Go Ahead… Bite Into That Apple!
The A-Z of Implant-Assisted Overdentures © 2014
University of Alabama School of Dentistry Alumni Association
ALUMNI WEEKEND 2014

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where/how do we start?

Relatively easy if…
Pt is edentulous…
and desires an implant restoration…

Evaluation must include:
- Medical history
- Dental history
- Existing dentition
- Prosthesis history
- Existing prosthesis evaluation
- Patient motivation / desire

Treatment Planning
- To insure ideal placement, coordinated treatment with the restorative dentist and the surgeon must occur
  - Radiographs / CT scans
  - Photographs
  - MOUNTED Diagnostic casts
  - Diagnostic wax ups / Trial tooth set ups
  - Templates

The Standard of Care continually evolves with the advent of new materials, new procedures and new court rulings

“The restoration of a lower edentulous mandible with a minimum of 2 implants and a complete denture has been the Standard of Care since 2002”

At the very least, it is the duty of the dental practitioner to inform their patients of this treatment option. (Informed Consent)
Massachusetts Board of Registration

Gone are the days where a patient will go to the surgeon first and return with a mouth full of implants that you will be asked to restore.

Rule #1
This is a Prosthetically driven restoration with an Attachment modality
The attachments are in addition to all other acceptable requirements for denture retention

- Owen CP. Guidelines for a minimum acceptable protocol for the construction of complete dentures. Int J Prosthodont. 2006;19:467-474
Assessing the angulation of the maxillary implant fixtures

Greater than 40° must have a custom abutment restoration

What do you say to an edentulous patient who says:

“I want implants...”

What do you say to an edentulous patient who says:

“I need dentures...”

What do you say to an edentulous patient who says:

“My new dentures don’t fit...”

This patient will present with one of 5 scenarios...

- Existing prosthesis
  » Acceptable dentures
  » Unacceptable dentures
- Remaining dentition
- Hopeless dentition
- No dentition (edentulous)

The common denominator in all cases is that you must start with an acceptable denture.

No acceptable denture.... no occlusal plane and VDO.... no space analysis

Though the end result may be an implant retained overdenture, evaluation of the 5 scenarios may produce variations in treatment plans.

Why?

In all cases, we are retrofitting the implant attachments to an acceptable denture.
The Acceptable Denture?
- VDO
- Occlusion
- Occlusal Plane
- Neutral Zone / Lip and cheek support
- Esthetics
- Space available
- If retro-fitting...
  Generally fabricated within the past 1-2 years

The Unacceptable Denture...
Evaluation of the Existing Prosthesis
- VDO
- Occlusion
- Occlusal Plane
- Lip and cheek support
- Esthetics
- Space remaining
- Age generally 1-2 years

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When retro-fitting...
It is important to have fresh and compatible materials with which to work
Rule #2

Space Analysis

Multiple Methods:

An acceptable denture allows an accurate Space Analysis

Clear matrix of existing denture superimposed on a cast of the residual ridge

Patient Remount of “duplicate denture” opposing existing occlusion

Multiple Methods:

During Intermaxillary Records or Tooth Set-up

A Space Analysis...

Always Requires evaluation at the correct VDO

This means:

For a Complete Denture – a mounting @ VDO is required

For a Partial Denture – if VDO cannot be assured by hand articulation – a mounting is also required

Space Analysis for an Implant Overdenture

Determines the inter-occlusal distance or vertical room necessary for:

- Denture tooth 2mm
- Denture base 2mm
- Attachment component 2mm
- Implant abutment +
- Implant fixture ~5mm (compared to the root)

TOTAL 10-11 mm

Summary

Space Analysis requires 2 pieces of information:

1. A representation of the occlusal plane
2. A representation of the residual ridge

What if the patient has a Hopeless Dentition?

It always starts with... Fabricate new denture
Space Analysis and Retro-fit
**What is the treatment plan for a patient with a hopeless dentition?**

- Fabricate immediate/interim denture
- Clear template (processed with denture)
- CT scan
- Implant placement – then:
  - Reline/rebase and retrofit attachments
  - Remake and retrofit to new overdenture

**Templates (or Stents)**

- Diagnostic / radiographic
- Surgical

**Diagnostic / Radiographic Template**

- Is a clear duplicate of an acceptable denture or a diagnostic wax up, fitted with:
  - Gutta percha or
  - Stainless steels markers
- Allows for evaluation of bone
  - CT Scan – 3D evaluation
  - Panoramic – vertical height only

**Diagnostic / Radiographic Template**

- Denture duplicated in clear acrylic
- Markers placed in areas most desirable for implant fixtures
- Most common areas:
  - Lingual to cuspids
    - For 2 implants
  - Within pre-molars
    - For 4 implants

**Lab Rx?**

- Process CU/CL in (specify) shade acrylic
- Lab remount; Pin = ___
- De-cast and return for finish and polish
- Process duplicate lower denture in clear acrylic
- Prepare parallel channels – in area specified:
  - Lingual to cuspids
  - Centered to (specify) posterior tooth #
- Place radiographic markers to evaluate for implant placement during CT scan

**Dentures are is processed and returned, along with duplicate denture, with markers**

**New CU/CL fabricated**

**The template is worn during the CT scan**

**The markers show up in one or more segments**

**Template is tried in for fit and comfort during CT scan**

**Determine appropriate location on cast Canine?**

**Cuspid position is transferred to cast**

**Cuspids are marked as preferred area for evaluation with template by CT scan**

**ICAT Scan**
Surgical Template
In most cases the diagnostic template may be modified for surgical use by:
- removal of the radiographic markers and
- placement of guide pin holes for fixture positioning

Duplicate Denture
- If the patient has an acceptable existing denture, then we will only need to duplicate this denture
- Arrange with the lab, in advance, to borrow the patient’s denture for approximately 1 day
- The denture is embedded in this special duplicating flask with alginate on both sides, registering both the polished and intaglio sides.
- When the denture is removed, the space left by the denture can now be filled with clear ortho resin and a clear duplicate of the denture will be created.

Attachment Selection
- Patient’s prosthetic expectations
- Patient’s financial capability
- Drs’ personal choice
- Laboratory experience
- Available inter-arch space
- # of implants
  - Anatomy of ridge
  - Availability of bone

…Begin with the end in mind…
What type of restoration is the patient expecting?
Keep it simple…

Classification of Attachments
- Resiliency
- Load distribution characteristics

Resiliency - definition
Movement between the denture & the abutment

The more the prosthesis is allowed to move, the more forces are transferred to the residual ridge

Rotary Resilient
- Stud (i.e. ERA and Locator)
  - Hinge, vertical, rotation
  - Provides 95% load relief to the implant
  - 95% Tissue/Ridge support

The more resilient the attachment, the more you must rely on the ridge and tissue for support
Space between nylon male and metal housing allows for VERTICAL RESILIENCY and ROTATIONAL MOVEMENT.

**Locator Housing**

**Locator Abutments - 0°**

Uses the retention rings for divergent abutments.

**LOCATOR® Retention Rings**

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Extended Range: Up to 20° angulation between 2 implants

**Hinge Resilient**

- **Hader Bar Joint**
  - 35% implant borne
  - 65% tissue/ridge
  - 2-4 fixtures

**Bar Restoration Summary**

- **Semi-Precision Attachment**
  - Both Vertical and Hinge Resilient
  - Fabricated in lab

**Hinge Combination**

- Hader Bar and 2 ERA Attachments
  - 4 Implant fixtures

**Hinge Resilient**

**Hader Bar Joint**

- 35% implant borne
- 65% tissue/ridge
- 2-4 fixtures

**Dolder Bar Joint**

**Dolder Bar Unit**

**Hader Bar**

**Precision Attachment**

**Semi-Precision Attachment**

**Both Vertical and Hinge Resilient**

**Fabricated in lab**

**We would have to use a different final restoration**

- Custom Hader Bar
- Custom Abutment

**Alternative treatment for significantly divergent implant fixtures?**

**Bar vs. Stud**

3-D force measurements with Straumann implants

- no significant difference in retention

- Individual anchors allows for the greatest stress distribution


3-D force measurements with Straumann implants
Bar vs. Stud

- Can increase retention and decrease movement if in combination
- Requires additional inter-arch distance
- Incr cost (lab fab)
- Occupies more space w/i denture
- May require F/W for strength
- Simplest restoration
- Lower cost (vs. bar)
- Prefabricated components
- Low profile require minimum space

Longevity of Retention Clips/Snaps Depends on:

- Size of arch
- Type of diet
- Oral habits
- Home care
- Angulation of stud / bar attachment
- OCCLUSION

Lingual Contact Occlusion

- Begin with anatomical maxillary posterior teeth (30°-33°)
- Eliminate the additional lateral impact of the maxillary buccal cusps by reducing the buccal cusp
- Flatten lower posterior teeth to 0-20°
- Bilateral Simultaneous contact in all movements

How does tooth selection affect Occlusion?

- Monoplane delivers less lateral force but is harder to remain in "balance"
- Anatomical delivers more lateral force but is easier to remain in "balance"
- Lingual Contact Occlusion uses a modified anatomical tooth to reduce lateral force and is easier to remain in "balance"

Common Causes of Attachment Wear

- Biting the overdenture into place
- Cleaning the abutments with an abrasive cleaner
- Denture Cleansers – can soften the nylon over time
- Placement of a nylon attachment with too much retention – excessive wear on metal component
- Tobacco chewing and smoking
- Using metal that is too soft when casting a plastic pattern
- Over-shellblasting when de-casting processed denture
- PATH:
  - If the attachments are not within 5° of parallel to each other
  - Path of insertion not consistent with anterior (or posterior) tissue undercuts

The OCCLUSAL SCHEME

- Rules of Denture Occlusion:
  - No Anterior Contact in CR
  - No incisal guidance in protrusive
  - No canine guidance in lateral
  - CR=CO
  - Occlusal Plane = 1/2 to 2/3 height RMP
  - NO porcelain teeth unless the opposing is fixed (and even then, use caution)
  - Lingual Contact Occlusion

Photo Album

Patient's chief complaint: "My dentures are loose; can you place implants?"
What is the treatment plan for a patient with an unacceptable existing denture?

- Fabricate new denture
- Clear template (processed with denture)
- CT scan
- Implant placement
- Retrofit to new denture

Space Analysis
Existing Prosthesis

- VDO
- Occlusion
- Occlusal Plane
- Neutral Zone / Lip and cheek support
- Esthetics
- Space remaining
- Age generally 1-2 years

Acceptable?

Final Impressions

Intermaxillary Records

@ Tooth Try-in

Note: tongue posture

No Anterior Contact in CR 1

Space Analysis @ tooth set-up

Remove lower record base
After try-in

Cuspid position is transferred to cast
Cuspid is marked as preferred area for evaluation with template by CT scan

A duplicate lower denture is processed in clear acrylic at the time of processing the case

Try in of Radiographic Template
Evaluate position of markers

The gutta percha is removed from the template so that the channels remaining act as a guide for the implant drills

A crestal incision is made reflecting the surgical site

The sites are prepared and checked for parallelism

The implant fixtures are covered with cover screws and tissue sutured
Approximately 4 months of healing is anticipated
These are bone level implants

After 2 weeks of healing the denture is adjusted.
The patient may begin to wear their denture again

Sore spot?
Over extended border
Uncovering the implant - 4 months post op

The punch technique is preferred if the implant position can be easily located. The tissue thickness is measured and healing collars are placed. The healing collar should extend 2-3 mm above the tissue.

The denture must now be retro fit to the healing collars. Indelible marker can facilitate the preparation of the "wells". Remove ANY acrylic interfering with the complete seating of the denture. Denture must be tissue borne.

After 2 weeks of healing, the healing collars are removed, trans-gingival tissues are measured for prefabricated LOCATOR® Abutments.

If Tissue Level implants have been placed your patient will not require uncovering. The healing collars will be placed at the time of surgery.

LOCATOR® Abutments

LOCATOR® Abutment Heights - Straumann® Tissue Level Implants

Regular Neck & Wide Neck

(NO Narrow Neck)

1.0 mm 2.0 mm 3.0 mm 4.0 mm 5.0 mm 6.0 mm
Which Locator® Abutment height to choose?

Remove healing caps/healing abutments.

Measure distance from top of implant to highest point of tissue for each implant.

Images courtesy of Dr. Bob Vogel

These implant fixtures are bone level, therefore they will generally have a greater trans-gingival width

Which Locator® Abutment height to choose?

Margin of Locator Abutments should be slightly supra-gingival to the highest point of tissue for each location.

4.0 mm abutment
1.0 mm abutment

Net effect is that all of the abutments end up at the same height.

Images courtesy of Dr. Bob Vogel

Locator® Abutment Placement

Step 1: Torque Locator Abutments to 35 Ncm

 locator driver
 Locator Abutment
 Torque Wrench

These implant fixtures are bone level, therefore they will generally have a greater trans-gingival width.

Locator abutment being torqued to 35 ncm with an electric torque driver

The denture wells are hollowed out to allow for passive tissue seating of the denture.

The intaglio is prepared with bonding agent for intra-oral pick-up of the attachments.

Auto-polymerizing material is used to cement the attachments into the denture.

Paint varnish within each prepared "well" - only

Light cure – 1 cycle
Place finger over perforation prior to filling wells with acrylic.

- Mix and express material
- Fill each well only ½ way
- Coat surface of attachment

While the auto-polymerizing material is setting, the patient is instructed to remain in light occlusion.

Test the set with any extruded material introrally or excess mixed material on the bench top.

The denture is removed after complete set. The shims are removed and excess material trimmed.

Evaluate pick-up:
1. Check that both attachments have been picked up
2. Look for voids
3. Voids are OK if attachment does not move (they will be filled in later)

Trim excess flash first.

Then fill in the void.

First repaint and light cure varnish in area to be repaired.
Second, add small amount of material to fill void only.
Finally, "Snap into place" Wait for set.

Check the polished side of denture for extruded material
Repair voids to blend with surface with same technique.

Not quite finished result...
Retention Ring must be added.

LOCATOR® Retention Rings
angle correction occurs within retention rings

COLOR
Clear Pink Blue Green Red Orange

IMPLANT ANGLE DIVERGENCE
1° - 10° 1° - 10° 1° - 10° 11° - 20° 11° - 20° 11° - 20°

RETENTION FORCE
5 lbs 3 lbs 1.5 lbs 3 – 4 lbs 1.5 lbs 2.0 lbs

Up to 20° angulation between 2 implants
Extended Range: Up to 40° angulation

Locator® Processing Ring Removal

Step 9: "Pluck" out black processing inserts using the Removal Tool of the Locator Core Tool.

Locator® Retention Ring Placement

Step 10: Place Retention Ring on tip of Seating Tool.

Step 11: Place Retention Rings in Denture Caps using Seating Tool.

Images courtesy of Dr. Bob Vogel
Photo Album

Restoration of an edentulous mandible with a Hader Bar and 2 ERA attachments

A duplicate lower denture is processed in clear acrylic.

Patient will need to be without their denture for a short time – to be determined by the lab tech.

Pre-op assessment of mandible and soft tissues

Placement and alignment

Adjustment of mandibular denture after 2 weeks

Evaluation of Existing Dentures

Right working CR

Template is tried in for fit and comfort during CT scan.

Patient Name: [Redacted]
ID [Redacted]
Age [Redacted]
Sex F

Grayscale Information

Level Width

First image (upper) corresponds to cut 55. Second image (lower) corresponds with cut 75.
Soft liner placed after sutures are removed

Evaluation of implant fixtures prior to restoration

Uncovering of implant fixtures 4 months post-op

Implant fixture position not obvious

Crestal incision to remove cover screws and replace with healing collars

Healing collar should extend 2-3 mm

Denture retrofit to healing collars using PIP

2 weeks post uncovering showing poor OH and plaque accumulation

Tissue conditioner (Coe-Comfort) placed OH reviewed and stressed TC + Healing Collar helps provide additional stability while healing

2 weeks later…
Punch technique used to uncover fixture and replace healing collar

1 week post (second) uncovering

Note: continued presence of plaque

Space analysis – implant fixture to occlusal plane – Angled implant fixtures? Tx options?

Preliminary impression for new mandibular denture

Neil’s Lateral Throat Form?

Custom tray adjusted for impression copings

An implant level impression is to be taken:
- to evaluate the angulation of the implant fixtures
- to fabricate a custom implant restoration

Block out of healing collars **
Custom tray fabrication
Open tray impression will be made for implant level final impression

Bead, box & pour soft tissue model with laboratory analogues of the implant fixtures
- Note the soft tissue model
- Since this restoration will be retrofit, we will need denture to modify
Lab Rx?

- Please fabricate a custom Hader Bar restoration with 2 ERA attachments off the distal to fit within the confines of the lower try in / denture.
- Metal substructure will be incorporated into the final prosthesis.

Lab returns Hader Bar restoration underneath modified denture.

Hader Bar + 2 ERA attachments
Bar is parallel to the occlusal plane
ERA attachments centered to the ridge.

Path of Insertion of attachments must match path of insertion of denture
ERA placement is ⊥ to path.

Evaluation of final fit or implant restoration and modified denture.

A silicone putty matrix is made to maintain tooth position.
While the substructure of the denture is fabricated.

Implant restoration Wax up of substructure
Metal substructure Processed denture incorporating substructure.

Embedded substructure in processed denture
2 Hader Bar clips 2 ERA attachments.
Completed restorations

Insertion of screw retained custom restoration

Fit and path of insertion evaluated with PIP

Occlusion?

Discussion

Photo Album
Restoration of severely misaligned implant fixtures
-Tissue Level -
Cuff Height measurement
Trans-Gingival measurement

Placement of 1 mm Locator Abutment

Using Articulating paper to retro fit denture

Assessing the angulation of the implant fixtures

Less than 40° can be still be accommodated by the extended range nylon attachment

LOCATOR® Retention Rings
angle correction occurs within retention rings

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Extended Range:
Up to 20° angulation between 2 implants
Extended Range:
Up to 40° angulation

Teaching the path of insertion to the patient is critical to avoid premature wear of the nylon attachment
Assessing the angulation of the maxillary implant fixtures.

Greater than 40° must have a custom abutment restoration.

Over-extended pick up impression of overdenture for clear matrix to observe borders and folds.

Cast restoration is waxed and cast within confines of denture.

Over the ridge and parallel to the path of insertion.
The other abutment is a conventional Locator.

Block out is CRITICAL before attachment pick up.

Relining an Attachment Overdenture

- Similar to that of a conventional denture*
  - Assess occlusion, VDO and CR
  - Snap on light attachments or impression copings intra-orally
  - Border mold and final impressions functionally
  - Remove denture and snap on lab analogues before pouring cast

The other abutment is a conventional Locator.

A standard retentive attachment may now be used.

The Final Impression

- Fit the denture adjusting any part that touches the metal housing
- The denture must be ENTIRELY TISSUE BORNE
- Border Mold and Rubber Base final impression as usual- “picking-up” new metal housings in the impression

*See Relines, Rebases and Repairs
Impression Copings
placed on the abutment intra-orally prior to functional impression

Laboratory Analogues
snapped into the impression coping after the impression is removed

A functional impression is made using the patient's own denture "picking up" the impression coping.

The laboratory analogue is snapped into the impression coping prior to beading, boxing & pouring.

BEAD, BOX & POUR the FINAL CAST

Lab Rx
- Please reline implant overdenture
- Use acrylic shade (specify)
- Process with laboratory processing male attachments; remove after processing
- Return for insertion

If the surgeon or the information is unknown...

www.whatimplantisthat.com
An online resource for Radiographic Implant Identification

Acknowledgements and References
- Clinical and Laboratory Manual of Implant Overdentures
  Hamid R. Shafie, DDS, CAGS
  Blackwell Munkgaard
- www.Sterngold.com
  James Ellison, CDT
- www.straumann.com
  Adam Dorsky
- www.ivoclar.com
  Frank Lautiti, DDS
- http://www.zestanchors.com/images/articles/article_55_implant_attachment_video.wmv
  Locator Implant Attachment Video