

Intro to Perio Surgery

Patient Preparation – Re-evaluation after initial treatment (SRP)

- May eliminate some pocket depths
- Can firm the tissue
 - o Inflamed tissues have capillary loops, are less firm
 - o Sutures tear more easily through inflamed tissues
- Gives time for patient education/comfort
 - o Poor homecare is a contraindication for surgery

Indications for Perio Surgery

- Improve prognosis of teeth (and their replacements)
 - o Reduce pocket depths via resection or regeneration
 - Increased access for hygiene (furcations, decreased pocket depths, etc)
 - o Reshape hard and soft tissues to more physiologic contours
 - Furcation involvement – improve or eliminate furcation access
- Improve esthetics
 - o Mucogingival problems with esthetic concerns/persistent inflammation

Predictors of Disease

Etiology	Sensitivity (True Positive)	Specificity (True Negative)	
Plaque	0.4	0.6	Deep pockets are not good predictors for future attachment loss
Redness	0.3	0.7	
BOP	0.2	0.8	Absence of deep pockets are good predictor for stability
Suppuration	0.1	0.9	
PD > 6mm	0.1	0.9	CAL is the most important variable in periodontitis
AL > 6mm	0.1	0.9	

- Critical probing depths
 - o <3.0mm = lose attachment with SRP
 - o <4.3mm = lose attachment with surgery
 - o >6.2mm = SRP not effective

Treatments

- Regeneration – improve clinical attachment loss, reduce pocket depth
 - o Requires healing of PDL, cementum, and bone
- Reparative – reduce pocket depth without new PDL, cementum, and bone healing
- Resective – removal of the pocket wall
 - o SRP – retraction and shrinkage – sometimes gingiva may heal so well you can't probe into the full depth
 - 2 weeks = shrinkage
 - 4 weeks = reattachment
 - 6 weeks = re-evaluation
 - o Gingivectomy – removal of gingiva because it has no chance of healing (ex: beside a filling)
 - o Apically positioned flap
 - If patient has poor hygiene, the problem becomes a caries instead of perio problem
- Surgical removal of tooth structure (root amputation, hemisection)

Treatment Selection

- Overall diagnosis, goals of surgery
- Access
- History of surgery
- Pocket form
- Esthetics
 - o Anterior teeth – single rooted, patient compliance is huge
 - o Interproximal bone loss = lose papillae
- **Blood supply**

Surgical Procedure

Method Selection/Considerations	Procedure
<ul style="list-style-type: none"> - Regenerative methods <ul style="list-style-type: none"> o Papillae preservation o Sulcular flaps o Modified widman flap (to maintain papillae) – very little tissue loss if done properly - Resective methods <ul style="list-style-type: none"> o Gingivectomy o APF - Smoking considerations - Informed consent - Sedation/anesthesia <ul style="list-style-type: none"> o Local anesthesia – keep surgery painless o Inhalation – antianxiety delivery of N₂O, safest method of delivery o Oral sedation – individually variable o Conscious sedation o General anesthesia - Emergency equipment 	<ul style="list-style-type: none"> - Premedication <ul style="list-style-type: none"> o Prophylactic antibiotics for surgery o NSAIDS for pain, reduce inflammation o Anti-anxiety medications o Chlorhexidine rinse pre and post-op to decrease aerosol exposure o Steroids to reduce inflammation - Tissue Management <ul style="list-style-type: none"> o Be gentle and careful o Observe patient at all times o Use sharp instruments to avoid masticating tissue - Surgical Dressings <ul style="list-style-type: none"> ▪ ZO-Eugenol packs ▪ Non-eugenol packs ▪ Retention of packs o Should remain in place for 1 week o Allow Coe-Pak to harden for 3h before eating o Do not disturb pack (ex: brushing, flossing) - Post-Op <ul style="list-style-type: none"> o Printed instructions o Return appointment o Repacking o Tooth mobility o Mouth care between procedures o Probing o Root sensitivity <ul style="list-style-type: none"> ▪ Desensitizing agents include homecare and in office products

Anterior Mental Nerve Loop

- Generally 0.5-3.1mm anterior to mental foramen
- 28% of cases 0.4-2.2mm anterior to mental foramen
- 86-90% Caucasians have anterior loop (mental nerve exiting in posterior direction)
- 45% Blacks have mental nerve exiting at right angle to foramen

Intro to Perio Surgery II

Anatomy

- Nerves and arteries usually run superior to mylohyoid muscle, but may run inferiorly
- Lingual concavity – estimate how superior it is for implant placement
- An incision following the central grooves to reach the Mn 3rd molars will cut into muscles, nerves, and arteries. The incision should turn and follow the ramus posterior superiorly
- Lingual nerve position is variable – so long as work is done in the keratinized tissue, should be okay. Outside the keratinized tissue = greater risk
- It can be difficult to close a flap without creating a lingual flap, but care should be taken because nerve/artery bundles run on the lingual side of the ramus
 - o Never do a sharp sectioning on the lingual side, because you don't know where the danger zone is
 - o Mylohyoid release –allows for the lingual side to be brought superiorly

Blood Supply and Tissue Survival

- Blood Supply
 - o Full or partial thickness flaps are both useable
 - o Partial thickness flaps in thin tissue may cause flap death
 - o Recipient site vascularity affects survival of thin flaps
 - o Velvet incision = off angled incision by the papilla to allow a large enough piece of tissue for suturing
- Full periosteal horizontal incision
 - o 24h – disturbance to gingiva coronal to incision
 - o 48h – local superficial gingival necrosis, overall tissue perfused by perio and intraosseous vessels
 - o Significance = most of the blood supply comes apical to coronal
 - Blood supply from the roots/bones = tissue heals like a scrape, top tissue sloughs
 - In a free gingival graft, lots of keratinized tissue is gained but no height
 - Height is gained by position tissue coronally (envelop flap with releasing incisions)
- Internal bevel incision between gingiva and periosteum
 - o 24h – no change
 - o Significance = healing is fast because of good blood perfusion
- Full thickness flap made, not reflected vs reflected and replaced
 - o 24h – similar disturbance, reflected flap had 50% greater reduction
 - o 96h – reflected flap had poorer appearance
 - o Significance = reflecting flaps decreases blood perfusion to elevated tissue
- FTF reflected, vertical incisions beyond the mucogingival margins, with test group incision length 2x control
 - o 24h – test group had poorer healing, marginal tissue necrosis
 - o Significance = critical length:width ratio = 2:1
- Flaps placed over recession areas, test flap 50% narrower than control
 - o 24h – test flap had 50% reduced circulation
 - o 7days – cleft-like tissue loss around gingival margin of test flap
 - Overly long flaps had some ischemic marking at sutures
 - o Significance = excess tension or excess flexion decreases flap healing

Gingival Surgical Procedures

Limited to gingiva, does not involve underlying osseous structures

- Gingival curettage – removal of gingival wall of perio pocket to separate out diseased soft tissue
 - Aka = excisional new attachment procedure, ultrasonic curettage, caustic drugs
 - Inadvertent curettage – happens with SRP
 - No clinical value (2002) – healing is by long junctional epithelium, no new attachment is gained
- Gingivectomy
 - Indications
 - Elimination of suprabony pockets in firm, fibrous tissue (SRP usually clears edematous pockets)
 - Elimination of gingival enlargements
 - Elimination of suprabony abscesses
 - Before they become infrabony ones
 - Access for restorative dentistry
 - Biologic width important in esthetic areas
 - Body wants around 2mm between bone and gingiva (beware of gingival rebound)
 - Biologic width = 2.04mm, supra-alveolar tissues (dentogingival junction) = 2.73mm
 - Esthetics
 - Ideal width = CI 25% wider than laterals, 10% wider than canines
 - Ideal height = CI and canine 20% longer than laterals
 - Ratio = 1.2/1.0
 - Surgical stents – want to know if the stent is for what tooth structure is showing, or where the crown margin is going to be placed (margin can be slightly in pocket)
 - Want to preserve some keratinized tissue, do not want to remove all of it
 - Keratinized gingiva = pocket depth + attached gingiva (mucogingival junction)
 - Measure pocket depth, mark it to cause it to bleed. Incision is apical to bleeding point, 45° bevel to root
 - Healing
 - Initially – acute PMN infiltrate and some necrosis, formation of initial protective clot
 - 12-24h – epithelial cells at margin migrate into granulation tissue and beneath the necrotic tissue
 - 24h – increased CT and angioblasts below surface layer
 - 4-16 days – vasodilation and vascularity start to decrease until normal
 - Epithelium grows at 0.5mm/day
 - 5-14days – surface epithelialization complete, keratinization incomplete
 - 7 weeks – complete repair of CT
 - Limiting Factors
 - Amount of keratinized gingiva
 - Esthetics and esthetic maintenance
 - Access to osseous defects for correction
 - Less post-op pain if procedure allows for primary closure
 - Gingiva may rebound without racial pigmentation – risk for patients with racial pigmentation

- Electrosurgery
 - Good hemorrhage control
 - Bad for patients with poorly shielded cardiac pacemakers
 - Must be limited to superficial procedures – can cause necrosis if tip touches bone or cementum
 - Different if only trying to coagulate – can be done at lower temperature
- Chemosurgery
 - Difficult to control depth
 - Slower healing
 - NOT recommended
- Gingivoplasty
 - Possible to do APF, gingivectomy, or combined techniques
 - Edematous tissue – treat with SRP
 - If extremely fibrous and interferes with access – consider treating with gingivectomy
 - Gingivectomy can recontour at the margin if adequate keratinized gingiva is present
 - Apically Positioned Flap – needs firm tissue, conserve keratinized gingiva
 - Common on palatal side – may end up sitting up in a point during crown lengthening. If it doesn't stay down, a blood clot can form there and cause tissue rebound. Tissue must lay down and be positioned apically to prevent rebound
 - Combined technique
 - Cut border to a regular border first, then place a flap and position apically
 - If gingival rebound is from drug use for systemic problems, insurance will pay for multiple gingivectomies
 - Use packs to prevent hematoma formation to prevent gingival rebound, gives esthetic outcome
- Gingival flap
 - The exception from all the others. Full thickness flaps may touch osseous structure but should not contour it or affect it

Treatment considerations

- Functional/esthetic compromise of adjacent teeth
 - Opening interdental spaces
 - Creating excessively “long” teeth
- Gingival diseases
 - Modified by medications
 - Difenidipine
 - Cyclosporine
 - Phenytoin (Dilantin)
 - Drug influenced gingival diseases
 - Drug influenced gingival enlargements (inflammatory drug induced hyperplasia)
 - Drug influenced gingivitis (Oral contraceptive associated, other)
 - Drugs that cause
 - Dental plaque induced gingival diseases
 - Usually seen in young patients rather than older patients
 - In patient has poor hygiene, tissue will have a greater rebound effect
 - Beware handicapped patients – their hygiene provider must be informed of importance of care

Periodontal Flap Surgery

Surgical Procedures <ul style="list-style-type: none"> - Gingivectomy - Periodontal flaps - Osseous contouring - Bone grafts - Laterally sliding flaps - Free gingival grafts 	Periodontal Flaps <ul style="list-style-type: none"> - Increase access to root - Reduce Pocket Depth - Expose areas for regeneration - Crown lengthening
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Incision Design

- Internal bevel scalloped (modified Widman) – most basic horizontal incision
 - Thins the gingiva, conserves attached gingiva, removes pocket lining epithelium
 - Incision to periosteum to detach flap
 - Scalloping to loosen pocket epithelium from tooth
 - Horizontal incision to remove pocket lining epithelium
- Vertical Incisions
 - Placed at line angle
 - Should not be at apex of gingival sulcus or interproximally
 - Loss of papilla or may cause gingival defect
 - Usually not placed on palatal side, Mn lingual, or nasopalatine areas (vessels, esthetic zones)
- Blades
 - #15 – good for newbs, sharp curved blade
 - #11 – sharp straight end with pointed tip
 - #12/12B – curved (like a sickle) with tip, good for distal wedge

Flaps

- Full thickness – goes through periosteum, might get up to 0.5mm bone loss because bone is thin
- Partial thickness – goes through CT, some CT and all periosteum remains attached to osseous structure
- Conventional flap – removes pocket epithelium
- Sulcular incision – used when you don't want to lose attached gingiva or in esthetic zones (anterior region)
- Repositioned flap – replacing the flap back to where it was before (modified Widman surgeries)
- Apically positioned flap – used after 4-6week post-op probing after SRP assuming pocket depths don't improve

Crown Lengthening

- Restorative margin cannot be closer than 2mm to crestal bone, or will disrupt osseous structure
- Sounding bone – probing through the biologic width to the bone, gives an idea of what bone contour is like
- Biologic width – expose 3-4mm of tooth coronal to bone during surgery to accommodate 2mm biologic width
- Modified Widman – internal bevel primary incision, then scalloping and removal of desired gingiva
 - Buck or orban knives helpful for removing interproximal tissue
- Suturing – slight exposure interproximally is okay. Cortical bone is backed up by cancellous bone
- Coe pack placed to help with healing, prevent rebound
 - Left for 3-4 days, up to 7-10 days
 - Post-surgical hemorrhage controlled by pressure, sutures, clotting, packs
 - Remove pack to ID bleeding source/stop bleeding if necessary
- Chlorhexidine rinses (both pre and post-op)
- Takes 4 weeks to heal

Free Gingival Grafting

- Coe packs can be used to cover donor site
- Take 10 days to get granulated, 6 weeks to heal
- Tissue dries and contracts quickly once it is removed from donor site
- Pain management

Mild	200-400mg ibuprofen	650mg aspirin	650-1000mg acetaminophen
Moderate	600-800mg ibuprofen	400mg ibuprofen with 60mg codeine or equivalent	600-1000mg acetaminophen with 60mg codeine or equivalent
Severe		600-800mg ibuprofen with 10mg oxycodone or equivalent	1000mg acetaminophen with 10mg oxycodone or equivalent

Distal Wedge Technique

- Best done with #12 blade
- Can be triangular, rectangular, or scalloped incisions
- Incisions diverge from each other, allows full thickness flaps to “collapse” so there isn’t extra bundling when sutured back together
- Used to eliminate distal pockets

Treatment of Osseous Defects

- Resection
- Debridement
- Grafting

Types of Defects

- Dehiscence – root exposure connected to the rest of the tooth
- Fenestration – window of root exposed
- Positive architecture – interproximal bone more coronal than radicular bone
- Negative architecture – interproximal bone more apical than radicular bone
- Infrabony defect – base of pocket apical to crest of alveolar bone
- Infrabony Pockets (negative architecture)
 - o 1 osseous wall
 - o 2 osseous walls – aka crater, most common osseous defect, usually because patient doesn't floss well
 - o 3 osseous walls

Furcations

CEJ to opening of furcation	
Mn molars	Mx molars
- Buccal side = 3mm	- ML side = 3mm
- Lingual side = 4mm	- Buccal side = 4mm
	- DL side = 5mm

- As much as possible, best NOT to open furcation (hard area to clean)

Other Surgical Considerations

- Widow's Peak
 - o If you leave bone adjacent to tooth surface by line angle (tendency to leave bone by line angle)
 - o More likely to have pocketing, reduction of bone by line angles to give smooth reduction reduces pocketing during healing
- Radiographic Limitations – 2D image, can't diagnose periodontitis or determine number of walls in defect
- Sounding bone (transgingival probing) – probing through the attached gingiva to find out where the bone is
 - o Used to discover osseous defects and what they are like, can help determine number of walls in defect

Osseous Resection

- Often combined with APF – gives a very predictable outcome for reducing/eliminating pocket depths
- Indications
 - o Wide 3 wall defects
 - o Interproximal craters (2 wall defects)
 - o Hemiseptums (1 wall defects)
 - o Furcations – no blood supply except apically
 - o Thick alveolar bone
- Ostectomy – shaping to ideal form which may sacrifice some supportive bone (bone adjacent to tooth)
 - o Crown lengthening – removes some bone from proximal teeth for contouring)
- Osteoplasty – reshaping without sacrificing supporting bone
 - o Tori removal

Regeneration/Repair

- Repair – healing of a wound by tissue that does not fully restore architecture or function
 - o Long junctional epithelium
- Regeneration – reproduction of a lost part resulting in new bone, cementum, and PDL

Bone Grafts

- NEED good blood supply
- Fix periodontal defects
 - o For 1 wall defects, may try osseous resectioning instead of grafting because of low blood supply
- Alveolar ridge augmentation
- Fill extraction sites
- Sinus augmentation

Types of Grafts

- o Best in narrow 3 wall defects – best for regeneration probability (blood supply)
 - Can condition root surface with tetracycline by soaking cotton pellet or mixing tetracycline into allograft reconstitute
- o Levels of Fill
 - Overfill
 - Standard fill (at level of alveolar ridge)
 - Underfill
- o Flaps should be placed back so that the graft is complete covered
- Autograft – self (may give regeneration)
 - o Graft Sources
 - Mx tuberosity
 - Mn ramus
 - Chin
 - Tori
 - Edentulous ridges
 - Extraction sockets – wait 8-12 weeks after surgery for harvesting bone
 - o Osseous Caogulum
 - Bone dust and blood – autogenous
 - From exostoses and edentulous ridges
 - Use a round carbide bur (#6 or 8), pack coagulum into defect
 - Low speed – 5,000-30,000rpm
 - Can also use rongeurs to clip/cut bone
 - 250-750um = predictable resorbed and good at inducing periodontium regeneration
 - >1000um = probably be rejected by body, cause bony spicules forced out of gingiva
 - <250um = won't be helpful

- Allograft – same species, usually cadaver (may give regeneration)
 - o Graft Sources (Must be reconstituted with saline before use)
 - Iliac cancellous bone
 - Freeze dried (50% fill)
 - Decalcified freeze dried (cortical bone better – more morphogenic protein)
 - o Advantages
 - No second site morbidity
 - Preservation of patient's tissue
 - Reduced surgical time
 - Availability, quantity, predictability, utility
 - Lack of adverse reactions
 - o Disadvantage – risk of disease transfer is 1/1-8million
- Xenograft – different species, usually bovine (usually repair over regeneration)
- Alloplast – synthetic material (usually repair over regeneration)
 - o Sclera
 - o Cartilage
 - o Plaster of Paris (CaSO_4)
 - o Plastic materials (HTR polymers)
 - o Calcium phosphate
 - Hydroxyapatite
 - Tricalcium phosphate
 - o Coral derived materials
 - o Glass granules
 - o Other

Conclusions

- 3mm (60%) bone fill – may be possible to get 4mm (75%) bone fill
- Total regeneration is not possible
- Allografts are safe
- Crestal bone fill is not consistently possible – difficulty because of blood supply
- Regeneration best with DFDBA/autogenous bone
- Growth factors show future promise in promoting regeneration/repair

Guided Tissue Regeneration

- Allows repopulation of a periodontal defect by cells capable of forming new connective tissue attachment and alveolar bone
 - o Epithelium – extremely fast, 0.5mm/day – races down and prevents PDL from forming after SRP
 - o Gingival connective tissue – slow growth
 - o Cementum/PDL – slow growth
 - o Alveolar bone – slow growth
- GTR barrier membrane allows gingival CT, bone, and PDL to form by blocking epithelium from reaching all of the defect area
- Ideal Membranes
 - o Absorbable
 - o Biocompatible
 - o Cell occlusive – blocks epithelium from getting through
 - o Space maintenance
 - o Tissue integration
 - o Clinically manageable

Indications

- Class II Furcations
- Bone recession
- Alveolar ridge preservation
- Sinus augmentation
- Grafting for implants
- Sinus repair after perforation from extraction
- Bone augmentation after infection
- Some mucogingival defects

Contraindications

- Insufficient bone height/width
 - o Very difficult to bulk build bone vertically because of lack of blood supply

Furcations

- For grade II furcations, better if grafting and GTR is combined
- Membrane should be 2mm away from CEJ, but should completely cover the furcation
- If membrane is exposed, procedure may be compromised. Better to completely cover membrane
- Enamel projections must be removed (usually via bur) to allow for regeneration

Barriers

- 1^o generation – non-resorbable
 - o Gore-Tex
 - Polytetrafluoroethylene
 - 2nd stage surgery needed – 4-6 weeks later to remove membrane
 - Use small incision, do not disturb tissue
 - Cover new tissue with flap
 - Extremely biocompatible
 - Multiple transgingival and submerged configurations to fit defect orientation
 - Go at least 2-3mm laterally out from defect
 - Membrane should be completely covered by gingiva
 - Can be titanium reinforced (TR) to maintain shape – better space making in non-space making defects

- 2° generation – resorbable

<p>Guidor – membrane</p> <ul style="list-style-type: none"> - Polylactic acid + citric acid ester - Degrades in 4-6 weeks <p>Biomend – membrane</p> <ul style="list-style-type: none"> - Collagen - Hemostatic, chemotactic for fibroblast - Easily manipulated - Degradation in 4 weeks <p>Capset – suspension, reconstitute in sterile saline</p> <ul style="list-style-type: none"> - Calcium sulfate - Placed over bone grafts to cover site and allow for soft tissue healing - Degradation in 3-4 weeks 	<p>Resolute – membrane</p> <ul style="list-style-type: none"> - Polyglycolic acid and polylactic acid-co-glycolic acid - Degradation in 8 weeks <p>Emdogain – reconstituted into a gel, syringe dispensed</p> <ul style="list-style-type: none"> - Enamel matrix protein - Amelogenins (procine – from pigs) – regeneration of perio defects, associated with tooth growth - Surface cementum forming cells - User friendly <ul style="list-style-type: none"> o Debride root surface o PrefGel (with EDTA) to condition tooth surface o Apply Emdogain – gives clinical attachment and alveolar bone over 12 months <p>Atrisorb</p>
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- 3° generation – resorbable and antimicrobial (4% doxycycline)
 - o Atrisorb-D – free flowing gel, syringe dispensed
 - Excellent seal against tooth – best outcome as it blocks epithelial migration through space

Autologous Platelet Concentrate

<ul style="list-style-type: none"> - Spray over membrane to increase healing <p>Draw 30-50mL blood</p> <p>Processed in centrifuge to concentrate platelets and growth factors to accelerate healing</p> <ul style="list-style-type: none"> - Take platelet rich plasma (lots of growth factors) - Concentrate those growth factors for use 	<p>Spray membrane with this suspension</p> <ul style="list-style-type: none"> - Concentrated platelets (10x) - Concentrated growth factors - Increased cell recruitment - Increased cell division - Accelerated wound healing
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<p>Surgical Guidelines for GTR</p> <ul style="list-style-type: none"> - Use full thickness flaps - Need primary coverage of membranes - Chlorhexidine rinses for 4-6 weeks - Antibiotic coverage for 14 days - Gentle brushing for 3 weeks 	<p>Affected By</p> <ul style="list-style-type: none"> - Systemic factors - Hygiene, smoking - Technical factors - Membrane exposure - Post-operative infection
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Conclusions

- Bioabsorbable
- Good for class II furcations, infrabony defects
- Is technique sensitive
- Oral hygiene is important, smoking has adverse effects
- Stable for >8 years (>10-15 years)

Multirooted Teeth

- Furcation involvement in general = greater chance of tooth loss
- Patients with good hygiene means furcation involvement has no effect on tooth loss
 - o Hygiene is vital for furcation involved teeth
- Most commonly lost teeth due to periodontitis
 - o Mx molars – average CEJ to furcation = 4mm
 - o Mn molars
 - Enamel projections most common in Mx and Mn 2nd molars
 - o Mx first premolars
- There are often osseous cavities by furcations

Treatment Options

- Odontoplasty – recontour the tooth and cover with a crown. Tooth should already be RCTed or patient will have lots of sensitivity
- SRP – use a cavitron in furcation; much better than hand instruments or cavitron alone
 - o Furcations with PD>4mm less favourable than flat surfaces for SRP treatment
 - o SRP can cause attachment loss (therefore disease progression) if not done properly
- Open debridement
 - o More calculus is left behind in furcations than non-furcated areas
 - o True for both open and closed curettage
- APFs
 - o Increases easier access to furcation areas for hygiene
 - o Tunneling – creating class III furcation to allow for cleaning
 - May be problematic – big increased risk of caries
 - 6.7% extracted because of caries
 - 4.7% hemisected because of caries
 - 23.5% developed caries
- Root amputation/hemisection
 - o Usually failure is from endodontic reasons, not periodontic ones
 - Periodontic failures usually in Mx molars
 - Most Mn molars failed due to root fracture
 - o Most often, hemisected teeth (Mn molars) served as distal bridge abutments
 - o Topical fluorides and hygiene vital in root hemisections – increased risk of caries
- Regenerative therapy (GTR)
 - o Class II furcations treated with GTR if there is some infrabony part to lesion
 - o Clinical/radiographic response generally similar between allogenic bone grafts, GTR, and growth factors (emdogain)
 - o Class III furcations do NOT respond well to surgical treatment
 - Best to maintain non-surgically or have tooth extracted

Perio Plastic Surgery

- Clinical attachment level = most important parameter for determining perio status, developing treatment plan
- Probing depths help determine what type of treatment to go with

Definitions

- Mucogingival defect – departure from normal dimension and morphology of the relationship between gingiva and alveolar bone
- Mucogingival surgery – perio surgical procedure to correct defects in morphology, position, and/or amount of gingiva
- Perio plastic surgery – surgical procedure to correct or eliminate anatomic, developmental, or traumatic deformities of gingiva and alveolar mucosa

Criteria for perio plastic surgery

- Surgical site free of plaque, calculus, inflammation
 - o Good hygiene important to keep perio problem from become a caries problem
- Maintain adequate blood supply
- Be familiar with anatomy of recipient and donor site
- Ensure stable grafting tissue
- Minimize trauma to surgical site

Keratinized Gingiva

- 1mm required
- 2mm suggested
- 5mm keratinized gingiva with 3mm attach gingiva for subgingival restorations

Indications

- Root Coverage
 - o Coronally positioned flap
 - o Semilunar flap
 - o Laterally positioned flap
 - o Double papilla flap
 - o Free Gingival Graft
 - o GTR
 - o Connective tissue grafts
- Gingival Augmentation
 - o Free gingival graft
 - Increase gingival width
 - Deepen vestibule
 - For ridge augmentation

Advantages	Disadvantages
<ul style="list-style-type: none"> - Donor material readily available, even with thin palates - Predictable healing 	<ul style="list-style-type: none"> - 2 surgical sites - Color may not match recipient area - Graft may be overly thick when mature - Donor site sensitivity

- o Allow for 25-50% shrinkage of graft
- o Can be done to increase the amount of keratinized gingiva around a tooth, also make tissue thicker

Millers Classification for Gingival Recession

- Class I
 - o Defect coronal to MGJ
 - o Interproximal bone and papillae intact, no malpositioning
 - o 100% coverage
- Class II
 - o Recession or attachment loss apical to MGJ
 - o Interproximal bone and papillae intact, no malpositioning
 - o 100% coverage
- Class III
 - o Recession or attachment loss at or apical to MGJ
 - o Some bone loss, papillae loss, or malposition present
 - o Partial root coverage only expected
- Class IV
 - o Recession of attachment loss apical to MGJ
 - o Extreme interproximal bone loss (horizontal bone loss), papillae loss, or extreme malposition present
 - o No root coverage can be expected

Root Coverage

- o Considerations
 - Thin tissue – can be augmented to increase thickness for more stability
 - Crater defect – 2 osseous walls (one buccal, one lingual)
 - Cortical bone only, difficult to get bone height because of poor blood supply
- Pedicle Graft
 - o Laterally positioned flap is the graft
- Free gingival graft
 - o SRP done, modifiers applied
 - o Donor tissue (1.5-2.5mm for root coverage) placed between layers of a partial thickness flap
 - o Sutured into place
- Connective tissue grafts
 - o Partial thickness flap
 - o SRP done, tetracycline applied
 - o Grafted, flap repositioned over graft, sutured
- Connect tissue grafts modified technique
 - No vertical incisions when preparing recipient site
 - Excellent blood supply to flap
 - Avoids scarring in esthetic zones
 - o Partial thickness flap
 - o Graft approximated, flap coronally positioned, sutured
 - o After grafting, will always look bulky but will fade over several months of healing
- Envelop Flap for CT Grafting (Raetzke technique)
 - o SRP, tetracycline used for surface conditioning
 - o Papilla undermined to create envelope flap
 - o Graft placed into envelope, sutured

Implants

- Impact of Diameter Change – increasing diameter exponentially increases surface area
 - o 3.7mm = baseline 5.50mm² seating area
 - o 4.0mm = 5% more SA 5.50mm² seating area
 - o 5.0mm = 35% more SA 12.25mm² seating area
 - o 6.0mm = 61% more SA 21.00mm² seating area

Biologic Width

- Bone level
 - o Vertical bone loss is determined by position of the microgap at implant/abutment interface
 - o Absent an interface, rough smooth border determines position of alveolar crest
- Probing Depths
 - o Implants do not have gingival fibers that attach – pocket goes right to bone
 - Gingivodental and transseptal fibers do not exist in gingiva surround implant abutment
 - o Some implants (ex: microlock) have tiny microthreads that sometimes may allow CT attachment

Emergence Profile

- Coronal aspect of implant should be 2-3mm apical to CEJ of adjacent teeth
 - o 3mm deep from CEJ of proximal teeth in esthetic zones
- Internal connection gives retention
- Scalloped design sometimes shows 2 rabbit ears over the gingiva – bad esthetics
- Papillae height for contact point to alveolar crest
 - o <5mm = 100%
 - o 6mm = 56%
 - o 7mm = 27%
- Implants should be >3mm apart to preserve the alveolar crest peak interdentally
- Platform switching gives moves the implant/abutment interface away from horizontally, allowing bone to remain at height instead of receding

Bony Sockets and Implants

- Minimum 1mm bone both buccal and lingual to implant
 - o Prefer 2mm buccal bone for esthetics
 - o Implant may be placed slightly to the palatal to give buccal bone width
- If the socket is >2mm, it's worth grafting
- If no grafting is done, lose around 5mm of bone in the anterior
 - o 2/3 of this bone is lost in the first 3 months
- Immediately post-extraction, place an ovate pontic to help maintain tissue scalloping and papillae form
- Ridge expansion can be done if needed after socket healing

Implant Perio/Recall

- Use plastic scalers so not to scratch the implant
- Before cementing a crown, feel for what the implant threads feel like
 - o Sometimes cement can feel like the threads
 - o In some instances, may want to place a flap to remove the cement to ensure the area is clean
- If using a scaler, cover it with a plastic sleeve or something to prevent scratching/damaging implant
- Prophy paste and a rubber cup on a prophy head/handpiece = good for polishing implant bars when removal of said bars are not indicated
- Woven nylon floss cords are abrasive enough to remove calculus, good for cleaning supracrevicular abutments/restorations
- Proxi-floss can be adapted to the abutment surface/ridge bars
 - o Fins are designed to remove plaque
- G-floss – designed for hygienic restorations
- Sponge tip applicators for Chlorhexidine
- Perio-aids and end-tufted brushes can remove plaque at subgingival margins
- Specific brushes based on
 - o Final restoration design
 - o Access to sulcus
 - o Patient dexterity

Periodontal Medicine

- Consider systemic conditions that increase susceptibility to periodontal disease
- Consider periodontal infections as a risk factor for systemic disease

Systemic Diseases Associated with Periodontitis

Cardiac disease

- Risk – 25% increase of coronary heart disease for patients with periodontitis
- Men < 50 years – 70% increased risk
- Moderate/Severe periodontitis – 70% increased risk

Stroke/Atherosclerosis

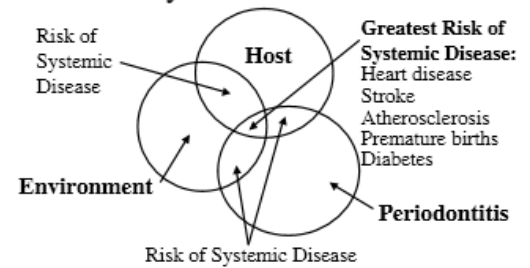
- End result blocks blood flow = O₂ starved cardiac tissue
 1. Periodontal infection → systemic circulation → coronary or carotid arteries → atheroma development
 2. Periodontal infection → production of inflammatory mediators in the gingiva → systemic circulation → coronary or carotid arteries → atheroma development
- Atherosclerosis
 - o Bacteria in Atherosclerotic Plaque
 - Dental Involved – Actinobacillus, Porphyromonas, Prevotella
 - Other – Chlamydia, Cytomegalovirus, Tanarella
 - o Risk Factors
 - Host (Genetics), Periodontitis, Environment (Cholesterol)

Diabetes

- Epidemiology – obesity (BMI) is rising in the USA
 - o Type I – IDDM
 - <30y/o, thin, usually Caucasian, abrupt onset, autoimmune (β cell destruction)
 - Diet, exercise, insulin
 - o Type II – NIDDM
 - Adults, obese, African/Hispanic/Indian, slow onset, insulin resistance
 - Insulin resistance – insulin receptors are overworked/damaged and do not bind insulin, leading to increased blood sugar = damage to vessels/organs due to osmotic gradient
 - Diet, exercise, oral hypoglycemic agents
 - o Gestational
- Diagnosis

- Fasting Blood Glucose	- HbA1c
- Normal < 110mg/dL	- Normal <6%
- Impaired < 126mg/dL	- Fair <8%
- Diabetic > 126mg/dL	- Moderate <9%
	- Poor > 9%
- Antibiotic Prophylaxis – well controlled
 - o Well controlled diabetes = no prophylaxis needed
 - SRP and frequent maintenance
 - 2 weeks doxycycline or low dose doxycycline
 - o Combined SRP and systemic doxycycline shown to decrease HbA1c

Risk Assessment Model for Systemic Disease



- Complications
 - Blindness
 - Kidney disease
 - Polyuria – frequent urination
 - Polydipsia – thirsty
 - Polyphagia – hungry
 - Nerve damage
 - Heart diseases/stroke
 - Periodontal disease
 - PMN function – decreased phagocytosis and chemotaxis
 - Increased infections
 - Collagen metabolism – decreased collagen synthesis by fibroblasts
 - Increased crosslinking (due to AGE products) decreases cell turnover
 - Slower wound healing
- Hypoglycemic Shock – treat with sugar
 - Be aware of drug peak activity – greatest risk of hypoglycemia
 - Symptoms = Confusion, Shakiness, Agitated, Anxious, Sweating, Dizziness

Low birth weight/premature birth

- Pregnancy increases risks
 - Gingivitis by 60-70%
 - Heart murmurs by 90%
 - Cardiac output increased by 50%
- Inform the patient, good oral hygiene is important, best to treat in 2nd trimester
- FDA Pregnancy Drug Classifications

	A	B	C	D	E
Animal	No Risk	No Risk	Toxic	Risk	Great Risk
Human		Unknown	Unknown		

- Local Anesthetics
 - Class B = Lidocaine, prilocaine, etidocaine (_ocaine, except procaine)
 - Class C = mepivacaine, bupivacaine, procaine (_vacaine and procaine)
- Antibiotics
 - Class B = penicillin, erythromycin, clindamycin, cephalosporin, metronidazole, azithromycin
 - For erythromycin, avoid Erythromycin Estolate during pregnancy
 - Class C = Clarithromycin, Ciproflaxin
 - Class D = tetracycline
- Analgesics
 - Aspirin – Class C/D (3rd trimester)
 - Acetaminophen – class B
 - Can be combined with codeine, hydrocodone, oxycodone
 - Ibuprofen – class B/D (3rd trimester)
 - Propoxyphene (opioid analgesic)

- Pre-Term Low Birth Weight
 - 10% of newborns
 - <37 weeks, or <5lbs 8oz
 - Risk increased 7x for pre-term low birth weight for mothers with perio disease
 - African Americans at greatest risk
 - Infection increases TNF_{α} and Prostaglandin E_2
 - TNF_{α} and Prostaglandin E_2 are childbirth mediators
 - Excessive secretion results in pre-term low birth weight babies
- SRP on perio active pregnant women may reduce PTLB babies
 - Untreated = 6.3% PTLB
 - Prophylaxis + Placebo = 4.9% PTLB
 - SRP + Placebo = 0.8% PTLB
 - SRP + Metronidazole = 3.3% PTLB

Osteoporosis

- Occurs in women 40-50y/o
- Medications for menopause = hormone replacement therapy, alendronate, calcium
 - Drugs that interfere with calcium absorption, steroids, diuretics, thyroid medications
- HRT decreases risk of losing teeth, both past and current users
 - Tooth retention increases with HRT duration
 - HRT increases breast cancer, cardiovascular disease, stroke
 - HRT decreases colon cancer, bone fractures
- Oral Consequences
 - Low bone mineral density in Mn
 - Greater clinical attachment loss
- Medications
- Drug Categories that may cause gingival overgrowth
 - Diuretics, Ca^{++} blockers, ACE inhibitors, α -blockers, immunosuppressant
 - Organ transplants require immunosuppressant drugs
 - Cyclosporine may be swapped for Tacrolimus
 - Alendronate (Fosamax) – bisphosphonate = inhibits bone resorption
 - If possible, contact physician and change the drug
 - Hyperplasia within the first 6 months = switch to another drug
 - Need good oral hygiene and frequent maintenance
- Drugs that may cause gingival overgrowth
 - Dilantin (antiepileptic)
 - Cyclosporin (immunosuppressant)
 - Nifedipine (Ca^{++} Channel Blockers)

Smoking

Chemotherapeutics

Local vs Systemic Delivery

- Can be used to treat periodontitis
- Should be used as an adjunctive treatment to SRP
- Systemic delivery is as good as local delivery
- Local and systemic can be used at the same time if desired

Local Delivery Advantages	Local Delivery Disadvantages
<ul style="list-style-type: none"> - More concentrated - Fewer side effects - Sustained delivery - Patient compliance 	<ul style="list-style-type: none"> - More chair side time - More expensive - No effect on bacterial reservoirs - Do NOT use for pregnant patients

Local Delivery Drugs

- Actisite (tetracycline hydrochloride) – still FDA approved, but discontinued. High [tetracycline]
 - o Perio Fiber Therapy – place fiber for 10days (tissue distension after fiber removal)
- PerioChip (2.5mg Chlorhexidine)
 - o Gelatin carrier – bioabsorbable, pockets >5mm, no refrigeration
 - o Good for patients allergic to tetracycline, pockets <5mm cannot be packed into properly
 - o Patients can brush, but should NOT floss in site for 10 days, regular diet okay
 - o Site moderately sensitive for first week
 - o >2mm reduction – 30.3% vs 13.5% SRP alone after 9 months
- Atridox (8.5% Doxycycline)
 - o Only drug approved to increase CAL (probably through long junctional epithelium)
 - o Bioabsorbable, controlled release for 7days for pockets >5mm
 - Can be packed TOO deeply into pocket, creating discomfort
 - o 2 syringe mixing – 450mg atrigel to 50mg doxycycline
 - o Liquid solidifies upon contact with crevicular fluid – sets into wax-like consistency in 1-2min
 - o Significantly reduces anaerobic bacteria, but doesn't develop antibiotic resistance
- Arestin (Minocycline)
 - o Sustained release as a powder, no reconstitution or refrigeration needed, 2 year stability
 - o 25% more patients went from >6mm PD to <5mm PD over 9 months compared to SRP alone
- Metronidazole (25% metronidazole)
 - o NOT approved in USA (degrades within 24h)
 - o Biodegradable, anaerobic bactericidal, >5mm pockets
 - o NOT shown to be more effective with SRP than SRP alone

	Actisite	Atridox	Periochip	Arestin
Ease of Use	Moderate	Easy	Easy	Easy
# of Sites	Multi (1-2 fibers/tooth)	8-15 (sites/syringe)	8 (1 chip/site)	1 (1 site/carp)
Dressing/Glue	Y	Y/N	N	N
GCF Conc ug/mL	1300	1000	125	1000
Release (days)	10	7	10	10
Removal	Y	N	N	N

Systemic Delivery Drugs

- Periostat – only FDA approved oral systemic treatment for chronic periodontitis – suppresses tissue destroying enzyme activity
 - o 20mg = no antimicrobial action, no bacterial flora changes and no resistance after 18 months
 - o Acts as an enzyme suppressor
- Adjunctive to SRP, promote attachment level and decrease pocket depth
- Indications – maintenance patients, refractory/recurrent periodontitis, smokers trying to quit
- Prescription:

<ul style="list-style-type: none"> o 20mg doxycycline 2x daily, duration up to clinician o 1h before meals, take with adequate fluids, do not double up dosage o Efficacy – minimum = 3months, max = 9months o Safety – 12months, follow traditional tetracycline contraindications 	Rx: Periostat Disp: 180 capsules Sig : 1 cap BID Refills: 2
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Indications for Controlled Delivery

- Pockets >5mm
- BOP
- Not responsive to SRP
- Esthetic concerns (surgery contraindicated)
- Refractory periodontitis
- Medically compromised patients (surgery contraindicated)
- Recent oral cancer
- Uncontrolled diabetes
- Smoking patients
- Dental phobic patients

Oral Manifestations of Uncontrolled Diabetes

- Severe gingival inflammation
- Acute gingival or periodontal abscesses
- Rapidly advancing perio disease

Systemic Antibiotics for Perio Therapy

- Not necessary most of the time – offer little/no advantage as adjunct to conventional therapy
- Refractory disease – progressive destruction of perio attachment in spite of good conventional mechanical therapy
 - o Doxycycline 100mg (21 tablets)
 - q12h for day, then qd until gone
 - Take 1hr before or 2hr after meals
 - Decreased absorption by – antacids, NaHCO₃, Al, Mg, Ca, antidiarrheals, Fe, Zn, food/dairy
 - Bacteriostatis, acts on protein synthesis (affects G+ and G-)
 - Side effect – tooth discoloration
 - o Amox 500mg and metronidazole 250mg (22 tablets each)
 - 2 tabs each, then 1 tab q8h until gone
 - Metronidazole – may take with or w/o food
 - Bactericidal (DNA synthesis), obligate anaerobes only
 - Side effects – GI tract, anticoagulant, disulfiram-like reaction, don't mix with ^OH

- Clindamycin 150mg (30 tablets)
 - 2 tabs immediately, then 1 tab q6h until gone
 - May take with or w/o food
 - Bacteriostatic (affects G+ and G-)
 - Side effects – pseudomembranous colitis (toxin from C. difficile)
 - Treat with oral vanco if necessary
- Ciprofloxacin 250mg and metronidazole 250mg
 - 2 tablets each q12h for 5 days
- Aggressive periodontitis
 - Juvenile perio – incisors and first molars affected severely
 - Actinobacillus actinomycetemcomitans – resists removal by mechanical debridement, even when surgically accessed
 - Use doxycycline or amox/metronidazole combination for drug therapy
- Systemic Conditions
 - Chediak-higashi syndrome
 - Down’s syndrome
 - Diabetes
 - AIDS – AIDS associated necrotizing ulcerative periodontitis
 - Gingivitis – chlorhexidine rinse
 - Periodontitis (NUG, NUP) – chlorhexidine rinse
 - Metronidazole therapy (250mg, 1 tab qid for 22tabs)
 - Cancer
 - Routine Care (17-20days after chemotherapy)
 - WBC > 2000/mm³
 - Platelet > 50,000/mm³
 - If catheter present – Amox 2g or clinda 600mg 1h pre-op
 - Papillon-LeFevre syndrome
 - Rx – augmentin (amox 500mg, clavulanic acid 125mg)
 - Clavulanic acid – increases amox effectiveness by inactivating beta lactamases
 - Don’t want to give tetracyclines to younger patients – may stain permanent dentition
 - Leukemia
 - Neutropenia
 - Hypophosphatasia
 - Leukocyte adhesion deficiency

Uncontrolled Diabetes

HbA1c	Fasting Blood Glucose
<6% = normal	< 110mg/dL = normal
<8% = fair	< 126mg/dL = impaired
<9% = moderate	>125mg/dL = diabetic
>9% = poor	>200mg/dL = defer elective treatment, use antibiotic if must treat

- Periostat – no antibacterial activity, inhibits collagenases
 - Rx: doxycycline 100mg
 - Disp: 21tablets
 - Sig: 1 tablet q12h first day, qd after until done

Pregnancy

- Antibiotics may decrease efficacy of birth control pills

Signs of Infection

- SHaRP
- Pain, redness, edema, pus, fistula
- Fever, increased vitals, lymphadenopathy, malaise, increased WBC count
- Penicillin VK 500mg (28tablets)
 - o 1 tab q6h
 - Pen VK take 1hr before or 2hr after meals
 - Amox or augmentin take with or w/o food
 - Bactericidal (cell wall synthesis)
 - Side effects – allergies, pseudomembranous colitis
 - Allergies – 3-10% population
 - Anaphylactic – 1/7K-25K
 - Cross-reactivity (cephalosporins) – 3-5%
 - o If pen/amox ineffective within 48-72hr, add in augmentin or metronidazole
 - Amox > Pen VK – better absorbed, longer serum half life, may take with food
 - Peaks at 2h, half life 0.7-1.4hr instead of 30min
- Erythromycin
 - o Azithro and erythro – 1hr before or 2hr after meals
 - o Clarithro – with or w/o food
 - o Bactericidal – protein synthesis
 - o Azithro better for perio disease
 - Better anaerobic coverage, long serum ½ life, qd only, category B pregnancy
 - 250mg BID first day, then qd for 5 days
 - o Side effects
 - Erythro – GI tract and nausea

Antibiotic Principles

- Switch if no response in 48-72h
- Continue 2-3 days after symptoms gone
- Loading dose = double maintenance dose
- If using oral contraceptive, use an additional form of birth control

Advancements in Surgical Techniques

LASER – light amplification by stimulated emission of radiation

- Wavelength determines character of laser
 - o Soft Tissue Lasers – Argon, CO₂, Nd:YAG, diode
 - May target pigment, water, bone, etc
 - May cause necrosis of hard tissue if used improperly
- Irbium laser can be used for SRP (calculus and endotoxin removal), but has great potential to damage hard tissue and is NOT shown to be greater benefit for clinical attachment loss than conventional SRP

Advantage	Disadvantage
<ul style="list-style-type: none"> - Hemostasis - Bactericidal - Minimal wound contraction 	<ul style="list-style-type: none"> - Precautions for eyes, other tissues - Reflected beam - CO₂ can cut tissue, others may cause damage

- Laser oscillation decreases intensity (chance of damaging stuff)

Diode Laser

- Affected by:
 - o Type of lesion
 - o Wavelength used
 - o Vascularity
 - o Selected mode of operation
 - o Speed of cutting desired
 - o Exposure time of tissue to laser
- Operations
 - o Tissue management/gingivectomy
 - o Gingival troughing (for impression taking around a crown prep, etc)
 - o Hemostasis
 - o Gingival sculpting/gingivectomy
 - o Crown exposure for orthodontics
 - o Biopsy (fibromas, etc)
 - o Frenectomy

Laser Evidence

- Conflicting results, comparisons between relative effectiveness of lasers vs conventional is impossible
- Nd:YAG or Er:YAG lasers may be useful in SRP adjunctive to conventional or stand alone, but no advantage in gaining clinical attachment loss

iCAT – radiographic stents

- The image on its own is not enough – shows thickness, but doesn't show if its in the needed position for good implant placement

Piezoelectric Surgery

- Works like a jackhammer – hits on a hard surface
- Soft tissue has give, so it doesn't cut soft tissue
- Very useful for sinus lifts, hard tissue surgeries

Occlusion and Orthodontics

Occlusion

- Physiologic – no signs of dysfunction or disease
- Traumatic – occlusion associated with dysfunction or disease
 - More rapid progression of periodontally involved teeth
 - Primary – excessive occlusal force on normal dentition
 - Secondary – normal force on a periodontally compromised tooth
- Therapeutic – specific interventions designed to treat dysfunction
 - Stable endpoint of Mn closure
 - Bilateral distribution of occlusal forces
 - Axial loading of teeth
- Therapeutic priority – control inflammation
 - After inflammation, THEN address residual mobility
- Clinical Features of Occlusal Trauma
 - Tooth mobility, increased displacement, stable pattern adaptation
 - Tooth migration, pain on percussion, radiographic changes (widened PDL, apical resorption, etc)
 - TMJ dysfunction
 - Excessive wear facets, fractures
 - Fremitus – vibration of palpation
- Treatment
 - Evaluate vitality and parafunctional habits
 - Occlusal adjustments – prophylactic equilibration is contraindicated
 - Splitting
 - Orthodontic tooth movement
 - Occlusal reconstruction
 - Extraction
- Outcome Assessment
 - Decreased mobility or stable pattern
 - Decreased migration of teeth
 - Stable or decreased radiographic changes
 - Relief of pain, fremitus, occlusal interferences
 - Stable, functional, physiologic and esthetically acceptable occlusion

Perio-Ortho

- Orthodontic Extrusion
 - Bracket placement
 - Extrusive ortho forces
 - Circumcrestal fiberotomy
 - Prevents rotational relapse, funneling or lipping of alveolar crest bone
 - Done every 1-2 weeks while tooth is being extruded, supracrestal gingival fibers are severed under LA
 - Speed of extrusion can allow for increased/decreased bone movement
 - Fast extrusion – 2-3mm/week, soft tissue but not bone movement
 - Slow extrusion – 2-3mm/month, bone and soft tissue moves with the tooth
 - Possible APF
- Advantages
 - May eliminate need for osseous resection
 - No loss of interproximal papillae
 - No post-op sensitivity
- Concerns
 - Hard to achieve good emergence profile in final prosthesis
 - Complicated hygiene
 - Tooth may be difficult to restore/maintain due to root form
- The Fiber Groups and Modeling
 - Classical – interradicular, apical, oblique, horizontal, alveolar crest, trans-septal
 - Buccal/Lingual – alveolar, alveologingival, dentoperiosteal, cementogingival, circular
 - Interproximal – alveologingival, dentoperiosteal, circular, dentogingival
- Fibroblasts – both creates and destroys
 - Secretes collagen, elastic, GS
 - Destroys collagen, elastic, GC intracellularly and extracellularly
- Osteoclasts:osteoblasts
 - Coupled process
 - Systemic factors – hormones, Vit D, etc
 - Local factors - GFs, cytokines, etc
- Goals of Ortho Movement
 - Force to maximize movement
 - Leading side – pressure, resorption, collagen fiber compression
 - Trailing side – tension, deposition, collagen fibers stretch
 - No pain
 - Without root resorption
 - Maintains healthy PDL throughout movement

- Anchorage
 - Active element – part that's moving
 - Resistance element – anchorage
 - Molars as anchor teeth, move single tooth and a time, consider large vs small roots
 - Usually take 3 teeth to anchor single tooth
 - Implants cannot move (no PDL), so can be used to move molars or entire arches
 - Absolute anchorage
 - Movement simultaneously (not segments, single teeth)
 - ANY tooth movement (including absolute intrusion)
- Surgical Considerations
 - Access
 - Angle of implant
 - Midline suture
 - Avoid nasal floor perforation
 - Explanation of the implant
 - Diagnostic waxup – level the occlusal plane

Wilckodontics

- Corticotomies
 - Cut cortical bone, elevate flap
 - Lines and dots (marrow space)
 - Healing phenomenon
 - Less bone mass
 - Stimulate osteoblasts and osteoclasts surgically
 - Can perform locally (not generally done)
 - Just boring into the bone, to stimulate osteoblastic/clastic activity, is fine. Don't need to remove cortical bone around the anchorage site
 - Makes for much faster tooth movement

Perio-Restorative

- Minimal risk = sealed margins, good proximal contacts, no overhangs
 - o If any of these are present, this increases risk factors for perio
- Interproximal caries and dental restorations = local risk factors for localized perio attachment loss
 - o Monitor these sites, take appropriate steps to minimize the risk
 - o Open contact = food impaction, harder to keep area clean, bacterial trap/retention area
- Widened PDL = should consider occlusal trauma
- Retraction cord = causes REVERSIBLE trauma – heals in about 12 days (2 weeks)

Surgical Instruments

- Blades = good, if you nick the bone it doesn't cause any problems
- Electrosurg and laser = must be 100% sure you are NOT contacting hard tissue, or it will cause localized necrosis

Contouring

- Over contoured teeth create a bacterial trap, makes it difficult to probe properly to get good measurements
- Under contoured teeth cause food impaction trauma and provide a bacterial trap
- Gingival overgrowth/swelling may be caused from drugs, be aware before offering surgical services
- Infrabony pockets are a big problem = harder to clean, harder to access, etc

Patient Expectations

- Patient esthetic expectations are primarily culturally based
- Metal allergies – use high noble metals to avoid allergic reactions
 - o Take a good medical history
 - o Use all ceramics/porcelains to avoid this problem
 - o Most common metal allergy is nickel
- When splinting teeth, check the occlusion
 - o When splinted, the teeth may not be mobile. However, a widened PDL may appear for the entire area
 - This is a good indication of occlusal trauma/disequilibrium

Perio Supportive Therapy

- Purpose of Perio Therapy – increase longevity of the person’s natural dentition by preserving supporting structures of the teeth
- Maintenance and Supportive Therapy – act of continually caring for and preserving the dentition in health and function

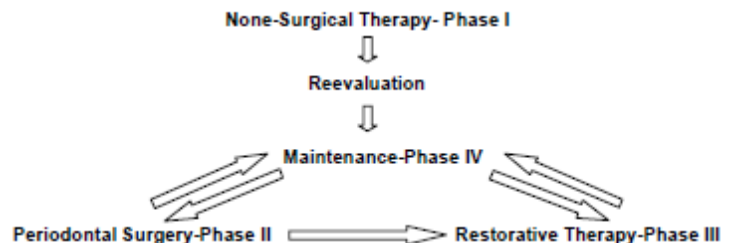
Objectives

- Early recognition of the disease
- Prevention of disease recurrence
- Prevention of further disease advancement

Rational

- Non-surgical therapy (phase I) → re-evaluation → perio surgery (phase II) → restorative therapy (Phase III) → maintenance (phase IV)
 - o If you code for 4910 (perio recall), be sure you include WHY so insurance will cover
 - o Perio recall (4910) is NOT a prophylaxis

Rational for Periodontal Maintenance and Supportive Therapy



Major Steps

- Update medical, dental, social history
- Detailed clinical and radiographic examinations
 - o If you cannot see the bone level in standard bitewings, take vertical bitewings to get bone level
 - o No pocketing does NOT mean there is no disease – recession is possible
- Determining diagnosis and prognosis
- Review oral hygiene and compliance
- Perform supra and subgingival instrumentation

Maintenance

- Look for mobility, increase probing depths, recession, bleeding, widened PDL, bone loss (Radiographic)
- This is basically a mini exam, to compare findings over time
- Once a perio patient, always a perio patient
 - o Must use 4910, can NEVER go back to prophylaxis
 - o Periodontitis is a chronic, lifelong disease
- Without maintenance, therapy is useless
 - o Limited therapy = instrumentation only, no surgery
- Patient compliance is not reliable
 - o 17% compliance
 - o 49% erratic
 - o 34% none

Perio Therapy Results

- Establish health
- Restore function
- Preserve health

Prevent and Treat Gingivitis

- Usually, no significant calculus builds up in 2 weeks
- Plaque accumulation for 2 weeks is completely reversible
- Health is associated with wealth/country
 - o Norway = better hygiene and care
 - o Sri Lanka = worse hygiene/care/condition
 - Studies done at age 40, where CAL begins to appear
 - Age isn't an issue, more the accumulation of the disease
 - As you get older, the more you accumulate so the greater the progression

Prevent and Treat Periodontitis

- BOP over prolonged period = approx. 70% greater chance for attachment loss/periodontitis
- Gingival recession predominant lesion before age 40
- Highest rate of periodontal disease occurs between ages 50-60
 - o Pocket periodontology principal mode of destruction between ages 50-60
- ¼ of the population has stable healthy periodontal condition throughout life
- ¾ of the population has slight/moderate perio disease, from 0.02-0.2mm/year
 - o Cumulative average of 2.44mm as patient approaches 60y/o
 - o Mean annual risk of initial attachment loss highest between 16-34y/o
 - Only 20% of sites continued to lose more attachment
 - <1% had substantial loss (>4mm)

Teeth Mortality

- Teeth w/o inflamed gingiva maintained average of 51 years
- Teeth w/ inflamed gingiva 46x more likely to be lost
- SRP/Prophy is better than no treatment
 - o People who receive perio therapy lose much less dentition than those who do not receive perio therapy
 - Chance is roughly 5x greater for loss
- Most patients don't lose teeth, but a few patients lose lots of teeth
 - o This can skew the data
- Perio therapy (surgically positioning apically) may change the problem from a perio to caries/sensitivity

Summary

- Best single action to prevent gingivitis = oral hygiene
- Best ways to treat gingivitis = oral hygiene, calculus removal
- Gingival bleeding/attachment loss = more likely to lose more attachment if there is bleeding
- 5x more tooth loss in untreated population compared to treated population
- The ultimate measure to determine efficacy of perio therapy = tooth retention

Perio for the GP

- Current perio therapy is provided mostly by specialists
- Practices that employ hygiene:

No Hygienists	1 Hygienist	2 Hygienists	3+ Hygienists
33.8%	24.8%	24.0%	17.4%

- Most patients treated for gum disease are <45y/o
 - o 29% are 25-35y/o
 - o 26% are 35-45y/o

Dental Team

- Analysis of the Dental Team
 - o Desire and motivation to make transformation
 - o Role of each member in the team
 - This isn't just the DDS and DH, it includes assistants, receptionists, etc
- Analysis of Practice Style
 - o Willingness to critically analyze existing practice
 - o Commitment to invest time, energy, funds required

Educational and Clinical Considerations

- o Didactic and clinical education and updates
- o Record keeping and quality assurance
- o Instruments and equipment needed
- o Recall system
- o Referral philosophy and process
- o Dealing with leaving and new patients
- The standard of care does NOT vary per location

Periodontal Disease

- Gingival disease
- 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

Referrals

- Having a good relationship with specialists and general practitioners
 - o Some of the worst experiences for periodontists are receiving referrals from other providers
- Developing the dental hygienist as a referral source
 - o Hygienists collect a TON of info, so they're a good source for suggesting when to refer out a patient
- There are 4 variables that influence number of referrals per month from a GP to a specialist
 - o Female gender
 - o Practicing with one other dentist
 - o Employing 2 or more hygienists
 - o Being more than 5 miles away from the nearest specialist
- When in doubt, seek periodontal consultation and/or a second opinion
- Provide information relevant to:
 - o Chief concerns expressed by patient and therapist
 - o Health status and need for special consideration
 - o Any past experience with perio treatment
 - o Anticipated dental therapeutic procedures
 - o Quality FMX
- Expect to receive back from the specialist:
 - o Periodontal diagnosis and prognosis
 - o Proposed perio treatment plan and possible alternatives
 - o Needs for coordinated treatments including but not limited to: endodontics, TMD, ortho, OMS, restorative, prosthetic reconstruction, implants, and recommended schedule for perio maintenance
 - o Patient interest and willingness to accept and follow-up on the proposed perio treatment
- Majority of patients have:
 - o Early (1-2mm CAL)
 - o Moderate (3-4mm CAL)
 - Chronic periodontitis that are diagnosed early can be typically treated/maintained in by GP
- Aggressive
 - o Localized or generalized periodontitis in kids or adolescents
 - o Individuals 30y/o or older with significant bone loss (>4mm or 1/3 of root length)
- Advanced (>5mm CAL) chronic periodontitis with sites depict
 - o Progressive deepening of pockets with CAL and/or bone loss as seen on radiographs
 - o Infrabony defects that have the potential for regenerative therapy
 - o Multiple rooted teeth with more than 4mm CAL with furcation involvement that will complicate therapy
 - o Mucogingival defects that exhibit progressive recession and/or are an esthetic concern
- Other clinical situations
 - o Comprehensive perio appraisal prior to initiating ortho or extensive restorative therapy on adults
 - o Atypical perio diseases associated with immune response or systemic health
 - o Excision of proliferative or excessive gingival tissues
 - o Crown lengthening surgery as indicated for restorative and/or esthetic purposes
 - o Mucogingival defects that exhibit progressive recession and/or are of an esthetic concern
 - o Tooth/teeth extraction in conjunction with ridge preservation/augmentation
 - o Exposure of impacted teeth in conjunction with ortho treatment
 - o Surgical placement of root formed dental implants

Conclusion

- Main reason for non-compliance is patients don't attend their own dentist exclusively for maintenance therapy
- Tooth loss and perio deterioration was more marked in this group that patients who in addition attended specialist office for maintenance therapy
- More is spent on oral health (\$71Billion) than cancer (\$62Billion)
 - o Heart conditions have the most (\$90Billion)
- Average total expenditure for insurance covered patients is ~ \$400
 - o Only 6-7% of all insured patients reach their yearly maximum
- Around half of all perio procedures are done by non-specialists
 - o Some preventative procedures are also perio procedures

Background Information and Dental Codes

- Dental benefits plans vary greatly between providers
- Not all carriers legally required to adhere to ADA standard
 - o Many states designate the ADA as standard for dental carriers, not-for-profit carries (Blue Cross, Delta), are not governed by such provisions
- Many carriers created contracts based on old CDT codes – until these expire, they will not change over to new CDT codes
 - o Insurance carriers typically have large in-house computer systems that are complex and may take time to re-program
- Dental vs dental hygiene provided services
- Determine overall medical, oral, dental, and perio status
- Use appropriate CDT code regardless of patient insurance
 - o Clinical evaluation codes
 - o Preventative codes
 - o Non-surgical codes
 - o Surgical codes
 - o Implant codes

The Leadership Curve

X axis = leadership skill

Y axis = clinical range of clinical care provided

Clinical, organizational, and relationship skills are also illustrated

