Lasers and Periodontal Therapy
Laser Workshop
Advanced

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Objectives
- Review current concepts of the etiology of periodontal disease
- Determine the patient periodontal status
- Consider the position of laser technology in periodontal therapy
- Develop quality outcomes of managing the periodontal patient

Data Collection

- Etiology
- Diagnosis
- Prognosis
- Treatment Plan

Data Collection

- Radiographic Exam
- Probing
- Tissue Characteristics
- Mobility

Examination

1. = Phase I Therapy (Debridement, O.H., etc.)
2. = Phase I Re-evaluation
3. = Periodontal Surgery
4. = Maintenance
5. = Recall

Connective Tissue: 1.07 mm
Epithelial Attachment: 0.97 mm
Sulcus Depth: 0.69 mm
Advantages of Lasers in Surgical Procedures

- Laser Cut More Visible To Eye / Dry Field
- Laser Sterilizes Wound As It Cuts
- Decreased Post Operative Pain And Edema
- Decreased Post Operative Infection
- The theory of "Sealing" and "Sterilizing" the wound?
- Less Wound Contraction And Scarring

The time that the laser is off in a pulsed mode is termed "Thermal Relaxation". During this time, the target tissue is allowed a period of cooling.

Thermal Effects on Tissue Temperature (°C):

- 37-50: Hyperthermia
- >60: Coagulation, Protein Denaturation
- 70-90: Welding
- 100-150: Vaporization
- >200: Carbonization

Biostimulation....
- Enhance angiogenesis
- Collagen formation
- Osteoblastic
- Fibroblastic

Diode lasers

- Advantages:
  - Can cut and coagulate gingiva with virtually no bleeding or collateral damage to healthy tissue
  - Most cases - topical anesthetic is sufficient for a pain free procedure
  - Surgical precision
  - Little to no postoperative discomfort and a short healing time
Laser Surgery Vs. Electrosurgery

- Less pain
- Less swelling
- Less redness
- Decreased surgical time on vascular lesions

Zones of necrosis...

- Electrosurgery: 500 to 700 cell layers (electro thermal)
- Laser: 3-5 cell layers (photo thermal)

Modes of Laser Operation:

- **Continuous Wave**
  Maximizes coagulation and speed
- **Pulsed Wave (Gated or Free-Running)**
  Minimizes thermal damage and pain

Graphical User Interface

Gorgeous, Intuitive, Streamlined

20 procedure presets put your most often performed soft tissue procedures at your fingertips

Whitening & Temporary Pain Relief

- 20-Minute Whitening
  Achieve up to 10 shades of whitening with available handpiece and gel kit
- Temporary Pain Relief
  Treat TMJ and other myofascial disorders with available Deep Tissue Handpiece™

Cost for DTHP?

Soft Tissue

- De-epithelization
- Degranulate
- Denature proteins
- Gingivectomy
- Inhibit epithelial migration...clot establishment
Cornea, Lens, and Retinal Damage from various wavelengths

**Laser Safety:**

- **Protective Eyewear**
  - Patient, close observers protocol
    - On First
    - Off Last
  - Doctor / Hygienist / Assistant protocol
    - On Before Treatment
    - Off After Treatment

*Protocol per operator’s manual

OTHERS—KEEP OUT!

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**YSGG Advantages**

- Best hard-tissue cutting
- Best soft-tissue cutting
- Deep Pocket Therapy
- Endo disinfection

**iLase Advantages**

- Setup in seconds for quick or unexpected soft-tissue needs
- Better hemostasis than YSGG
- Removable tips might provide better access to some locations

Although we have not yet developed a protocol for iLase, Biolase diodes are FDA-cleared for temporary relief of minor pain

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**Intuitive Power**

- 2011

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**Waterlase iPlus**

- Intuitive, Easy Interface

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**Hard tissue**

- Tooth
  - Cementum
  - Calculus
  - Dentin
- Bone
  - Removes
  - Biostimulates
Soft Tissue
- De-epithelialize
- Degranulate
- Denature proteins
- Gingivectomy
- Inhibit epithelial migration...clot establishment

6 Key Decisions
Cosmetic Crown Lengthening
1. Sound the osseous crest (3.0 mm osseous crest - proposed GM)
2. Zone of keratinized gingiva
   Scallop desired lengths if >3mm will be retained
3. Bevel papilla areas (later you can apically position and adjust levels)
4. Leave papilla intact at base
5. Thin osseous crest but leave minimum of 1mm thickness
6. Will Dentin / Root Surfaces be exposed?

Procedures for Pocket Reduction
- Excisional periodontal surgery
  - Gingivectomy
- Incisinal periodontal surgery
  - Flap surgery

Attached Gingivae
- Color: red, coral pink
- Surface: smooth, shiny, stippled
- Mobility: loose, mobile, firm, immobile
Gingivectomy --- NO!!

- Access to osseous is critical
- Minimal or no attached gingivae

Gingivectomy -- Yes!!

- Supraboney pockets - Access top osseous not important
- Gingival enlargement
- Fibrotic gingivae
- Adequate attached gingivae

Practical Procedures and Aesthetic Dentistry Vol 18 #3 - May 2006

Introducing Chu’s Aesthetic Gauges

Laser-Assisted Flapless Crown Lengthening: A Case Series

- Er:YAG GV and flapless osseous resection
- Observed: osseous troughs, insufficient and ragged bone removal, and root surface pitting
- Followup to 3 years and stability

Comparison of Er:YAG Laser Flapless Crown Lengthening vs. Open-Flap Bur Approach in Animal Studies

- Sheep mandibles
- Silicon impression technique
- No difference macro and microscopically
- Flapless surgery is as effective in contouring crestal bone as conventional surgery
Inflammation...

- a complex reaction to injurious agents such as microbes and damaged, usually necrotic, cells that consists of vascular responses, migration and activation of leukocytes, and systemic reactions

- Kumar. Robbins Basic Pathology

Current Concepts of Periodontitis


Periodontal Tissues in Health and Disease

Floss Limitations in Periodontal Patients
Antimicrobial Photodynamic Therapy in the Non-Surgical Treatment of Aggressive Periodontitis: Cytokine Profile in Gingival Crevicular Fluid, Preliminary Results


- Non-surgical periodontal treatment with PDT or SRP led to statistically significant reductions in TNF-α level 30 days following treatment. There were similar levels of TNF-α and RANKL at the different time points in both groups, with no statistically significant differences.

Periodontal Inflammation

The effect of laser therapy as an adjunct to non-surgical periodontal treatment in subjects with chronic periodontitis: a systematic review ... Karlson et al J peri 2008

- Limited studies evaluating the effect
- Results using laser as an adjunct to SRP or replacing SRP as first tx option, should be interpreted with caution
- Need independent studies with power

Conclusion: To date, no evidence exists on the significance of laser treatment as an adjunct to non-surgical periodontal treatment in adults with chronic periodontitis.

Attachment

- Long Junctional Epithelium
- Connective Tissue Adherence
- Connective Tissue Attachment
- New Attachment
Assessing Success
- Radiographs
- Pocket depths
- Rentry
- Histology

Comparative summary of results from clinical trials using Nd:YAG, Er:YAG, or diode lasers for treatment of periodontitis (4-6mm PDs)

<table>
<thead>
<tr>
<th>Laser</th>
<th># of Trials</th>
<th>PPD</th>
<th>CAL</th>
<th>BOP (%)</th>
<th>Microbes</th>
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</thead>
<tbody>
<tr>
<td>Nd:YAG (10)</td>
<td>1.23</td>
<td>1.04</td>
<td>41</td>
<td>2/10</td>
<td></td>
</tr>
<tr>
<td>Erbium (11)</td>
<td>2.30</td>
<td>1.68</td>
<td>47</td>
<td>0/11</td>
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<tr>
<td>Diode (5)</td>
<td>1.70</td>
<td>1.52</td>
<td>68</td>
<td>1/5</td>
<td></td>
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<tr>
<td>Photo dy (5)</td>
<td>1.05</td>
<td>0.91</td>
<td>56</td>
<td>0/5</td>
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</tr>
</tbody>
</table>

Rationale for pocket reduction surgery:
- Access to the sulcus by both the clinician and the patient
- Modify habitat for periodontal pathogens
- Decrease quantity/quality of host inflammatory cells

Considerations for laser periodontal procedures:
- Measure GM to CEJ
- Measure CEJ to pocket depth
- Establish attached gingiva
- Consider horizontal osseous resorption
- Consider angular osseous resorption
- Establish esthetic requirement

Progression of Disease

Surgical Curettage
Flap Surgery

Biomodifiers

Emdogain

Influence of laser therapy on peri-implantitis

**Thoughts…**

- Minimal advantage of laser therapy in non-surgical periodontal treatment
- Possible laser applicability to early to moderate periodontitis, horizontal bone resorption, single rooted teeth
- Some applicability to moderate to severe periodontitis, multiple roots, furcations, angular defects, but technique sensitive and may require augmentation

**Thoughts…..**

- Learn laser physics and effects on tissue
- Embrace generic CE laser courses
- Decide your needs..then purchase
- Acquire loops >4X
- Use anesthesia
- When in doubt …flap….

**And some more….**

- Dentistry: Suggest laser certification by state boards of dentistry
- Corporate: Cease encouraging marketing to patients as a cure for periodontitis until science
- Periodontics: Be open and guide new discoveries

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