

# Uprighting, Derotation and Protraction of Mandibular Second Molars into Severely Atrophic Alveolar Ridge Using Mini-Screw Implants

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## ABSTRACT

Moving teeth into severely atrophied alveolar ridges with conventional Edgewise setups is problematic due to possible bone dehiscence, root resorption, and anchorage loss. This report describes successful bilateral up-righting and protraction of mandibular second molars into severely resorbed extraction sites using mini-screw implants as the main anchorage unit in a 59 year old woman.

**Methods:** The mini-screw implants were placed bilaterally in the buccal alveolar bone between first and second premolars. Nickel titanium springs were used to upright and derotate the second molars before protraction into atrophied extraction sites.

**Results:** The second molars were successfully up-righted by 10 months and spaces were closed at 18 months with good posterior occlusion. An increase in alveolar width was noted mesial to the second molars without any sign of root resorption.

**Conclusions:** Up-righting and protraction into atrophic sites using light, continuous forces from mini-screw implant anchorage is feasible.

## LITERATURE SUMMARY

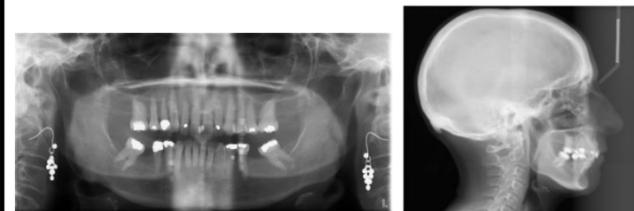
- > The periosteum on the labial and lingual surfaces will normally form bone if teeth are bodily moved slowly into the edentulous areas. If the teeth are moved too rapidly, there is a risk for development of a dehiscence.
- > When teeth move through an edentulous area, it is important to avoid tipping the tooth into the region. The root should, in principle, be moved ahead of the crown to build up bone by exerting a light pressure, thus increasing the density of the bone ahead of the tooth.
- > When a second molar is orthodontically protracted into an extraction site, the second molar will bring its own investing bone with it, and the large bony defect disappears. This is seen more readily in young patients. Older patients seem to have a decreased apposition of new alveolar bone.
- > Root resorption and dehiscence are concerns that are judged on a case-to-case basis.
- > Closed space tends to re-open post-treatment and is usually less than 1 mm.
- > Alveolar crest augmentation and bone grafting prior to orthodontic tooth movement have been recommended to minimize the above noted complications.
- > Patient may benefit from an Accelerated Osteogenic Orthodontic Procedure (Wilckodontics) prior to orthodontic tooth movement.

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## PRE-TREATMENT

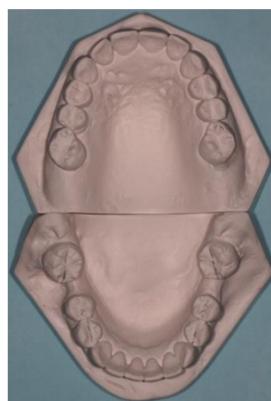
A 59 year old Caucasian female presented for improvement of her posterior occlusion. Historically, she lost all four 1<sup>st</sup> molars secondary to extensive decay when she was 14 years old. Her upper and lower 2<sup>nd</sup> molars were severely rotated, with the lower 2<sup>nd</sup> molars tipped mesially. The extraction sites of the lower first molars were severely atrophic. Skeletally, she was Class II with an ANB of 5.6°. Dentally, she had an end-on occlusion with a tendency toward Class II Div 2 with minimal crowding on the upper and lower arches. The patient also reported that she had received orthodontic treatment 11 years prior.



## CEPHALOMETRIC MEASUREMENTS

SNA (°) = 80.8	FMA (°) = 24	U1-SN (°) = 84.6	L1-NB (mm) = 7.0	Nasolabial Angle (°) = 115.2
SNB (°) = 75.3	Y-Axis (°) = 73.2	U1-FH (°) = 97.3	L1-NB (°) = 30.2	Upper Lip to E-plane (mm) = -5.7
ANB (°) = 5.6	IMPA (°) = 88.3	U1-NA (mm) = 0.8	U1-L1 (°) = 140.4	Lower Lip to E-plane (mm) = -4.4
A-NA Perp (mm) = 3.7	FMA (°) = 57.7	U1-NA (°) = 3.8		

## PRE-TREATMENT DENTAL CASTS



## TREATMENT PLAN

### A. TREATMENT OBJECTIVES

1. Improve patient's occlusion posteriorly
2. Establish/Enhance canine Class I
3. Coordinate upper & lower midlines to the face
4. Establish proper overbite, overjet, and anterior coupling

### B. TREATMENT ALTERNATIVES

1. Comprehensive orthodontic treatment, uprighting of lower second molars, with restorative to replace lower first molars
2. Comprehensive orthodontic treatment with uprighting and protraction of lower second molars
  - a. Alveolar crest augmentation and bone grafting
  - b. Accelerated Osteogenic Orthodontic Procedure (Wilckodontics)
3. No treatment

## TREATMENT PROGRESS

### 1. MOLAR UPRIGHTING BIOMECHANICS



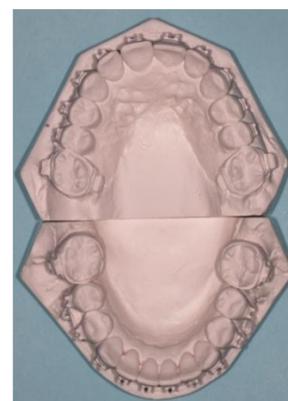
### 2. TAD PLACEMENT & SPRING ACTIVATION



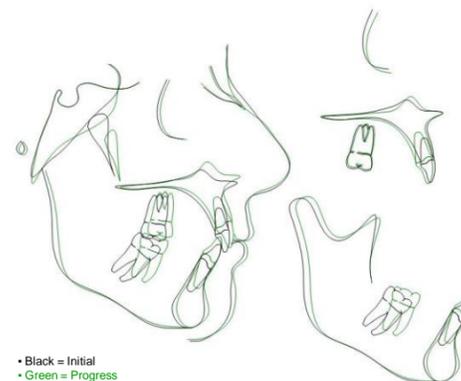
### 3. PROGRESS PHOTOS



### 4. PROGRESS CASTS

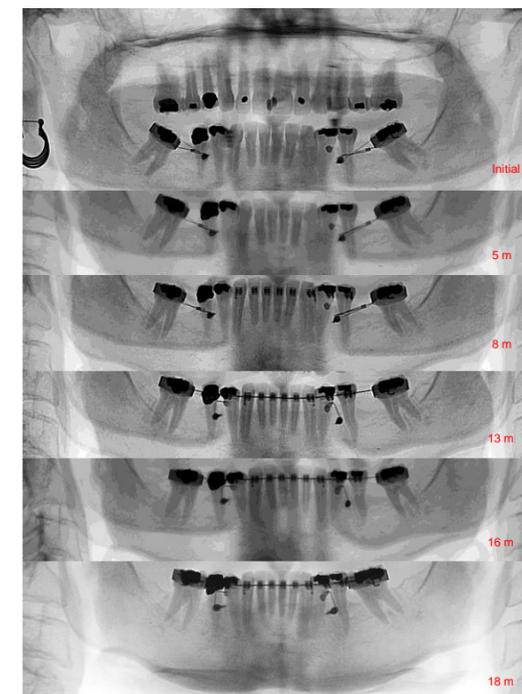


### 5. CEPHALOMETRIC SUPERIMPOSITIONS



• Black = Initial  
• Green = Progress

### 6. PROGRESS PANORAMIC



### 7. BONY SCAN



## DISCUSSIONS

1. Upper and lower second molars were successfully de-rotated. Lower second molars were successfully up-righted and protracted, closing all space at 18 months of treatment without root resorption.
2. On the CT scans, there is buccal and lingual cortical bone on the apical and middle areas of the roots. However, toward the coronal areas of the roots, there may be less than adequate cortical bone and possibly the potential for future dehiscence. This information is not conclusively useful due to not having a pre-treatment CT scan for comparison, and also due to the fact that there are root prominences on all her other teeth.
3. Lower molars ideally should be up-righted beyond vertical position to enhance mesial root positioning and associated bone width in preparation for protracting the molars into the extraction sites.
4. Class I molar and canine are established on the left side. The right side is end-on and a TAD is treatment planned to be placed in the infra-zygoma to distalize the whole segment.
5. Post-treatment considerations are relapse due to supra-crestal fibers and the possibility for periodontal involvement.
6. Patient may have benefitted from alveolar crest augmentation and bone graft of the atrophic sites or Accelerated Osteogenic Orthodontic Procedures prior to orthodontic tooth movement.
7. Patient's experience with TAD is positive with no complications. Patient is very happy with the results achieved thus far.

## ACKNOWLEDGEMENT

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