Soft Tissue Surgery using the Er:YAG laser @2940nm (PowerLase/ LightWalker) and the 1064 nm semiconductor laser (Xlase)

Some practitioners fail to recognize and treat abnormal oral conditions.
Some practitioners choose to ignore abnormal oral soft and hard tissue problems.
Some practitioners refer all soft tissue abnormalities and pathology out.

Lawrence Kotlow DDS
1/1/2013

Understanding your diode laser
1. Diode vaporize soft tissue by a photothermal effect.
2. Tissue is heated and vaporized, excised or incised by direct contact of the laser tip to the tissue.
3. The two desired tissue interaction of laser energy are absorption and scattering which increases absorption by increasing the number of target chromophores potentials.
4. Primary targeted tissue is pigmented tissue (tissues that contain hemoglobin and/or melanin).
5. The 1064 and 980 wavelengths are more highly absorbed in water than lower wave lengths such as the 810 nm.
6. Delivery is by fiber or replaceable fiber tips
7. Lower cost and easier portability
8. Continuous wave and gated or pulsed wave

Understanding your Erbium lasers
1. The Erbium family consists of two very close wavelengths
   a. Erbium : YAG @ 2940 nm
   b. Erbium, Chromium:YSGG @ 2780 nm
2. Delivery is either by Fiber or an Articulated arm.
3. Soft tissue surgery is completed without the need for water due to the high water content of the soft tissue.
4. Tissue ablation, excision or incision is by photo-acoustic activity rather than photothermal, which causes the primary chromophore - OH (water) within the tissue to explode.
5. Free running pulsed
6. Non-contact

The effect of pulse duration on tissue ablation and control of bleeding
Hemostasis can be attained by using Erbium lasers having long pulse durations which allow for good control of bleeding.
1. Pulse durations longer than 700 usec provide residual thermal energy for coagulation.
2. Pulse durations in the range of 50-100 usec are precise and appear to accelerate hard tissue ablation and reduce patient discomfort.

****Principles and practice of Laser Dentistry 2010 CONVISSAR
The Erbium Family

2780 nm & 2940 nm

Erbium: YAG @ 2940 nm

Lares (Fotona)

Biolas

Er, Chromium: YSGG @2780 nm

Soft tissue procedures in pediatric and orthodontic practices

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Diodes/Nd:YAG</th>
<th>Erbiu m</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maxillary lip-tie</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>2. Lingual tongue-tie</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>3. Biopsies</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>4. Herpes labialis</td>
<td>most effective</td>
<td>yes</td>
</tr>
<tr>
<td>5. Aphthous ulcers</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>6. Lip-split tissue welding</td>
<td>?</td>
<td>yes</td>
</tr>
<tr>
<td>7. Venous lake lesion removal</td>
<td>yes</td>
<td>n/a</td>
</tr>
<tr>
<td>8. Mandibular frenum revision</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>9. Caries exposure</td>
<td>yes</td>
<td>yes</td>
</tr>
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<tr>
<td>10. Phase three orthodontics</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>a. Gingival recontouring</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>b. Gingivectomy</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>11. Alternative to mandibular</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>cleft grafting/ frenectomy</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>12. Periodontal therapy</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>13. Pulp therapy</td>
<td>?</td>
<td>yes</td>
</tr>
<tr>
<td>14. Exposure of unerupted teeth</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>15. Crown lengthening</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>16. Pericoronal flap problems</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Preparing your laser tips & fibers for surgery

Erbium: YAG 2940 nm LightWalker/Powerlase AT Spa

1. Surgical settings for excision of soft tissue 20-30 Hz and 55-100 mJ using longer pulse durations (LP 600 msec)

1064 nm x lase laser

1. Surgical settings for excisions of soft tissue pulsed or gated at 24 msec on 18 msec off 200mW fiber 1.53 w (in most cases actual power will remain below 1.5 w)

Preparing your laser tips & fibers for surgery

Erbium:

1. Quartz tips can be reshaped and polished
2. Sapphire tips are hotter than quartz at same settings and may not be polishable

1064 fiber

1. Fibers must be cleaved prior to each procedure and may need additional cleaving if the procedures are long or difficult.
Maxillary lip-tie (also known as maxillary frenectomy!  
Older children and teen-aged patients

The maxillary frenum should be redefined and identified as a vertical band of lip tissue extending from the inside portion of the upper lip attaching to the alveolar mucosa of maxillary arch. In certain instances this attachment may become a factor in limiting the mobility and function of the upper lip, other times this tissue attachment may not appear to create any significant problems.

No scaring, no orthodontics and not waiting until age 9-12

Preoperative  
One year later  
two years later

Maxillary Lip-tie revision, emla

28 year old female

5 days post surgery
Ankyloglossia

1 week post surgery

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erbium

1064 laser

Biopsies

Biopsy of mucocele

Biopsies

Lingual frenum revision with local and suturing

Thick tissue required local anesthetic

Suture placed to prevent reattachment

Erbium

Six days post-op

1064 laser

6 days post

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**Biopsy**

Biopsy of mucocele local anesthetic sutures post-op 6 days post-op

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**Herpes labialis**

1064 laser

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**Herpes Labialis**

200u .5-.7w cw 2 minutes

24 hrs 4 days

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**Aphthous Ulcers**

Er:YAG

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**Mucocele & Maxillary lip-tie surgery :Female BD 2/6/06**

Lip-Tie Revision 2/3/11

Mucocele 1/27/11

Combined Er:YAG/1064

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Aphthous Ulcer Treatment

The photothermal effects of laser energy

Tissue welding using Erbium lasers

Photothermal heating effects in soft tissue

Tissue welding of split lip

Removal of venous lake lesions

Diode: Removal of *venous pool 8yr old female

Removal of venous lake lesions

Diode: Removal of *venous pool 8yr old female
Removal of impacted teeth

Mandibular frenum revisions (alternative to gingival grafting)

Periodontal problems: mandibular frenum release

Mandibular frenum revisions

1064 laser with using topical only

Mandibular frenectomy (OFD)

1064 gingivectomy

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Crown lengthening to expose caries

Pericoronal flap problems

Erbium:YAG Lasers

- Lasers are an effective alternative for treating pulps with the additional benefits of providing pulp therapy without the need to introduce chemicals into children’s systems.

Pulp therapy in primary teeth

Phase III orthodontics

Orthodontists using lasers may need to consider the effect of doing their own soft tissue surgical procedures and how it could affect referral sources.
Exposure of crown or crown lengthening for orthodontic bracket placement

Exposing teeth for Orthodontic Bracket placement

Topical anesthetic only: Emla
1064nm laser 24/18 300u 1.2w

Gingivectomy during or immediately after orthodontic treatment

Lip-tie release and gingivectomy

Intercepting the decalcification process
Gingivectomy during or immediately after orthodontic treatment

5 days post surgery

Combined mandibular frenum revisions and gingivectomy

Due to all lasers creating a photobiostimulating effect once the laser is used you can use your conventional instruments and then finish the procedure using your laser.

Removing hyperemic tissue

Erbium Laser with local "Cut" and laser

Six days post treatment

Gingival reshaping after orthodontic removal of brackets
Torus removal: Er:YAG

Removal of bony lesions and recontour soft tissue post-op

Photos courtesy of Dr. Don Coluzzi

Gingival reshaping after orthodontic removal of brackets

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Additional non-traditional pedo-ortho procedures

Periodontal disease treatments
Fiberotomy
Implant recovery
Endodontics: PIPS(lares)
Apicoectomies
Closed flap crown lengthening
Torus removal

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Apicoectomy: Erbium 2970nm

Don Coluzzi

Surgery: adult tooth removal

Difficult extraction using Erbium:YAG

Photos courtesy of Dr. Don Coluzzi

Open flap bone reduction

1 month post-op

Photos courtesy of Dr. Don Coluzzi
Closed bone reduction

Soft tissue removed first

Closed flap osseous removal

1 month post-op

“If we don’t change, we don’t grow. If we don’t grow, we aren’t really living!”

Gail Sheehy

THANK YOU

THANK YOU

Thank you for your interest and time today