine.
• Laser was test fired.
• High-volume evacuation was used.
• The outline of the fibroma was made with the tip in noncontact mode about 90 degrees to the surface of the tissue.
• The depth of the lesion was determined by contact mode and the laser was then used to undermine and remove the specimen (Figure 2).

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Er,Cr:YSGG Laser Removal of Hyperplastic Tissue in the Maxillary Frenum

A 68-year-old female presented with a maxillary denture that had an acrylic fracture at the anterior frenum. The soft tissue had been chronically irritated for several years and the frenum tissue had expanded into the denture base border area (Figure 1).

An Er,Cr:YSGG laser (Waterlase, BioLase Technology, San Clemente, California) with an emission wavelength of 2780 nm was used with a glass contact tip:
• 1 Watt power
• 600-micron tip diameter
• 20 Hz repetition rate
• 30 seconds exposure duration
• No water
• 11% air.

No anesthesia was used. The excessive tissue was removed and the frenum recontoured (Figure 2). Homeostasis was achieved and there was no reported discomfort from the patient. The one-month postoperative visit revealed complete healing and no further irritation from the denture border (Figure 3).

Dr. William Greider received his undergraduate degree from Boston University, his dental degree from the University of Pennsylvania, and completed a general practice residency in the United States Air Force. He has practiced general dentistry in Ft. Myers, Florida since 1981. Dr. Greider was awarded his mastership in the Academy of General Dentistry and his fellowship in the International Congress of Oral Implantologists. He has used numerous laser wavelengths in his office including argon, Nd:YAG, diode, Er:YAG, and Er,Cr:YSGG. Dr. Greider was one of the first users of the Er,Cr:YSGG laser in the United States and is affiliated with BioLase Technology, Inc.

Comparing Laser Wounds - Part 2

Donald J. Coluzzi, DDS, Redwood City, CA

In the Fall 2001 issue of Wavelengths, a photo essay demonstrated some differences in the appearance of a laser excision using three different wavelengths. We will continue the discussion with the addition of the erbium family of laser devices.

As indicated in the introduction, the erbium wavelengths are very readily absorbed by water in the target tissue, roughly 10,000 times more than either diode or Nd:YAG, and 100 times more than Ho:YAG.

The four accompanying photographs show the appearances of immediate postoperative wounds in four clinically similar procedures (excisional biopsies) performed by different practitioners on different patients. The difference in absorbance of each laser wavelength is apparent, as well as an indication of the mode of operation of each device.

The diode and Nd:YAG laser show a greater depth of cut, partially owing to their relatively deeper soft tissue penetration and excellent absorbance into tissue pigmentation. The holmium site exhibits an outer layer, up to 1 mm wide, of surface ablation of the water component of the tissue — neither of these differences are typically achieved with the Er:YAG laser.

Figure 1: Diode laser, 810 nm, excision of buccal mucosa, 400-micron fiber, 1.8 W, CW.

Figure 2: Nd:YAG laser, 1064 nm, excision of buccal mucosa, 320-micron fiber, 3.0 W, 100 mJ, 30 Hz.

Figure 3: Ho:YAG laser, 2100 nm, excision of buccal mucosa, 400-micron fiber, 2.0 W, 200 mJ, 10 Hz.

Figure 4: Er:YAG laser, 2940 nm, excision of buccal mucosa, 600-micron straight tip, 2.4 W, 80 mJ, 30 Hz, no water spray.
thether the diode nor Nd:YAG sites show this feature. The Er:YAG wound also shows a similar border of water ablation on the surgical borders, and the relatively shallow depth of penetration is demonstrated.
The wounds produced by the three free-running pulsed devices (Nd:YAG, Ho:YAG, and Er:YAG) show a more ragged edge and surface due to the high peak power of each pulse.

Although not shown here, all four laser wounds healed uneventfully and without complications. The clinicians elected not to use sutures in order to minimize the formation of scar tissue. Healing occurred by secondary intention.

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**Er:YAG Laser Preparation of Class V Restoration with Soft Tissue Reflection**

*Continued from page 13*

**E. Surgical Prognosis**

Prognosis is good. The final soft tissue level has remained very healthy and level during the postoperative period. There is some recession on the labial aspect of this particular tooth and there is generalized recession and some mobility of some of the remaining permanent teeth, but the periodontal status of this particular tooth is better than most.

There may have been a slight rebound of the tissue since the original procedure, which in this case will be in the patient’s best interest.

**F. Treatment Record**

Treatment was recorded with written documentation in the chart, and digital photographs from a camera (Coolpix 900, Nikon) mounted to a microscope (Global Surgical Operating Microscope), through which all the clinical dentistry was visualized and performed.

**G. Patient Management**

Following the preparation and restoration appointment, the patient was given Advil 200 mg tablets to be taken four times a day as necessary and advised on salt water and Listerine rinses. The amount of discomfort to be expected was suggested as being minimal as the amount of soft and hard tissue removal was moderate.

**H. Postoperative Instructions**

The patient was advised on the protocol for symptomatology and the management of medications if needed.

**Follow-Up Care**

**A. Side Effects and Complications**

No unusual side effects or responses to the type of treatment performed with the Er:YAG laser were noted. The patient loved the technology and mentioned that he couldn’t believe the whole procedure was done without any anesthetic. He also enjoyed watching the procedure live via the video feed from the microscope to the overhead television.

**B. Assessment of Treatment**

The patient returned for a one-week follow-up. The soft tissue had healed beautifully without incident and the restoration was intact and asymptomatic despite the relative depth of the preparation.

A one-month follow-up again showed the restoration to be without symptoms and the soft tissue had remained intact and healed.

**C. Long-Term Results**

As of three months the soft tissue remained healthy and no recession has been observed.

The tissue healing has remained relatively the same all the way through the postoperative period since the initial restoration was completed. The restoration looks perfect and still is not symptomatic.

**D. Healing Assessment**

Total healing has taken place. All signs point to the tooth remaining vital and asymptomatic with no indication of nerve irritation while or after the laser was used to retract the tissue for optimum viewing and then used for preparation of the tooth structure. Slight rebounding of the tissue as well as complete healing has been noted.

**E. Discussion**

In this case an Er:YAG laser was used on a geriatric patient to remove both soft and hard tissue without anesthesia. The ability of the laser to remove hard tissue without overt sensitivity has been well documented and in the presence of noninflamed soft tissue, this wavelength is able to remove soft tissue around carious lesions without significant bleeding.

So often in the geriatric population where medications and heart conditions complicate the routine usage of anesthetic, the ability to perform caries removal without anesthetic is of tremendous benefit to the dentist.

Patients appreciate the opportunity to have the procedure completed without the dreaded aftereffects of local anesthesia and are typically less sensitive (perhaps due to smaller pulps) than younger patients. The added benefit to the dentist of completing the restoration without anesthetic and without pain is noted.

In conclusion, this case demonstrates how the Er:YAG laser can be of tremendous aid to both the patients and the dentist when restoring root caries in the geriatric population.

Dr. Glenn A. van As is in full-time private practice in North Vancouver, BC, Canada. He has experience with multiple wavelengths, having obtained a standard proficiency level in argon, and an advanced proficiency level in the erbium wavelength. He has lectured internationally on the value of surgical operating microscopes and various lasers for general practice. Dr. van As lectures for Continuum Biomedical and Global Surgical Microscopes for which he receives an honorarium.
Er,Cr:YSGG Laser Treatment of a Pulpal Exposure

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Dr. Arun Darbar was born in Uganda. His early life and schooling was in Kenya although he graduated in dentistry and obtained his postgraduate diploma in the UK. Since then he has practiced dentistry for over 20 years. He is the owner of a small market town practice in Leighton Buzzard, about 50 miles north of London. Dr. Darbar achieved Standard Proficiency in 1996 and Advanced Proficiency in the Er,Cr:YSGG wavelength at the 2001 ALD Annual Conference in Tucson, Arizona.

Laser Biopsy of a Fibroma Using an Er,Cr:YSGG Laser

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Dr. William Chen graduated for Washington University School of Medicine and has been a general practitioner in Granite City, Illinois and St. Louis, Missouri for more than 25 years. Besides being an active staff member at St. Elizabeth Hospital in Granite City, Illinois, he has served as Dental Chief since 1987. Honors awarded to Dr. Chen include Fellowship and Mastership of the Academy of General Dentistry, Fellow of the American College of Dentists, and Fellow of the International College of Dentists. He holds an advanced proficiency in the 2780 nm wavelength. Currently Dr. Chen is using three wavelengths of lasers: 633 nm, 810 nm and 2780 nm. Dr. Chen is a lecturer and trainer for BioLase Technology for which he receives an honorarium.

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