“Win the Battle Against Biofilm: Leverage the Power of Ultrasonics”

COURSE DESCRIPTION
This course is based on current scientific literature and evidence based strategies to give the clinician practical guidelines regarding the use of ultrasonic instrumentation for nonsurgical periodontal therapy. Ultrasonic instrumentation techniques will be covered extensively following the dental hygiene process of care and utilizing hands-on activities.

COURSE GOAL
The goal of this course is to enable the clinician to identify modifying factors related to nonsurgical periodontal instrumentation, manage patient discomfort appropriately, and improve ultrasonic instrumentation skills to facilitate thorough periodontal debridement and enhance treatment outcomes.

COURSE OBJECTIVES
Upon completion of this course, participants will be able to:

- Differentiate the advantages and limitations of the various technologies which drive power scaling units
- Compare and contrast the three E’s of hand, sonic, and ultrasonic instrumentation techniques: effectiveness, efficiency, and ergonomics
- Discuss current research findings which demonstrate the clinical advantages/benefits of ultrasonic instrumentation over manual instrumentation
- Describe the technology of ultrasonics and define key terminology, including acoustic streaming, acoustical turbulence, cavitation, lavage, frequency, power and stroke pattern
- Identify and assess pretreatment considerations for the use of ultrasonic instrumentation to include patient’s medical history, clinical indications, and contraindications
- Incorporate appropriate pain management techniques to improve patient comfort and efficiency during instrumentation
- Identify various modifying factors which influence and/or change instrumentation protocols such as root anatomy, furcations and oral conditions.
- List criteria for the appropriate selection of ultrasonic inserts, both standard and modified.
- Demonstrate the correct technique for utilization of the ultrasonic scaler to include insert and power selection, lavage flow, grasp, fulcrum, tip adaptation, and stroke

OUTLINE:

I. Evolution of Instrumentation for Nonsurgical Periodontal Therapy
II. Assessment
   a. Medical History
   b. Periodontal Status
   c. Morphology
III. Diagnose and Plan Instrumentation Approach
IV. Implementation of Instrumentation Strategies
   a. Science of Ultrasonic Technology
   b. Ultrasonic Tip and Insert Designs
   c. Clinical Application of Ultrasonic Instrumentation
V. Evaluation of Therapy
VI. Ultrasonic Lavage
“Ultrasonics: An Evidence Based Approach to Nonsurgical Periodontal Therapy”

Assess
Diagnose
Plan
Implement
Evaluate

Assessment

Patient Assessment – assessment of the patient’s chief complaint, current periodontal and dental disease status

Biofilm Assessment – assessment of the quality and quantity of the biofilm present

Morphology Assessment - assessment of the root morphology to include furcations, challenge areas and root adaptability

Cementum Assessment – assessment of the cementum at the location of the biofilm


• Gingival diseases
  – Plaque induced
  – Non-plaque induced
• Chronic periodontitis
• Aggressive periodontitis
• Periodontitis as a manifestation of systemic diseases
• Necrotizing periodontal diseases
• Abscesses of the periodontium
• Periodontitis associated with endodontic lesions
• Developmental or acquired deformities and conditions

Plan

Nonsurgical Periodontal Therapy

• Periodontal debridement
• Lavage/Irrigation
• Sustained-release antibiotic/antimicrobial agent
• Remove iatrogenic biofilm retainers
• Concurrent dental therapy

Periodontal Debridement

• Therapeutic interventions
  – Scaling
  – Root planing
  – Root debridement
• Definitive or complete treatment
• Preparatory or initial therapy prior to surgery

Implement

Instrumentation Approach

• Diagnostic instrumentation
• Ultrasonic periodontal debridement including lavage
• Evaluation - hand and/or ultrasonic
• Ultrasonic subgingival irrigation/rinse
Hand Instrumentation

Choices in Hand Instrument Selection
- Area specific designs
- Terminal shank and working end length
- Variety of handle diameters
- Stainless steel, carbon steel, and hybrid steel

Technique
- Terminal shank
- Work to base of pocket
- Engage 1/3
- Apply lateral pressure

Ultrasonic Instrumentation

<table>
<thead>
<tr>
<th>Ultrasound Technology</th>
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<tbody>
<tr>
<td>Acoustic streaming</td>
<td>• Forceful fluid flow</td>
</tr>
<tr>
<td>Acoustic turbulence</td>
<td>• Fluid moves in a swirling manner</td>
</tr>
<tr>
<td>Cavitation</td>
<td>• Bubbles implode creating a shock wave</td>
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</table>
| Sonic technology              | • Compressed air runs handpiece to activate tip
|                               | • 2,500 to 7,000 cps
|                               | • Circular/elliptical movement
|                               | • All sides are active|
| Piezoelectric technology      | • Electrical energy activates piezo-ceramic disks in handpiece
|                               | • 25,000 to 50,000 cps
|                               | • Linear movement
|                               | • Two active sides|
| Magnetostrictive technology   | • Electrical energy is applied to coils in the handpiece
|                               | • 25,000 to 30,000 cps
|                               | • Elliptical movement
|                               | • All sides are active|
| Frequency                     | • Number of cycles (one complete stroke path) per second
|                               | • Frequency correlates to the active tip area
|                               | • Example: 30k = 4.2mm of active tip area|
| Power                         | • Size of the stroke path
|                               | • As the power increases, the stroke becomes larger|
# Ultrasonic Guidelines

<table>
<thead>
<tr>
<th>Inserts</th>
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<tbody>
<tr>
<td><strong>Magnetostrictive</strong></td>
<td><strong>Standard Design Power – Low to High</strong></td>
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<tr>
<td><strong>Beavertail</strong> Heavy stain or calculus</td>
<td><strong>Straight</strong> Light calculus and/or deplaquing in pockets less than 4mm</td>
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<tr>
<td><strong>Single bend</strong> Light to moderate calculus</td>
<td><strong>Modified / Curved</strong> Light calculus and/or deplaquing in pockets greater than 4mm</td>
</tr>
<tr>
<td><strong>Double bend</strong> Light to moderate calculus</td>
<td><strong>Dental Specialty Inserts</strong> 1. Endodontic – canal debridement, cleansing, irrigation; for dental use only 2. Diamond Coat – removal of tenacious calculus and soft tissue in surgical treatment settings; for dental use only</td>
</tr>
<tr>
<td><strong>Triple bend</strong> Moderate to heavy tenacious calculus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piezoelectric</th>
<th><strong>Standard Design</strong></th>
<th><strong>Thin Design</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tips</strong></td>
<td>Large scaling tips and bladed tips - tenacious calculus – medium to high power light to moderate calculus – medium power</td>
<td>Furcation and deep periodontal pockets – utilize on high power to remove calculus deposits from root surface and to prevent burnishing</td>
</tr>
<tr>
<td><strong>Specialty Tips</strong></td>
<td>1. Thin Diamond Coated Tips ~ fine scaling and root planing in narrow furcations ~ can be utilized with Dental Endoscope for subgingival areas ~ low power 2. Furcation ball tips – furcation areas ~ low power 3. Implant Carbon Composite Tip/ Restorative Margins</td>
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## Clinical Application

| Positioning | • Modified pen grasp and fulcrum |
| Stroke Patterns | • Vertical or tapping motion for moderate to heavy calculus • Horizontal or sweeping motion for light calculus and/or deplaquing • Oblique for interproximal and contact areas |
| Vertical Technique | • Positioned like a probe • Vertical or horizontal strokes |
| Oblique Technique | • Positioned like a hand instrument • Oblique strokes |
| Modified / Curved Design Technique | • Subgingival application in pockets greater than 4mm |
| Hand Instrument Evaluation | • Assess with probe, explorer, and/or inactivated tip |
| Ultrasonic Lavage/Rinse | • Water • Chlorhexidine • Povidone-iodine • Other |
Bibliography


Centers for Disease Control and Prevention. Guidelines for Infection Control in Dental Health-Care Settings – 2003. MMWR 2003; 52(No. RR-17).[inclusive page numbers].


