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Use of Diode Laser 980nm in Gingival Depigmentation

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Introduction:

Gingival hyperpigmentation is caused by excessive deposition of melanin in the basal and suprabasal cell layers of the epithelium. Although melanin pigmentation of the gingiva is completely benign, cosmetic concerns are common, particularly in patients having a very high smile line (gummy smile). Various depigmentation techniques have been employed, such as scalpel surgery, gingivectomy, gingivectomy with free gingival autografting, cryosurgery, electrosurgery, chemical agents such as 90% phenol and 95% alcohol, abrasion with diamond burs, Nd:YAG laser, semiconductor diode laser, and CO2 laser. The present case report describes simple and effective depigmentation technique using semiconductor diode laser(980nm) for gingival depigmentation, which have produced good results with patient satisfaction.[1]

Clinical Case Study: Difficulty is Moderate

1. **Outline of the Case:**

Figure 1

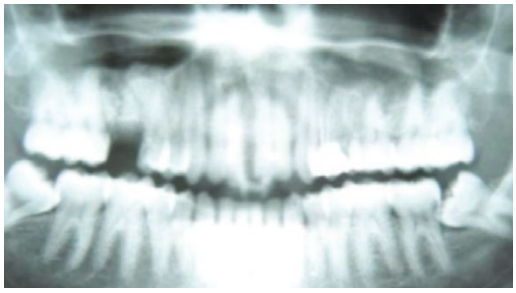

Figure 2

A. Full clinical description: 23 years old patient coming to treat his teeth with severe pain in upper left 4 andhave swelling (Figure.1).

I. **Medical History: No any medical problem**

● Dental History:

The patient had several amalgam fillings in upper left 4,5,and 6.

Composite filling in upper right 5.

* Remaining root from history of fracture upper right .

● Teeth occlusion: Good occlusion

● TMJ: Normal structure and normal movement

II. **Radiographic exam (pre-treatment):**

III. **Periodontal Charting: not required**

IV. **Soft tissue status:**

● General oral soft tissue

* No any abnormality all tissues appear normal

● Gingival soft tissue

* Bleeding on probing

* A lot of dental calculus and plaque

* Deep gingival pigmentation

● Hard tissue status:

*There is impacted lower left and right 8

* Amalgam fillings in the upper left 4 and 5
* R.C.T FOR upper left 4
* Remaining root in upper right 6
• Tooth vitality:
Examined by cold air all the teeth is vital
• Mobility:
No teeth mobility
• Percussion:
No pain with percussion
V. **Any other tests**
B.Diagnosis:
I.Provisional Diagnosis:
Treatment of this case in 3 steps
* Scaling and Polishing.
* Re-treatment of upper left 4 R C T.
* And I advise the patient to make laser for gingival pigmentation.
• Final Diagnosis:
I will use diode laser 980nm in for gingival depigmentation in upper and lower anterior area use fibre optic delivery system and with 1 w power with continuous wave
• Treatment plan outline:

* Scaling and polishing
* Root canal treatment in the upper left 4
* Gingival depigmentation by diode laser
II. Indications:
In this case I want good homeostasis
Less pain during and after operation
Contraindications:
No any contraindication
III. Precautions:
• Use minimum laser power
• Care must be taken to avoid thermal damage and control the carbonization
• The tip with angle in gingival tissue 45 degrees
• Slowly movement with removal of tissue debris and fibre tip with gauze
• Care must be taken to avoid damage of gingival contour or interdental papillae
Treatment alternatives:
By scalpel and periodontal pack
IV. Informed Consent:
Treatment plan was fully explained and written consent form was signed by the patient

2. Treatment:
I. **Laser specifications**:

Specifications	
Origin	LAMBDA SpA Via dell'Impresa 36040 Brendola (VI) - Italy
Model	L A 3D0 001. 3NM
Input of power suply	100 - 240 VAC
Network frequency	47-63Hz
Maximum current absorbed by the Network	0.5A (@230V)
Output of power supply	12VDC - 8.33A max
Supply voltage for the system	12VDC
Max absorption of the system	0.6A
Maximum power output on the work point	II B
Medical class	II B
Isolation class	I
Part applied	Type B
Protection against anaesthetics	This device is not suitable for use with a mixture of inflammable anaesthetio with air or oxygen or nitrogen dioxide.
Protection level IP	IPXO
Procedural use	Continuous with alternative load: active 3 min, pause 2 min.
Working conditions	TEMP: 10 30°c HUMIDITY: 30 75% ATM, PRESSURE : 700/1060 hP²
Storage conditions	TEMP: 5 50°c HUMIDITY: 30 75% ATM, PRESSURE : 700/1060 hP²
External connections	Footswitch (optional) + interlock
Cooling system	Air
Laser class	4
Dimensions	9.7x13.5x18 (LxPxA) cm
Weight	1 kg ca.

Intrinsic Parameters		Adjustable Parameters		Calculated Parameters	
Manufacturer	Doctor smile	Average Power(watts)	1 watt	Energy per pulse (mj)	----
Model	Wiser	Energy per pulse (mj)	----	Average Power(watts)	1 watt
Type	Diode	Pulse width (microsec)	----	Peak Power (watts)	1 watt
Wavelength (nm)	980 nm	Pulse repetition rate(PPS)	----	Tip Area(cm^2)	.0013 cm^2
Delivery System (Fiber, sapphire tip, articulated arm)	fibre optic	Tip diameter (um)	400 um	Spot Diameter at Tissue(cm)	----
Emission Mode (continuous wave, gated, free running pulse)	Continuous wave	Tip-to- Tissue (millimeters)	contact	Spot Area at Tissue(cm2)	----
Energy Distribution (Gaussian or flat-top)	Gaussian	Beam divergence (degrees)	----	Peak Power Density(w/cm^2)	796 w/cm^2
Tip initiation ?	no	Water (ml/min)	----	Peak Power 796 w/cm^2	796 w/cm^2
Initiation technique	not required	Air (ml/min)	----	Pulse Energy Air (ml/min) Density (j/cm2)	----
----	----	Length of treatment(sec)	240 sec	Total Energy 240 J (joules)	240 J

II. Laser parameters for gingival depigmentation:

III. Treatment delivery sequence:

• Preliminary to patient delivery:

Securing an operating room, define controlled area and place proper laser warning signs. Set up laser and test proper laser operation. Test fire laser, employing safety measures, using minimum power settings. In addition to fibre tip can be inspected to ensure a proper cleave has been carried out and the spot size is uniform. Supplies dispensed, equipment and sterile instruments arranged.

• Safety: Eye protection that compatible with diode laser 980 nm for patient and all team work.

• Treatment sequence:

* For gingival depigmentation in upper and lower anterior area from canine to canine

*Laser setting 1 watt with contact mode uninitiated tip in c .w.

*After scaling and polishing the laser tip angulated to the gingival tissue and slowly movement with removal of tissue depress and tip with gauze

* After that, clean the area with normal saline

IV. Post-operative instructions:

• The surgical sites were shown to the patient and their appearance explained

• Analgesic to relief pain after operation

V. Prognosis:

Good result with recurrent after 6 to 9 months.

3. Post-Treatment:

I.Complications-types, events, management:

• Mild pain can treated by the analgesic same like Paracetamol

•Bleeding

•But in this case no any complication

During Operation

Immediate after operation

After 2 weeks (lower)

After 2 weeks (upper)

After 2 months (lower) After 2

After 2 months (upper)

References :

1. Management of Gingival Hyperpigmentation by Semiconductor Diode LaserGeeti Gupta J CutanAesthet Surg. 2011 Sep-Dec; 4(3): 208–210. doi: 10.4103/0974-2077.91256.