

Recurrent aphthous ulcers: Etiology and laser ablation

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The recurrent aphthous ulcer is among the most difficult oral lesions for a dentist to treat. Three clinical types of recurrent aphthous ulcers occur:

(1) minor aphthae, which are observed clinically as single or multiple, small, well-defined, crater-like lesions up to 1 cm in diameter. The lesions have a yellow border surrounded by a narrower, red, hyperemic border. They may be found on the tongue and unattached mucosa, including the floor of the mouth, soft palate, and free gingiva. Patients with minor aphthae report having painful, burning mouths, and difficulty eating. The lesions usually resolve in 7 to 10 days and heal with no scar. This type of aphthous ulcer accounts for approximately 80 percent of all cases of recurrent aphthous ulcers.

(2) major aphthae, also known as Sutton's disease, or periadenitis mucosa necrotica recurrens, are defined clinically as variants of minor aphthae; major aphthae

have a larger diameter (greater than 1 cm), can take up to 1 month to heal, and may leave a scar. As with minor aphthae, major aphthae may be found on the tongue and unattached mucosa. Patients with major aphthae report having more severe pain and dysphagia than patients with minor aphthae. Major aphthae account for approximately 10 percent of all recurrent aphthous ulcers.

(3) herpetiform aphthous ulcers, so called for their clinical similarity to ulcers caused by the herpes simplex virus. Herpetiform aphthous ulcers may begin as up to 100 pinhead-sized lesions on the unattached gingiva that coalesce to form irregularly shaped ulcerated areas. They are distinguishable from herpetic gingivostomatitis by location of the lesions. Herpetic gingivostomatitis occurs primarily on the attached gingiva and hard palate, whereas herpetiform aphthous ulcers rarely occur in these areas. Symptoms associated with herpetiform aphthous ulcers include pain, burning mouth, and dysphagia. Such ulcers account for approximately 10 percent of all

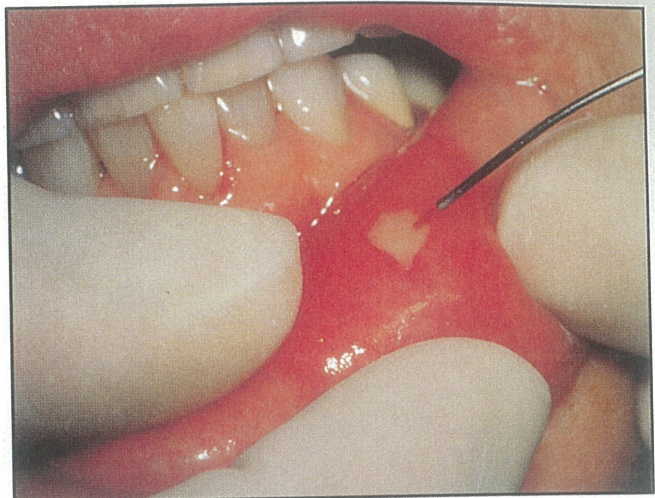
recurrent aphthous ulcers.

Although the exact cause of recurrent aphthous ulcers is unknown, many theories have been postulated concerning etiologic and predisposing factors. Etiologic factors may include alpha-hemolytic streptococcal infections,^{1,2} decreased immune system integrity, and deficiencies of folic acid, iron,²⁻⁵ or vitamin B₁₂.²⁻⁶ Predisposing factors include stress, trauma to the ulcerated site,²⁻⁵ allergies to certain foods,^{2,4,5} and endocrine imbalances.²⁻⁵ The ulcers also may be present in patients who have Crohn's disease, ulcerative colitis,⁷ or Behcet's syndrome.^{3,6,7}

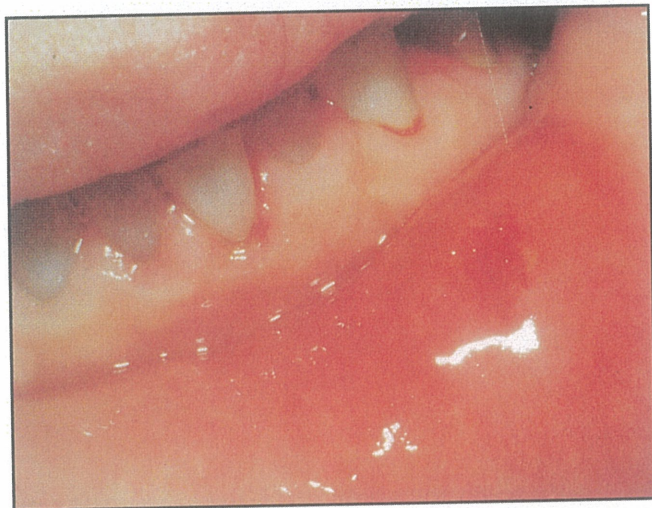
A number of treatment alternatives have been suggested; however, such treatments are palliative, not curative. Most such treatments are associated with side effects or other drawbacks that make their usage clinically questionable or impractical. One such treatment alternative, tetracycline oral suspension rinse,^{2,4,5,8} is contraindicated in pregnant women and children younger than 8 years because of staining of the dentition. Diet also is restricted as dairy



1. Preoperative view of a recurrent aphthous ulcer on mandibular labial mucosa (Case No. 1).



2. The ulcer is exposed to 100 millijoules of laser energy (Case No. 1).



3. Immediate postoperative view of coagulum over the ulcer site (Case No. 1).



4. The lesion and scar are not evident 4 days postoperatively (Case No. 1).

products deactivate tetracycline. Candidiasis also may develop with use of tetracycline.

Topical steroids, such as triamcinolone (Kenalog) in orabase, and betamethasone, hydrocortisone, and fluocinonide ointments^{1,5,8} also may cause oral candidiasis.

Systemic steroid therapy, such as prednisone,^{1,2,4,5} can cause a number of adverse systemic side effects, such as hyperglycemia and electrolyte imbalance.

Thalidomide^{3,9,10} is extremely teratogenic and unsuitable for use in pregnant women. Thalidomide has been shown to be of some use in treating aphthous ulcers, but currently is approved only for use in treating leprosy. Side effects

of thalidomide include nausea, weight gain, irritability, and various functional disturbances.

Use of vitamin B₁₂ supplements is associated with polycythemia, diarrhea, itching, and exanthema.^{2,6,10}

Use of monoamine oxidase (MAO) inhibitors, such as phenelzine,^{3,11} requires dietary modification (no tyramine-containing foods) because of the possibility of a hypertensive crisis. Other side effects associated with use of MAO inhibitors include insomnia, headaches, constipation, and nausea.

Chlorhexidine gluconate mouthwash (Peridex, Procter & Gamble, Cincinnati)^{5,12} has been shown to be of some use in treating only

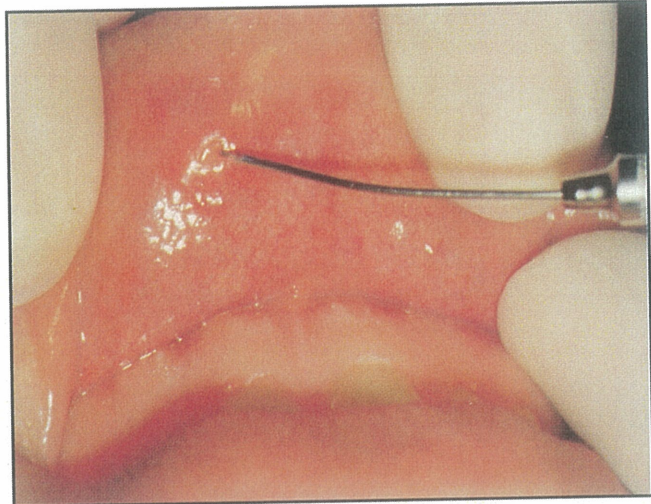
minor aphthae. The disadvantage of using chlorhexidine is the severe, objectionable staining of teeth and dental restorations.

Lasers

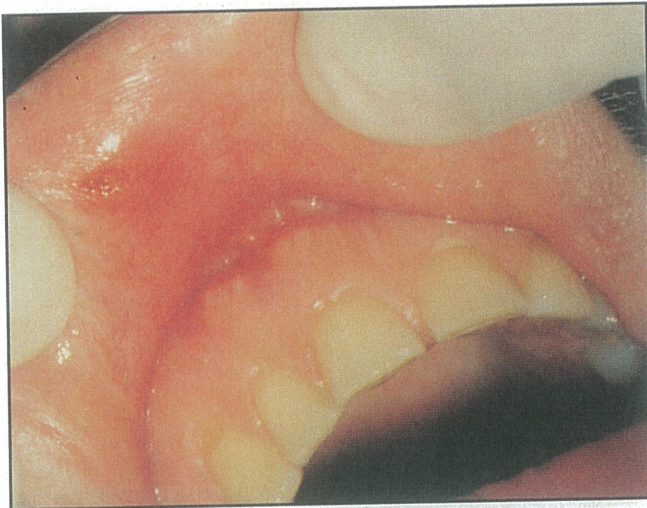
Pulsed neodymium: yttrium-aluminum-garnet lasers (Nd:YAG) (American Dental Laser, Troy, MI, and Premier Laser Systems, Irvine, CA) have been used to treat all three types of recurrent aphthous ulcers successfully. The laser ablates the lesion in 30 to 45 seconds. The treatment is painless, and patients report immediate relief of symptoms. The following three case reports illustrate effective use of Nd:YAG dental lasers in treating recurrent aphthous ulcers.



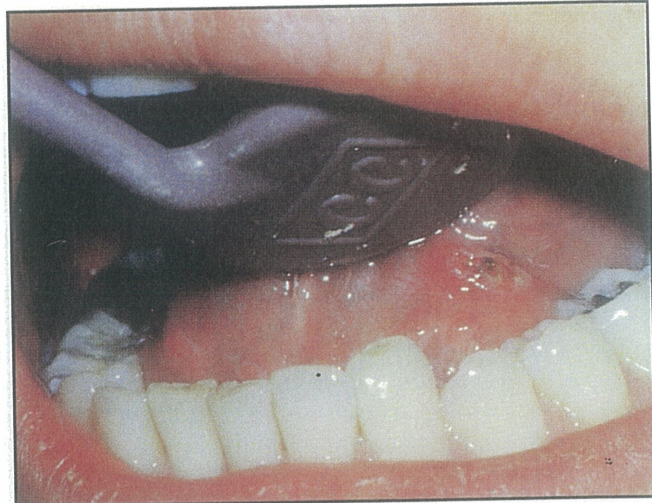
5. Preoperative view of a recurrent aphthous ulcer on maxillary labial mucosa (Case No. 2).



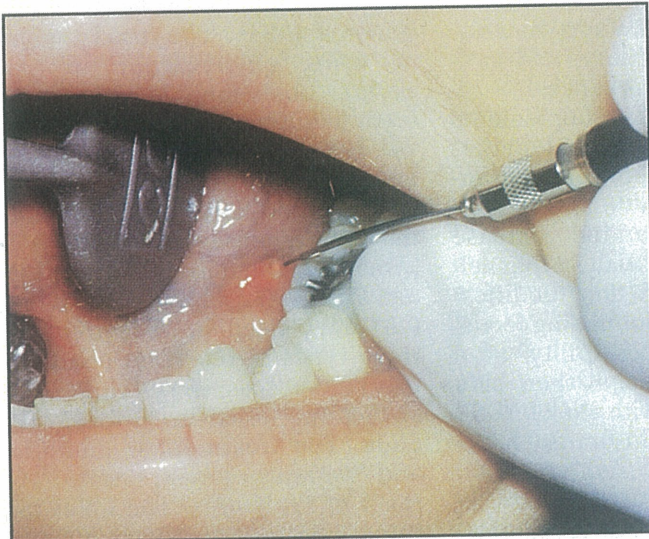
6. The ulcer is exposed to 100 millijoules of laser energy (Case No. 2).



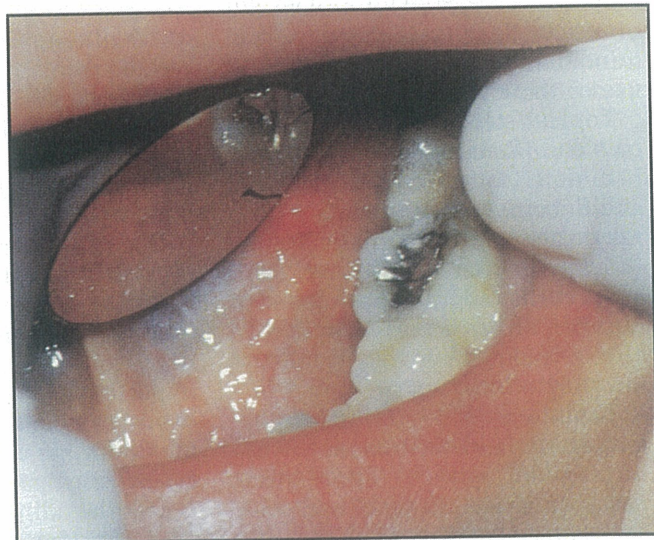
7. Immediate postoperative view of the patient in Case No. 2.



8. Preoperative view of a recurrent aphthous ulcer on the floor of the mouth (Case No. 3).



9. The ulcer is exposed to 100 millijoules of laser energy (Case No. 3).



10. Slight redness at the operative site is evident 24 hours postoperatively.

Case reports

Case No. 1—A 53-year-old woman sought routine examination and prophylaxis. Oral examination revealed a solitary recurrent aphthous ulcer on her mandibular labial mucosa (Fig. 1). The patient said that she had been suffering outbreaks of these lesions every few months for many years. She had been treated unsuccessfully with a variety of therapies by her physician and other dentists.

This current outbreak had occurred 5 days before her examination in this case and coincided with the closing of a real-estate transaction that the patient said was causing her much stress. She was given the option of laser treatment or no treatment. After laser therapy was explained to her, she chose laser treatment.

The laser was set for 20 pulses per second and 2 watts of power, which produces 100 millijoules of energy. The laser handpiece was brought into contact with the lesion (Fig. 2), and the entire lesion was cross-hatched with the laser. The patient experienced no discomfort during the procedure. Treatment time was 45 seconds. The lesion disappeared immediately, which allowed healthy tissue to appear; the healthy tissue bled slightly for 10 to 20 seconds before coagulation (Fig. 3). The patient experienced immediate relief of the pain that had been caused by the lesion. She was dismissed with no postoperative precautions or restrictions, but was told to return after four days for a follow-up examination. At that time, there was no sign of the lesion (Fig. 4). The patient reported no postoperative discomfort, and that she was able to tolerate all types and temperatures of food and beverages in her mouth within a few hours of treatment. She was gratified with the treatment and its results.

Case No. 2—A 61-year-old man complained of a "canker sore" on his upper lip (Fig. 5). The patient said that the lesion had been there for approximately one week, and interfered with his ability to eat

and drink.

Clinical examination revealed a solitary aphthous ulcer inside the upper lip. The same treatment protocol was followed as with the patient in Case No. 1. The lesion was cross-hatched with a laser for 30 seconds with 100 millijoules of energy (Fig. 6). Healthy tissue appeared at the site from which the lesion was removed; the healthy tissue bled slightly for 10 to 15 seconds before coagulation (Fig. 7). The patient felt no discomfort during or after the procedure and was dismissed with no postoperative restrictions. When he returned one week postoperatively, there was no sign of the lesion. The patient reported no postoperative problems.

Case No. 3—A 27-year-old woman complained of a lesion on the floor of her mouth (Fig. 8). She said the lesion had been present for three days, and was painful. Because of the lesion, she could not consume anything except liquids through a straw.

Clinical examination revealed an aphthous ulcer on the floor of the mouth, medial to the mandibular left second premolar-first molar region. The lesion in this case was cross-hatched with a laser for 30 seconds with 100 millijoules of energy (Fig. 9). The patient had no discomfort during the procedure. Immediately after the procedure, she drank a cup of water and experienced no pain. She was dismissed with no postoperative precautions or restrictions.

The patient returned to the office 24 hours postoperatively for a follow-up examination. The involved area was slightly more red than the surrounding gingiva but was otherwise free of any sign of the ulcer (Fig. 10).

Summary

Three case reports have been presented in which pulsed dental Nd:YAG lasers were used successfully to ablate recurrent aphthous ulcers. The lasers vaporize the lesions, and leave a healthy bed of tissue. Patients experienced no discomfort during or after the

procedure, which relieves painful symptoms of the lesions immediately. Laser treatment compares favorably with other treatment modalities owing to lack of side effects and contraindications, and immediate palliation of lesions.

The exact mechanism of action associated with application of laser energy on aphthous ulcers is not known. Whether application of laser energy will prevent subsequent outbreaks of aphthous ulcers at the same site also is not known. Further research is needed to understand the interactions between laser energy and aphthous ulcers.

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