Go Ahead...Bite Into That Apple:  
The Nuts and Bolts of Implant-Assisted Overdentures Lecture  
Dr. Ronni Schnell  

Thursday, June 11, 2015  
8:30 a.m. – 11:30 a.m.

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“Go Ahead… Bite into that Apple!”
The Nuts & Bolts of Implant-Assisted Overdentures
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Thursday June 11th
8:30-11:30 AM Lecture
2:00-5:00 PM Workshop

Implant - Assisted Overdentures

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)

• Implant Overdenture Delphi Study JADA 2012

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

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

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

Why?
In most cases, we are retrofitting the implant attachments to the (acceptable) denture

This patient will present with one of 5 scenarios...
- Existing prosthesis
  - Acceptable dentures
  - Unacceptable dentures
- Remaining dentition
- Hopeless dentition
- No dentition (edentulous and no prosthesis)

Sequence of Patient and Lab Visits
- Preliminary Impressions
  - Custom trays
- Final Impressions
  - Record bases & Occlusion rims
  - Intermaxillary Records
  - Set-up
- Trial Denture
  - Processing & Lab Remount
- Insertion
  - Pt (Clinical) Remount & Equilibration
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:

- Vertical space is the distance between the ridge and the occlusal plane
- Vertical space available is the main constraint
- Whatever projects above the mucosa must be absorbed by the denture...

An acceptable denture allows an accurate Space Analysis

A Patient Remount is the EASIEST way to do a Space Analysis, particularly if you are evaluating a recently inserted denture for implant placement.

A Patient Remount of “duplicate denture” opposing existing occlusion

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 of Space Analysis

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?

Treatment Plan Summary

Regardless of which of the 5 scenarios the patient presents, you must start with an acceptable denture:

- Fabricate denture
- Fabricate template
- Insert denture
- CT Scan
- Modify template
- Implant(s) placed
- Implant(s) (uncovered) / sized
- Denture retro-fitted

Templates (or Stents)

- Diagnostic / radiographic
- Surgical

Diagnostic / Radiographic Template

- Acceptable denture duplicated in clear acrylic
- Markers placed in areas most desirable for implant fixtures

Most common areas (lower):

- For 2 implants
  - Lingual to cuspids
- For 4 implants
  - Lateral and 1st premolars

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

Lab Rx for Simple Radiographic Stent fabricated during processing

- 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

This patient is to receive four mandibular implants

They will be marked and placed between the mental foramina in the lateral and first premolar areas

4 Maxillary and 2 Mandibular tissue level implants shown with healing screws

Space analysis being done for a maxillary prosthesis with four implant fixtures

They are typically placed farther posterior due to the anterior bone undercut and esthetics, if only removable on maxilla
Denture(s) are processed and returned, along with duplicate denture, with markers in areas specified.

New CUCL fabricated

Template is tried in for fit and comfort during CT scan

The template is worn during the CT scan

The markers show up in one or more segments

Surgical Template

In most cases the radiographic template will 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.

**Denture Duplicator (Lang)**

1. Impress both sides of denture.
2. Remove denture and fill with clear acrylic.
3. Process in pressure cooker @ 20 lb for 20 min.
4. Sand and polish.

**Attachment Selection**
- Patient’s prosthetic expectations
- Patient’s financial capability
- Dlr’s 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.

**Classification of Attachments**
- Resiliency
- Load distribution characteristics

**Rotary Resilient Abutment Indications:**
- Simplest – most frequent application for 2 implant fixtures on mandible (Standard of care)
- When maximum load relief is needed
- Multiple implants where 1 has a poor prognosis
- Shape of arch
- Position of implants (i.e. too close, too far…)
- Minimal ridge resorption / Small inter-arch space

**Rotary Resilient Abutment Options:**
- Angulation of implants and inter-arch space will determine abutment selection:
  - Micro ERA – 2-piece requires angle correction or Micro ERA abutments
  - Locator abutments
  - Bar – custom Hader Bar or Prefab SFI Bar

**Questions?**

**Abutments**

**Sterngold ERA Abutment**

Engagement of the attachment only occurs in function (occlusal load and lifting) and not when passive.
**Stern ERA Implant Abutments**

Angle correction is in the abutment
May be 0° to 30° angle correction

**Rotary Resilient**

- Stud (i.e. ERA, 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

**Selective Implant Abutments**

Locate Abutments are 0°

Locator Abutments are 0°

Locator corrects angulation within the retention ring at the occasional expense of retention for severe angulation

**Locator Abutment**

Requires metal housing

**Bar vs. Stud**

3-D force measurements with Straumann implants
...no significant difference in retention

We would have to use a different final restoration

Custom Hader Bar or Custom Abutment

**LOCATOR® Retention Rings**

angle correction occurs within retention rings

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Extended Range: Up to 40° angulation
Bar vs. Stud

- Can increase retention and decrease movement if in combination
- Requires additional inter-arch distance
- Incr. cost (lab fab)
- Does NOT allow removal of tissue support (with only 2 fixtures)

Simplest restoration
- Low profile requires minimum space
- Prefabricated components

Longevity of Retention Clips/Snaps
Depends on:

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

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)
  - Monoplane Occlusion or Lingual Contact Occlusion

Insertion and Activation

- Insertion and Adjustments
  - Day of Insertion:
    - Fit & insert denture as a conventional * denture, adjust where needed (do not activate attachments on the day of insertion)
  - 1-2 weeks of adjustments:
    - Adjust where needed
    - Reinforce OH
    - Evaluate for attachment activation
    - Attachments are incorporated into denture after all sore spots have been eliminated *

Follow-up Care – Long Term

- Maintenance / Denture with attachments
  - Cleaning instructions
    - Brush denture before soaking to loosen particles
    - Soak for only 10-15 minutes then rinse and soak overnight in plain water
    - NO tablets containing Chlorine

Attachment Care

- Instruct Patient to insert denture with finger pressure only
- Do not bite into place – the attachments will prematurely wear
- Attachments are replaced at annual recall – There is a fee associated with this. Patients must be told at initial tx planning.
- If fixtures are misaligned, attachments may be replaced sooner (q 6-12 months)

Common Causes of Attachment Wear

- Biting the overdenture into place
- Cleaning the abutments with an abrasive cleaner
- Denture Cleaners – can soften the nylon over time
- Placement of a nylon attachment with too much retention
- Excessive wear on metal component
- Tobacco chewing and smoking
- PATH:
  - If the attachments are not within 5° of parallel to each other
  - Path of insertion not consistent with anterior (or posterior) tissue undercuts
Photo Album

Patient’s chief complaint:
“My dentures are loose; can you place implants?”

CU/OL with 2 Bone Level fixtures and Locator Abutments

Medical history – Parkinson’s (tongue is constantly moving) This is a 1 year old IU/IL

Space Analysis
Existing Prosthesis

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

Acceptable?

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

Intermaxillary Records

Note: tongue posture

No Anterior Contact in CR!
Space Analysis @ tooth set-up
Remove lower record base

After try-in
Cuspid position is transferred to cast
Cusps are 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?

The punch technique is preferred if the implant position can be easily located.

Uncovering the implant - 4 months post op

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 Locato 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.

Even in occlusion… Denture must be tissue borne.

LOCATOR® Abutments

Tissue Cuff height Margin of Retention
LOCATOR® Abutment Heights - Tissue Level Implants

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

Highest point of tissue
Top of implant

Which Locator® Abutment height to choose?

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

2.0 mm abutment
1.0 mm abutment
1.0 mm abutment
2.0 mm abutment

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

Image courtesy of Dr. Bob Vogel

Locator® Abutment Placement

Know your implant system… i.e. Torque Locator Abutments on a Straumann implant to 35 Ncm.

Locate Abutment
Locator Driver
Torque Wrench

Amount of torque depends on the implant system and the abutment.

ERA abutment on a Nobelbiocare implant being torqued to 20 ncm with a manual torque driver

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

Locator abutment being torqued to 35 ncm with a manual 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.

Shims are placed to block out undercuts. Housing is snapped into place. Shims are provided with Locator abutments. Rubber dam material must be used for all others.

Armamentarium:
- Overdenture
- Attachments
- Pick-up material
- Varnish

Auto-polymerizing material is used to bond the attachments into the denture. It is a B-GMA Varnish. Varnish MUST be used. I use EZ-Pickup material for BOTH Stergold ERA and Locator Attachments.

Paint varnish within each prepared "well" - only Light cure – 1 cycle.

Place finger over perforation prior to filling wells with pick-up material.

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

While the auto-polymerizing material is setting, the patient is instructed to close lightly at first and then the denture is stabilized with the dentist’s fingers – so as not to over-seat the denture.

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

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
Repare voids to blend with surface with same technique

LOCATOR® Retention Rings
angle correction occurs within retention rings

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NOT APPROVED FOR USE IN FULL ARCH INSTALATION.

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

Not quite finished result…
Retention Ring must be added for:

- Angle Correction (if Locator) &
- Vertical Resiliency (for ERA and Locator)

Locator® 3 in 1 Tool
- Seating Tool
- Removal Tip
- Abutment Driver
“Pluck” out black processing inserts using the Removal Tool of the Locator Core Tool.

Place Retention Ring on tip of Seating Tool.

Snap Retention Rings in Denture Caps using Seating Tool.

Tissue Level vs. Bone Level

- Bone Level ONLY
- Two-stage surgery
- Internal Tri-Channel
- Platform is color coded:
  - Yellow = 4mm
  - Blue = 5mm
  - Green = 6mm

Nobel Biocare
Straumann Implants

**Bone Level & Tissue Level**

**Bone Level**
- **USUALLY**:
  - Two stage surgery
  - Sits below the free gingival margin
  - Needs a trans-gingival measurement for the abutment

**Tissue Level**
- **USUALLY**:
  - One stage surgery
  - Sits above the free gingival margin
  - Needs NO trans-gingival measurement for the abutment

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**Notes for Bone Level**
- Please use EXTREME caution when measuring that you do not add any additional height to your measurement.
- Order exactly what you measure.
- Measure 1mm = order 1mm cuff

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**Notes for Tissue Level**
- The profile is TAPERED in order to exit through the tissue and create a gingival profile.

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**Photo Album**

**CU/OL with 2 Bone Level severely divergent fixtures restored with Sterngold 2-piece Micro ERA Angle Correction Abutments**

**Built intra-Barrier**
Assessing Angulation Intra-orally

- R27=17°, R22=11° angle correction abutment
- Vernier Abutment Gauges
- Torque driver – Wrench – Base

PB250547
PB250548
PB250549
PB250550

#27=17°, #22=11° angle correction abutment

Measurement of tissue cuff and placement of:
#22 – 2mm (tissue cuff) base
#27 – 3mm (tissue cuff) base

First coat the threads of the abutment, then fill the base

- Resin-filled cement
- Auto mix
- Self-cure
- 1.5 minutes – doughy phase – begin to wipe excess
- 3.5 minutes – additional for full set (5 min total)

Snap on alignment handles and carry the angle correction abutments to the corresponding base

Snap in place and rotate until parallel M… and B…

Snap on alignment handles

I usually cement one at a time, because of the fast set, but I leave the non-cemented abutment in place for alignment

Snap the abutment onto the base, ensuring the Sharpie lines align

Snap the edge of handle @ 15°

Express Lock Cement into abutment thread,

Light finger pressure on handle during set

Fill the base

Carry the abutment to the base with the handle and snap into place

Check alignment

Wipe off excess before thin set

Measurement of tissue cuff and placement of:
#22 – 2mm (tissue cuff) base
#27 – 3mm (tissue cuff) base

Torque each base to 20 ncm

“Break away” wrench @ 20 ncm

I usually cement one at a time, because of the fast set, but I leave the non-cemented abutment in place for alignment

Snap the abutment onto the base, ensuring the Sharpie lines align

Snap the edge of handle @ 15°
Rubber dam material is cut and placed around the abutment like a turtle neck to block out any undercuts and prevent denture “lock-on.”

Express EZ pickup into each tooth well about 1/2-3/4 tab
Springs around each attachment
Express onto pt napkin to test set

Denture is in mouth and patient first closes lightly to align occlusion.

- Then opens for final set

After complete set, denture is removed and pickup is assessed
Rubber dam and excess flash is removed

Removing the Black Processing Male and
Adding Retention & Vertical Resiliency

- Core Cutter
- Seating Tool

Black – Processing Male ONLY
White – Light Retention
Orange – Moderate Retention
Blue – Heavy Retention
Grey – Very Heavy Retention
Yellow – Oversized for worn female abutments
Red – More than Yellow

After complete set, denture is removed and pickup is assessed
Rubber dam and excess flash is removed

Varnish is painted in each of the wells (rigs)
Varnish shows the bonding of the denture acrylic (Bur)
Relining/Rebasing 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

*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
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
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  Blackwell Munksgaard
- www.Sterngold.com
  James Ellison, CDT
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  David Sipperly, Joel Montiero