WELCOME!!

North Charlotte Dental Hygiene Study Club
2013
NORTH CHARLOTTE DENTAL HYGIENE STUDY CLUB

• Goals:
  • Informative
  • Interactive: Opportunity to meet your colleagues
  • Tailored to your needs
  • Suggestions are welcomed – Lecture Topics
PACKET

- Introduction Letter
- CE Certificate
- Laser Newsletter
- Laser Charts
- Periodontal Therapy Overview
LECTURE SERIES

• Feb 28<sup>th</sup>: Laser Assisted Periodontal Therapy

• Apr 30<sup>th</sup>: “Watch that bite! Pediatric dental occlusion, space maintenance, and treatment” by Dr. Scott Goodman

• Topics Possibilities for Aug 27<sup>th</sup> & Oct 29<sup>th</sup>
  • Periodontal Disease Classification System
  • 3-D Cone Beam Technology
  • Immediate Implants / Provisionalization
  • Cosmetic Periodontal Procedures
  • Functional Crown Lengthening Surgery
  • The Latest in Preventive Oral Healthcare Products – J Brame
INFORMATION SOURCES

• North Charlotte Dental Hygiene Study Club
  • Facebook

• www.trvperio.com
  • Dental Hygienist page
A RETROSPECTIVE EVALUATION OF LASER ASSISTED PERIODONTAL SURGERY: ANOTHER TOOL IN THE TREATMENT OF PERIODONTAL DISEASE
GOALS OF LECTURE

- To review important clinical parameters in diagnosis and treatment.
- To provide an overview of periodontal therapy options.
- To review the different lasers available.
- To show clinical results we have achieved using a laser.
- To recognize indications/patients who may be laser treatment candidates.
IMPORTANCE OF DIAGNOSIS

Failure to diagnose periodontal disease is the #1 reason for litigation in dentistry.

Most important cause of advance periodontal disease is the un/misdiagnosed and inadequate treatment of early periodontal disease.
IMPORTANCE OF DIAGNOSIS

• Correct diagnosis will help direct most effective treatment option(s)

• Help to understand and predict therapeutics outcomes

• Early diagnosis: key to a successful outcome; treatment is most conservative early on

• Incorrect or Delayed diagnosis (7+ mm or greater) leads to reduced clinical responses and a negative patient experience

• Who is to blame for not identifying the problem?
QUESTIONS TO ASK WHEN FORMULATING A DIAGNOSIS

- Is this disease? Where is pocket?
- What’s the etiology?
- What are the contributing factors?
- What’s the treatment plan?
- What are the outcomes you desire?
Y our initial diagnosis is a presumptive diagnosis.

Y ou must re-evaluate your diagnosis during treatment and after treatment to prevent missing the true diagnosis/etiology.
PERIODONTITIS

• An extension of inflammation from the gingiva to the supporting structures of the teeth; Leads to bone loss and loss and attachment

• Generalized vs Localized

• Mild vs Moderate vs Severe

• Acute vs Chronic

(AAP Parameters 2000)
HOW DO YOU TREAT CHRONIC AND AGGRESSIVE PERIODONTITIS

• Scaling and Root Planing
• Antibiotics (Localized vs Systemic)
• Flap Surgery
• Osseous Surgery
• Guided Tissue Regeneration
• Laser Assisted Periodontal Therapy
• Extraction(s)
We will review important clinical parameters to evaluate pre and post-treatment.

Each treatment has strengths and limitations.
PROBING DEPTH

- Represents current status of patient
- Comparisons with previous depths gives longitudinal data on disease progression or lack of progression (Hafajee, et al. 1983)
- For establishing periodontitis: 2 sites with probing depths of 6 mm and one site with CAL of 5 mm (Machtei, et al. 1993)
- Where is the pocket? (Relative to the CEJ)
- What influences PD?
  - Biotype; Inflammation; Calculus
  - Pain, Angulation
**BIOTYPE**

- **Thick biotype**
  - Thick bone circumferentially, but, more importantly on the facial/buccal
  - Bone can exist at / above the CEJ. This will cause the clinical crown to be short
  - Minimal to no bone loss post-extraction
  - Short clinical crowns
  - Where is the pocket?

- **Thin biotype**
  - Thin bone circumferentially, but, more importantly on the facial/buccal
  - PDL inserts into the thin bone termed bundle bone
  - Significant bone loss post-extraction
  - Fully visible crowns
  - More prone to gingival recession
PERIODONTAL DISEASE CLASSIFICATIONS

- Gingival Diseases (Plaque/Non plaque)
- **Chronic Periodontitis**
- **Aggressive Periodontitis**
- Periodontitis As a Manifestation of Systemic Diseases
- Necrotizing Periodontitis (NUG/NUP)
- Abscesses of Periodontium
- Periodontitis Associated with Endodontic Lesions
- Developmental or Acquired Deformities and Conditions

(AAP Annals Vol. 4, 2000)
BLEEDING ON PROBING

- Presence does not necessarily indicate the site is at risk for loss of attachment *(Lang, et al. 1986)*
- Absence correlates with active disease absence *(Lang, et al. 1990)*
- Histology reveals inflammation and loss of collagen *(Polson, et al. 1980)*
INFLAMMATION

- When a patient is inflamed, we penetrate through the JE into the CT which is why we record even deeper pockets than we might predict.

- After the inflammation is removed the probe stops superior the JE.

- Probing too hard may give you a false reading but the tissue will heal itself within days.
PLAQUE SCORE

- O’Leary plaque index:
  - Scores presence of plaque on six surfaces of tooth
- Evaluates patient’s level of oral hygiene
- Baseline and subsequent scores can be utilized to evaluate patient’s long-term compliance
- Periodontal surgery is contraindicated in patients with poor oral hygiene
MOBILITY

- Clinical indicator of the biophysical state of tooth support (Muhlemann, et al. 1965)
- Mobile teeth shown to have wider PDL, increased pocket depth, and crestal bone loss (Jin, et al. 1992)
- Mobile teeth have poorer therapeutic outcomes than non mobile teeth (Fleszar et al)
- Mobile teeth have a better therapeutic outcome when combined with occlusal adjustment or splinting (Harrel and Nunn)
RADIOGRAPHIC EXAM

- Bone loss pattern
- Bone loss percentage
- Furcation involvement
- Pathology
- Caries
- Calculus/Etiology
- Root Length/Root trunk Length
- Nerve/Sinus Proximity
FURCATION INVOLVEMENT

Courtesy Rateitschak
In health, the crestal bone is located 0.4 – 1.9mm (avg. 1.2mm) apical to CEJ

(Hausmann, et al. 1991)
VERTICAL BONE LOSS
TYPE OF VERTICAL BONE LOSS

- Interproximal location only

- Buccal and Lingual

- How many walls of bone remain?
  - 3 wall is ideal – represents a crater interproximally with good buccal and lingual bone
  - 2 wall defect – represents interproximal and buccal or lingual bone loss
  - 1 wall defect – bone loss through and through
OCCCLUSAL TRAUMA

Clinical Signs:
- Tooth mobility
- Fremitus
- Wear Facets
- Tooth Migration
- Tooth Fracture
- Pulpal Symptoms

Radiographic Signs:
- Widened PDL
- Vertical bone loss
- Furcation bone loss
- Root Resorption
- Thickened Lamina Dura
PARAFUNCTIONAL HABITS

- Bruxism (grinding)
- Clenching
- Biting a pencil
- Tongue thrust
- Holding a sewing needle/nail with front teeth
- Chewing finger nails
- Wind instruments
- Tongue Rings
Intrabony defects associated with occlusal trauma assume many forms.

The most commonly seen defect in “My Chair” seems to be the circumferential.
LOCAL ETIOLOGY
AMALGAM OVERHANGS

- Teeth with medium to large overhangs were found to have more bone loss (Jeffcoat, et al. 1980)
- 33% of patients and 25% of teeth found to have overhangs (Brunsvold, et al. 1990)
Periodontal Therapy
PERIODONTAL TREATMENT

Ultimate Goal:

• To maintain the dentition in health, comfort, and function for the life of the patient

• While always addressing the patients chief complaint!!
TYPES OF PERIODONTAL THERAPY

• **Non-surgical**
  • Scaling and Root Planing
  • Antimicrobial

• **Surgical**
  • Resective
    • Gingivectomy
    • Osseous surgery
  • Tissue Sparing
    • Flap surgery (MWF, ENAP, OFD)
    • Regenerative (BRG, EMD, Gem-21S, GTR)
  • Laser surgery
NON-SURGICAL THERAPY

- Initial therapy and improved oral hygiene is critical for both short and long term success.
- Sc/Rp is effective in pockets up to 5mm.
- Residual calculus is commonly found in pockets greater than 5mm.
- Direct visualization improves the effectiveness of calculus removal in deep sites and furcations.
SCALING/ROOT PLANING
CALCULUS REMOVAL: AN ACHIEVABLE GOAL?

• Total calculus removal can rarely be achieved (Kepic et al., 1990).

• Most often operators leave calculus at the CEJ, in root flutes, in furcations and at line angles (Jones and O’Leary, 1978).
LIMITATIONS OF TRADITIONAL SCALING AND ROOT PLANING

• Incomplete calculus removal in deep—greater than 4mm—pockets (Lovdal et al., 1961, Rabbani et al., 1981, Stambaugh et al., 1981).

• Decreased effectiveness of calculus removal on buccal and lingual surfaces as compared to mesial and distal surfaces (Stambaugh et al., 1981).

• Difficulty of clinical detection of residual calculus with an explorer (Sherman et al., 1990).

RESIDUAL CALCULUS

- Covered in biofilm
- Retains Endotoxin
- Acts as chronic local irritant
- Is rough and becomes repopulated with pathologic bacteria quickly
- Is usually undetectable on x-rays and with an explorer
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CHEMOTHERAPEUTICS

• All local delivery antibiotics must be combined with ScRP!

• Do not use them as a stand alone therapy

• Residual calculus is an issue. Even sterilized calculus acts as a chronic irritant

• Local antibiotics are beneficial in certain situations but should not be used in 50 sites at every maintenance appointment

If you were bleeding to death would you keep putting new band-aids/Neosporin on the wound every 2 minutes or would you go to the hospital to fix the problem?
CHEMOTHERAPEUTICS OBSTACLES

- Residual calculus
- Inflammation causes outflow of GCF at a rate of 44ul/min. The flow/pressure is out of the sulcus!
- Deep intrabony defects have tissue bridging the defect. This will not miraculously close.
- Allergy
- Costly
- Over medicated culture
- Patients are referred to us after several rounds of Sc/Rp and Arestin and still need surgery...are enraged unless the dentist communicated adequately.
- Meta analysis only shows modest short term gains in attachment
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Surgical – Pocket Elimination Surgery

- Resective
  - Gingivectomy
  - Osseous surgery

- Tissue Sparing
  - Flap surgery (MWF, ENAP, OFD)
  - Regenerative (BRG, EMD, Gem-21S, GTR)
  - Laser surgery
RESECTIVE PROCEDURES

- Resective procedures aim at the establishment of a healthy periodontium at a “reduced” level accepting the destruction which has already occurred as irreversible.

- Objective: pocket elimination or reduction.

(World Workshop 1989)
TISSUE SPARING PROCEDURES

• Attempt to restore the lost tissue architecture which includes the cementum, periodontal ligament, and bone through the use of differential tissue responses to exclusion or to the presence of certain materials

• Types:
  • Guided tissue regeneration
  • Grafting procedures
  • Biologic mediators

(AAP 1992; Cochran 1999)
CLINICAL GOALS OF PROCEDURES

Post-operative evaluation:

- Decreased:
  - pocket depth
  - inflammation
  - mobility

Post-operative evaluation:

- Increased:
  - clinical attachment levels
  - bone fill with regenerative procedures
OSSEOUS SURGERY
CONSEQUENCES OF OSSEOUS SURGERY
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OPEN FLAP DEBRIDEMENT
DISADVANTAGES OF FLAP SURGERIES

• Recession
• Root exposure
• Root sensitivity
• Pain/swelling “ice and vicodin”
• Bleeding
• Potential for neural injury
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REGENERATION / INTRABONY DEFECTS
REGENERATION / FURCATION
Six-month reentry
DISADVANTAGES OF REGENERATION

• Disease surgery success is 20% technique and 80% patient compliance

• Can only realistically expect 50% regeneration 50% of the time
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LASER SURGERY
TYPES OF DENTAL LASERS

- Argon
- CO₂
- Diode
- Erbium
- Nd:YAG
- Soft / Low Level
ALL LASERS ARE DIFFERENT

• Different applications
  • Soft tissue trimming – healthy tissues
  • Soft tissue removal – diseased tissues
  • Coagulation / fibrin clot formation
  • Hard tissue removal – tooth preparation
  • Hard tissue removal – bone / crown lengthening
WHICH ONE IS BEST FOR THE TREATMENT OF PERIODONTAL DISEASE?

Criteria

- Assess to entire length of pockets
- Flexibility: get into grooves and into furcations
- Absorption by inflamed tissues: blue, red, purple, bleeding
- Absorption by calculus: black, weaken binding to root surfaces
- Safe: Pulsed delivery to allow for cooling between laser firings
- Multi-function: ablation, hemostasis, diode
- Sterilization of remaining calculus and plaque (?)
- Penetration into the tissues
- Training and Treatment Protocol
Approximate Absorption Curves of Tissue Compounds

Wavelength (microns)

Absorption Coefficient (1/cm)

Laser Type:
- ArF
- XeCl
- Alexandrite (2ν)
- Argon
- HeNe
- GaAlAs
- Nd:YAG
- Ho:YAG
- Er:YSGG, Er:YAG
- CO₂ (9.3, 9.6, 10.6)

Compounds:
- Melanin
- Hb
- HbO₂
- Protein
- Water
- Hydroxyapatite
WHICH LASER MEETS OUR CRITERIA?

Millenium Periolase Nd:YAG laser

- Laser energy works best with inflammed tissues
- Different fiber sizes for access into different areas
- Penetration into the tissues beyond the tip
- Can use as a diode laser for soft tissue
- 5 day training over 1 year
- Achieving clinical results
- Patient response very positive
WHAT PATIENTS COULD BENEFIT FROM LASER THERAPY?

• Heavy inflammation
• Previous deep cleanings
• Unresolved deep pockets
• Multiple localized antibiotic treatments
• Previous periodontal surgery treatment
• A compromised medical history
• Cold sensitivity due to gum recession
• Anterior bone loss
CLINICAL EFFECTS OF ND: YAG LASER

- Removes the pocket epithelium
- Kills pathogens
- Neutralizes endotoxin
- Reduces inflammation and inflammatory products (PGE, IL, MMP, TNF)
- Biostimulation (increased growth factors and cell activity)
ADDITIONAL BENEFITS

• Do not have to take patient off of anticoagulant therapy
• Less invasive for older patients and patients with poor systemic health
• Prevents significant recession unless you purposely create it
• No sutures to create tension or irritation
• Most likely prevents the 0.5 - 1mm of crestal resorption associated with flap reflection
• Patients love it and tell their friends! Patient response is very positive (Polar opposite of traditional surgery)
• Will we be able to use it as a future definitive therapy in patients on IV bisphosphonates?
WILL THE LASER “CURE” PERIODONTAL DISEASE?

• NO!!

• Why?
  • Periodontal maintenance still important
  • Patient compliance still an issue
  • Difficult teeth: Max molars, mobile teeth
  • Depends on the Periodontal Disease diagnosis
  • Each treatment modality has pros/cons
WHAT DO WE TELL PATIENTS AT CONSULT?

• Diagnosis
• Treatment recommendations
• Targets inflammation
• Pocket reduction: soft tissue attachment and/or bone regeneration
• Minimal recession
• Minimal cold sensitivity
• Minimal pain
• If indicated, why along with the positives than negatives
Figure 1. Step-by-step surgical technique for LPT.
ABLATION
SCALING AND ROOT PLANING
HEMOSTASIS
OCCLUSAL ADJUSTMENT AND THERAPY
ONE WEEK POST-OP
TREATMENT PROTOCOL

• Exam

• Treatment as indicated

• POT x 1 weeks with no OH and only rinsing

• Prophy at 1 month for full mouth cases; start maintenance if localized sites

• Start maintenance 4, 7, 10, etc (rotating maintenance ASAP)

• Nightguard
POST OPERATIVE INSTRUCTIONS

- Soft diet for two weeks
- Ibuprofen
- Brushing at 7-10 days
- Flossing at 2 weeks
- Stress maintenance
CLINICAL CASES
CLINICAL PARAMETERS

- Probing Depths
- Biotype
- BOP
- Inflammation
- Plaque index
- Mobility
- Radiographic exam
- Furcation involvement
- Horizontal bone loss
- Vertical bone loss (pattern and type)
- Occlusal Trauma)
CASE #1

Pre-op

• Previous GTR (bone grafting/mem)
• Regeneration partially successful – pocket worsened overtime
• Chronic 9mm pocket #12 mesial (concavity)
• 3 walled vertical defect
• Then treated with LAPT

Post-op

• “Regeneration” complete
• Close to 100% bone fill
• Probing depth 3mm
CASE #2

Pre-op
- Significant bone loss #30-31
- Thick biotype
- #30 shallow 2-3 walled crater
- #31 narrow 2-3 walled crater with bone loss on 30 D

Post-op
- “Regeneration” complete
- Close to 100% bone fill
- One treatment

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CASE #3

Pre-op

- Significant bone loss #27-31
- Occlusal Trauma evident
- Vertical bone loss
- Thick biotype

Post-op

- Close to 50% bone fill
- Reattachment of soft tissue: Is this bad?
CASE #4

Pre-op
- Significant bone loss #9, 27
- Thin biotype
- High smile line: considerations?
- #9: 2 wall on mesial; 0 on palate
- #27: 1-2 wall

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Post-op
- Close to 80% bone fill
- Soft tissue attachment palate #9
- No recession #9
CASE #5

Pre-op

- Significant bone loss #2-5
- Thick biotype
- Generalized bone loss: PD 6-11mm
- Furcation bone loss: max molars

Post-op

- Close to 80% bone fill
- Gen pocket elimination: 1-4mm
- Bone fill around #3, 5

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CASE #6

Pre-op

- Significant bone loss #3-6
- Thick biotype
- Mobility #4-5; occlusal reduction paramount
- Pocketing on palate; 0 walls

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Post-op

- Close to 80% bone fill
- Soft tissue attachment on palate

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**CASE #7**

**Pre-op**
- Significant bone loss \(\#24-25\)
- Class II mobility
- Thin biotype
- Splinting needed
- Narrow access

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<td>10</td>
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**Post-op**
- Close to 40% bone fill
- + mobility
- Soft tissue attachment

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6 MONTHS POST OP

3mm Probing Depths
No Recession
CLINICAL FINDINGS THUS FAR:

- Can be very effective with proper case selection
- Learning curve does exist
- Mandibular anterior is very favorable to treatment even when only localized disease
- Minimal recession unless created or large abscesses are present
- Not as effective in areas of extremely thick tissue (D wedges sometimes necessary)
- Does not fully resolve pockets with a thick biotype
- Can be used in conjunction with other therapies
- Occlusion must be adjusted to alleviate interferences or premature contacts.
- Splinting is important to stabilize certain mobile teeth
- Patients do not take pain meds and do not miss work
### Ideal PD Range

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Ideal PD Range</th>
<th>Ideal Biotype for Treatment</th>
<th>Recession After Treatment</th>
<th>Furcation Treatment</th>
<th>Horizontal Bone Loss Response</th>
<th>Vertical Bone Loss Response</th>
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<tr>
<td>ScRP</td>
<td>4-5mm</td>
<td>Thin</td>
<td>Minimal</td>
<td>Ltd</td>
<td>Minimal</td>
<td>Ltd</td>
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<td>Antimicrobials</td>
<td>With ScRP; Refractory sites</td>
<td>Thin</td>
<td>Minimal</td>
<td>Ltd</td>
<td>Minimal</td>
<td>Ltd</td>
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<tr>
<td>Gingivectomy</td>
<td>Soft tissue pockets</td>
<td>Both</td>
<td>Varies</td>
<td>NO</td>
<td>Access: Yes but Recession</td>
<td>NO</td>
</tr>
<tr>
<td>Flap</td>
<td>5-12mm</td>
<td>Thick</td>
<td>Moderate</td>
<td>YES</td>
<td>Access: Yes but Recession</td>
<td>NO</td>
</tr>
<tr>
<td>Osseous Sx</td>
<td>5-12mm</td>
<td>Both</td>
<td>Significant</td>
<td>YES</td>
<td>Access: Yes but Recession</td>
<td>Ltd; in residual craters</td>
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<tr>
<td>Regeneration</td>
<td>7-12mm</td>
<td>Thick</td>
<td>Minimal</td>
<td>Site specific</td>
<td>Minimal</td>
<td>YES Thick Biotype</td>
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<tr>
<td>Laser Tx</td>
<td>5-12mm</td>
<td>Both, Ltd on Thick</td>
<td>Minimal</td>
<td>YES</td>
<td>Access: Yes Minimal Recession</td>
<td>YES Thick Biotype</td>
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**ALL THERAPIES:** Decrease BOP; Decrease Inflammation; Requires Plaque Control; and Requires Adjustment of Occlusion to Reduce Mobility
Thank you