

# Use of Carbon Dioxide Laser for the Treatment of Early Squamous Cell Carcinoma and Severe Leukoplakia

Walter Niccoli-Filho<sup>1</sup>  
Indira Muliterno Rojo  
de Almeida<sup>2</sup>  
Denise Takehana dos Santos<sup>3</sup>  
Carlos Schwab<sup>4</sup>

<sup>1</sup>Department of Biopathology and Diagnosis of Sao Paulo State University - UNESP, School of Dentistry, Sao Jose dos Campos - SP, Brazil

<sup>2</sup>Fellow, Sao Paulo State University, School of Dentistry, Department of Biopathology and Diagnosis, Sao Jose dos Campos, SP, Brazil

<sup>3</sup>Dentistry Emergency Service, Sao Paulo State University - UNESP, School of Dentistry, Sao Jose dos Campos - SP, Brazil

<sup>4</sup>Department of Physics at Advanced Studies Institute - IEAv, Lasers Division, Sao Jose dos Campos - SP, Brazil

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Address for correspondence:

Walter Niccoli-Filho, DDS,  
PhD  
Sao Paulo State University  
Department of Biopathology  
and Diagnosis  
Av. Francisco Jose Longo,  
777  
12245-000 Sao Jose dos  
Campos, SP Brazil  
Phone: 55-123-218166 Ext.  
1410  
FAX: 55-123-821794  
E-mail: wniccoli@phonet.  
com.br

## Summary

*Leukoplakia is potentially a premalignant lesion and, in a small number of cases, invasive carcinoma occurs at the same site. In recent literature, the commonly accepted rate of malignant transformation varies between 3 and 6%. Among the methods advocated for the treatment of these lesions are cryosurgery, chemical peel, surgical excision, and CO<sub>2</sub> laser vaporization. In the following case, bilateral lesions in buccal mucosa with a 5-year history of development are presented. Utilizing local anesthesia, the involved surface epithelium and submucosa on each side were treated at 7-day interval with a continuous wave CO<sub>2</sub> laser vaporization, 2.0 mm defocused spot at 10.0 watts. Mucosal destruction was carried out to the depth at which muscle fibers could be seen with arbitrary margins of approximately 5 mm. Lesions were followed up after 1, 3, 6, 9, and 12 months following surgery and there was neither recurrence nor any other intercurrent problems observed.*

**Key words:** leukoplakia, squamous cell carcinoma, carcinoma in situ, carbon dioxide laser, oral cancer

## Introduction

Leukoplakia is defined as a white patch on the mucosa that cannot be rubbed off and is not ascribable to any other condition (Cancer Unit of the World Health Organization). Diagnosis is therefore descriptive, with no etiological definition and a negative differentiation from other conditions (1).

Diagnosis of leukoplakia is based on a process of elimination. A number of inflammatory conditions affecting the oral mucosa may also be present, such as whitish changes, thus making diagnosis difficult for the inexperienced. The differential diagnosis includes discoid lupus erythematosus, submucous fibrosis, lichen planus and the glossitis forming part of the tertiary syphilis syndrome (1).

Those lesions with a high degree of dysplasia must be deemed precancerous. They are identified by the fact that all the criteria of dysplasia are usually present to a marked degree. Carcinoma *in situ* is characterized by the additional feature of complete loss of epithelial stratification. It may be regarded as an early form of oral cancer not showing invasive growth (1).

Treatment should be eminently surgical, although an incisional biopsy may precede total surgical extirpation of the lesion, to supply information related to the degree of commitment and/or possible malignancy. Furthermore, risk factors should be excluded (no smoking, better oral hygiene, parafunctional habits, etc). A close follow-up supervision is essential.

Very often, the proposed conventional surgery leads to patient mutilation, as the surgical extirpation of vast areas becomes necessary, not only in the buccal cavity but in the face as well, thus greatly decreasing his life quality. With the introduction of high energy lasers, some malignant lesions could be successfully treated without the problems caused by conventional surgeries, such as long hospitalization, hemorrhage, suture, long and painful postoperative period, infection, etc.

Our objective was to present a case of hyperkeratosis with a high degree of epithelial dysplasia treated with carbon dioxide laser which, has not yet presented signs or symptoms of recurrence.

## Case report

A male patient, Caucasian, 58 years old, smoker, presented with bilateral lesions in the buccal muco-

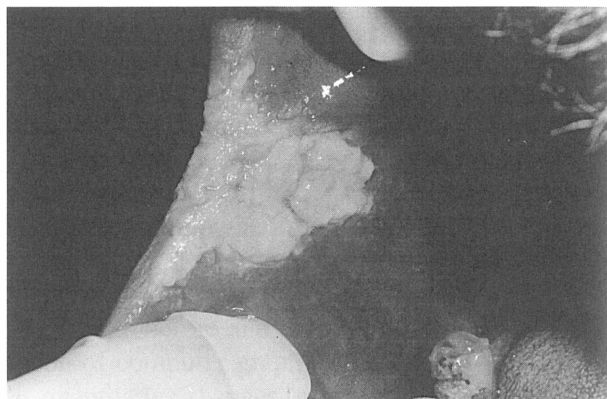


Figure 1. White, verrucous lesion, compatible with leukoplakia on the right side of buccal mucosa, reaching the lips

Slika 1. Verukozna leukoplakija desne strane obrazne sluznice sa širenjem u usnice



Figure 2. White, verrucous lesion, compatible with leukoplakia on the left side of buccal mucosa, without reaching the lips

Slika 2. Verukozna leukoplakija lijeve strane obrazne sluznice bez širenja u usnice

sa with a 5-year history of development. After anamnesis, clinical examination of the buccal mucosa on both sides showed extensive areas with verrucous hyperkeratosis-like changes (Figures 1 and 2). Initially, incisional biopsies were obtained from the right and left buccal mucosa which showed hyperkeratosis with a high degree of epithelial dysplasia, with basal cell hyperplasia, polarity lost, polymorphism, increase in rate mitosis, epithelial stratification lost and stroma not yet invaded. Utilizing local anesthesia, the involved surface epithelium and submucosa for each side were treated at a 7-day interval with a continuous wave CO<sub>2</sub> laser vaporization,

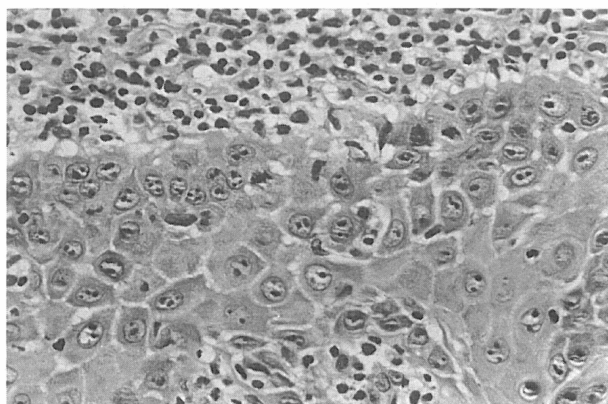


Figure 3. *Histological aspect of the lesion showing a high number of cellular dysplasia. HE 400 X*

Slika 3. *Histološki izgled promjene pokazuje velik broj staničnih displazija. HE 400 X*



Figure 6. *Vaporized area, one year after postoperative (right side)*

Slika 6. *Spaljeno područje godinu dana poslije (desno)*

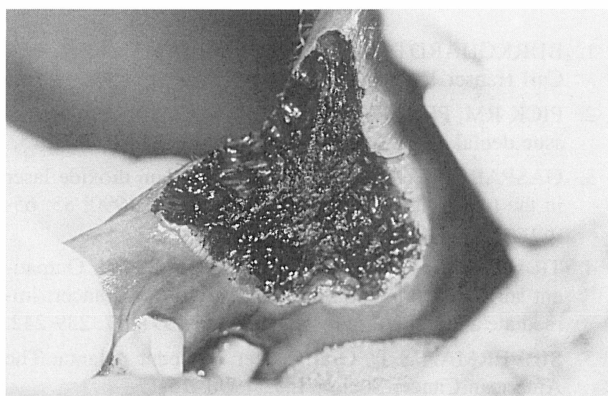


Figure 4. *Postoperative, immediately after vaporization (right side).*

Slika 4. *Postoperativni nalaz neposredno nakon djelovanja lasera (desno)*



Figure 7. *Vaporized area, one year after postoperative (left side)*

Slika 7. *Spaljeno područje godinu dana poslije (lijevo)*

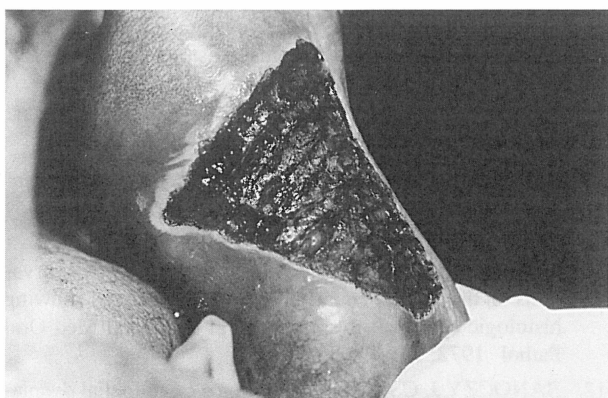


Figure 5. *Postoperative, immediately after vaporization (left side)*

Slika 5. *Postoperativni nalaz neposredno nakon djelovanja lasera (lijevo)*

2.0 mm defocused spot at 10.0 Watts (Sharplan 15F® - FAPESP 97/07645-2). Mucosal destruction was carried out to the depth at which muscle fibers could be seen with arbitrary margins of approximately 5 mm. Lesions were followed up after 1, 3, 6, 9, and 12 months following surgery and there was neither recurrence nor other intercurrent problems observed (Figures 3, 4, 5, 6 and 7).

### Discussion

Utilization of CO<sub>2</sub> laser radiation in oral surgeries, when well indicated, has brought advantages which exceed those of conventional surgeries. Among these advantages, the following may be qu-

oted: sterilization of the surgical wound, absence of hemorrhage, and allows for a non-contact type of surgery and therefore no mechanical trauma to the tissue (2). Another benefit to be pointed out is the fact that, after lasing, the wound is coagulated and the patient postoperative course with minimal oozing of blood as well as minimal postoperative pain. These advantages are important when the area cannot be sutured and is left to heal by secondary intention, also because surgery is bloodless, surgical time is decreased, with minimal swelling and scarring after surgery (2).

Gaspar & Szabo (3) report laser treatment in 126 mouth cavity leukoplakias with different commitment degrees. Results showed that after laser treatment, 118 patients were free of symptoms (93.6%). After operation, emerging pain and edema are minimal and the patients, as a rule, were capable of working the following day. In 51 cases of excising squamous cell carcinoma of the oral cavity or lip by CO<sub>2</sub> laser were reported by Tradati et al. (4). Results show that complete removal was obtained in 44 instances, while in 7 cases, cancerous margins were observed in the specimen. Two of 39 T1 patients developed local relapses and 6/12 recurrent cancers relapsed again.

An important aspect is the tobacco usage that increases the risk factors for developing oral cancer. On the other hand, nonsmoking patients present a higher risk [5-8]. Although the reason for this finding is not clear, it might be speculated that in the absence of tobacco as a causative irritant, there might be a more lethal initiating or potentiating factor (5). Banoczy (9) confirmed this increase risk in nonsmokers in her long-term reports on leukoplakic patients.

Some clinical leukoplakias demonstrate microscopic cellular changes that warrant a classification of dysplasia. The diagnosis of dysplasia is an interpretation based upon abnormal tissue patterns and cell morphology combined with individual judgment (5). The significance derives from studies that document the increased risk for malignant transformation of dysplastic leukoplakic lesions on an unpredictable basis (10-13).

Excellent results have been obtained for other oral surgeries which would also present difficulties by conventional means, such as cases of vermilionectomy for actinic cheilitis (14), epulis (15), benign

chronic pemphigus (16), vascular tumors (17) and multiple oral epithelial hyperplasias (18).

In this case, the extension and clinical characteristics of the lesion led us to opt for laser vaporization because, if we had opted for the conventional, the trauma would have been much greater, with more discomfort for the patient. The case is being followed up every two months and, after one year and neither intercurrent nor recurrence characteristics have been observed.

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# Uporaba lasera s ugljičnim dioksidom u liječenju ranog stadija karcinoma pločastih stanica i teške leukoplakije

Walter Niccoli-Filho<sup>1</sup>  
Indira Muliterno Rojo  
de Almeida<sup>2</sup>  
Denise Takehana dos Santos<sup>3</sup>  
Carlos Schwab<sup>4</sup>

<sup>1</sup>Department of Biopathology and Diagnosis of Sao Paulo State University - UNESP, School of Dentistry, Sao Jose dos Campos - SP, Brazil

<sup>2</sup>Fellow, Sao Paulo State University, School of Dentistry, Department of Biopathology and Diagnosis, Sao Jose dos Campos, SP, Brazil

<sup>3</sup>Dentistry Emergency Service, Sao Paulo State University - UNESP, School of Dentistry, Sao Jose dos Campos - SP, Brazil

<sup>4</sup>Department of Physics at Advanced Studies Institute - IEAv, Lasers Division, Sao Jose dos Campos - SP, Brazil

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## Sažetak

*Leukoplakija je potencijalno predmaligno žarište, te se u malog broja slučajeva na njezinu mjestu razvije invazivni karcinom. Prema podacima iz najnovije literature, čestoća zloćudne pretvorbe iznosi 3 do 6%. Među metodama na raspolaganju za liječenje tih žarišta jesu kriokirurgija, kemijsko ljuštenje, kirurško uklanjanje i uklanjanje laserom s CO<sub>2</sub>. U ovom je radu prikazan slučaj obostranih žarišta na bukalnoj sluznici nastao tijekom 5-godišnjeg praćenja. Zahvaćena površina epitela i podsluznica s obje strane pod lokalnom su anestezijom tretirane laserom CO<sub>2</sub> u sedmodnevnom razdoblju i s kontinuiranom zrakom apsorpcijske površine 2 mm pri 10 wata. Sluznica se razarala do dubine pri kojoj su se mogla vidjeti mišićna vlakna, s uvjetno postavljenim rubom od oko 5 mm. Žarišta su se kontrolirala 1, 3, 6, 9 i 12 mjeseci nakon kirurškoga zahvata i nije bilo znakova recidiva ni ikakvih drugih komplikacija.*

*Ključne riječi: leukoplakija, karcinom pločastih stanica, karcinom in situ, laser s ugljičnim dioksidom, karcinom usne šupljine*

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Address for correspondence:

Walter Niccoli-Filho, DDS,  
PhD  
Sao Paulo State University  
Department of Biopathology  
and Diagnosis  
Av. Francisco Jose Longo, 777  
12245-000 Sao Jose dos  
Campos, SP, Brazil  
Phone: 55-123-218166 Ext.  
1410  
FAX: 55-123-821794  
E-mail: wniccoli@phonet.  
com.br

## Uvod

Leukoplakija se definira kao bijela mrlja na sluznici koja se ne može obrisati ni pripisati ikojem drugom stanju (Odsjek za rak Svjetske zdravstvene organizacije). Zato je dijagnoza opisna, bez etiološke definicije i negativne diferencijacije od ostalih stanja (1).

Dijagnoza leukoplakije temelji se na postupku eliminacije. Brojna su upalna stanja koja zahvaćaju sluznicu usne šupljine, poput bjelkastih promjena koja otežavaju postavljati dijagnozu, napose neiskusnima. Diferencijalna dijagnoza uključuje diskoidni lupus eritematosus, submukoznu fibrozu, lihen planus i glositis kao sastavni dio sindroma terciarnog sifilisa (1).

Ta žarišta s visokim stupnjem displazije moraju se uzeti kao predkancerозна. Identificiraju se na osnovi činjenice da za njih u znatnoj mjeri vrijede sva mjerila karakteristična za displaziju. Karcinom *in situ* dodatno je obilježen i potpunim gubitkom stratifikacije epitela. On se može uzeti kao rak usne šupljine u ranom stadiju, koji ne pokazuje znake invazivnoga rasta (1).

Liječenje u prvome redu mora biti kirurško, premda se prije potpunoga kirurškog uklanjanja žarišta može napraviti incizijska biopsija, kako bi se dobila informacija o stupnju zahvaćenosti i/ili zloćudnosti. Nadalje, valja isključiti čimbenike rizika (nepušenje, bolje održavanje higijene usne šupljine, parafunkcijske navike itd). Bitno je pozorno i neprekidno praćenje.

Provedeni kirurški zahvat često osakati bolesnika. Nužna je, naime, kirurška ekstirpacija velikog područja, koja ne pogađa samo usnu šupljinu već i lice, čime se znatno smanjuje kakvoća življenja. Pojavom lasera visoke energije postalo je moguće uspješno riješiti neka zloćudna žarišta, izbjegavajući pritom probleme koje uzrokuju konvencionalni kirurški zahvati, poput dugog razdoblja hospitalizacije, krvarenja, postavljanja šavova, dugog i bolnog poslijeoperacijskog razdoblja, infekcije itd.

Naš je cilj prikazati slučaj hiperkeratoze s visokim stupnjem epitelne displazije, liječen laserom s CO<sub>2</sub>, koji, barem za sada, ne pokazuje znakove recidiva.

## Prikaz slučaja

Riječ je o bolesniku muškoga spola, bijele rase, u dobi od 58 godina, pušaču, s obostranim žarištima

na bukalnoj sluznici i s 5-godišnjom povijesti razvoja žarišta. Pošto je uzeta anamneza, klinički je pregled bukalne sluznice pokazao na objema stranama opsežna područja s verukoznim promjenama nalik na hiperkeratozu (Slike 1 i 2). Najprije je napravljena incizijska biopsija na lijevoj i desnoj strani bukalne sluznice, ona je pokazala hiperkeratozu s visokim stupnjem epitelne displazije, s hiperplazijom bazalnih stanica, izgubljenom polarnošću, polimorfizmom, povećanim stupnjem mitozna, izgubljenom stratifikacijom epitela i stromom koja još nije bila zahvaćena. Zahvaćeni površinski epitel i podsluznica pod lokalnom su anestezijom na svakoj strani tretirani tijekom 7 dana laserom s CO<sub>2</sub> s kontinuiranom zrakom i defokusiranim mjestom apsorpcije površine 2 mm pri 10 Watta (Sharplan 15F® - FAPESP 97/07645-2). Sluznica je razorena do dubine na kojoj su se mogla vidjeti mišićna vlakna, s uvjetno postavljenim rubovima od 5 mm. Žarište je kontrolirano 1, 3, 6, 9, i 12 mjeseci nakon kirurškoga zahvata i nije bilo znakova recidiva ni ikakvih drugih komplikacija (Slike 3, 4, 5, 6 i 7).

## Rasprava

Uporaba laserske zrake s CO<sub>2</sub> u kirurgiji usne šupljine, kad je indicirana, ima prednosti koje konvencionalna kirurgija ne može pružiti. Među te se prednosti, između ostaloga, mogu ubrojiti: sterilizacija kirurške rane, odsutnost krvarenja i činjenica da je riječ o kirurškom zahvatu bez dodira te nema mehaničke traume tkiva (2). Još jedna prednost koju valja istaknuti, jest u činjenici da se nakon obrade laserom rana koagulira te se gubitak krvi i poslijeoperacijska bol smanjuju na najmanju moguću mjeru. Te su prednosti važne ako se rana ne može sašiti te ju se mora ostaviti da zacjeljuje bez šava, a važne su i zato što pri zahvatu nema krvarenja, vrijeme kirurškoga zahvata je kraće, otjecanje je minimalno, a ožiljak manji (2).

Gaspar i Szabo (3) objavili su rezultate liječenja laserom u 126 leukoplakija usne šupljine, različitog stupnja zahvaćenosti. Pokazali su da nakon intervencije laserom 118 bolesnika više nije imalo nikakvih simptoma (93,6%). Bol i otjecanje nakon operacije bili su minimalni i bolesnici su, u pravilu, već drugoga dana mogli raditi. Tradati i sur. (4) objavili su rezultate ekscizije karcinoma pločastih stanica iz