



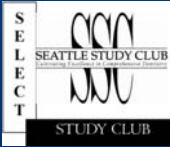
Woodyard  
Periodontics, PC  
*Excellence in Periodontics and Dental Implants*



Academy of Osseointegration  
Advancing the Vision of Implant Dentistry



Active Member  
American Academy of Periodontology



SEATTLE STUDY CLUB  
STUDY CLUB

# EXCESSIVE WEAR AND MISSING TEETH: PLANNING AND TREATMENT

Dr's James Woodyard, Randy Brown, Glenn Norton



## Sponsorship and photos

- Dr Woodyard
  - Acts as a consultant to BioHorizons® and Salvin Dental on several projects
- None of the photos in todays lecture have been altered other than for color and cropping

## Handout available online

- [www.woodyardperio.com](http://www.woodyardperio.com)
- Choose “Referring doctor resources”
- Choose “Doctor clinical and video resources”
- They are in the “Handout” section at bottom of the page

## Goals for this lecture

### Diagnosis

- Examine severe wear and use the CORE system to aid in diagnosis

### Planning

- How do you plan and execute a severe wear case with orthodontics and tooth replacement

### Treatment

- What is the sequence of treatment and realistic long term outcomes



## Introduction and Background

This 56-year-old man presented with his wife for treatment of severe anterior tooth wear and chipping. His initial concern at examination was a fracture on tooth no. 8. He had recently remarried and his wife had encouraged him to seek care. A few years prior he had seen another restorative dentist who told him that orthognathic surgery would be required. He was open to treatment, but his one request was "no jaw surgery." After records were obtained, a conference with the orthodontist and the periodontist was completed.

It was determined that limited orthodontic treatment on the maxillary arch, in conjunction with transitional bonding to create a target for the orthodontist, would be possible. After orthodontics, tooth replacement with dental implants was recommended. An important consideration in the treatment plan was the patient's finances, requiring that his definitive restorations be phased over time. Other than financial restrictions, the limiting factor was time: The patient's job as a railroad engineer frequently took him out of town.



Initial Presentation: March 2008 | Age at Initial Presentation: 56 | Active Treatment Completed: May 2011



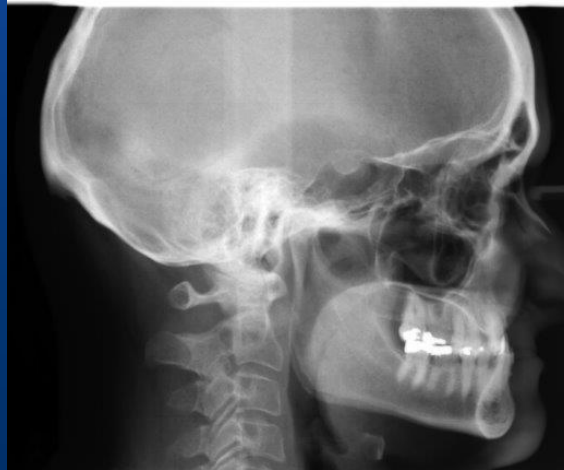
## Medical History

- ❑ ASA Class 2 (mild hypertension).
- ❑ Blood pressure 150/85; pulse 74 (patient attributes elevated BP to white coat syndrome).
- ❑ Nonsmoker.
- ❑ Medications: Nexium® for acid reflux, Avodart® for benign prostatic hypoplasia.
- ❑ Last physical < 1 year earlier.



## Diagnostic Findings: TMJ/Muscle

- Joints comfortable under loading.
- Piper class 1 right and left (normal).
- Dental Angle Class III on the right and Class I on the left masking underlying Class III skeletal base with horizontal mandibular excess.



- TMJ: no pain, sounds within normal limits.
- Muscles of mastication within normal limits and masseters contract equally bilaterally.
- Maximum opening 50 mm.
- Right and left lateral movements 8 mm bilaterally.



## Diagnostic Findings: Extraoral/Facial

- Concave lateral soft tissue profile.
- Short lower anterior facial height.
- Mandibular prognathism.
- Obtuse nasolabial angle.
- Thin upper lip.
- Lack of maxillary incisor display at rest.





## Diagnostic Findings: Intraoral/Dental

- ❑ Both arches constricted due to severe wear and interproximal contacts moving apically.
- ❑ Severe incisal wear: #7–11 and 20–27.
- ❑ Missing teeth #6, 14, and 19.
- ❑ Worn Amalgam restorations: #2, 3, 15, 18, 20, 28, 29, 30, and 31.



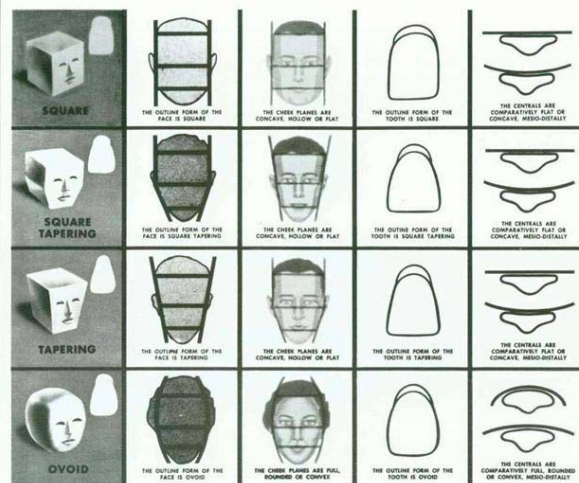
## Diagnostic Findings: Intraoral/Dental



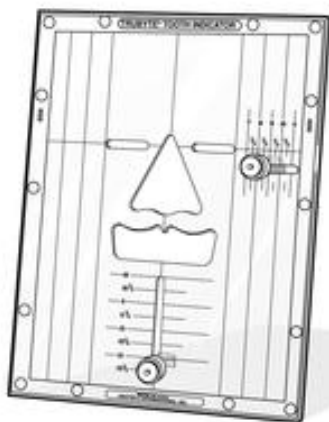
- ❑ Facial fracture tooth no. 8.
- ❑ Failing amalgam restorations teeth nos. 30 and 31.
- ❑ Pin-retained restorations teeth nos. 30 and 31.
- ❑ Supra-eruption and tilting of teeth associated with wear.
- ❑ Lack of anterior protective guidance.



## Dentsply Trubyte Tooth Indicator®

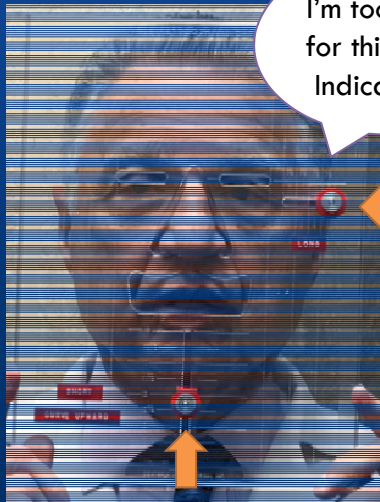


## Dentsply Trubyte Tooth Indicator®





## Dentsply Trubyte Tooth Indicator®



I'm too SEXY  
for this Tooth  
Indicator...

- Tooth size analysis indicates ideal central incisor dimensions of 11 mm × 9 mm.
- Where you can get it
  - ▣ Amazon price \$64.13
  - ▣ FREE Shipping for Prime member



## Facially Generated Treatment Planning

Let analyze Patient this using the CORE principles



## Full Face Repose

### Notes

Lack of maxillary incisor display at rest.

CORE

Face

Smile

Teeth

7's

DX

TP



## Full Face Smile

### Notes

2 mm of incisal edge display of #8

CORE

Face

Smile

Teeth

7's

DX

TP





## Full Face Profile

### Notes

Concave lateral soft tissue profile.  
 Short lower anterior facial height.  
 Relative Mandibular prognathism and  
 Maxillary retrognathism.  
 Obtuse nasolabial angle.  
 Thin upper lip.  
 Lack of maxillary incisor display at rest.



Face Smile Teeth 7's DX TP



## Middle Third Measurement

### Notes

Middle Third 62 mm

Short Middle third



Face Smile Teeth 7's DX TP




## Lower Third Measurement

Notes

Middle Third 62 mm  
Lower Third 42 mm  
Short Middle third

CORE Value: Ratio 1:1

**CORE** Face Smile Teeth ?s DX TP




## Upper Lip Length

Notes

Upper Lip 8 mm  
☐ Short upper lip

CORE Value:  
Female 20-22 mm  
Male 22-24 mm

**CORE** Face Smile Teeth ?s DX TP



## Lip Mobility

### Notes

Length of Central 0 mm

Central in Repose -0 mm

Gingival Exposed +0 mm

Lip Mobility =0 mm

Core Value: Lip Mobility 6-8 mm



Face

Smile

Teeth

7's

DX

TP



## Tooth Presentation

### Notes

Dental Midline 3 mm R (R/L)



Face

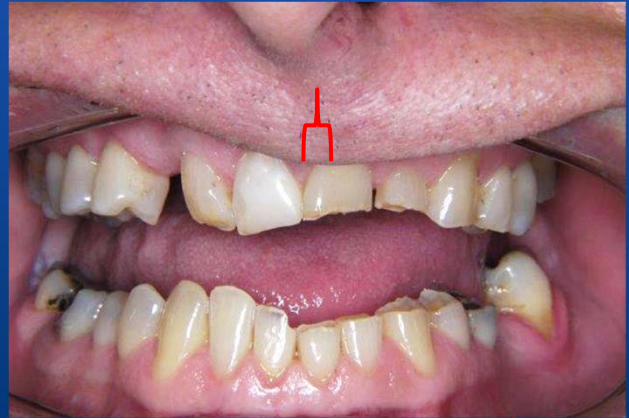
Smile

Teeth

7's

DX

TP



## Tooth Presentation

### Notes

Central in Repose 0 mm

Ideal measurement- for his age

Male 2 mm

Female 3 mm



Face Smile Teeth 7's DX TP



## Smile Presentation

### Notes

Gingival Line to Upper Lip  
Not visible

Distal Extent of Smile (Tooth #)

R 3 : L 14

Buccal Corridors

Right OK  
(OK/Excessive)

Left OK  
(OK/Excessive)



Face Smile Teeth 7's DX TP





## Incisal Edge to Lower Lip

### Notes

#### Incisal Edge to Lower Lip in FULL Smile

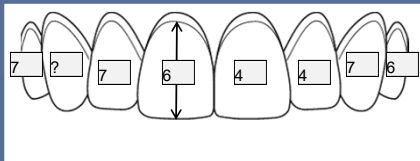
Irregular and does not follow smile line.  
Low lip line with no maxillary gingiva exposed. Incisal edge should follow smile line

(Follows Smile Line, Covered by Lip, Reverse, Irregular)



Face Smile Teeth 7's DX TP

## Tooth Length



#### CORE Value:

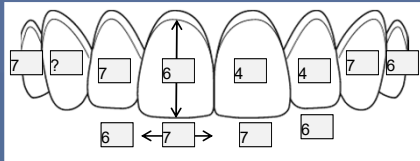
Maxillary Canine 10.4  
Maxillary Lateral 8.2  
Maxillary Central 10.2



Face Smile Teeth 7's DX TP

# Height/Width Ratio

Tooth size analysis indicates ideal central incisor dimensions of 11 mm × 9 mm.



CORE Value:

Maxillary Canine 10.4

Maxillary Lateral 8.2

Maxillary Central 10.2

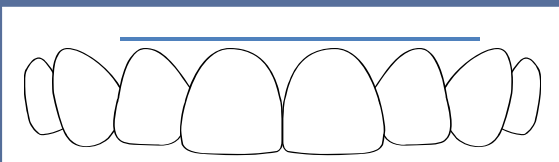
Ratio 1.2:1



Face Smile Teeth 7's DX TP



# Tissue Levels



Notes

Gingival Line is Straight



Face Smile Teeth 7's DX TP



# Angle of Incisal Plane

## Notes

Incisal Plane is NOT Parallel to Horizon and is very irregular



Face

Smile

Teeth

7's

DX

TP

# Pathologic Tooth Wear

## Notes

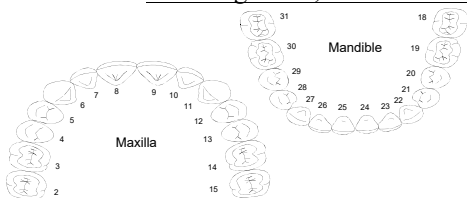
Pathologic Wear Y (Y/N)

Etiology:

Bruxism,

malocclusion,

tooth alignment,



Face

Smile

Teeth

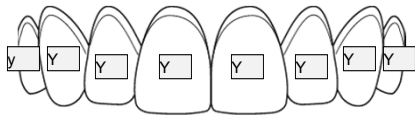
7's

DX

TP



# CEJ Located



Notes

CEJ felt on all the teeth in  
periodontal exam 1-2 mm  
subgingival



CORE

Face Smile Teeth 7's DX TP

# Posterior Plane

Notes

Posterior Occlusal Plane  
Step up left side

(OK, Step Up, or Step Down, R/L)



CORE

Face Smile Teeth 7's DX TP

# Tooth Alignment

## Notes

Anterior cross bite  
Interproximal space and tooth width lost due to wear and parafunction. Minimal spacing and little overlap



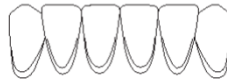
Face Smile Teeth 7's DX TP



## CORE DENTISTRY "Global" Analysis Diagnosis

Face Height 70/71 mm  
Lip Length 23 mm Lip Mobility 11 mm  
Dental / Facial Midline ok R/L  
Central Exposed in Repose -2 mm  
Gingival Line to Upper Lip in Full Smile +1 (#8/9) +5 (#6/11) +/- mm  
Distal Extent of Smile (Tooth#) 3 R 14 L  
Incisal Edges to Lower Lip (Follows Smile Line, Covered by Lip, Reverse, Irregular)  
+3 mm at centrals, 0 mm at canines  
Buccal Corridors — Negative Spaces Y/N ok

Length of Maxillary Anteriors — (Chart)  
Tissue Levels — (Chart)  
Angle of Incisal Plane — (Chart)

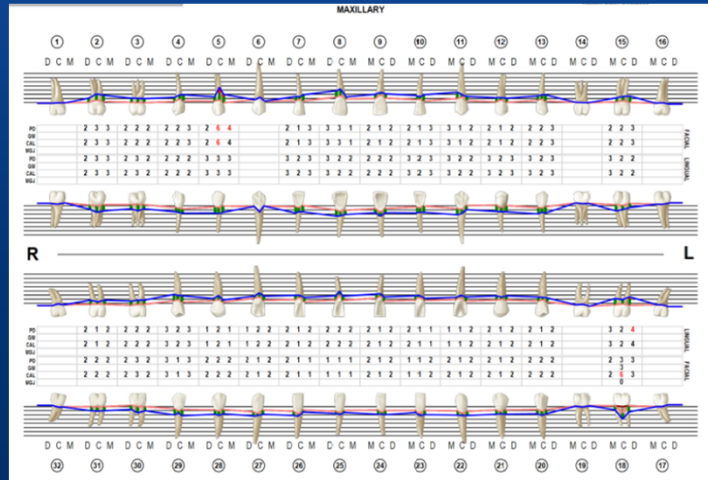


Pathologic Tooth Wear — Y/N Tooth #'s No  
CEJ Located Y/N No #2-15  
Posterior Occlusal Plane (OK, Step Up, or Step Down, Cant) ok  
Tooth Color A-1  
Tooth Alignment (Spacing, Overlap) ok

DR. NOTES

© CORE Dentistry. All Rights Reserved

- Oral mucosa WNL.
- 4–6 mm probe depth on #5 associated with gingival inflammation due to calculus.
- Gingival tissue healthy and no bleeding on probing.
- Home care excellent and very compliant with maintenance intervals.
- Mobility of 1 on teeth nos. 4 and 5.



- ❑ 3 mm of recession tooth no. 18 with no attached gingiva and thin gingival phenotype
- ❑ Localized buccal ridge atrophy site nos. 6 and 14 due to missing teeth.
- ❑ Site measurements for Possible implant tooth replacement:



Proposed implant site	Ridge width including soft tissue	Intertooth distance or space	Interarch distance or restorative space	Amount of facial keratinized tissue	Amount of facial bone loss
#6	6	8	7	6	4
#14	8	9	10	3	4
#19	3	12	10	3	5



## Occlusal Notes

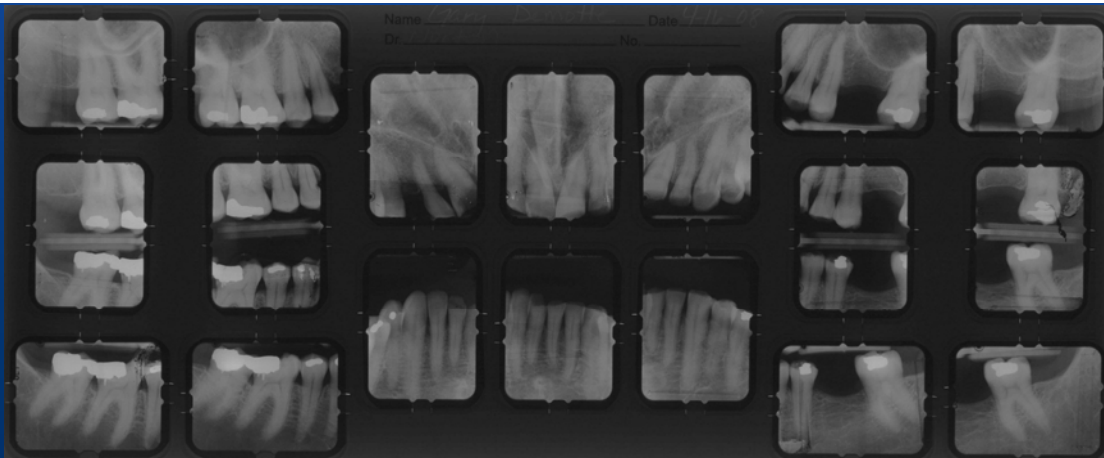
- Angle Class III on the right and Class I on the left masking underlying Class III skeletal base with horizontal mandibular excess.
- Anterior crossbite involving teeth nos. 7, 8, 9, and 10.
- Tooth size analysis indicates ideal central incisor dimensions of 11 mm × 9 mm.



- Supra-eruption and tilting of teeth associated with severe wear and attrition.
- Lack of anterior guidance in group function.
- Flat mandibular plane angle.
- Relative horizontal mandibular skeletal excess.
- Progressive loss of vertical dimension as the mandible autorotates closed with the continued incisal wear



## Radiographic Review-FMX 2008



Normal bone levels, #6 missing, Tooth no. 30 has a fractured restoration.



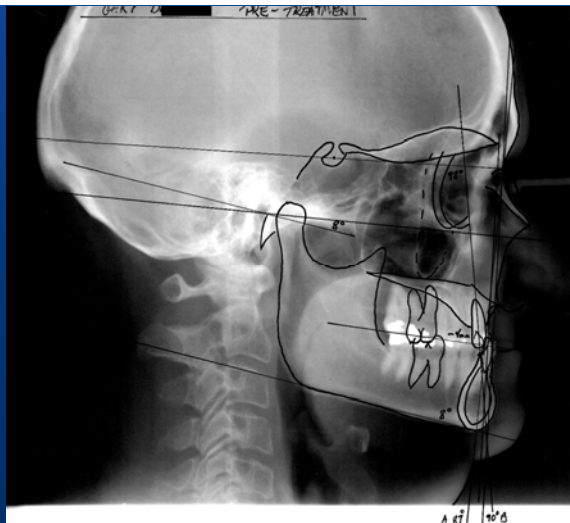
## Radiographic Review-Panoramic 2008



Sinus pneumatization at site no. 14 with 7.5 mm vertical bone available as estimated on panoramic radiograph.



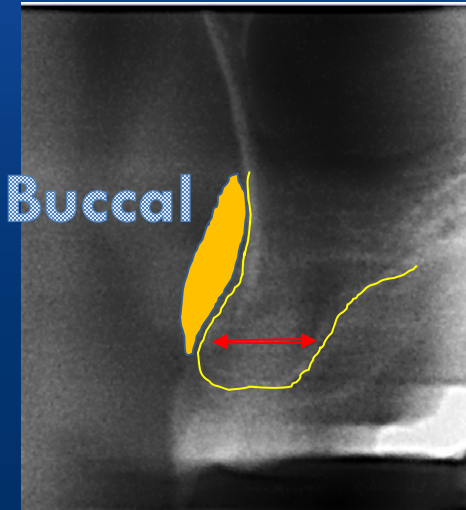
## Radiographic Review-Cephalometric 2008



- ❑ Short lower anterior facial height.
- ❑ Mandibular prognathism secondary to loss of vertical dimension as the mandible autorotates closed.
- ❑ Obtuse nasolabial angle.
- ❑ Concave lateral soft tissue profile.



## Radiographic Review-Tomographic survey 2008



- Site no. 6 has 4 mm buccal bone loss with 6 mm bony ridge width as estimated on the lateral tomogram.



## Diagnosis

- AAP Class I Gingivitis
- Generalized severe tooth wear, attrition, and bruxism.
- Overclosure/loss of vertical dimension.
- Anterior crossbite with malocclusion.
- Partial edentulism.
- Soft and hard tissue atrophy on buccal of missing teeth nos. 6, 14, and 19.
- 3 mm gingival recession tooth no. 18 with no attached gingiva.
- Tooth no. 8 facial fracture, tooth no. 30 fractured restoration, tooth no. 31 poor marginal integrity.







## Prognosis



- Hopeless: None.
- Questionable: None.
- Fair: teeth nos. 8, 9, 23, 24, 30, and 31.
- Good: all remaining teeth.



## Summary of Concerns

- The patient is worried about experiencing pain when he eats and continuing tooth wear.
- The patient has financial and scheduling concerns.
- The patient has declined orthognathic surgery.
- How do we provide a satisfactory result for the patient with phased treatment?



- How do we identify the causes of the severe wear, erosion, and attrition over the years?
- How do we determine if there is adequate space for restoration of teeth and placement of dental implants?
- The patient does not understand or own his problems. The patient thinks that he broke his teeth on popcorn and that dentures are inevitable.





STOP- Consider what you would treatment plan



## Treatment

What we did and wanted to do

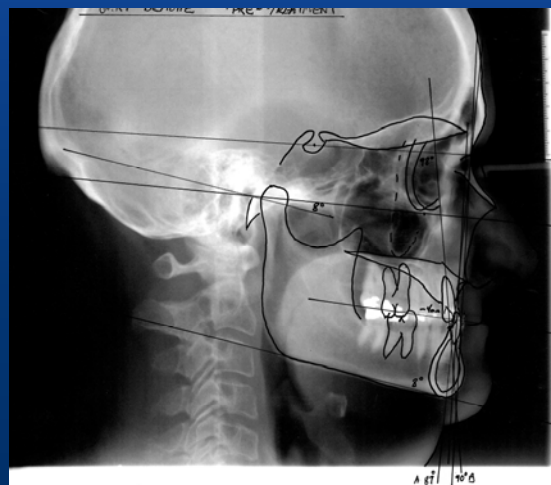


## Phase I: Diagnostic Workup and Initial Treatment

1. Perform initial examination for decay and mobility, periodontal probing, and full-mouth radiographs.
2. Perform prophylaxis with oral hygiene instruction.
3. Consult with orthodontist and schedule patient for exam, photos, and casts with orthodontist.
4. Provisionalize tooth no. 8 with resin composite and mount casts.
5. Complete the composite mockup/trial smile of the maxillary anterior teeth and core buildups of teeth nos. 30 and 31.



## Orthodontic Consultation





## Provisional Bonding #8



## Diagnostic Wax up





## Wax up transferred to patient-Trial Smile



## Phase II Transitional Bonding and Orthodontic Therapy

1. Bond mandibular teeth nos. 20–31 to guide orthodontist in moving the maxillary teeth and opening the vertical dimension.
2. Begin orthodontic therapy in the maxillary arch.
3. When teeth are in the right position, remove orthodontic appliance and perform wax up to verify that teeth can be restored esthetically and functionally.
4. Place thermoplastic retainer to maintain teeth in desired position.
5. Bond teeth nos. 7–11 utilizing Dentsply dentofacial analyzer to determine tooth size.



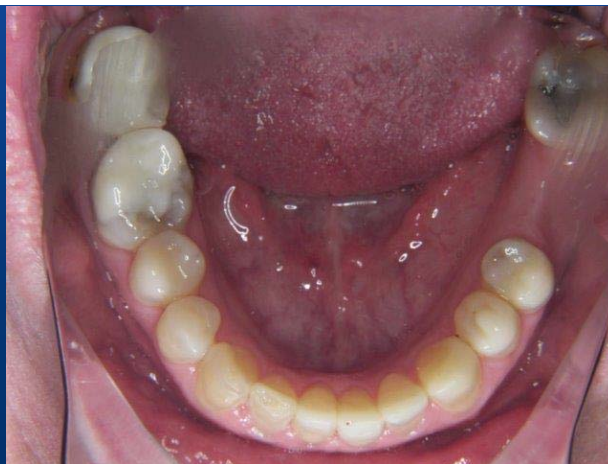
## Bond mandibular teeth nos. 20–31 to guide orthodontist



The failing restorations in the lower arch on teeth #30 and 31 were restored with composite as well. The restoration material of choice for the lower arch was a Cosmodent microhybrid resin.



## Bond mandibular teeth nos. 20–31 to guide orthodontist





Begin orthodontic therapy in the maxillary arch.



Begin orthodontic therapy in the maxillary arch.







## Orthodontics progresses



## Orthodontics complete

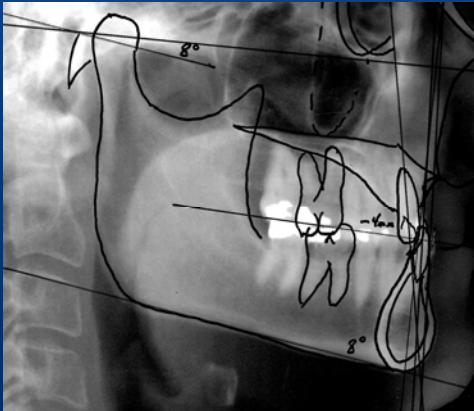




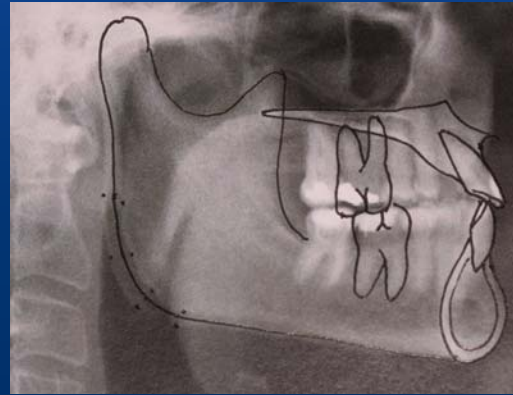


## Orthodontics complete- Ceph tracing

Initial



After



## Transitional bonding teeth nos. 7–11

- Dentsply dentofacial analyzer indicates ideal central incisor dimensions of 11 mm × 9 mm.
- Begin by building up the centrals then move to adjacent teeth
- The restorative material of choice for the upper bonding was Cosmodent microhybrid for the base layer and faced it with Cosmodent microfill.





After restorative position is verified with wax up  
transitional bonding #7-11



After restorative position is verified with wax up  
transitional bonding #7-11

Initial



After Ortho and transitional bonding



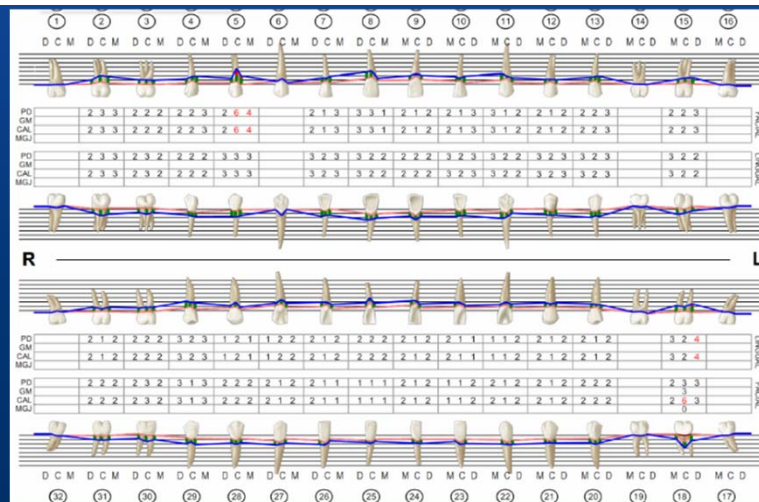


## Phase III Periodontal Examination and consultation

1. Consult with periodontist and send for periodontal exam and therapy as necessary.
2. Place implant in site no. 6 using a surgical guide after preparing site with bone and/or connective tissue grafting as necessary.
3. Perform subepithelial connective tissue grafting for root coverage and increase tissue thickness at tooth no. 18.



## Periodontal Exam





## Periodontal recommendations

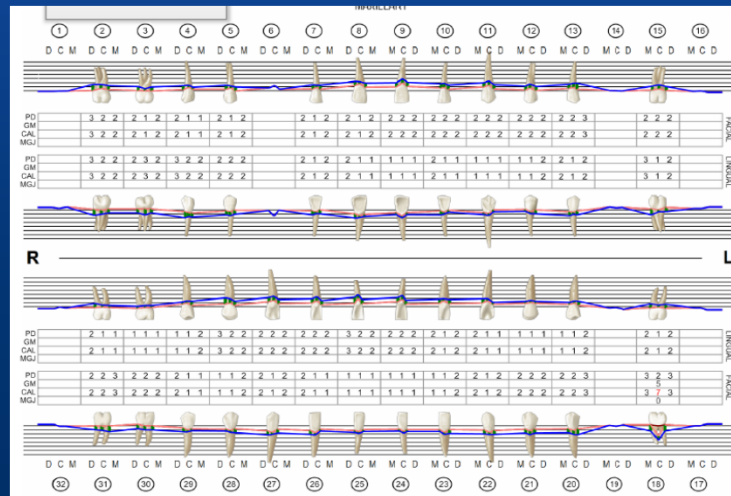
- the pocketing in the #5 area had not resolved so the first thing done was **root planing** and re-evaluation to make sure that this was healthy.
- Consulted with the restorative dentist
- Proposed **placing implants in the #6 site with a ridge split technique, a ridge augmentation in the #19 site and an later #19 implant and subepithelial connective tissue graft in the #18 site**
- The patient would not more forward with the ridge augmentation and implant treatment on #19 due to cost. He did the graft on #18 in conjunction with the dental implant on #6 after the periodontist offered to do the tissue graft on #18 at a **reduced** fee.



At this Point we Begin to see Changes in the Plan



## Periodontal exam 8 weeks after root planing



## Phase IV Tissue grafting 18 and Implant Placement 6 with ridge expansion and bone graft





## Phase IV Tissue grafting 18 and Implant Placement 6 with ridge expansion and bone graft



## Phase IV Tissue grafting 18 and Implant Placement 6 3 weeks post op visit...what happened







## Phase IV-a: tissue graft to repair damage from occlusal guard



## Phase IV-a: tissue graft to repair damage from occlusal guard







## Phase IV-a: tissue graft to repair damage from occlusal guard – final healing

Initial



8 weeks after 2<sup>nd</sup> graft



## Phase IV root coverage on #18

Initial



12 weeks after graft

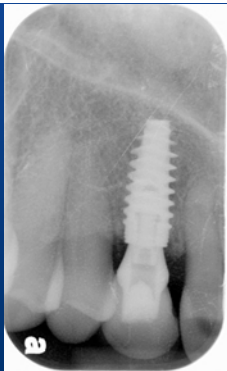




## Phase IV Perio and implant treatment complete



## Phase V: Provisionalization of 6 implant



- The restorative dentist fabricated a composite provisional utilizing a stock titanium abutment on the implant on #6 to shape the tissue and fabricated a maxillary occlusal guard. He was not pleased with the initial provisional and fabricated a second one a few weeks later.



## Phase V: Provisionalization of 6 implant



## Phase V: Provisionalization of 6 implant





## Phase V: Provisionalization of 6 implant

Initial



After Ortho, Transitional bonding, implant #6, provisional crown #6 and grafting #18



## Our Initial treatment plan

### Phase I Diagnostic Workup and Initial Treatment

1. Perform initial examination for decay and mobility, periodontal probing, and full-mouth radiographs.
2. Perform prophylaxis with oral hygiene instruction.
3. Consult with orthodontist and schedule patient for exam, photos, and casts with orthodontist.
4. Provisionalize tooth no. 8 with resin composite and mount casts.
5. Complete the composite mockup/trial smile of the maxillary anterior teeth and core buildups of teeth nos. 30 and 31.

### Phase II Transitional Bonding and Orthodontic Therapy

1. Bond mandibular teeth nos. 20–31 to guide orthodontist in moving the maxillary teeth and opening the vertical dimension.
2. Begin orthodontic therapy in the maxillary arch.
3. When teeth are in the right position, remove orthodontic appliance and perform wax up to verify that teeth can be restored esthetically and functionally.
4. Place thermoplastic retainer to maintain teeth in desired position.
5. Bond teeth nos. 7–11 utilizing Dentsply dentofacial analyzer to determine tooth size.



## Our Initial treatment plan

He would not do any of the treatment in yellow

### Phase III Periodontal Examination, Treatment, and Implant Placement

1. Consult with periodontist and send for periodontal exam and therapy as necessary.
2. Place implant in site no. 6 using a surgical guide after preparing site with bone and/or connective tissue grafting as necessary.
3. Perform subepithelial connective tissue grafting for root coverage and increase tissue thickness at tooth no. 18.

### Phase IV Provisionalization

1. Deliver provisional crown to implant at site no. 6 to shape the tissue.
2. Fabricate and place maxillary occlusal guard after 4 months of implant integration.

### Phase V Posterior Implant Surgery

1. Evaluate bone in posterior mandible and determine need for sinus augmentation and/or bone grafting prior to implant placement.
2. Fabricate a surgical guide for implant placement.
3. Perform bone augmentation as needed and place implants in site nos. 14 and 19.

### Phase VI Provisionalization

1. Verify the vertical dimension of occlusion.
2. Create a wax up to determine final occlusal scheme.
3. Fabricate and deliver a tooth- and implant-borne fixed provisional restoration in the maxilla.
4. Verify esthetics and phonetics.
5. Establish anterior guidance.

### Phase VII Definitive Restorations

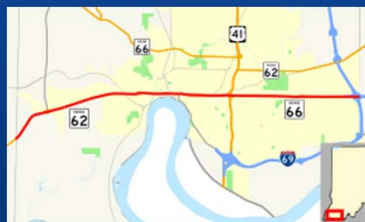
1. Place veneers with contacts restored to leave the cingulum for strength on teeth nos. 7–10 and 22–26.
  2. Place crowns on teeth nos. 3, 11, 12, 20, 21, 29, 30, and 31, and on the implants at site nos. 14 and 19.
  3. Fabricate a custom abutment and a cement-retained implant crown for the implant at site no. 6.
- Replace worn restorations with resin composite restorations on teeth nos. 2 and 18.

### Phase VIII Maintenance

1. Fabricate and deliver an occlusal guard.
2. Place the patient on a 6-month recall schedule for periodontal maintenance.



Sometimes when you take a Journey it is good to have a Map/Plan in case you hit a Detour







## So What did We do?

- Dr. Norton did his best to maintain him and encouraged him to move forward
- The patient has routinely kept his hygiene periodontal maintenance every 4-6 months. We were able to document his progress on 9/25/2013 and 1/10/2018 We are now 7 years out from the transitional restorations on the teeth and the final restorations.
- He has continued to wear his occlusal guard. The patient has had little complications. **The provisional crown #6 coming off 3 times in the last 7 years. He has chipped the composite on tooth #25 only once and was repaired.**

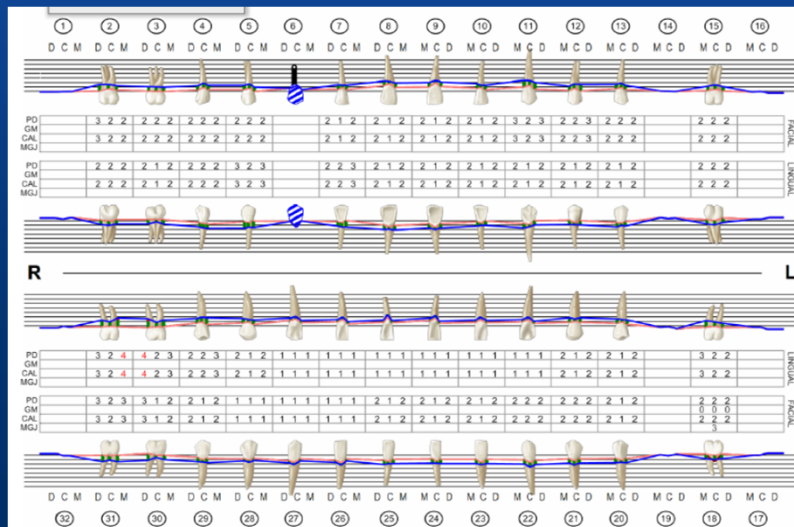


## 6 year Follow up: 2013-FMX





## 3 year Follow Up: Periodontal examine



## 3 year Follow up: 2013





## 7 year follow up: 2018



His gingiva is inflamed and needs to improve his home care



## 7 year follow up: 2018





## Transitional Bonding standing the Test of Time!

2010



2018



## What can we learn?

- ❑ We have many patients who cannot afford complex dentistry and provide us with many barriers to care. This is how things often occur in day to day practice.
- ❑ There are also complications that occur despite our best efforts of interoffice communication.



## What can we learn?

- This case is evidence that when a stable occlusal scheme is achieved that even transitional bonding can stand the test of time with minimal complications.
- Our hopes are that this case shared a way to phase and spread out complex treatment for a severe wear patient.



## Incredible Results

2010



2018





## Incredible Results

2010



2018



Thank you for your attention!

