DID YOU KNOW?

26% of adults have lost all their permanent teeth by age 74.

95% The success rate of implants after nearly 50 years of clinical research.

69% of adults ages 35 to 44 have lost at least 1 permanent tooth.

Source: American Association of Oral and Maxillofacial Surgeons
Dental Implants
A. Use of Dental Implants

1. Root replacement: replacement of dentition by anchoring a prosthesis to the max or mand

2. Major benefit: stability of the prosthesis

3. Maintains the health of the maxilla/mandible with minimal bone resorption

4. Increases patient comfort with chewing, increased confidence in speaking and smiling

5. Disadvantages: greater financial investment; extended tx time; risk of infection or rejection
B. Dental implants are no longer considered experimental or “last resort” treatment

1. State-of-the-art treatment for edentulous patients and those missing one tooth or several

2. Considered “superior” in comparison to removable dentures: improved chewing, speaking, aesthetics

3. Implants support a variety of prosthesis: crowns, bridges, overdentures
C. Comprehensive dental implant system attributed to success of dental implants.

1. **Team approach**: oral surgeon, periodontist coupled with prosthodontist and general dentist, lab tech, and RDH. COMMUNICATION is essential key!

2. Standardized equipment

3. Quality control in manufacturing of the dental implant, surgical and restorative equipment

4. **Strict** guidelines for patient selection
D. Hygienists Role

1. Provide valuable information for potential implant patient

2. Ability to answer questions pertaining to restorative modalities

3. Instruct patient on the most effective homecare techniques for implant maintenance

4. Provide maintenance therapy: assessment of implant: prosthesis and surrounding structures; and prophylaxis
II. Patient Selection

** important variable to total implant success **

A. Medical evaluation

- Patient should be healthy and free from systemic diseases that may retard or hinder the healing process

Contraindications:

1. Severe osteoporosis
2. Bleeding disorders
3. Uncontrolled diabetes
4. Connective tissue disorders
5. Chronic steroid therapy
6. Immunosuppressive therapy
7. Anticoagulant medication
8. Head and neck radiation – reduced salivary flow
B. Dental evaluation
1. Free of carious lesions
2. **NO** evidence of active periodontal disease can exist
3. Strong commitment to meticulous oral hygiene
4. Bone levels of sufficient quantity and quality (amount and density; height and width of edentulous areas)

C. Psychological evaluation
1. Realistic expectation from implant treatment
2. Attitude and ability to cooperate during complex procedures
3. Complete understanding of all procedures and possible complications are absolutely necessary
4. Patient should sign an informed consent statement and an agreement of understanding
III. Treatment Plan decisions

A. Implant types

1. Subperiosteal – framework that rests on the alveolar ridge but does not penetrate the bone
   - less invasive, however, less stable
   - success rate: 55% after 15 years
   - dental material: cobalt-chromium-molybdenum alloy or titanium
2. Transosteal – penetrates completely through the mandible (only!)
   - success rate: 90% after 8 – 16 years
   - dental material: stainless steel, ceramic-coated materials, or titanium alloy

Why the Mandible only????????
… otherwise you get this look!!
… but prevents this!!
3. Endosseous – submerged and anchored within the bone

- most successful design to date; > 90% success rate in mand.; > 80% success rate in max. after 5 yrs
- most frequently utilized implant type
- dental material: titanium (strength) coated with a ceramic (hydroxyapatite) “Bioactive”: reacts directly with bone tissue; produces a direct chemical bond between the implant and the newly forming bone
a. Endosseous Styles:
- **Blade** – flat with circular holes or “cut-outs”
- **Cylindrical** – hollow tube with vents
- **Screw** – threaded shaft

Exposure of the blade style implant was a common complication.
IMPLANT TERMINOLOGY

MINI IMPLANTS:
have a diameter of 1.8 mm to 2.5 mm and come in lengths of 10 mm to 18 mm. They are intended only for overdentures or denture stabilization. These restorations are tissue borne but implant retained, meaning that the load is still on the tissue and bone; the small-diameter implant is just there to keep them in place.

HYBRID IMPLANTS:
have a 2.9 mm to 3.25 mm diameter and come in various lengths, depending on the manufacturer.

TRADITIONAL IMPLANTS:
have a diameter of 3.5 mm or more. With a traditional implant, the load is not just on the tissue, but mainly on the implants—the big difference between mini and traditional implants.
b. Osseointegration – style (design) of endosseous implant allows for retention between new bone formation and surface of the implant, creating a strong union to stabilize the implant
B. Determination of the positioning and the number of implants

1. Use of diagnostic casts and surgical guide stents
2. Stent - template; covers the area of surgery, made of clear acrylic - acts as a guide for proper placement of implants and for implant exposure after healing
3. Number of implants – ranges from 1 for single tooth replacement to 5-8 for edentulous arch
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C. Diagnostic tests to analyze preferred sites and locate critical landmarks

1. Radiographs: periapical, panoramic and CT (computed tomography) scans. Computer-generated cross-sectional 3-D images to determine quality and quantity of bone

2. Landmarks
   - Maxilla – nasal cavity and sinuses
   - Mandible – mental foramina and mandibular canal
IV. Surgical Procedures

* Two-stage surgical system most generally used, however – can be performed in one phase, leaving the capped abutment protruding but not loaded for several months with the prosthesis

A. Surgical Phase I – Implant Placement

• Step 1: Anesthesia – sedation is common, however, local anesthesia alone may be sufficient

• Step 2: Stent is placed and implant sites are marked on alveolar ridge
Step 3: Stent is removed and an incision is made along the alveolar ridge at the implant site
Step 4: Using copious amounts of sterile irrigation and a high/low-speed handpiece (to counteract frictional heat), utilizing a series of burs with increasing diameters to form the recipient site for the implant.
Step 5: Implant is carefully inserted
Step 6: Mucoperiosteal flaps are repositioned and sutured over the implant.
B. Healing Phase

1. Implant must remain passive in the bone while osseointegration occurs; no “load” (occlusal forces)

2. Movement of the implant may cause a formation of a fibrous tissue layer instead of osseointegration

3. Fully and partially edentulous patients are advised not to wear prosthesis for a short time following surgery. Denture will then be relined with a soft material or temporary bridge placed.

4. Healing and osseointegration require 3 – 4 months in the mandible; 6 months in the maxilla
C. Surgical Phase II – Implant Exposure

Step 1: Stent repositioned to locate proper position of implant
Step 2: Sharp instrument is lowered through opening in stent to mark a bleeding point of exact location of implant; stent is then removed
Step 3: An electrosurgical loop is used to remove soft tissue over implant, layer by layer, until titanium screw is located or a biopsy punch.
Step 4: Attachment of an abutment post with a healing cap to the implant fixture for formation of the “peri-implant” environment

Step 5: 2 – 3 weeks later, healing cap is removed and final prosthesis is placed. Generally, 9 – 12 months with delivery of desired restoration to arrive at total completion of treatment
D. The Peri-implant Environment

1. Surrounds the implant fixture and abutment post:
   • implant fixture and osseointegrated bone (cortical and cancellous bone); **NO** periodontal ligament
   • abutment post and gingiva – exhibits gingival margins and sulcus.

   - referred to as: **perimucosal seal, zone, or biological seal**.

2. Newly formed sulcus may be deeper than 2 – 3mm (4mm); depends on the length of the abutment post which is determined by amount of attached gingiva initially present prior to surgery

3. “Zone” serves as a barrier to bacteria and toxins – meticulous hygiene is critical to the success of the implant
V. Implant Prosthetics/Restoratives

A. Single tooth – crown – one implant

B. Several teeth – fabrication of bridge, rests for RPD – number of implants determined by length of edentulous span and anticipated load of prosthesis
C. Edentulous patient – 2 options:

1. 2 – 4 cylindrical implants supporting a superstructure or bar
   - fabrication of over denture – 80% of natural function restored vs. 30% of conventional denture

2. 4 – 8 cylindrical implants supporting a full arch bridge from prem./prem.; molar/molar
   - secured with screws on the occlusal surface; covered with composite material
   - removed by DDS, **not** patient
** Not only is function improved by implants, but surrounding bone is stimulated by chewing function and will not resorb like bone underneath a removable denture. *

VI. Implant Evaluation and Success

Characteristics of successful implants:

1. Immobility: determined by direct observation or tapping on the implant with an instrument and listening for a solid “ring”

2. Radiographs: no radiolucency evident around the implant; if radiolucency is present – indicates presence of fibrous tissue instead of bone
3. Marginal bone loss: 1.5mm resorption expected; subsequent resorption < 0.2mm yearly

4. No persistent pain to patient from implant or prosthesis  
   - Causative factors to failure:  
     • incorrect number of implants  
     • incorrect orientation of placement  
     • uneven distribution of occlusal load

5. Continued care and recare appointments  
   - meticulous home care  
   - dedication to continued care
VII. Implant Failure

A. Signs & Symptoms of early failure

1. Tissue inflammation
2. Sensitivity upon biting
3. Presence of exudate
4. Bleeding – may be related to probing force only!!
5. Tissue retractability
6. Recession
7. Bone loss as evidenced on radiographs (vertical and around periphery of implant)
8. Dull sound on percussion
Terminology (Collectively, peri-implant mucositis and peri-implantitis are referred to as peri-implant disease):

- **Peri-implant mucositis** – reversible inflammatory reaction in the soft tissues surrounding a dental implant that lead to bone loss.

- **Peri-implantitis** – inflammatory reaction in the hard and soft tissues surrounding a dental implant that results in bone loss.

**FIGURE 1: CLASSIFICATION OF PERI-ImplANTITIS**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>PD ≥ 4 mm (bleeding and/or suppurition on probing*) Bone loss &lt; 25% of the implant length**</td>
</tr>
<tr>
<td>Moderate</td>
<td>PD ≥ 6 mm (bleeding and/or suppurition on probing*) Bone loss 25% to 50% of the implant length**</td>
</tr>
<tr>
<td>Advanced</td>
<td>PD ≥ 8 mm (bleeding and/or suppurition on probing*) Bone loss &gt; 50% of the implant length**</td>
</tr>
</tbody>
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*Noted on two or more aspects of the implant
**Measured on radiographs from time of definitive prosthesis loading to current radiograph. If not available, the earliest available radiograph following loading should be used.
B. Treatment to intercept peri-implant failure (mucositis & peri-implantitis)

1. Debridement of the area with hand instruments

2. Irrigation around the implant (ex.: Chlorhexidine)

3. Antibiotics

4. Flap surgery
VIII. Maintenance and Patient Home Care

A. Maintenance visit

1. Evaluation of:

a. plaque control – intervals: 1st week, 1st month, subsequent recall appts: 3-4 months during first year; then 4-6 months thereafter.

b. tissue health – peri-implantitis or mucositis?? Color, contour, consistency, bleeding tendency of tissue. Percussion test to elicit a strong metallic ringing which indicates osseointegration.

c. stability of prosthesis – mobility???
d. bone levels – radiographically documented:
   Baseline film taken at the time of insertion of the final prosthesis and then repeated at 6 months, 1 year, and every 2 years thereafter

e. occlusion – equal distribution of occlusal load; overloading?

f. accurate dental charting of implant sites
   - difficult to determine visually
   - chart location, abutment types, and prosthetic design directly on patient’s chart
   - indicate fixture placement on dental chart in the corresponding placement site
ECC paper dental charting

- blue ink, shade in all coronal views - add PFM (if applicable).

- Place an “I” on root surfaces (F and L aspects)
2. RDH procedures
   a. to probe or not to probe????
      *Controversial*
      - YES – baseline data to determine attachment level in subsequent recall appointments
      - NO – may damage present attachment or introduce bacteria into the “zone”. Only probe if inflammation is present.
        ➔ **Gentle** probing is recommended **ONLY** if pathology is suspected.
        ➔ Must use a **plastic** probe with gentle pressure.
b. Instrumentation

** NO metallic instruments – will scratch the surface of the implant, creating a rough surface that will attract plaque and microbes.

- **plastic, graphite, or nylon-type** instruments
Damage caused as a result of a stainless steel scaler on the surface of the abutment
DO NOT USE: ultrasonic or sonic scaler (unless it is plastic tipped) or prophy jet (unless using polishing powder with a Mohs hardness number of 3 or less) directly on implant.
Damage caused by an ultrasonic scaler to a titanium surface after only a 5 second application:
c. Polishing

• Slurry of tin oxide and chlorhexidine or fine prophy paste with rubber cup, used gently on prosthesis

• Use of proxy brush or soft foam cone dipped in slurry for difficult access areas (under prosthesis)
Fixed prosthesis should be removed every 18 – 24 months for ultrasonic bath cleaning – by DDS only.

Plaque accumulation is apparent around the dental implant abutments after prosthesis removal, even though a dental hygienist provided professional plaque debridement prior to its removal.

Plaque trapped in the undercuts and flanges of the denture are difficult to access without prosthesis removal.

d. Irrigation

- Use of antimicrobial agent as adjunctive treatment by swabbing around implant sulcus
- Pressure from irrigator may damage biologic seal or “zone”
- Irrigator tip must be plastic
B. Patient Home Care
   - strict compliance needed!!

1. Toothbrush – manual, powered
2. End-tufted brush – under prosthesis

*3. Proxy brush – core (wire) **must** be plastic or plastic coated to prevent scratching

4. Soft foam cones
5. Floss – super floss, gauze strips
6. Implant floss – braided cord with stiff, curved end
7. Antimicrobial rinse – possible staining of prosthesis
ANY QUESTIONS?

Showtime......

video clip links on next slide
Implant supported Upper Denture
http://youtu.be/cgvJzZteCIs

Implant Overdenture or an Implant Retained Denture
http://youtu.be/yLGRcK8RRA8?t=3s

4-Implant Ball Attachment Overdenture - Model Demonstration
http://youtu.be/clw7CBeYF4c
Review for Test #4 - Dental Implants and Materials for Cast Restoratives

1. Handouts
2. Implant movie outline
3. Chapters 10, 11, 12, 17, 18
4. Test format – T/F, Multiple Choice, Diagram Identification, and Short Answer
5. Test breakdown – approximately 40% casting materials & 60% implants
6. Specifics:
   ▶ Implants – Everything – all objectives!!
   ▶ Casting Materials:
     * Acronyms
     * Alloying – define, purpose
     * Casting – definition
     * Gold – relationship btw strength, hardness, & function
     * Porcelain – composition, application, clinical concerns
     * Noble metal alloys – examples, benefits
     * Base metal alloys – composition, benefits, risks
     * Indirect composite technique – benefit of use
     * Mouth protectors, Lightening trays, - types, benefits, disadvantages, care
     * RPD – components, care
     * Dental liner – use (function)