# IMPROVING RESTORATIVE SUCCESS WITH IMPLANT SOLUTIONS PRESENTED BY MATTHEW B. HALLAS

April 5th, 2019 Genesis Hospital - Adler Auditorium 1236 Rusholme St. Genesis Heart Institute - Lower Level Davenport, IA 52803

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# Improving Restorative Success with Implant Solutions

Matthew Hallas, DMD

# Lecture Outline: Prosthetically Driven Implant Restorations

- Clinical Assessment
  - Treatment Planning & Restorative Options
  - Implant position determination
  - How many implants are needed?
  - Case discussions: Where to start & communication with the patient
- Restorative Solutions
  - Provisisonalization options & solutions
  - Custom final impression
  - Abutment design & cementation techniques
  - Authentic components
  - Broken screw retrieval

# **Diagnosis & Treatment Planning**

- Patient interview, medical and dental history
- Clinical examination
- Diagnosis
- Treatment planning options and sequencing

# **Medical History: Blood Pressure**

- Taken for every new patient
  - Updated regularly by assistants

Blood Pressure Category	Systolic mm Hg	Diastolic mm Hg
Normal	<120	<80
Prehypertension	120-139	80-89
Hypertension (Stage 1)	140-159	90-99
Hypertension (Stage 2)	>160	>100
Hypertensive Crisis	>180	>110

Blood Pressure Guidelines and Screening Techniques Connie Kracher, PHd, MSD Crest Continuing Education Course, 2/29/2012

# Medical History: Lexicomp



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.exicom	p Interaction Ana	Lexicomp Online: Interactions		Page 1 of 3	
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# Medical History: Anticoagulants

- Three new blood thinners to be cautious of:
  - Xarelto (Rivaroxaban)
  - Pradaxa (Dabigatran Etexilate)
  - Elequis (Apixaban)
- NO predictable reversal agent available
- 12 hr med

# Bisphosphonate Medications & Dentistry

Generic Name	Trade Name
Alendronate	Fosamax
Risedronate	Actonel
Etidronate	Didronel
Tiludronate	Skelid
Pamidronate	Aredia
Ibandronate	Boniva
Zoledronate	Zometa

- Bisphosphonates irreversibly alter the metabolism of the osteoclasts, so there is little or no bone resorption affecting the bone's ability to heal
- The jawbone is particularly vulnerable to osteonecrosis because of tooth and gum susceptibility to infection

Medication-Related Osteonecrosis of the Jaw: 2014 Update Special Committee Position Paper by AAOMS



# **Clinical Implications to Dentistry**

- 33 million prescriptions written world-wide for oral bisphosphonates
- 30,000 cancer patients are receiving high-dose IV bisphosphonates for bone involvement by cancer
- Increasing number of cancer patients on antiangiogenic agents

# **Terminology Update**

 Change from BRONJ (Bisphosphonate-related osteonecrosis of the jaw) to MRONJ (Medication-related osteonecrosis of the jaw) b/c of the growing number of cases of osteonecrosis of the jaw associated w/ antiresorptives and antiangiogenic agents

# **Clinical Implications to Dentistry**

- Risk of ONJ among cancer patients not given bisphosphonates ranged from 0 – 0.019%
- Risk increased by 50-100 fold among cancer patients exposed to Zometa
- Risk increased by 50-100 fold among cancer patients exposed to Denosumab
- The risk is additive and the combination of antiangiogenic agents with bisphosphonates markedly increased risk levels

# Clinical Implications to Dentistry: Medications to be Aware of

- Denosumab Injection (Prolia)
- Avastin
- Nexavar (Sorafenib)
- Sunitinib
- Zometa

It should be stressed that 92% of the reported cases of MRONJ occurred in cancer patients who received high dose IV bisphosphonates. The other 8% of the reported cases received oral or low dose IV bisphosphonates for treatment of osteoporosis

> Update on Oral Bisphosphonate-Associated Osteonecrosis of the Jaw: New Informational Statement by the ADA

# Brand Name: Reclast

Prescription Drug Name: Zoledronic Acid

- Caution: At this time, the patient's chance of developing osteonecrosis of the jaw bone with **Reclast** is unknown
- Reclast Warnings:
  - Be sure to brush your teeth and keep your mouth clean while using Reclast. A dentist should examine your mouth and perform any necessary treatments before you start on the medicine
  - Osteonecrosis is more likely to occur if you have dental surgery or treatments while using Reclast

# Medical History: Diabetes Mellitus

- More prone to infection
  - Slower healing process
- A high success rate has been reported in the dental literature when implants are placed in diabetic patients whose diabetes is under control
  - Antibiotic considerations

# Medical History: Diabetes Mellitus

#### DO NOT TAKE THE PATIENT'S WORD THAT THEY ARE CONTROLLED

- Medical Consult: Request HbA1c
  - Average of blood sugar over 2-3 months
  - Range:
    - 4-5.6%: Normal
    - 5.7-6.4%: Inc Risk
    - 6.5%: Diabetes
      - The goal for people with diabetes is 7%
      - The higher the number, the higher the complication rate

# **Medical History: Smoking**

- Nicotine 50% reduction in oxygen to the bone
- There is a greater risk of developing periimplantitis due to the increased resorption of the peri-implant bone
- Consent form

# Medical History: Medical Consult

Meture MEDICAL C	ONSULTATION REQUEST University of the Pacific
	Please complete the form below and rotum it to
	Dr
	Bead
Date if Brth	int
Our patient has presented with the	e following modical problem(s):
The following treatment is schedu	and in our direc
Most periors experience the follo	wing with the above planned procedures.
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- Template completed intially by assistant
  - Includes:
    - Planned procedures
    - Timeline
    - Medications & Anesthetics
- Reviewed by dentist & signed
- Faxed to appropriate physician for consult

# Clinical Examination for Implant Restorations

- Peri-Implant Esthetic Factors
- Type of Defect
  - Site Development: Implant Position & Angulation
  - Emergence Profile
- Radiographic Examination (PA X-ray & CT Scan)
- Implant Design
- Adjacent Teeth: Potential need for crown(s)



*Patients Chief Complaint* "In the patient's <u>OWN WORDS</u>, why are they seeking treatment?"

*"I kept getting infections from this tooth and it had to be pulled "* 

#### Pre-Treatment Evaluation: Diagnostic Considerations



# Type of Defect Smile Line & Prosthesis Emergence Profile

Fixed-Prosthetic Implant Restoration of the Edentulous Maxilla: A Systematic Pretreatment Evaluation Method Edmond Bedrossian, DDS, FACD, FACOMS, Richard M. Sullivan, DDS, Yvan Fortin, DDS, Paulo Malo, DDS, and Thomas Indresano, DMDJ Oral Maxillofacial Surg 66:112-122, 2008

# Site Development: Tooth – Implant Minimum Distance



~1.5mm on each side of the implant, 2mm is better for soft tissue

# Horizontal Appearance Considerations



- Type & Extent of Deficiency
  - Amount of Resorption
    - Broad
    - Concave
    - Knife Edge
- Width of KG tissue

# Horizontal Appearance Considerations: Adjacent Teeth



- Adjacent tooth angulations
- Adjacent tooth contact points & black triangles

# Vertical Appearance Considerations



- Type & Extent of Deficiency
  - Amount of Resorption
    - Soft Tissue
    - Hard tissue
  - Super Eruption of Tooth/Teeth & Occlusal Plane Evaluation
- Final Restoration Design

# Evaluation of the Available Restorative Space

- Examine the distance from the crest of the alveolar ridge/implant platform to the proposed incisal edge
  - The ideal space for a fixed restoration is suggested to be between 8 12mm



Case Study: Resistance to dislodgement of zirconia copings cemented onto titanium abutments of different heights

- Purpose: Authors measured the force it takes to dislodge a cemented crown on abutments of various heights
- Results:
  - The taller the abutment height, the greater the force required to dislodge a cemented crown
  - Study recommends that abutments should be no less than 4mm in height when using a cemented crown

Abbo B, Razzoog M, Vivas J, Sierralta M. J Prosthet Dent 2008;99:25-29

# Restorative Interocclusal Space Considerations

- Screw Retained Restoration: 5mm
- Cement Retained Restoration: 7.5mm



#### Site Development: Vertical Implant Positioning



Emergence profile is the key determining factor: Minimum width may NOT allow for proper esthetics or restoration design



Predicting Single Tooth Peri-Implant Esthetics: Five Diagnostic Keys

#### Kois J.

Compendium, March 2001, Vol. 22, No. 3, 199-208

Evaluation of the hopeless tooth before extraction to determine potential for favorable functional and esthetic outcome.



# Treatment Planning Considerations: Smile Line





# Treatment Planning Considerations: Smile Line



# Treatment Planning Considerations: Periodontal Biotype



Thick Biotype: Square tooth form Labial cervical region is convex Lg interdental region



Tapered tooth form Labial convexity is small Thin periodontal tissues Dehiscence Sites with a thick gingival biotype exhibited significantly less facial gingival level change than sites with a thin gingival biotype at both 1 year after implant placement (-0.25mm vs -0.75mm respectively) and the most recent follow-up examination (2-8yrs with -0.56mm vs -1.5mm, respectively)

> Facial Gingival Tissue Stability Following Immediate Placement and Provisionalization of Maxillary Anterior Single Implants: A 2-8 Year Follow-up Kan J. et al. International Journal of Oral & Maxillofacial Implants; Vol 26, Number 1, 2011

The effect of gingival biotype on peri-implant tissue response seems to be limited to facial gingival recession and does not affect interproximal papilla or proximal bone levels

> Facial Gingival Tissue Stability Following Immediate Placement and Provisionalization of Maxillary Anterior Single Implants: A 2-8 Year Follow-up Kan J. et al. International Journal of Oral & Maxillofacial Implants; Vol 26, Number 1, 2011



#### It is the bone height on the adjacent tooth that supports the papilla for single tooth implants

The Interproximal Height of Bone: A Guidepost to Esthetic Strategies and Soft Tissue Contours in Anterior Tooth Replacement Salama H, Salama M, Garber D, Adar P 2003

#### The Interproximal Height of Bone: A Guidepost to Esthetic Strategies and Soft Tissue Contours in Anterior Tooth Replacement Salama H, Salama M, Garber D, Adar P 2003



CLASS	Restorative Environment	Proximity Limitations	Vertical Soft Tissue Limitations
1	Tooth-Tooth	1	5 mm
2	Tooth-Pontic	N/A	6.5 mm
3	Pontic-Pontic	N/A	6.0 mm
4	Tooth-Implant	1.5mm	4.5 mm
5	Implant-Pontic	N/A	5.5 mm
6	Implant-Implant	3mm	3.5 mm

Point of Measurement Clinically: Most Coronal Peak of Bone

 Applies to tooth, implant or pontic



Timing and Sequential Staging in Esthetic Immediate Implant Therapy

The actual timing of tooth extraction, implant placement, and abutment connection will ultimately influence the specific outcome

> Timing, positioning, and sequential staging in esthetic implant therapy: a four-dimensional perspective. Int J Periodontics Restorative Dent. 2007 Aug;27(4):313-23. Funato A, Salama MA, Ishikawa T, Garber DA, Salama H

# Site Development:

Hard & Soft Tissue Augmentation Procedures

- One Stage Approach:
  - Immediate Implant
     Placement
  - Associated Grafting Procedures
- Two Stage Approach:
  - Block Graft, GBR, GTR
  - Healing
  - Implant Placement
- Pink Porcelain





#### **Treatment Planning**

Extraction vs Saving a Tooth



# When to Save or Extract a Tooth in the Esthetic Zone:

A Commentary Gary Greenstein, DDS, MS; John Cavallaro, DDS, and Dennis Tarnow, DDS Compendium April 2008, Vol. 29, No. 3

Extract vs Retain a Tooth Considerations:

- Smile Line
- Severity of periodontal condition
- Expected Recession induced by pocket elimination procedures
- Need for endodontic intervention with or without post/cores & crown lengthening
- Remaining tooth structure or ferrule
- Emotional & esthetic concerns of the patient

When to Save or Extract a Tooth in the Esthetic Zone: A Commentary Gary Greenstein, DDS, MS; John Cavallaro, DDS, and Dennis Tarnow, DDS Compendium April 2008, Vol. 29, No. 3

# When to Save a Tooth

- Psychological impact of losing teeth
- Avoiding two adjacent implants
- Thin biotype
- Medical Hx



When to Save or Extract a Tooth in the Esthetic Zone: A Commentary Gary Greenstein, DDS, MS; John Cavallaro, DDS, and Dennis Tarnow, DDS Compendium April 2008, Vol. 29, No. 3

Tooth Prognosis: Restoration Consideration for Teeth Adjacent to Edentulous Areas

- Aquilino et al reported that patients wearing removable RPDs over 10 yr period lost 44% of abutment teeth
- Wagner et al reported that only 42% of RPDs remained in service for 8 yrs

Tooth Prognosis: Restoration Consideration for Teeth Adjacent to Edentulous Areas

- Walton et al reported the long-term survival rate of FPDs was 87% at 10 yrs & 69% after 15 yrs
  - Risk of RCT considerations

When to Save or Extract a Tooth in the Esthetic Zone: A Commentary Gary Greenstein, DDS, MS; John Cavallaro, DDS, and Dennis Tarnow, DDS Compendium April 2008, Vol. 29, No. 3

# Standard of Care: Dental Implants

"The routine use of dental implants has revolutionized prosthodontics and the way missing teeth are replaced. Dental implants have become the standard of care for the replacement of teeth because dental implants allow a missing tooth (or teeth) to be restored to optimum function and appearance without invading or damaging any other teeth or tissues."

> -The American College of Prosthodontists http://www.prosthodontics.org/patients/implants.asp

## Informed Consent: "Informed Refusal"

"The wealth of dental literature supports implants as a well established form of long-term dental restoration, as reliable as bridges and preferable to removable appliances. The law holds that experts may rely on well-established and authoritative literature on the subject to support their opinions. In doing so, those experts have contributed to a change in the law by way of a modification of the duty of informed consent to include informed refusal."

-Arthur W. Curley, JD

Dental Implant Jurisprudence: Avoiding the Legal Failures. J Calif Dent Assoc 2001

# Dental Implants: Failure to Advise

"... the patient learned that she could have had an implant and avoided any need for treatment of the adjacent teeth. She contacted an attorney, suit was filed and subsequently settled in part because of problems with the root canal treatment and for failure to advise of the alternative of dental implants."

-Arthur W. Curley, JD

Dental Implant Jurisprudence: Avoiding the Legal Failures. J Calif Dent Assoc 2001

#### **Extraction Defect Classification System**

Caplanis N, Lozada J, Kan J. J. Calif. Dent. Assoc. 33(11) 2005

#### EDS Type 1

- Pristene condition
- 0 walls missing
- Thick biotype
- No hard tissue loss
- FGM to bone < 3mm</li>

#### EDS Type 3

- Moderate damage
- Walls missing =1-2
- Hard tissue loss 3-5mm

#### EDS Type 2

- Pristene to slight damage
- Walls missing 0-1
- Thick or thin biotype
- Hard tissue loss 0-2mm
- ? Esthetics

#### EDS Type 4

- Severe damage
- Walls missing =2-3+
- Hard tissue loss >6mm

# **Classification of Extraction Sockets**

#### Type I

1.Four-wall socket or incipient 3-wall dehiscence

2. Adequate bone is available beyond the apex for initial stabilization of the implant

- 3. Osseous crestal topography is harmonious
- 4. The labial plate of bone is adequate

Adequate scenario for immediate implant placement



Salama H, Salama M. Ine role or orthodontic extrusive remodelling in the enhancement of hard and soft tissue profiles prior to implant placement: a systematic approach to the management of extraction site defects. Int J Periodontics Restorative Dent. 1993;13(4):312-333

# **Classification of Extraction Sockets**



# Site Development: Angulation of the Implant





# Radiographic Considerations: Know your anatomy!



#### 3D Assessment of the Implant Site

- Space between teeth & roots
- Vertical height of bone available
- Width of bone available

# **Radiographic Considerations**



- Space between teeth & roots
- Vertical height of bone available
- Width of bone available
- Presence of infection or bone defect

# **Tilted or Off Axial Implants**

- Key Considerations:
  - Abutment/Crown design for emergence profile
  - Cantilever existence

Krekmanov L, Kahn M, Rangert B, Lindström H. Tilting of posterior mandibular and maxillary implants of improved prosthesis support. Int J Oral Maxillofac Implants 2000; 15: 405-414

Aparicio C, Perales P, Rangert B. Tilted implants as an alternative to maxillary sinus grafting: A clincal, radiologic, and periotest study. Clin Implant Dent Relat Res 2001;





# **Tilted or Off Axial Implants**



Labial inclination of the long axis of the implant beyond the incisal edge results in subgingival contours of the abutment or restoration that deflect the gingival tissue apically

Saadoun Ap, Le Gall M. Selection and ideal three-dimensional implant position in the anterior aesthetic zone. Int Mag Oral Implantol 2003; 4(4):8-18

# Non-Ideal Implant Position and Its Prosthetic Consequences



•Emergence of access hole on buccal surface of the crown •Buccal emergence needs to be prosthetically corrected



Excessively bulky crown buccally

# Non-Ideal Implant Position and Its Prosthetic Consequences



Clinical Relevance: Marginal bone loss and soft tissue recession

# Site Development: Angulation of the Implant



# Site Development: Angulation of the Implant







#### Literature

#### Clinical and Esthetic Outcomes of Implants Placed in Postextraction Sites

Int J Oral Maxillofacial Implants 2009;24 Stephan T. Chen, BDS, MDSc PhD Daniel Buser, DMD 1107 abstracts and 170 full text articles reviewed with 91 meeting the inclusion criteria

# Findings

- Survival of post extraction implants are high, >95%
- Immediate loading vs conventional protocols have similar outcomes.
- Immediate placement does not prevent vertical or horizontal resorption of ridges.\*

# Scientific Rational

"Based on 3153 Immediate Function™ implants, a failure rate of 4.1% is calculated for implants placed in extraction sockets (n=1480) compared to a failure rate of 3.4% for implants placed in healed sites (n=1673), after varying times of follow-up."

Nobel Review of Literature Ref. 2-40

# Documentation

- Norton M. A Short-term Clinical Evaluation of Immediately Restored Maxillary TiOblast Single-tooth Implants. Int J Oral Maxillofac Implants 2004; 19:274-281
  - After 30 months, marginal bone loss under function was 0.4mm, with 37.5% recording no marginal bone loss at all with respect to the reference level

#### Literature

#### Instant Provisionalization of Immediate Single-Tooth Implants is Essential to Optimize Esthetic Treatment Outcome

De Rouck T, Collys K, Wyn I, Cosyn J Clin Oral Implants Res 2009; 20:566-570

# Comparative Study: The soft tissue was examined at immediate implant sites after two restorative protocols:

 1) Immediate connection of provisional crown
 2) Submerged healing, during which a removable partial denture was used

# Findings

Showed that implant survival, bone remodeling, probing depth, and bleeding tendencies were not influenced by the restorative protocol. Delayed restoration resulted in initial papilla loss, taking up to 1 year to attain comparable height with that achieved by immediate restoration

> Instant Provisionalization of Immediate Single-Tooth Implants is Essential to Optimize Esthetic Treatment Outcome De Rouck T, Collys K, Wyn I, Cosyn J Clin Oral Implants Res 2009; 20:566-570

# Findings

More importantly, midfacial recession was systematically 2.5 to 3 times higher after delayed restoration than with immediate restoration after 1 year

> Instant Provisionalization of Immediate Single-Tooth Implants is Essential to Optimize Esthetic Treatment Outcome De Rouck T, Collys K, Wyn I, Cosyn J Clin Oral Implants Res 2009; 20:566-570

# Conclusion

If the primary implant stability permits it, immediate single-tooth implants should be instantly provisionalized in the interest of optimal midfacial esthetics

> Instant Provisionalization of Immediate Single-Tooth Implants is Essential to Optimize Esthetic Treatment Outcome De Rouck T, Collys K, Wyn I, Cosyn J Clin Oral Implants Res 2009; 20:566-570

#### **Classification of Extraction Sockets**

#### Type III

 Vertical and buccolingual dimensions of bone inadequate for placement and stabilization of immediate implants.

2. Recession present and loss of the labial plate of bone severe

3. Severe circumferential and angular defects present

Immediate implant placement **NOT** recommended



Why should the clinician utilize socket preservation type techniques at the time of tooth extraction?

Post-extraction bone loss is accelerated in the first 6 months followed by a gradual modeling and remodeling of the remaining bone, with as much as 40% of the alveolar height and 60% of alveolar width lost in the first 6 months

> Extraction site reconstruction for alveolar ridge preservation. Part 1: rationale and materials selection. Bartee BK J Oral Implantol. 2001; 27(4):187-93.



Misch et al can be quoated as saying, "During the first year after tooth loss, 40-60% of the width of the alveolar ridge resorbs after tooth extraction. The resorption & collapse of the hard & soft tissue architecture increases the complexity of the treatment process. To prevent this complication, grafting extraction sockets with alloplastic materials has become routine part of extraction surgery in my office." Adjacent Teeth: Potential Need for Crown(s)



# **Implant Selection**





# **TiUnite Surface**

	f Dental Implants with a
Moderately Rough	(TiUnite) Surface:
A Meta-Analysis of Pros	spective Clinical Studies
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A the outset of modern implant dentatoy, implant Asurfaces were not aboved following the machining process which today is referred to as "surred" or "ma- rimed" surfaces. Teatizing that the surface threatthe- ntatics of dental implants are important determinants of short term and long series. Ideal particular particular process and long series. Objective particular particular particular particular particular particular particular particular particular particular particular particular particular particular particular particular particular particular particular particula	bologic fusion with alveolar bone in shorter pariod of time through increased surface nouphens. <sup>14-14</sup> and ultinately lead to a lower includence of implant failu- within the fina year after placement compared wit machined unities implants? A number of surface medifications have been into deced with varying success. These paragraphs to be
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 Based on a meta-analysis of prospective studies, implants with the TiUnite surface provide a predictable treatment modality in a variety of indications.

Nobel Active is a tapered implant following a straight drilling protocol with widely spaced double-lead threads that compress bone gradually during insertion

Irinakis T, Wiebe C. Initial torque stability of a new bone condensing dental implant: a cohort study of 140 consecutively placed implants. J Oral Implantol 2009;35:277-282

Kolinski ML, Cherry JE, McAllister BS, Parrish KD, Pumphrey DW, Schroering RL. Evaluation of a variable thread tapered implant in extraction sites with immediate temporization: A 3-year multi-center clinical styudy. J Periodontol. 2013

# **Implant Diameter Considerations**





# Platform Switching & Conical Connections

- Implant-Abutment Connection below marginal crest
- Conical Connection minimizes micro-leakage & micro-movements
- Minimizes screw loosening



Hansson S. A conical implant-abutment interface at the level of the marginal bone improves the distribution of stresses in the supporting bone. An axisymmetric finite element analysis. Clin Oral Implants Res 2003;14(3):286-93. (ID No. 79030

Jansen VK, Conrads G, Richter EJ. Microbial leakage and marginal fit of the implant-abutment interface. Int J Oral Maxillofac Implants 1997;12(4):527-40.

# **Conical Connection**



#### NobelActive<sup>™</sup>: Stable Bone Levels and Healthy Papilla - Abstract

#### Results

The cumulative survival rate was 98.3% at the two-year follow-up. One implant failed prior to the three-month follow-up visit. The mean marginal bone remodeling from implant insertion to the one-year follow-up was -0.22 mm (SD 1.30 mm, n=41), followed by and average bone gain of +0.12 mm (SD 0.77 mm, n=33) between 12 months and 24 months. Mean marginal bone remodeling was -0.10 mm (SD 1.38 mm, n=35) from implant insertion to the two-year follow-up.

Papilla size, as measured by Jemt's Papilla Index\*, increased significantly (p < 0.001) over the two years. Patients assessments fo function, esthetics, and self-esteem, measured on a VAS scale of 1 to 100, also showed significant improvement over the course of the study.

#### Conclusion

The results, over 24 months, indicate that the variablethread tapered implant NobelActive can be used safely and effectively under demanding conditions such as an immediate post-extration tooth replacement.



Radiographs from one case in the study highlighting the increasing bone levels over time.

\* Jemt T. Regeneration of gingival papillae after single-implant treatment. Int J Periodont Rest Dent 1997;17:327-33

# Number & Location of Missing Teeth



# NobelActive WP 5.5







- Implant Dimensions
  - Platform: 5.1mm
  - Abutment Interface: 4.4mm





# NobelProcera FCZ Implant Crown





 Utilizes the Angulated Screw Channel to place the screw access hole anywhere between O° & 25° in a 360° radius





Uses the New Omnigrip Driver





During the healing phase, provisionalization allows the clinician to maintain & sculpt the tissue to accommodate the final restoration, setting up a smooth transition



# Criteria for Immediate Loading

- Implant length of at least 10mm
- Implant stability greater then 35Ncm
- Maintenance of high implant stability
- Controlled occlusal force
- Patient selection & clinician experience

Esposito et al. (2007, update 2013): Insertion torque over 35Ncm is crucial for success

D.P. Tarnow et al. Guidelines to help ensure clinical success for immediate loading. JOMI 1997;12:319-324

# Abutment Selection for Implant Provisionalization



# Immediate Temporary Abutment









The Positive Relationship Between Excess Cement and Peri-Implant Disease: A Prospective Clinical Endoscopic Study

Thomas G. Wilson Jr.\*

**Conclusions:** Excess dental cement was associated with signs of peri-implant disease in the majority (81%) of the cases. Clinical and endoscopic signs of peri-implant disease were absent in 74% of the test implants after the removal of excess cement. *J Periodontol 2009;80:1388-1392.* 

# Number & Location of Missing Teeth



# Diagnosis & Treatment Planning Considerations:

Splinted Restorations



Individual Restorations

# Splinted vs Individual Restorations

- Type of bone
- Location of the implants
- Maxilla, mandible
- Anterior, posterior
- Length of implants
- Diameter of implants
- Opposing natural teeth or denture
- Stable occlusion & Bruxism
- Rest of the arch
- Restoration Design
- Esthetics
- Implant Failure History





# **Occlusion & Biomechanics**



#### Center of Rotation Torque

#### Torque = F x D

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# **Occlusion & Biomechanics**

Lateral/Oblique load

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# **Occlusion & Biomechanics**



**Reduce Implant Loading** 

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# FPD vs Single-Tooth Replacement



# Number & Location of Missing Teeth



# Number & Location of Missing Teeth





# Interim RPD



- Tooth stop design considerations
- Anatomical areas of support

# Maryland Bridge Provisionalization



**Design Considerations:** 

- 1. Material Selection
- 2. Wing Design and Extension
- 3. Modified Ridge Lap Pontic
- 4. Cementation

# NobelProcera ASC Abutment Interface



Abutment Design from a New Angle





Ability to angulate screw channel 0 to 25<sup>0</sup>



Zr abutment with titanium metal insert & conical connection available for NP & RP platforms New Product: Temporary Snap Abutment For Conical Connection Implants





#### **Snap Connection**

 Snap-fit functionality with no need for screw fixation during try-in & adjustment of the provisional restoration







# TempShell Quick Guide PDF



Custom Impression Coping for an Exact Registration of the Healed Tissue in the Esthetic Implant Restoration



Kenneth F. Hinds, DDS\*

Hinds, K. Custom impression coping for an exact registration of the healed tissue in the esthetic implant restoration. Int J Periodontics Restorative Dent. 1997 Dec; 17(6): 584-91.

# Management of Cement Excess – Application Techniques



Custom abutment (left) Custom putty abutment (right)



Custom putty abutment replica fitted inside complete crown, permitting extraoral elimination of most excess cement. Only thin layer of cement remains inside complete crown, minimizing amount of cement extruded into soft tissues.

A simple cementation method to prevent material extrusion into the periimplant tissues.

Suzanne Caudry, PhD, MSc, David Chvartszaid, DDS, MSc, and Nicholas Kemp, BDS, DDS Faculty of Dentistry, University of Toronto, Toronto, Canada The Journal of Prosthetic Dentistry. Inc. 2009. 102(2):130-1. Reproduced with permission from the Editorial Council for *The Journal of Prosthetic Dentistry*, Inc.

#### Number & Location of Missing Teeth





Number & Location of Missing Teeth



Additional Implant Situation



#### References to Read

Surgical Complications IN Oral Implantology

CONTEMPORARY

DENTISTRY

IMPLANT

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# Journal of Prosthodontics on Dental Implants



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