There are a variety of dedicated soft tissue lasers available in the wavelength range of 810 nm though 1064 nm which can be classified as a semiconductor or diode laser.

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.
7. Lower cost and easier portability.
8. Continuous wave and gated or pulsed wave.
9. Caries exposure                           yes                          yes
10. Mandibular enum revision    yes                         yes
11. Venous lake lesion removal         yes                         n/a
12. Lip        most effective
13. Herpes labialis                           yes                          yes
14. Aphthous ulcers                      yes                          yes
15. Lip-split tissue welding              ?                            yes
16. Lip-split tissue welding              ?                            n/a
17. Radiation therapy                     yes                         yes
18. Mandibular frenum revision            yes                          yes
19. Caries exposure                      yes                          yes

Understanding your diode laser

1. Diode vaporizes 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.

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 microsecond provide residual thermal energy for for coagulation.
2. Pulse durations in the range of 50-100 microsecond precise and appear to accelerate hard tissue ablation and reduce patient discomfort.

**P**rinciples and practice of Laser Dentistry 2010 CONVISSAR
Soft tissue procedures in pediatric and orthodontic practices

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Diodes/Nd:YAG</th>
<th>Erbium</th>
</tr>
</thead>
<tbody>
<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 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. Periconal flap problems</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Suggested Settings for soft tissue surgery

*Be careful of preset factory settings*

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 xHase laser

1. Surgical settings for excision of soft tissue pulsed or gated at 24 msec on 18 msec off 200u fiber 1.5-3.0 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 know 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.

Maxillary lip-tie (also know as maxillary frenectomy! Older children and teen-aged patients

Er:YAG laser

1064 laser

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

Preoperative | post-op

2006 | 2007 | 2010

7/3/08 | 10/6/10

Ankyloglossia

1 week post surgery

1064 laser

Ankyloglossia

10/6/10 | 7/3/08
Erbium

Six days post-op

Thick tissue required local anesthetic

Suture placed to prevent reattachment

Biopsies

Biopsy of mucocele

Biopsy of mucocele

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

Lip-Tie Revision-2/3/11

Mucocele 1/27/11

Combined E: YAG/1064

1064 laser

Herpes labialis
Herpes Labialis
200u .5-.7w cw 2 minutes

Aphthous Ulcers
28

Aphthous Ulcer Treatment

Lawrence Kotlow DDS 2012

The photothermal effects of laser energy

Tissue welding using Erbium lasers

Photothermal heating effects in soft tissue

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

Mandibular frenum revisions
(alternative to gingival grafting)

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Mandibular frenum revisions

1064 laser with using topical only

1064 gingivectomy

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

Orthodontists using lasers may need to consider the effect of doing their own soft tissue surgical procedures and how it could affect referral sources.

Phase III orthodontics
Exposure of crown or crown lengthening for orthodontic bracket placement

Gingivectomy during or immediately after orthodontic treatment

Lip-tie release and gingivectomy

Combined mandibular frenum revisions and gingivectomy

Cut first and finish using your laser
Removing hyperemic tissue

Six days post treatment

Gingival reshaping after orthodontic removal of brackets

Lawrence Kotlow DDS 2012

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

Additional non-traditional pedo-ortho procedures

Surgery: adult tooth removal
Difficult extraction using Erbium YAG

Don Coluzzi

Open flap bone reduction

Lawrence Kotlow DDS 2012
1 month post-op

Closed bone reduction

Soft tissue removed first

Closed flap bone removal

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

Gail Sheehy

Thank you for your interest and time today.