The use of lasers in oral and maxillofacial surgery was introduced in 1964 by Patel. In 1970, Polanyi premiered the incision of living tissue with a CO2 laser. The various soft tissue procedures which can be performed using lasers include:

- Incisional and excisional biopsies
- Periodontal pocket disinfection/reduction with gingival curettage
- Cosmetic crown lengthening
- Gingivectomy and frenectomy
- Soft tissue tuberosity reduction
- Operculum removal
- Ablation of lesions

Advantages include production of a sterile surgical field, minimal cicatrix formation and wound contraction, ability to coagulate, vaporize or incise tissue, good hemostasis, reduced local tissue trauma and edema, reduced pain by induced neural anesthesia, minimized tumor cell dispersion by lymphatic sealing, and reduced damage to surrounding structures.

Disadvantages of lasers in surgery include the need for specialized didactic and clinically oriented instruc-
tion in laser use for the surgeon and ancillary assistants, hazards to the patient and operating team, expensive equipment, maintenance requirements, fire hazard, and electrical hazards of laser equipment.

Four basic interactions of carbon dioxide laser with tissue are absorption, scattering, reflection, and transmission. CO₂ radiation is rapidly absorbed and dissipated, having a minimum penetration depth of 0.02 mm. This results in a system that produces a very accurate effect.

Location of the leukoplakic lesion within the oral cavity (floor of the mouth and lateral border of tongue) may be an indicator of the likelihood of malignant transformation. Management of leukoplakias is far from satisfactory and no large trials offer guidance as to the most reliable treatment. Surgical removal of leukoplakia seems one reasonable option. Some experts surgically remove these lesions with scalpel, laser, or cryoprobe. Laser excision is preferred to fulguration in laser surgery was found. 22

Ishii et al17 reviewed the records of oral leukoplakia patients treated with laser surgery in order to assess its clinical usefulness. It has been reported that the rate of recurrence was 7.7% to 38.1%, while malignant transformation was 2.6% to 9% for oral leukoplakia treated with laser surgery. This suggests that nonhomogeneous leukoplakia on nonkeratinized epithelia, eg, the tongue mucosa, has a high risk for malignant transformation, so lesions should be excised after detecting abnormal epithelia using vital tissue staining. The wound healing process after laser surgery was satisfactory and no significant complications were observed.17

CASE REPORT

A 58-year-old male patient reported to the Oral Medicine, Diagnosis and Radiology Department of M.A. Rangoonwala Dental College, Pune, with a chief complaint of missing teeth, and wanted prosthetic treatment. Additionally, the patient reported a history of habitually smoking bidis (traditional form of smoked non-filtered tobacco with betel leaf) 20 to 30 times a day for the past 40 years, which he had discontinued six months previously. No other relevant history could be recorded.

Upon examination, the patient was completely edentulous. He had a non-scrapable whitish brown lesion on the anterolateral part of the dorsum of the tongue, measuring approximately 2.5 x 4.0 cm and having an irregular shape. The lesion had diffuse borders with reddish areas interspersed. The lesion was symptomless and had been present for many years (Fig 1). A provisional diagnosis of leukoplakia was made.

The patient was referred for routine blood investigations. The report was unremarkable, except that the hemoglobin level was 11 gm%.

The patient was then scheduled for laser surgery using CO₂ laser. The extent of the lesion, patient’s age and systemic health status were the deciding factors for the choice of treatment modality.

Patient safety was ensured using protective eyewear, and the area surrounding the lesion was covered with wet gauze. After adequate local anesthesia was administered, an outline of the lesion was made around 0.5 to 1.0 mm beyond its clinical extent (to compensate for the zone of thermal coagulation) in a slow and con-
trolled fashion, using rather low-level continuous wave irradiation of wavelength 10,600 nm at 2 W (Union Medical, Korea) in noncontact mode. Then excision was carried out with a desired depth of 12 mm. The procedure was painless and well tolerated by the patient.

The patient was discharged after ensuring complete hemostasis and was advised to use chlorhexidine mouthwash. Analgesics were given as required to control postoperative pain.

The specimen was sent for histopathological examination. H & E stained slides showed hyperparakeratosis with dysplastic features and an intact basement membrane (Figs 2 and 3). The clinical and histopathological findings were correlated and a final diagnosis of leukoplakia was made.

The patient was followed-up regularly for six months (3rd, 10th, and 21st days postoperatively, and after 6 months) (Figs 4 to 7) with no postoperative complications and a complete resolution of the lesion.

**DISCUSSION**

The World Health Organization first defined oral leukoplakia as a white patch or plaque that could not be characterized clinically or pathologically as any other disease; therefore, lichen planus, candidiasis, and white
Since 1983, the WHO definition reads: Leukoplakia is a whitish patch or plaque that cannot be characterized clinically or pathologically as any other disease, and is not associated with any physical or chemical causative agent, except the use of tobacco.²

Our case was at stage III according to modified LCP classification given by van der Waal;¹⁶ there was a diffuse whitish discoloration of the dorsum of the tongue near the midline. The lateral areas were erythematous with localized loss of tongue papillae.

It is well known that leukoplakia is more common in males, with ratios up to 5.29:1.³ However, a recent report⁶ showed that the sex ratio has altered, with the male rates falling proportionally more than female rates. The affected area in our patient was the dorsum of the tongue, which is in agreement with previous research.¹¹-¹⁴ Bánóczy⁴ suggested that the most common site for leukoplakia is the commissure (42%), followed by the buccal mucosa (22%) in males, and the buccal mucosa (40%) and commissures (19.2%) in females. It is well accepted that certain sites carry a higher risk of malignant transformation.

Various surgical as well as nonsurgical treatment options are available for leukoplakia. These include scalpel surgery, laser surgery, cryosurgery, electrocautery, fulguration, and medicinal therapy with antioxidants. Perhaps the general consensus is that surgical excision of oral leukoplakia is the best treatment for this lesion. Among the surgical treatments, CO₂ laser surgery is the technique of choice.⁸ Laser excision is suitable for leukoplakia cases on nonkeratinized epithelia (eg, the tongue and buccal mucosa).¹⁸
The use of the CO2 laser, in spite of some advantages, seems to have the same problems as other surgical and nonsurgical techniques in the treatment of invasive lesions. However, the CO2 laser is helpful in preventing intra- and postoperative complications. Moreover, the recurrence rate is low.7-15 The laser reduces the amount of intra-operative bleeding compared to conventional techniques and eliminates the need for suturing the mucosa or grafts, which require in-patient treatment.

Re-epithelialization following laser surgery is achieved with minimal wound contraction.21 Due to its high temperature, the CO2 laser beam results in a sterile and noncontaminated wound. Lasers produce a sterile surgical field based on instant vaporization of tissue and adjacent vascular and lymphatic sealing. Furthermore, it helps in preventing the seeding of the dysplastic cells in adjacent soft tissue areas.1,5,19

Studies have shown that histologically, there are few myofibroblasts present, which appears to be responsible for less scar contraction.10,21 In addition, less collagen formation is noted and there is delayed epithelial regeneration. Prolonged pain and scar formation is often observed when electrocautery is used because of tissue necrosis.21

Oral CDx is a new noninvasive laboratory diagnostic technique for the evaluation of common unexplained white and/or red tissue lesions that may be precancerous or cancerous, despite their innocuous appearance. It involves the use of a firm brush rotated clockwise over the lesion to get the complete transepithelial biopsy. This method detects potentially cancerous lesions at a very early stage. We can use this diagnostic technique to detect the atypical cells and once confirmed, the laser treatment can be initiated. Thus, adding a diagnostic technique like Oral CDx could detect cancer at a very early stage and help treat leukoplakia-like lesions with enhanced accuracy.

CONCLUSION

Oral leukoplakia is a potentially premalignant lesion which needs expert management. Successful treatment with CO2 laser requires that the operator possess adequate skills, knowledge, and training in laser use. However, the device does not cure the disease. The appropriate use and surgical selection based on sound clinical judgement are responsible for elimination of the disease process.

Management of oral leukoplakia with laser surgery prevents not only recurrence and malignant transformation, but also postoperative dysfunction. Hence, it can be considered as an excellent procedure that is able to overcome many problems encountered in various other treatment modalities, as discussed above.17

We would like to propose that the management of leukoplakia could be initiated by the additional procedure of OralCDx® (CDx Laboratories, Suffern, NY) Oral Brush Biopsy. This will not only help in early detection of dysplastic changes, but will also prevent unnecessary loss of normal tissue at the depth of the lesion.

REFERENCES

CASE REPORT

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