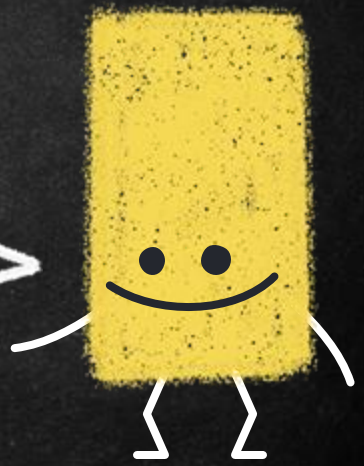
Chapter 33

The Patient with Dental Implants



Learning Objectives

1. Describe concepts, technology, and terminology relevant to implant dentistry.
2. Develop a knowledge base related to osseointegration and ancillary procedures in oral implantology.
3. Comprehend patient selection factors and education essentials.
4. Understand theory and practice of dental implant maintenance in the clinical setting.
5. Recognize and manage dental implant problems, complications, and failures.

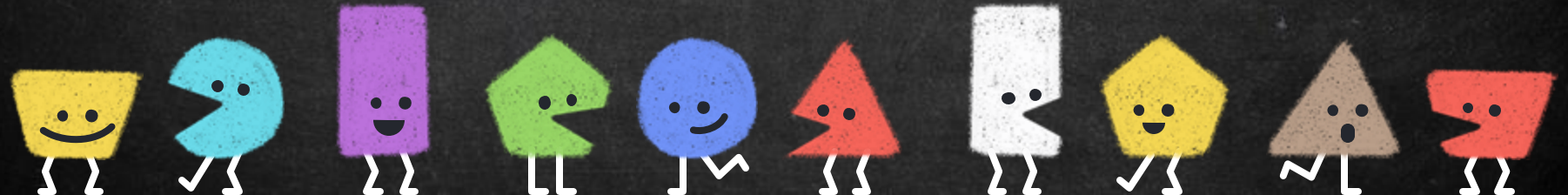
Lecture Agenda

1. Implant Basics
2. VIDEO: What a dentist wants the patient to know
3. Review homecare choices for **patients** with implants
4. How does the **RDH** Care for implants?
    a. Radiographs?
    b. Probing?
    c. Instruments?
5. Team up for a DEBATE!
6. Time for Questions, then SPRING BREAK!

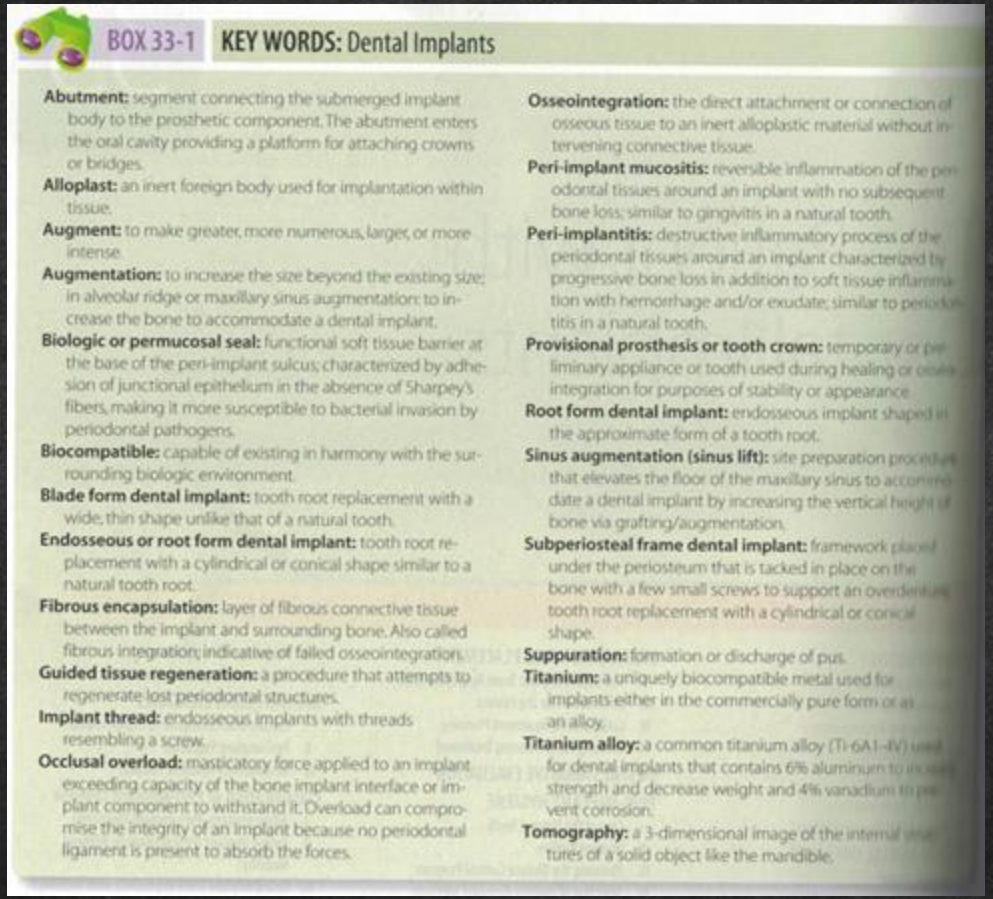
WARNING!

You are going to WANT to pay attention to this GREAT information.

I'll be asking questions, if nobody virtually raises their hand, I'll choose!



Key Words to Know



BOX 33-1 KEY WORDS: Dental Implants

Abutment: segment connecting the submerged implant body to the prosthetic component. The abutment enters the oral cavity providing a platform for attaching crowns or bridges.

Alloplast: an inert foreign body used for implantation within tissue.

Augment: to make greater, more numerous, larger, or more intense.

Augmentation: to increase the size beyond the existing size; in alveolar ridge or maxillary sinus augmentation: to increase the bone to accommodate a dental implant.

Biologic or permucosal seal: functional soft tissue barrier at the base of the peri-implant sulcus; characterized by adhesion of junctional epithelium in the absence of Sharpey's fibers, making it more susceptible to bacterial invasion by periodontal pathogens.

Biocompatible: capable of existing in harmony with the surrounding biologic environment.

Blade form dental implant: tooth root replacement with a wide, thin shape unlike that of a natural tooth.

Endosseous or root form dental implant: tooth root replacement with a cylindrical or conical shape similar to a natural tooth root.

Fibrous encapsulation: layer of fibrous connective tissue between the implant and surrounding bone. Also called fibrous integration; indicative of failed osseointegration.

Guided tissue regeneration: a procedure that attempts to regenerate lost periodontal structures.

Implant thread: endosseous implants with threads resembling a screw.

Occlusal overload: masticatory force applied to an implant exceeding capacity of the bone implant interface or implant component to withstand it. Overload can compromise the integrity of an implant because no periodontal ligament is present to absorb the forces.

Osseointegration: the direct attachment or connection of osseous tissue to an inert alloplastic material without intervening connective tissue.

Peri-implant mucositis: reversible inflammation of the periodontal tissues around an implant with no subsequent bone loss; similar to gingivitis in a natural tooth.

Peri-implantitis: destructive inflammatory process of the periodontal tissues around an implant characterized by progressive bone loss in addition to soft tissue inflammation with hemorrhage and/or exudate; similar to periodontitis in a natural tooth.

Provisional prosthesis or tooth crown: temporary or preliminary appliance or tooth used during healing or osseointegration for purposes of stability or appearance.

Root form dental implant: endosseous implant shaped in the approximate form of a tooth root.

Sinus augmentation (sinus lift): site preparation procedure that elevates the floor of the maxillary sinus to accommodate a dental implant by increasing the vertical height of bone via grafting/augmentation.

Subperiosteal frame dental implant: framework placed under the periosteum that is tacked in place on the bone with a few small screws to support an overdenture tooth root replacement with a cylindrical or conical shape.

Suppuration: formation or discharge of pus.

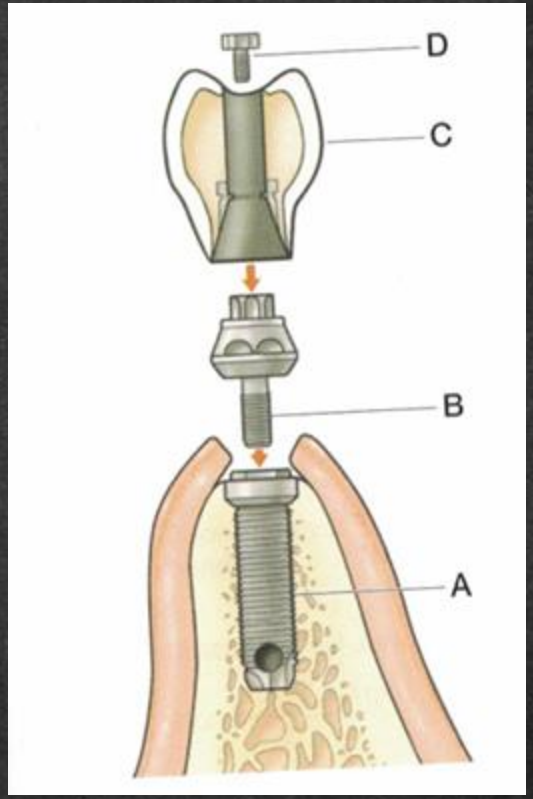
Titanium: a uniquely biocompatible metal used for implants either in the commercially pure form or as an alloy.

Titanium alloy: a common titanium alloy (Ti-6Al-4V) used for dental implants that contains 6% aluminum to increase strength and decrease weight and 4% vanadium to prevent corrosion.

Tomography: a 3-dimensional image of the internal structures of a solid object like the mandible.

Components of a Dental Implant

What are the components called?



Components of a Dental Implant

A: Implant Body

B: Abutment

C: Crown

D: Screw (or cement)

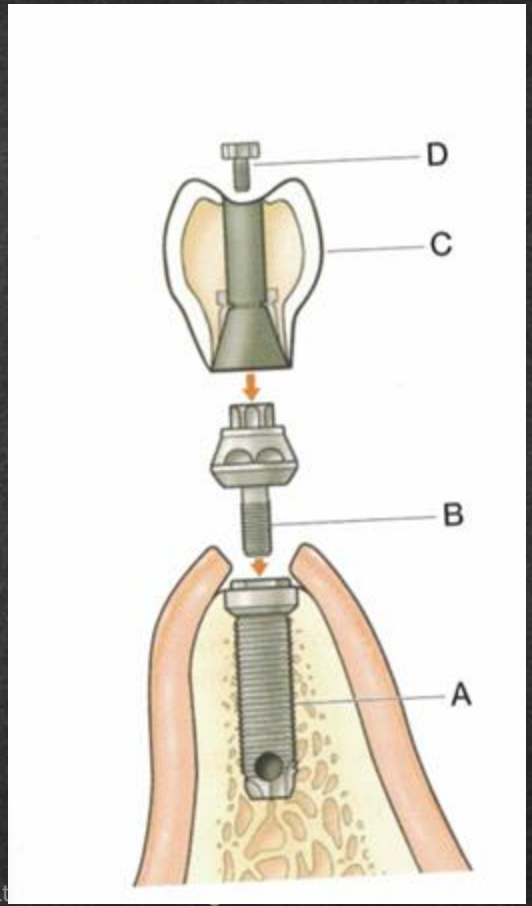


Figure 32.3. Implants and Components. An example of a titanium implant screw and abutment. (Used with permission ©2009 Zimmer Dental Inc. All rights reserved.)

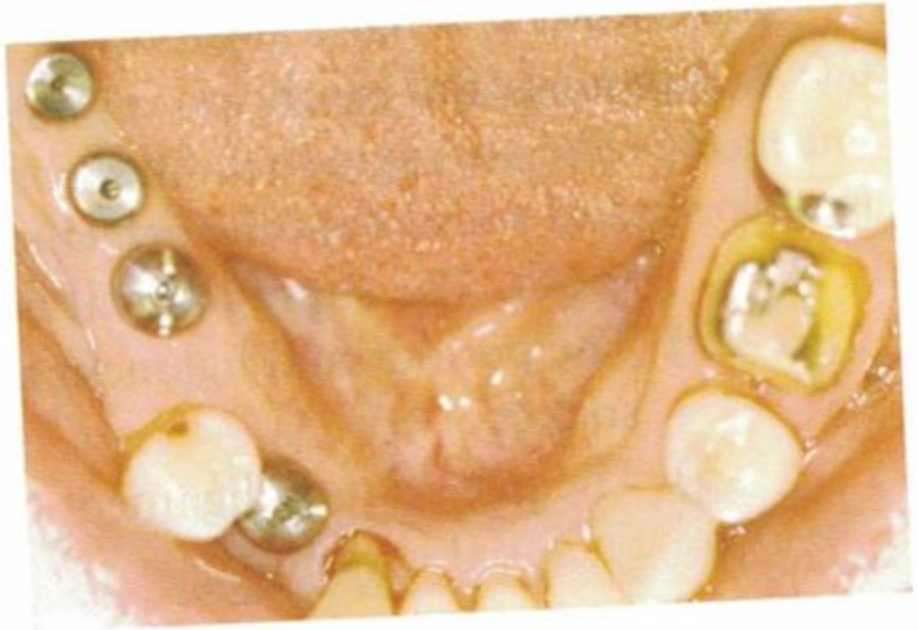


Figure 32.4. Abutments. This photograph shows the healing abutments for four implants. (Courtesy of Dr John S. Dozier, DMD, MSD, Tallahassee, FL.)

Bone Physiology

I. Bone Classification
II. Biomechanical Force
III. Grafting and Regeneration

Types of Bone Cells

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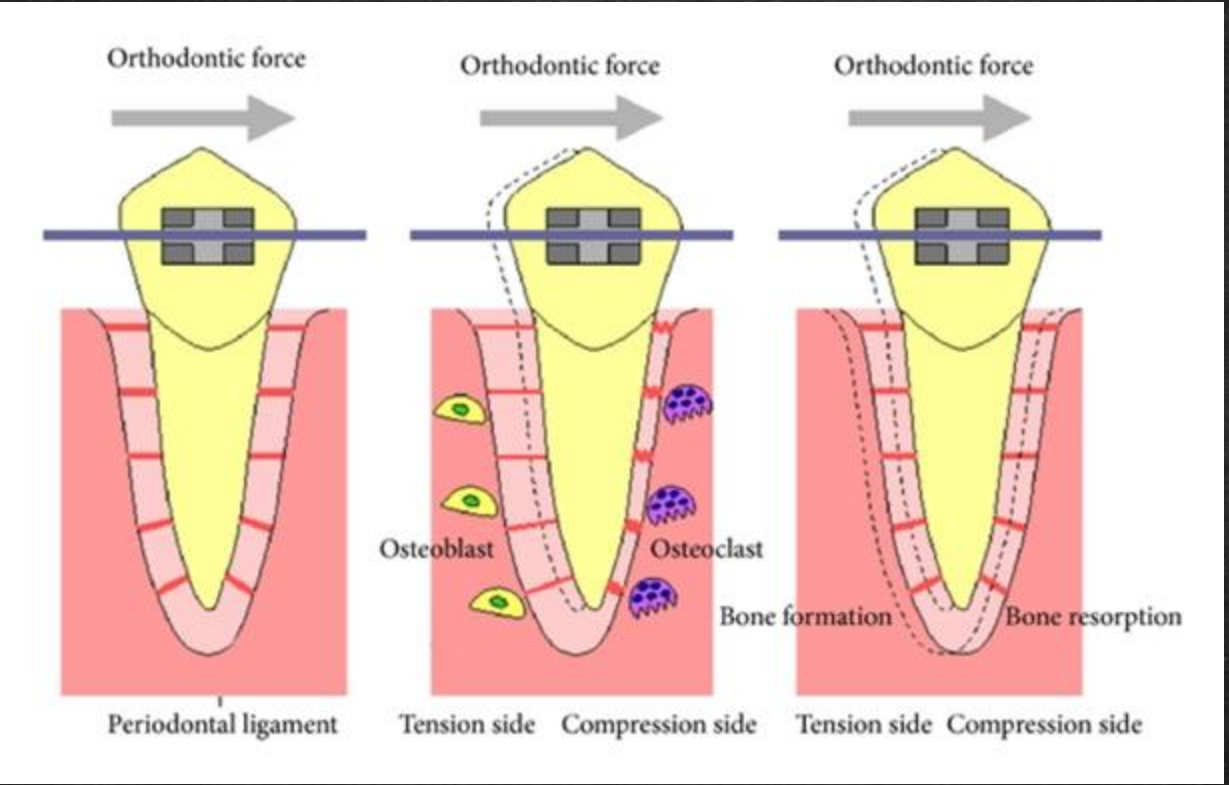
Cell Type	**Function**	**Menuonimc**
OsteoCYTES	Mediate activity	
OsteoBLASTS	Repair and Regenerate	Blasts BUILD bone
OsteoCLASTS	Remodeling and homeostasis	Clasts CUT up bone

Wolff's Law

"Bone is laid down in areas of greatest stress and resorbed in areas where it is not stressed"

How Teeth Move with Braces



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“Use it or Lose it” Principle

Bone will resorb if not “used”

No tooth? No forces? = Bone LOSS

Dental implants PRESERVE bone!

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Types of Bone

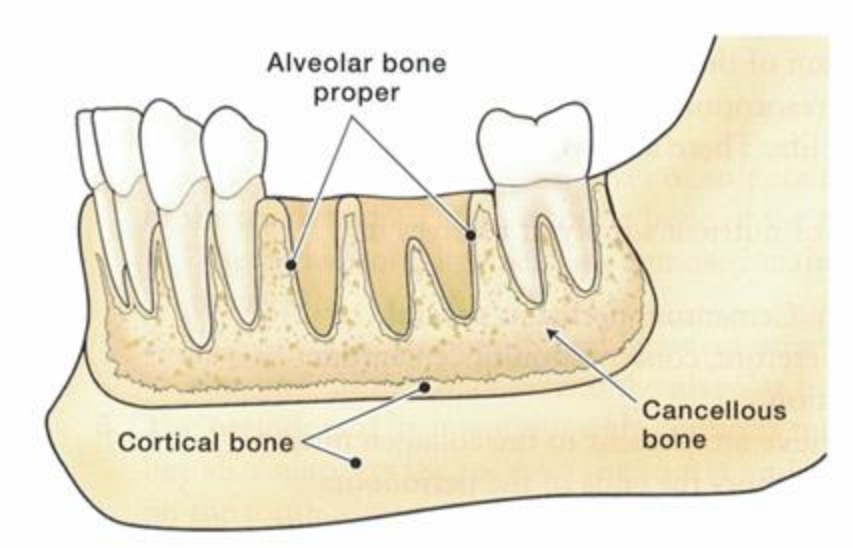
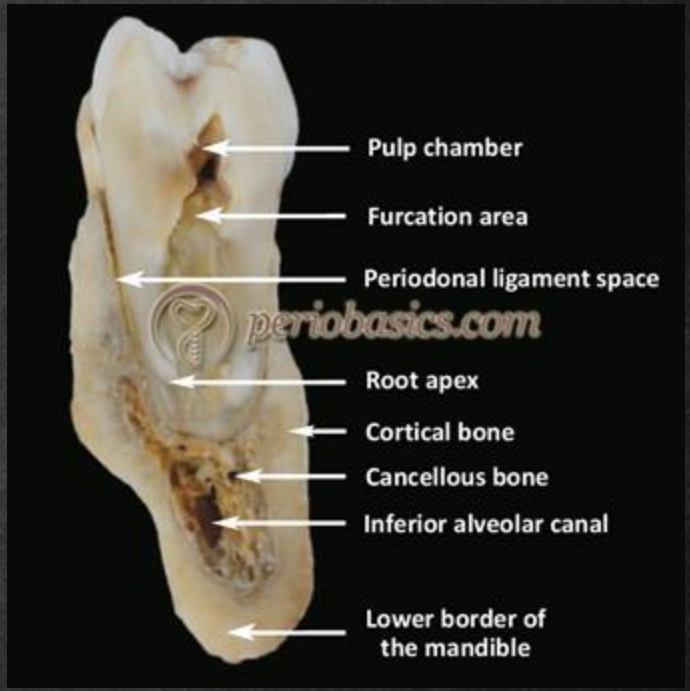


Figure 1.16. Layers of the Alveolar Process. A lateral section of the mandible reveals the three bony layers: the alveolar bone proper, cancellous bone, and cortical bone.



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What if there is not enough bone?

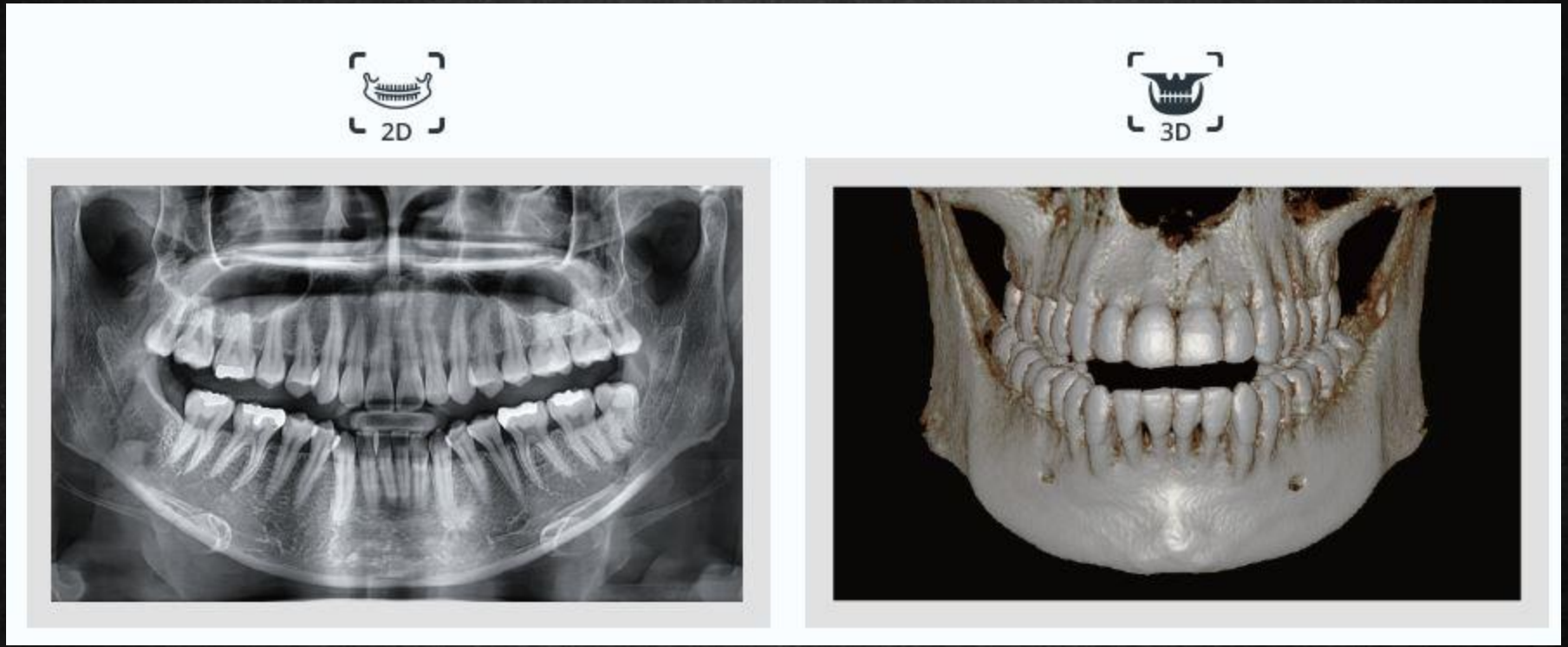
What if there is not enough bone?

➜ May not be an implant candidate

➜ Bone can be added through graft procedures

Autograft	Bone from patient, harvested from donor site (i.e. roof of mouth)
Allograft	Bone from another human (i.e. cadaver bone)
Zenograft	Bone from another species (i.e. cow, bovine, horse)
Alloplast	Synthetic bone (i.e. beta tricalcium phosphate)

Diagnostic Tools



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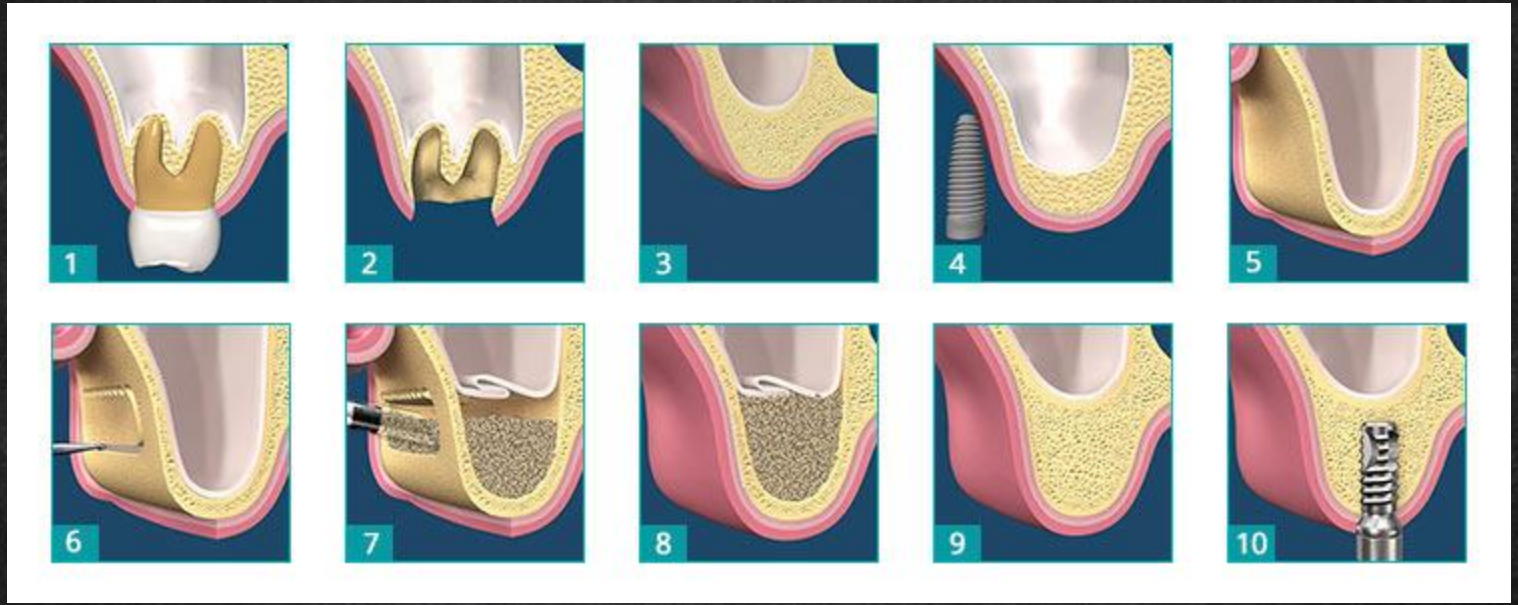
Maxillary Sinus Lift



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Osseointegration

- Healing phase takes place between 0 and 12 months.
- Remodeling phase takes place between 3 and 18 months.
- Steady state takes place 18 months and beyond.

Depending on Bone LOCATION depends on healing

Remember Dental Anatomy?

→ Mandibular bone is more dense

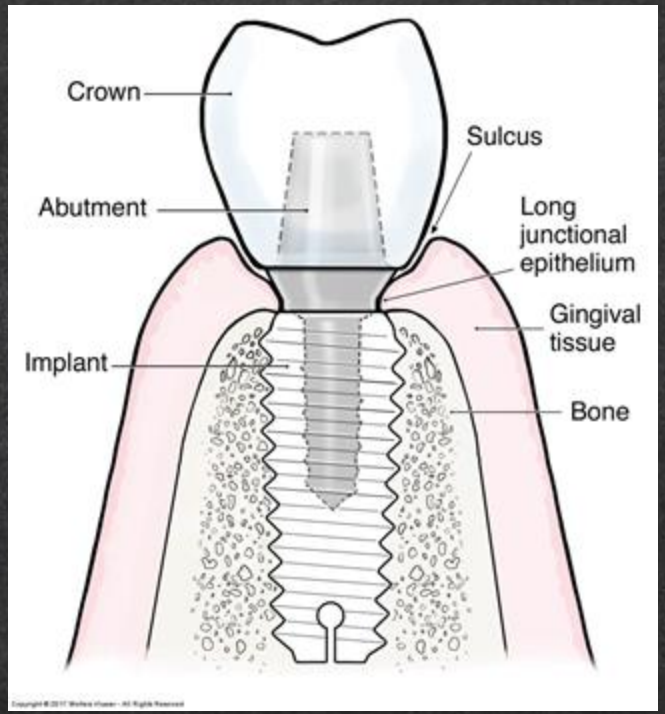
→ Maxillary bone is less dense

→ Bone growth is physiological process, patient dependent! (Think medical history)

Implant Interfaces

I. Implant/Bone Interface
II. Implant/Soft Tissue Interface

FIGURE 33-1 The Implant/Soft Tissue Interface



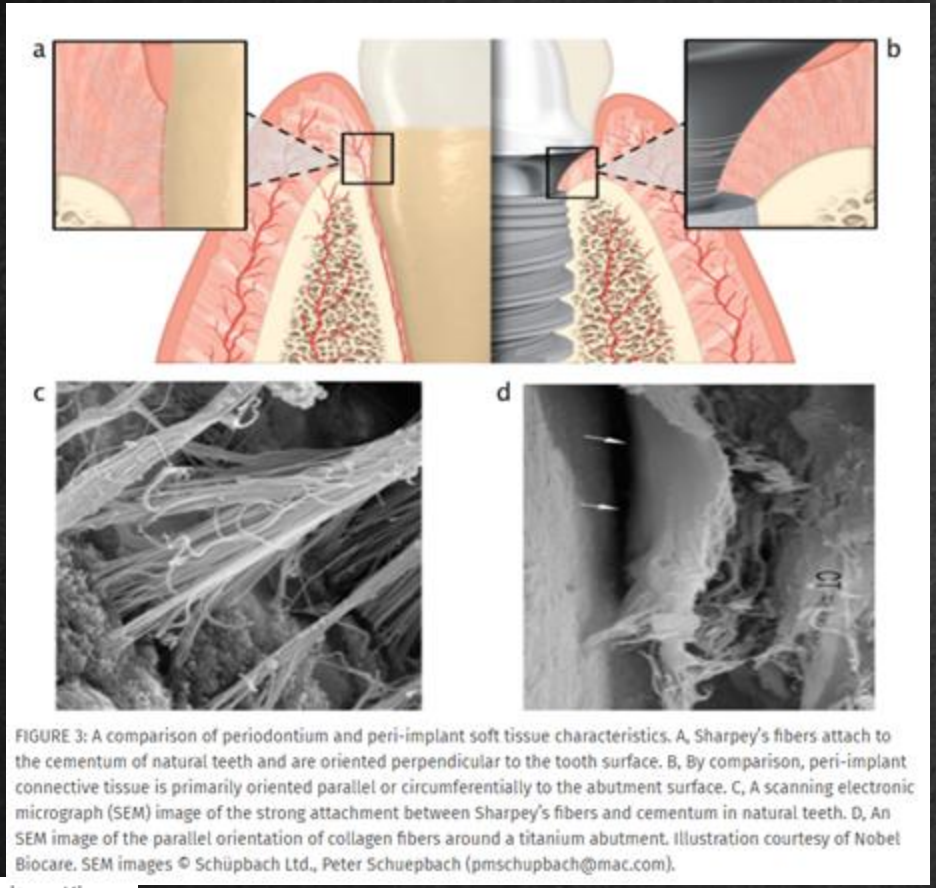


FIGURE 3: A comparison of periodontium and peri-implant soft tissue characteristics. A, Sharpey's fibers attach to the cementum of natural teeth and are oriented perpendicular to the tooth surface. B, By comparison, peri-implant connective tissue is primarily oriented parallel or circumferentially to the abutment surface. C, A scanning electronic micrograph (SEM) image of the strong attachment between Sharpey's fibers and cementum in natural teeth. D, An SEM image of the parallel orientation of collagen fibers around a titanium abutment. Illustration courtesy of Nobel Biocare. SEM images © Schüpbach Ltd., Peter Schuepbach (pmschupbach@mac.com).

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Types of Dental Implants

I. Subperiosteal
II. Transosseous (Transosteal)
III. Endosseous (Endosteal) Implant

Subperiosteal Implant

"SUB" means below

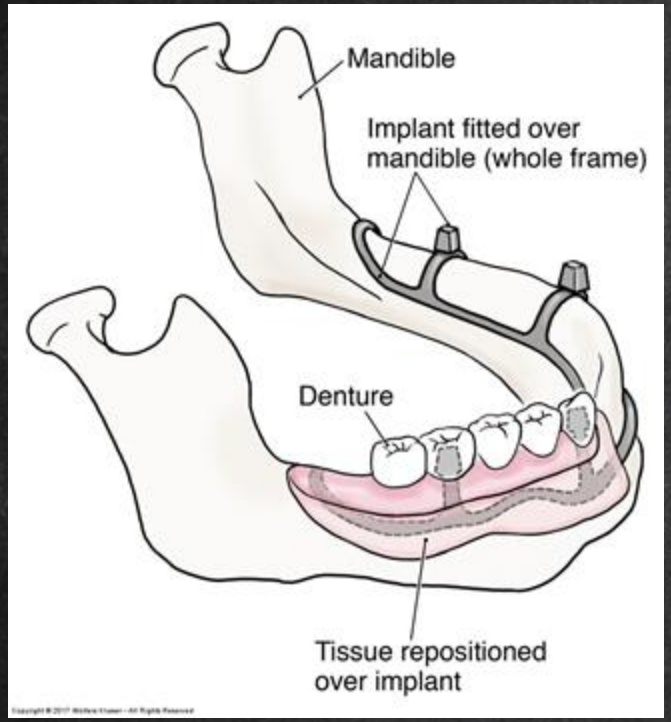


FIGURE 33-2

Custom fabricated framework of metal that rests over the bone, under the periosteum

Transosteal Implant

"TRANS" means across

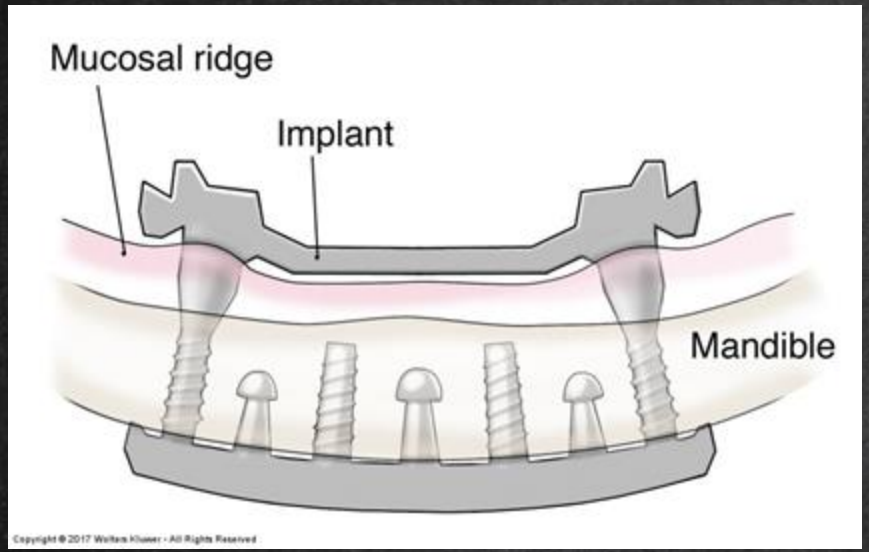


FIGURE 33-3

Dental implant penetrates both cortical plates and passes through full thickness of alveolar bone.

AKA: mandibular staple implant
staple bone implant

Endosseous Blade Implant

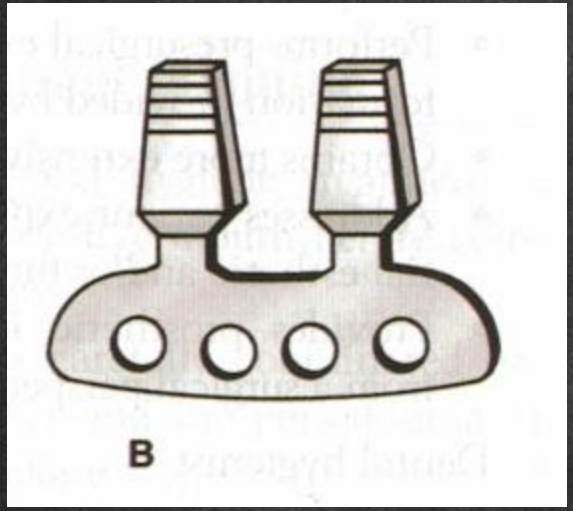
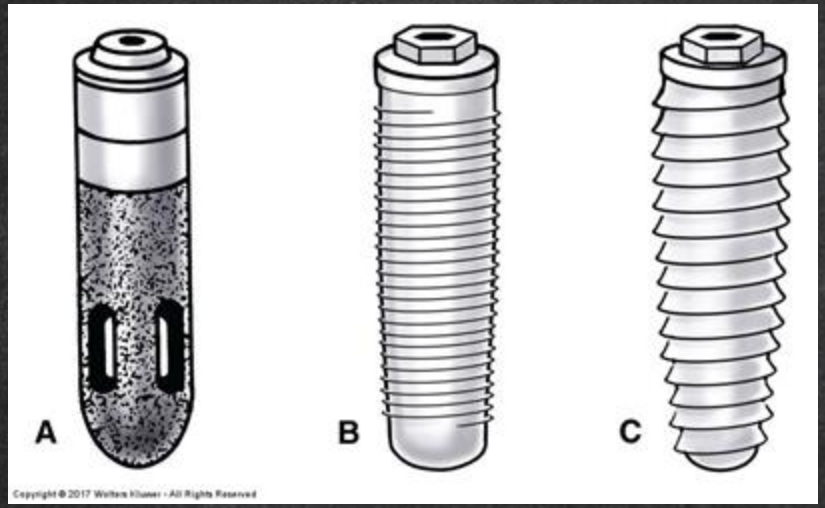


FIGURE 33-4

Earliest generation of endosseous implant

Not commonly used anymore

Endosseous Root Form Implants

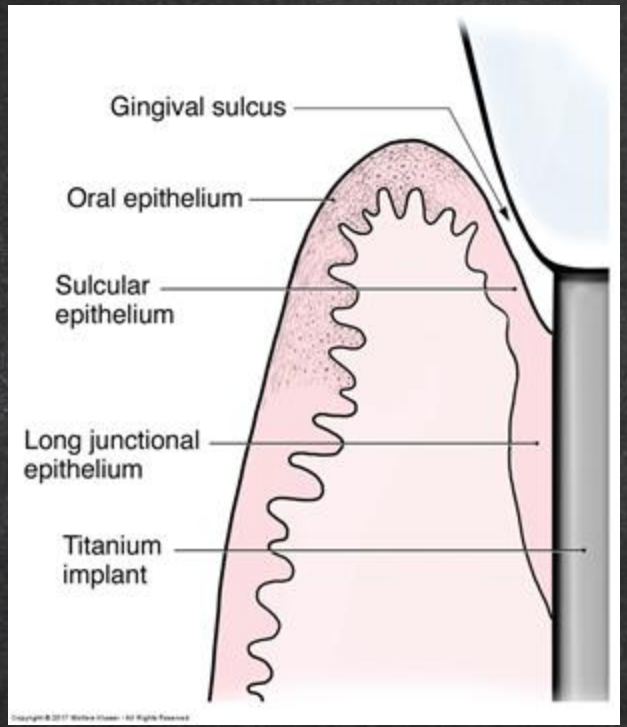


A: Cylinder type

B & C: Screw Type
*Most commonly used

FIGURE 33-5

FIGURE 33-6 Parts of an Endosseous Implant



Implant Procedure

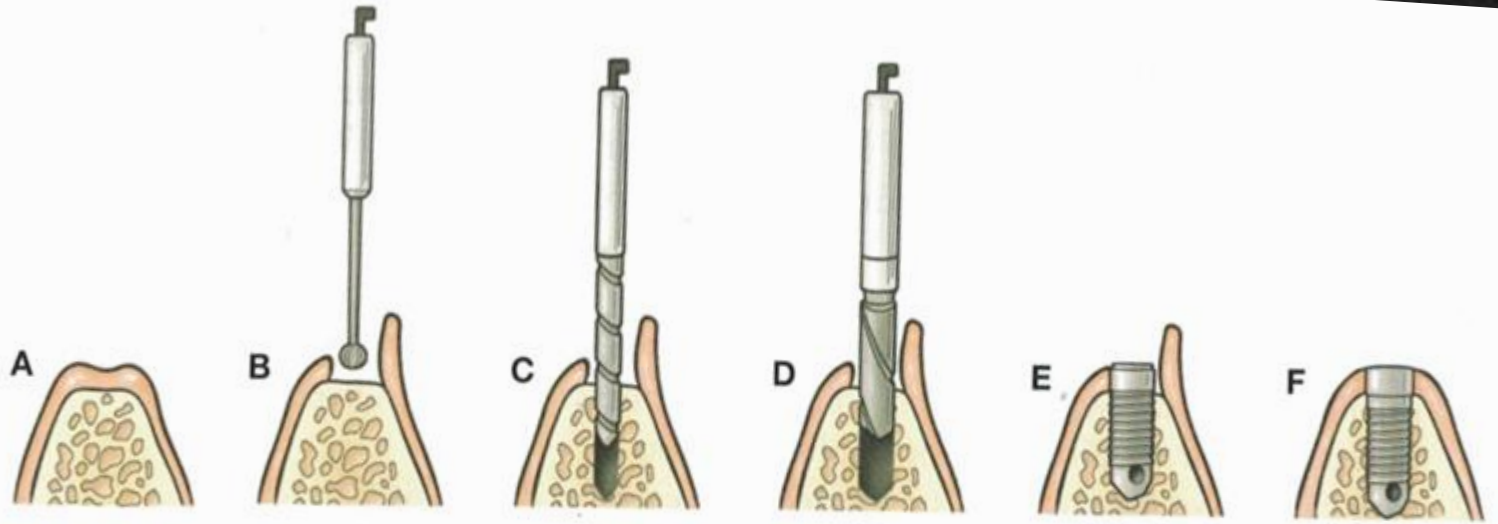
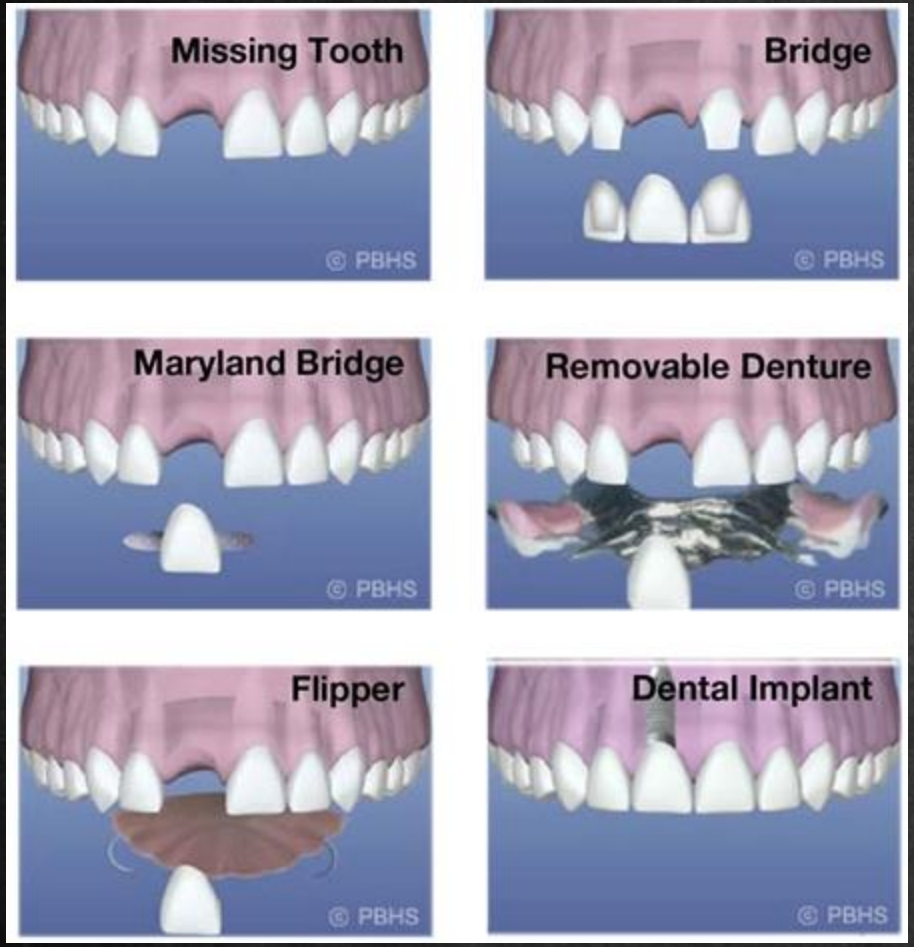
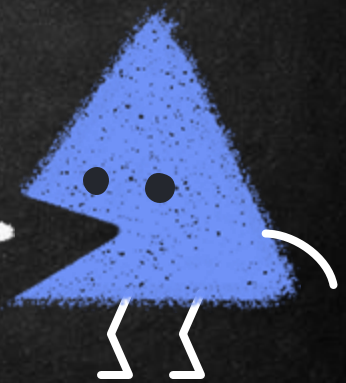


Figure 32.5. Surgical Placement of Dental Implants. A: Edentulous alveolar ridge. B: Initial osteotomy site established. C, D: Drills of increasing diameters used to prepare osteotomy to the size of the planned implant. E: Implant body seated in the osteotomy. The top of the implant body may be slightly above, level with, or slightly below the crest of the bone. F: Implant body seated in bone with cover screw attached. At the end of placement surgery, the implant can be covered with gingiva or left exposed to the oral cavity, as shown here. A healing time of several weeks to months is allowed so that osseointegration can occur.

Interview with Dr. Ashley Brown, DDS



What's a "Flipper"?



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Factors to Teach the Patient

I. Tooth loss - progressive, irreversible bone resorption.
II. Implants preserve and maintain surrounding bone
III. Care for implants
IV. Meticulous daily self-care by the patient.
V. The role of biofilm in periodontitis and peri- implantitis;

Factors to Teach the Patient con't

VI. History of periodontitis may increase risk for peri-implantitis.

VII. Time necessary for biofilm removal

VIII. Frequent, ongoing professional care

IX. Contact office if complication

Realistic Expectations

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https://www.clearchoice.com/the-benefits-of-clearchoice/

Patient Selection

I. Systemic Health
II. Tobacco Use
III. Oral Examination

What do you know so far?

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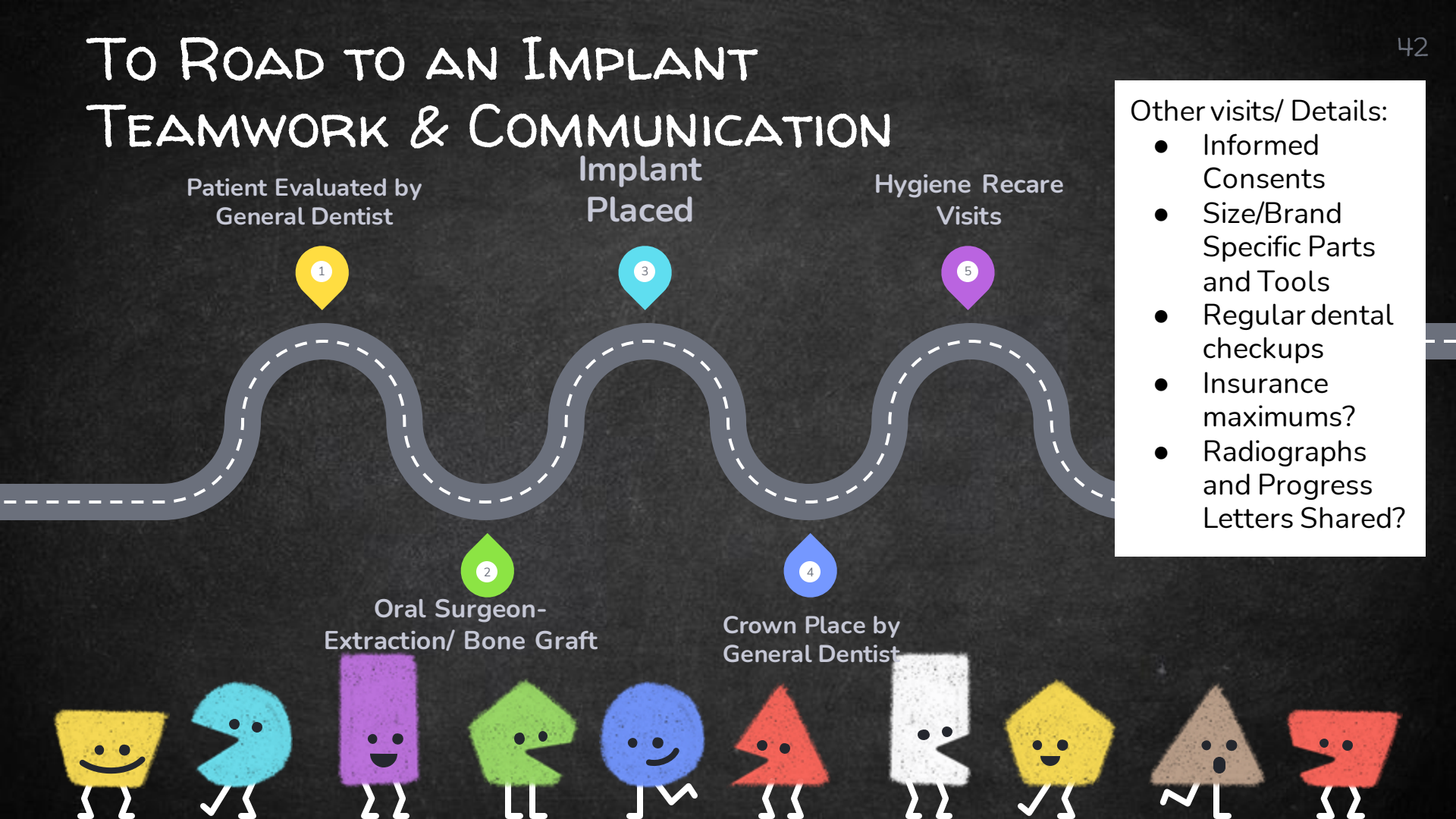
Preparation and Placement

I. The Dental Implant Team Responsibilities
II. Information for the Patient
III. Collaborative Treatment Planning
IV. Limiting Factors During Treatment

To Road to an Implant
Teamwork & Communication

1. Patient Evaluated by General Dentist
2. Oral Surgeon- Extraction/ Bone Graft
3. Implant Placed
4. Crown Place by General Dentist
5. Hygiene Recare Visits



Other visits/ Details:

- Informed Consents
- Size/Brand Specific Parts and Tools
- Regular dental checkups
- Insurance maximums?
- Radiographs and Progress Letters Shared?

Postrestorative Evaluation

- Radiographic
- Peri-implant tissue health
- Test for mobility
- Occlusal integrity
- Patient function and comfort
- Sufficiency of patient's oral self-care

Occlusal Guard/ “Night Guard”

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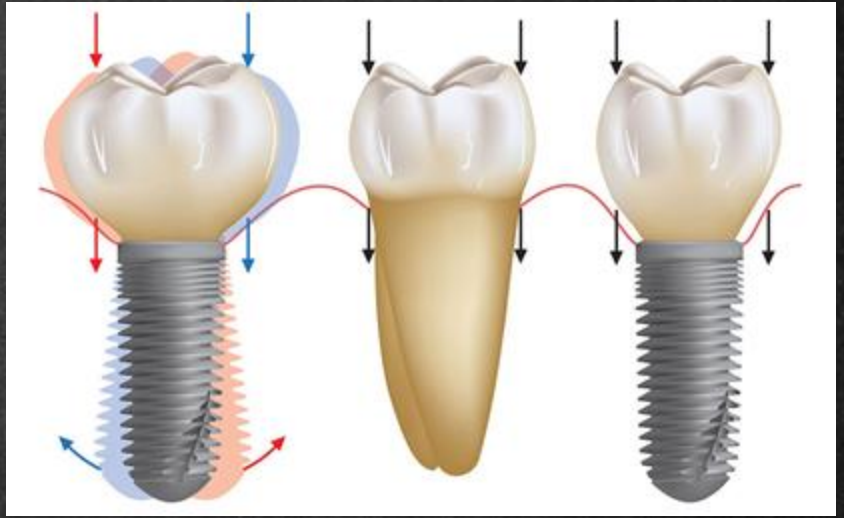

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Peri-implant Hygiene

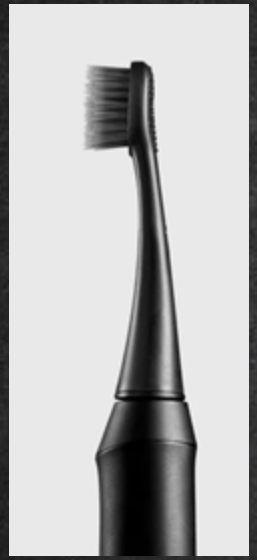
I. Care of the Natural Teeth
II. Implant Biofilm
III. Planning the Disease Control Program
IV. Selection of Biofilm-Removal Methods
V. Rinsing and Irrigation
VI. Fluoride Measures for Dental Caries Control

OHI Specific for Implants

1. Toothbrushes
2. Toothpastes
3. Rinses
4. Interdental Aids:
    a. Floss
    b. Water piks
    c. Proxy Brushes

Power Brushes

BURST



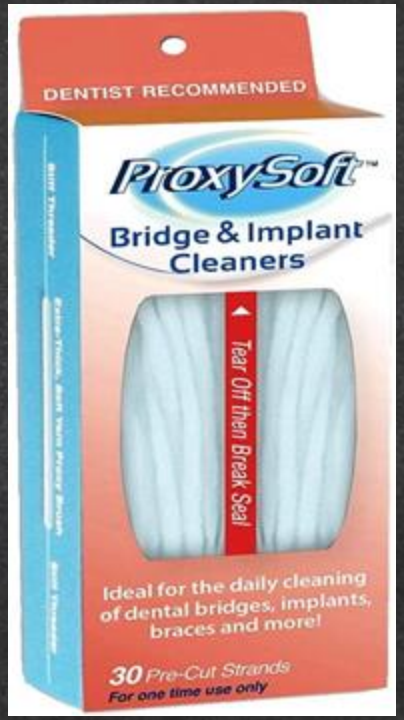
Burst Charcoal
Tapered Bristles

PHILIPS
sonicare

Oral-B

Oral B “Power Tip”
Brush Head

Homecare Products- Floss



Water Flosser

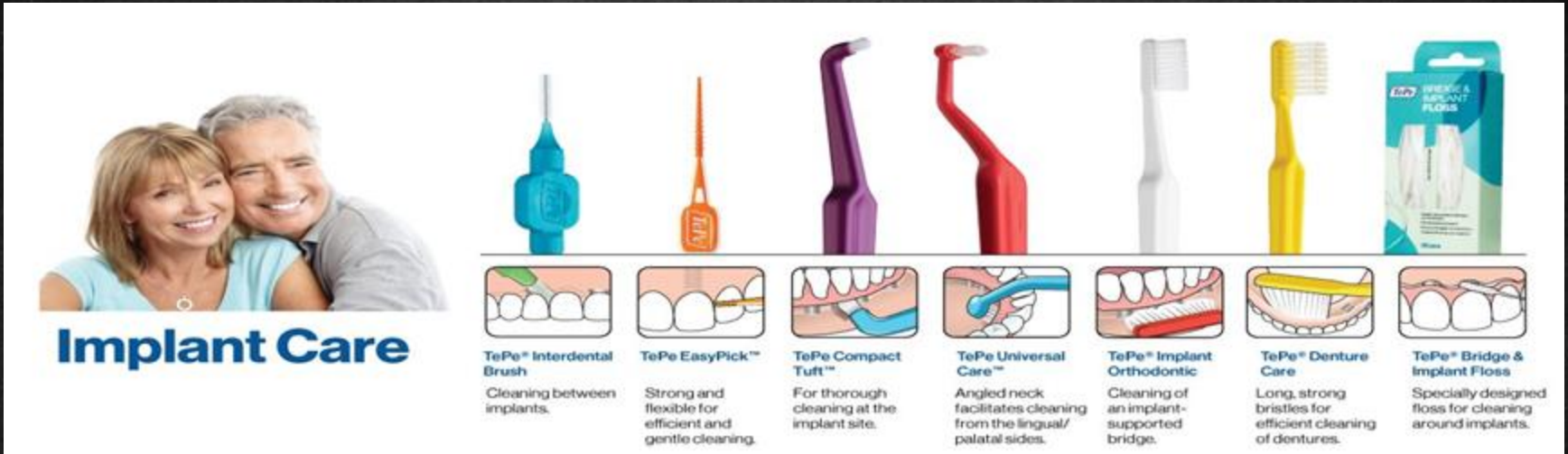
Special Waterpik Tip for Implant Retained Denture

Waterpik® Plaque Seeker™ Tip

Waterpik® Implant Denture Tip

Homecare Products- Interdental/Proxy

Homecare- Specialty Brushes



https://www.perioimplantadvisory.com/clinical-tips/hygiene-techniques/article/16411611/dental-hygiene-nightmares-no-more-athome-maintenance-for-success-with-dental-implants

TePe Implant Kit

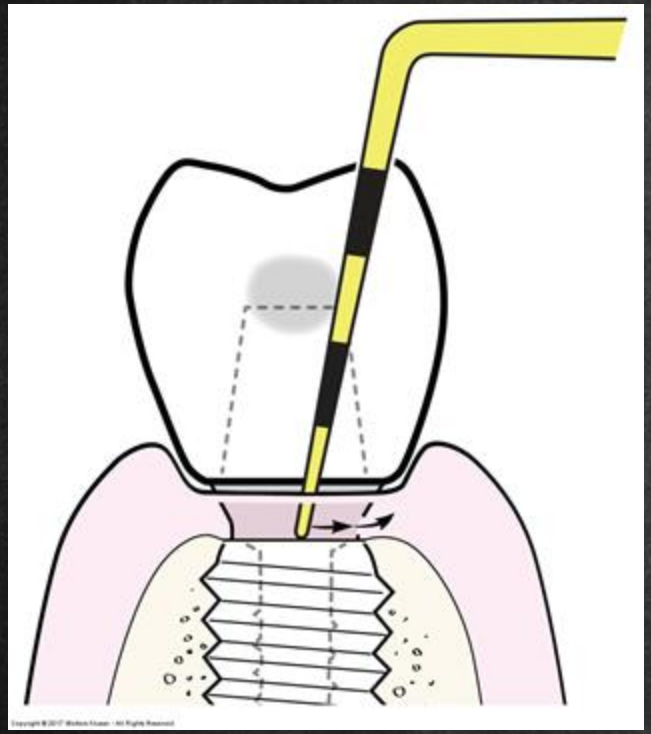
Video 2:18

Continuing Care

I. Probing Dental Implants
II. Basic Criteria for Implant Success
III. Frequency of Appointments
IV. The Continuing Care Appointment

Where at HCC?

FIGURE 33-7 Probing an Implant



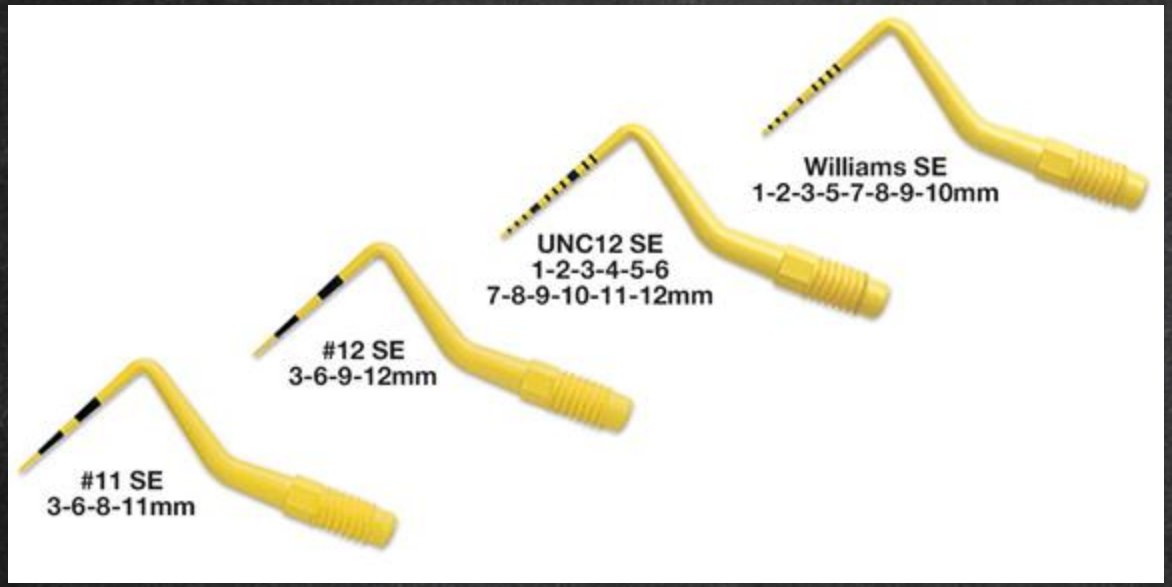
WHEN to probe?

How to probe?

What probe do I use?

What do the numbers “mean”?

Color Vue - Plastic Probe



Natural Tooth v. Implant

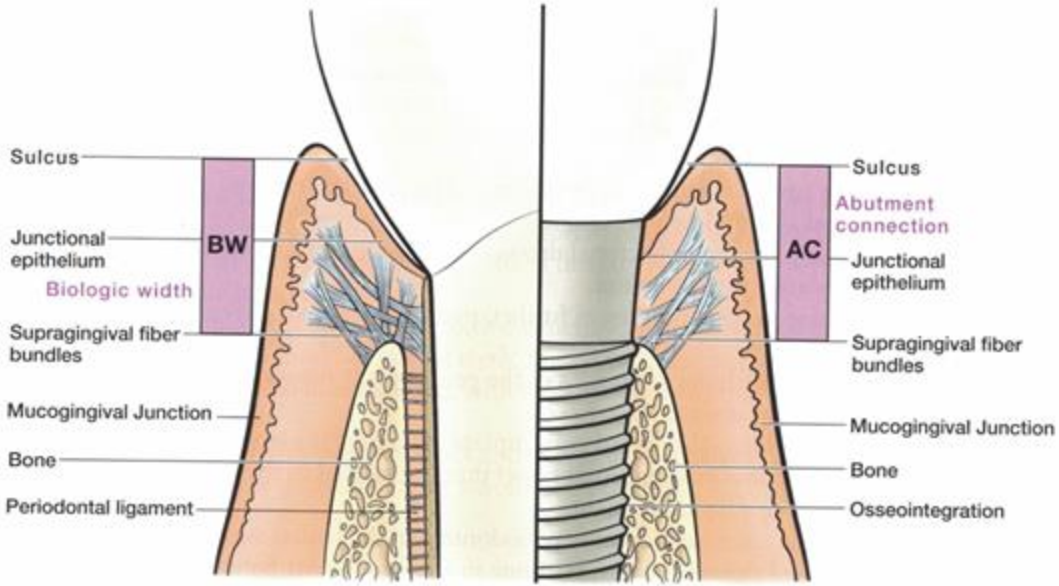


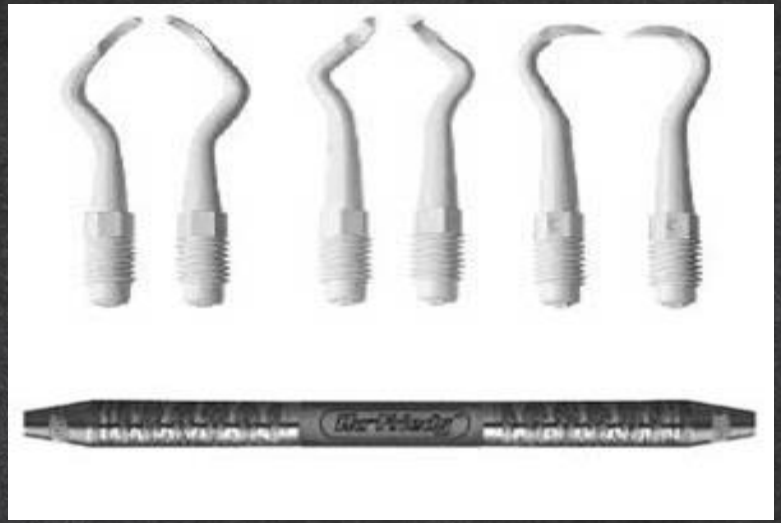
Figure 32.6. **Comparison of Periodontium Interface with a Natural Tooth Versus a Dental Implant.** Note that the interface between a tooth and the periodontium differs from the interface between an implant and the periodontium. The implant lacks the periodontal ligament connection to the alveolar bone and the gingival fibers do not insert into the titanium.

Lets see in ACTION

HYGIENE EDGE

https://www.youtube.com/watch?v=Z7r-fCiVM-A

Hu Friedy Plastic Scalers



Titanium Implant Scalers

Hu-Friedy is now a proud member of HuFriedyGroup
The Best In Practice

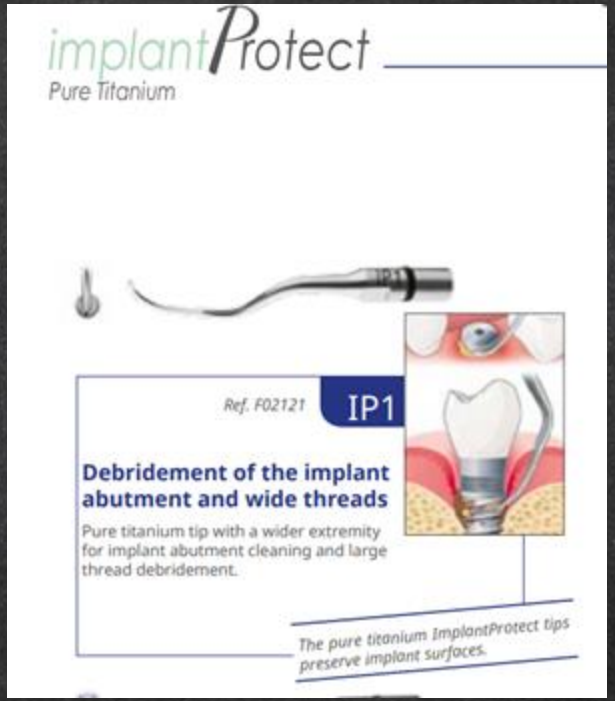
PDT Paradise Dental Technologies
Passionate. Purpose Driven Design™

https://www.hu-friedy.com/TIS

Ultrasonic Insert for Implants

Magnetostrictive “Cavitron”

Ultrasonic Insert for Implant-Piezoelectric



Air Polishing

Glycine Powder

AIR-POLISHING vs. HAND INSTRUMENTATION

Subjects	33
Environment	in vivo
Duration	6 months

NON-SURGICAL TREATMENT OF PERIIMPLANTITIS USING AN AIR-ABRASIVE DEVICE OR MECHANICAL DEBRIDEMENT AND LOCAL APPLICATION OF CHLORHEXIDINE: A PROSPECTIVE, RANDOMIZED, CONTROLLED CLINICAL STUDY

Sahm N, Becker J, Santel T, Schwarz F
Journal of Clinical Periodontology; 2011; 38: 872-878

AIM:

To evaluate and compare the efficacy of an air-polishing device with mechanical debridement and local application of Chlorhexidine (CHX) for non-surgical treatment of periimplantitis

CONCLUSION:

Both treatment procedures resulted in comparable but limited clinical attachment level gains at 6 months

Air-polishing (EMS AIR-FLOW® PERIO) was associated with significantly higher reductions in bleeding on probing than mechanical debridement

MATERIAL AND METHODS

TEST GROUP AND CONTROL GROUP:

- 33 subjects with at least one screw-type titanium implant, showing clinical and radiographic signs of initial to moderate periimplantitis, were selected

DEVICES:

- Test group: Treatment was performed using an AIR-FLOW Master® with PERIO-FLOW® nozzle and glycine-based powder (25 µm, AIR-FLOW® PERIO Powder)
- Control group: Mechanical debridement was performed using carbon curettes (Straumann), followed by the application of CHX (GlaxoSmithKline)

PROCEDURE:

- 4 weeks before the treatment, all subjects received professional supragingival implant and tooth cleaning using rubber cups and polishing paste
- The same procedure was repeated at baseline, and 2, 4, 6, 8, 10, 12, 16, 20 and 24 weeks after treatment
- Treatments for both groups were performed under anesthesia
- Using the single-use PERIO-FLOW® nozzle, glycine-based powder was delivered subgingivally along the mesial, distal, vestibular and oral surfaces for 5 sec/site
- Mechanical debridement was carried out using carbon curettes until the operator was satisfied with the calculus removal. This was followed by pocket irrigation with 0.1% CHX digluconate solution, and submucosal application of 1% CHX gel
- The following clinical variables were evaluated at baseline, and three and 6 months post-treatment: Plaque index, bleeding on probing (BOP), periodontal pocket depth (PPD), mucosal recession and clinical attachment level
- All measurements were taken at 6 aspects per implant

RESULTS:

- At 6 months, the air-polishing group revealed significantly higher reductions in BOP in comparison to sites treated with mechanical debridement
- The clinical attachment level gains and PPD reductions were comparable

AIR-POLISHING vs. ULTRASONICS

Subjects	15
Environment	in vivo
Duration	1 month

THE EFFECT OF AIR-FLOW® GLYCINE POWDER AND HAND INSTRUMENTATION ON PERI-IMPLANT SOFT TISSUES: A SPLIT MOUTH PILOT STUDY

Mussano F, Rovasio S, Schierano G, Baldi I, Carossa S

AIM:

To compare the efficacy of traditional teflon curettes with an air-polishing device using glycine-based powder in the periodontal therapy of dental implants

CONCLUSION:

Air-polishing with AIR-FLOW® PERIO was observed to be more effective and less invasive than Teflon curettes for maintenance of periimplant soft tissues

MATERIAL AND METHODS

TEST GROUP AND CONTROL GROUP:

- 15 edentulous subjects with overdentures supported by 2 implants in the mandibular region were selected
- Each of the 2 implants per subject was randomly assigned to either hand instrumentation or air-polishing

DEVICES:

- Test group: Air-polishing was performed using an EMS AIR-FLOW Master® with PERIO-FLOW® nozzle and glycine-based powder (25 µm, AIR-FLOW® Powder PERIO)
- Control group: Mechanical debridement was performed using teflon curettes (Universal Implant Deplaquer, Hawe Neos) for subgingival deposits and a scaler (IH 6/7 tips; Hu-Friedy) for removal of plaque from the abutments

PROCEDURE:

- The following clinical variables were evaluated before treatment (T0), at one hour (T1), 1 week (T2) and 4 weeks (T3) post-treatment: bleeding on probing, periodontal pocket depth and bacterial count within the gingival sulcus
- Periodontal probing was done using a plastic probe (PerioWise®, Premier Dental) at T0, T2 and T3
- Microbial analysis from perio-implant sulcus was done by inserting sterile paper points at all time points
- Air-polishing was performed for 5 sec per site whereas the time spent on hand instrumentation was not noted

RESULTS:

- A significant effect modification of the Glycine Air-polishing compared to hand instrumentation with respect to time was found for periodontal pocket depth, bleeding on probing and bacterial count

What happens when implants FAIL?

https://images.app.goo.gl/Ee9HB3n6dumqcm1i6

Implant Complications

I. Factors that Contribute to Implant Failure
II. Peri-implant Problems
III. Restorative/Prosthetic Hazards

Classification of Peri-implant Disease

I. Ailing Implant (Peri-implant Mucositis)

II. Failing Implant (Peri-implantitis Without Mobility)

III. Failed Implant (Peri-implantitis with Mobility)

Retained Cement

Figure 6: X-ray shows retained cement on mesial of implant. Photo courtesy of M. Virginia Kirkland, DMD, MS.

Figure 7: Explant exposing piece of cement. Photo courtesy of M. Virginia Kirkland, DMD, MS.

https://www.rdhmag.com/pathology/periodontitis/article/14071644/how-dental-hygienists-can-manage-periimplantitis-patients

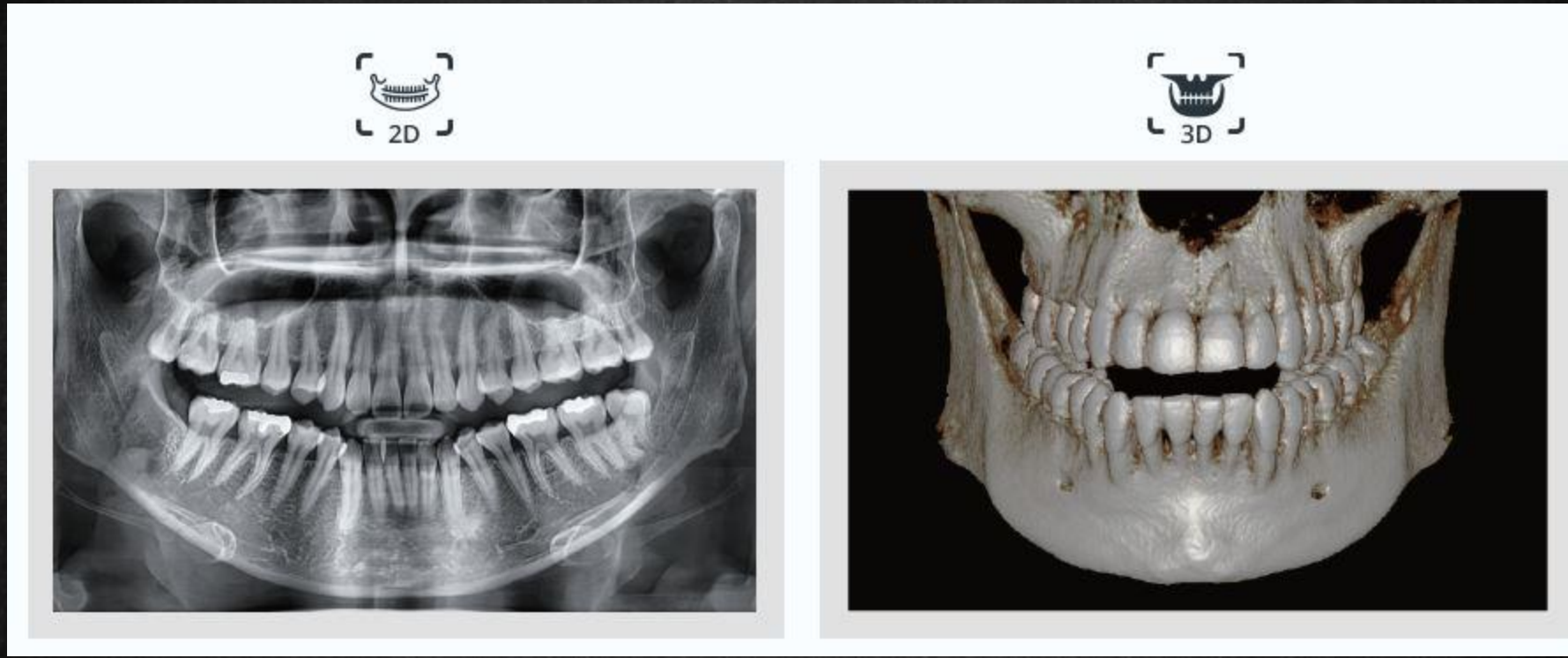
Radiographs

Why would you take a Bitewing in the Horizontal or Vertical Direction?

Remember- 2D radiographs are limited. Will not show the entire “picture”.

What other technology might we use?

2D vs. 3D Imaging

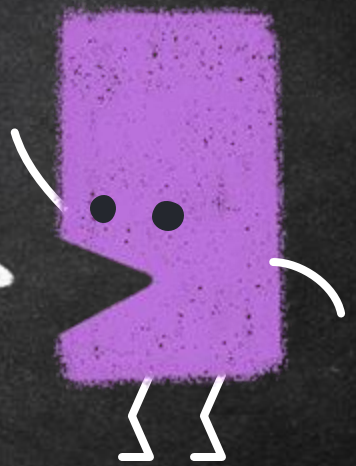


https://images.app.goo.gl/jZwqQAHT49A6vgif8

Clinical vs. PA. vs. BW

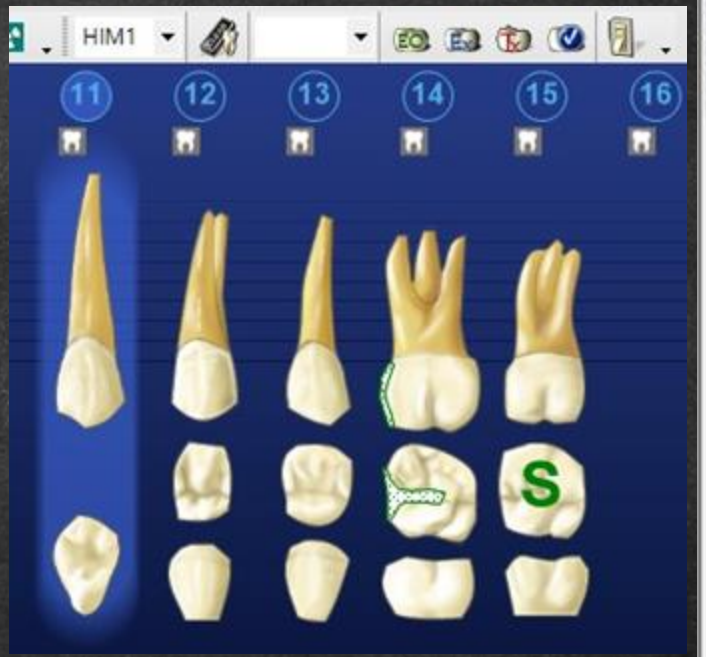
“

Want to learn something REALLY useful?

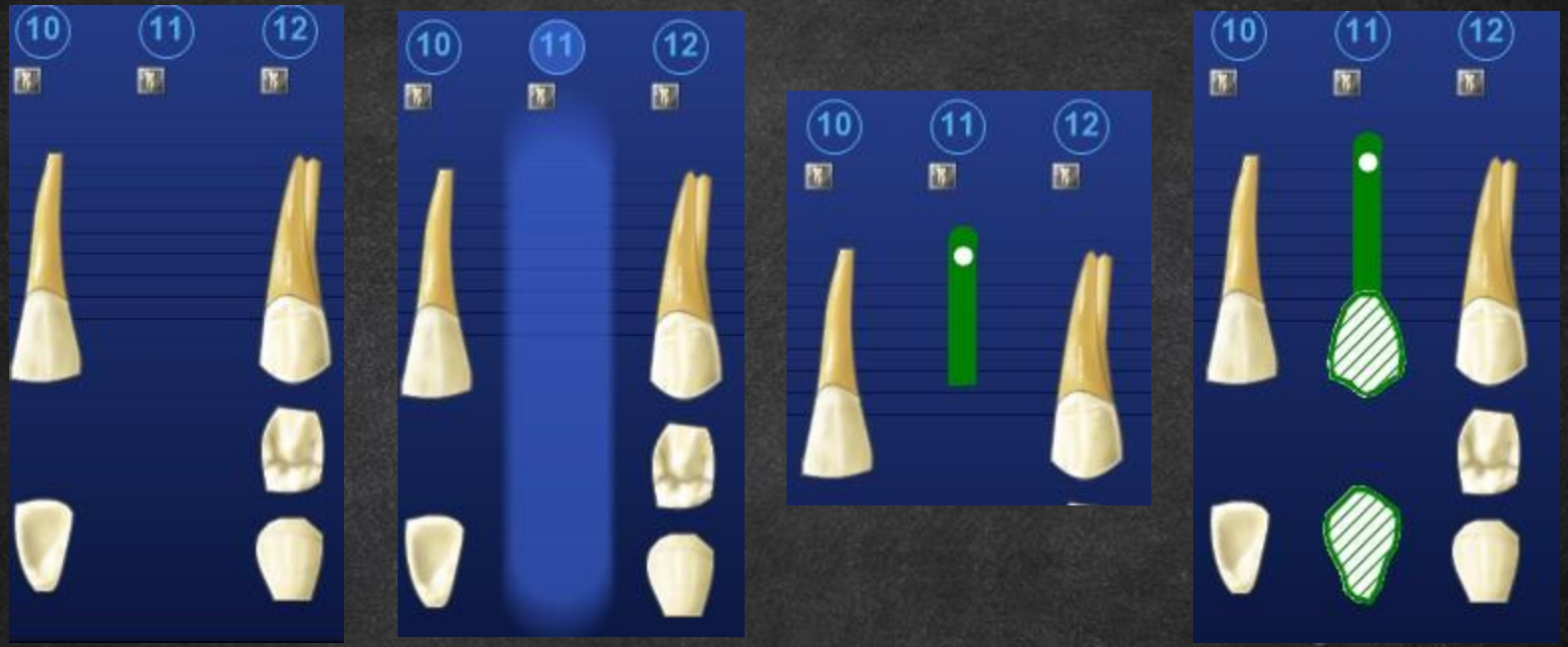


Dental Charting Steps in Dentrix

1. Select tooth (highlighted in blue)
2. Select codes
   a. Extracted tooth
   b. Dental implant
   c. Implant crown
3. Select “Post” (Tooth with check mark)
4. Click EO (green)



Charting Implants in Dentrix



Charting Implants in Dentrix

If it looks like this?

→ Make sure to chart the root as extracted

→ Add implant crown

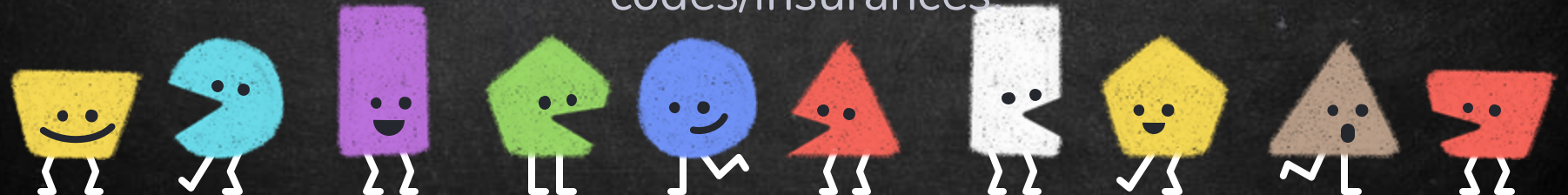
DISCLAIMER FOR THE "REAL WORLD"

→ Might have a different software

→ Don't get caught up too much in details.

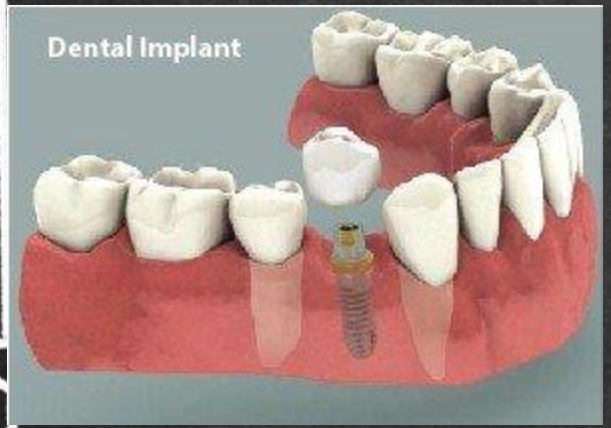
The most important thing for you to know is how to chart a dental implant.

Do not worry about specific codes, most offices will have a treatment plan coordinator, or the dentist or dental assistant will know specific codes/insurances.



Implant Vs. Bridge

PRO & CON



PRO & CON

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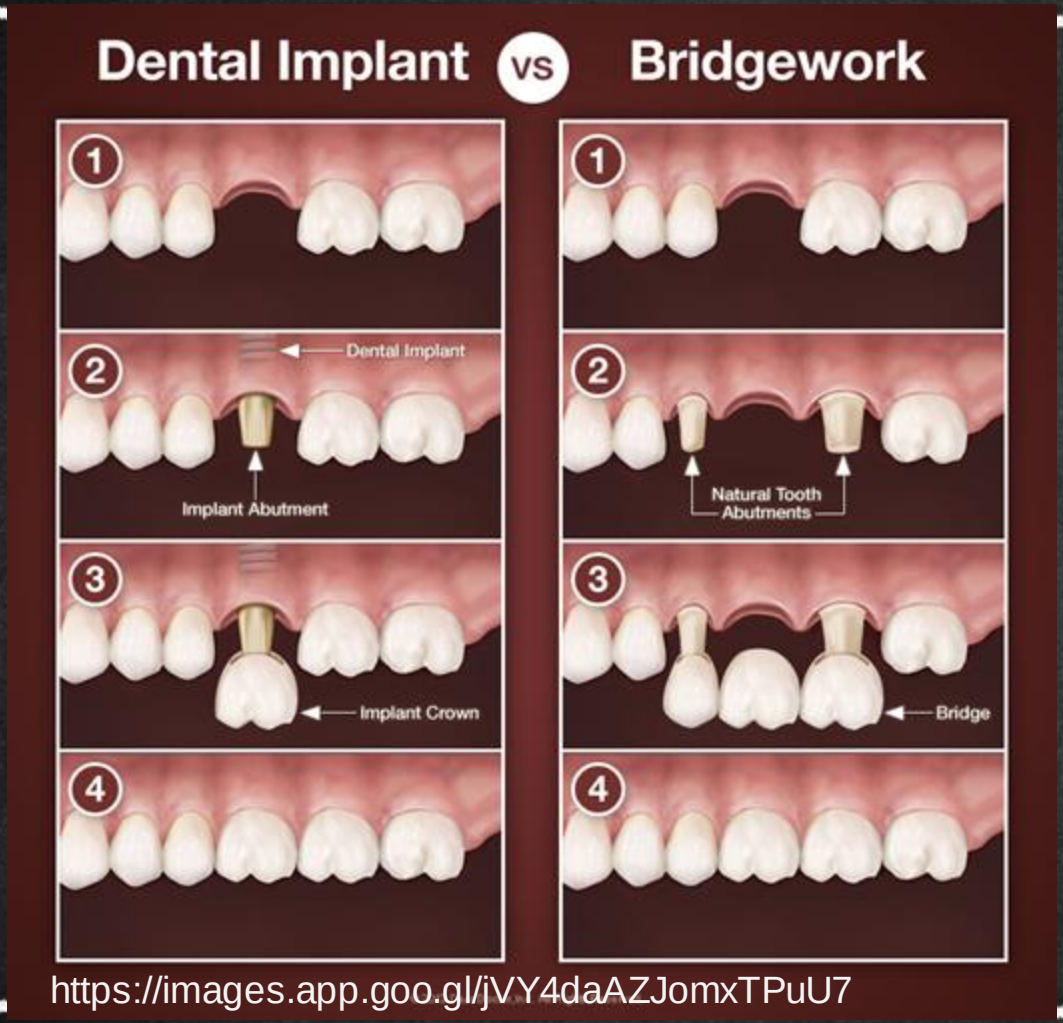

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A few Answers- Implant V. Bridge

PRO implant

- Industry standard/ideal
- Preserves bone
- Preserves enamel
- Easier to cleanse

PRO Bridge

- Does not require as much bone
- Less costly

CON implant

- More costly
- Might not have enough bone
- Medical contraindications

CON Bridge

Helpful Resources

Podcast!

https://www.ataleoftwohygienists.com/tag/dental-implants/

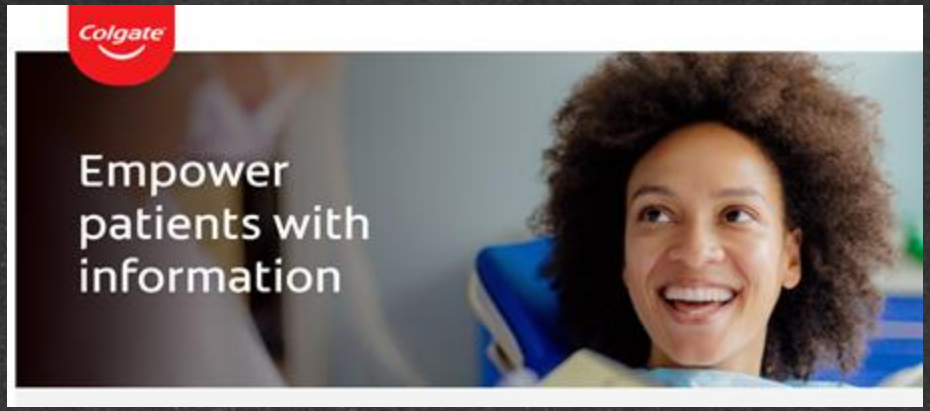
Dental Hygiene Implant Expert

- ➜ Created “implant care practitioner” training
- ➜ http://www.rdhinnovation.com/
- ➜ Dental Implants Uncovered Facebook Group

Great online CE

https://www.dentalcare.com/en-us/professional-education/ce-courses/ce514

Colgate OHI Resources



https://www.colgateprofessional.com/patient-education

Thanks!

Any questions?

Have a wonderful, restful, and SAFE Spring Break!

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