

Case Report CT: A multidisciplinary approach to treatment, including orthognathic surgery, endodontics, periodontics, and implants for anchorage and restoration

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A 49-year-old female was referred by her general dentist for a complete orthodontic evaluation. Her chief complaint was the presence of an overbite. She had a Class II, Division 1, malocclusion and several teeth were missing, including the right first molar and both second and third molars in the maxilla and both first molars and the right second and third molars in the mandible. The mandibular left first molar had a full coverage restoration and a periodontal defect involving the furcation. There were several restorations, including pin-retained composites in the maxillary central incisors. Her medical history was positive for frequent headaches and sinus trouble. She was currently taking Prozac, Premarin, and Synthroid.

Clinical examination

The patient displayed facial symmetry, decreased vertical lower face height, and a marked labiomental groove with redundant tissue. Her profile was convex due to mandibular retrognathia (Figure 1). Oral hygiene was good, but there were a large number of restorations and an isolated periodontal problem—a 7 mm pocket and furcation involvement of the mandibular left second molar. There was also insufficient attached gingiva buccal to the mandibular left second and third molars.

The dental examination revealed an overjet of 7 mm and an overbite of 12 mm, with the lower incisors impinging on the palatal tissues. The mandibular midline was shifted 3 mm to the left.

Both arches were moderately crowded (Figures 2 and 3). The entire mandibular dentition was lingual to the maxillary dentition except for the mandibular left second molar. Occlusal examination revealed popping of both the right and left temporomandibular joints, soreness to palpation of the muscles of mastication, and a normal range of motion.

Radiographic examination

The panoramic radiograph showed several dental restorations (Figure 5B). Both mandibular condyles appeared well rounded and corticated. The cephalometric radiograph confirmed the short lower facial height (Figure 4). The mandibular plane angle (GoMe to SN) was

Figure 1A-B
Pretreatment photographs.



Figure 1A



Figure 1B



Figure 2A

Figure 2A-C

Pretreatment intraoral photographs



Figure 2B



Figure 2C

Figure 3A-B

Pretreatment study models. Note mandibular dental midline.

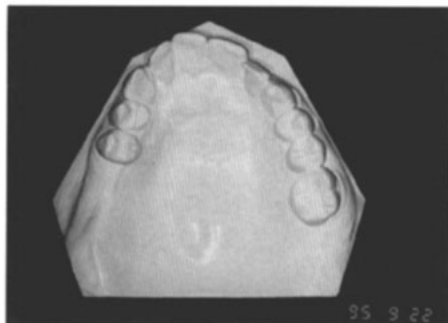


Figure 3A



Figure 3B

Figure 4

Pretreatment cephalometric tracing

Figure 5A-B

Pretreatment radiographs.



Figure 4



Figure 5A



Figure 5B

19 degrees. A marked labiomental groove and redundant lower lip tissue were apparent. The lower incisors were procumbent, with a Holdaway ratio of 8/3 (lower incisor to NB/pogonion to NB). The maxillary incisor-stomion relationship was excessive with the maxillary incisor extruded 3 mm. Skeletal dysplasia was evident with an ANB of 6 degrees and a Wits of +5 mm.

Treatment objectives

Based on the patient's chief complaint and the diagnostic records, the following objectives for treatment were developed.

1. Ideal overjet and overbite in both the anterior and posterior regions.
2. Class I canine relationships
3. Increased lower facial height
4. Improved posterior relationships to facilitate dental reconstruction



Figure 6A



Figure 6B



Figure 6C

Figure 6A-C
Posttreatment intraoral photographs. Maxillary canine is a temporary crown and maxillary first molar will be restored.



Figure 7A

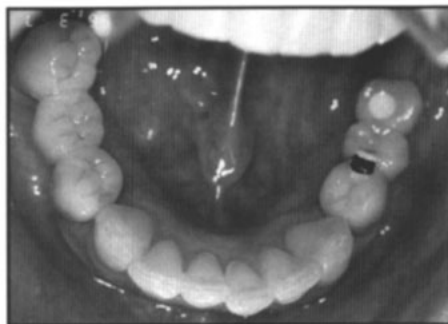


Figure 7B

Figure 7A-B

A: After reconstruction. Note rest seat on the maxillary second premolar for a removable partial prosthesis.

B: After placement of the prostheses. Bridge to implant is removable (female-male to fixed crown). Mandibular left bridge used only the distal root and is very stable.



Figure 8A

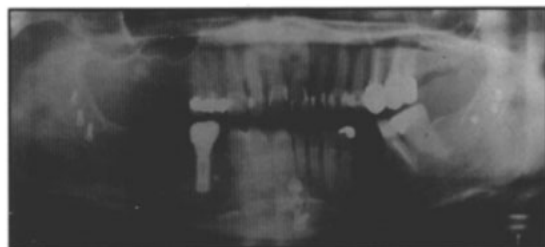


Figure 8B

5. Coincident dental midlines

General plan of treatment

Because this approach to treatment would require orthognathic surgery and the placement of an implant, the first step was to involve an oral and maxillofacial surgeon. The patient accepted the recommendations for an implant in the mandibular right first molar area and mandibular advancement surgery. The implant was to be used

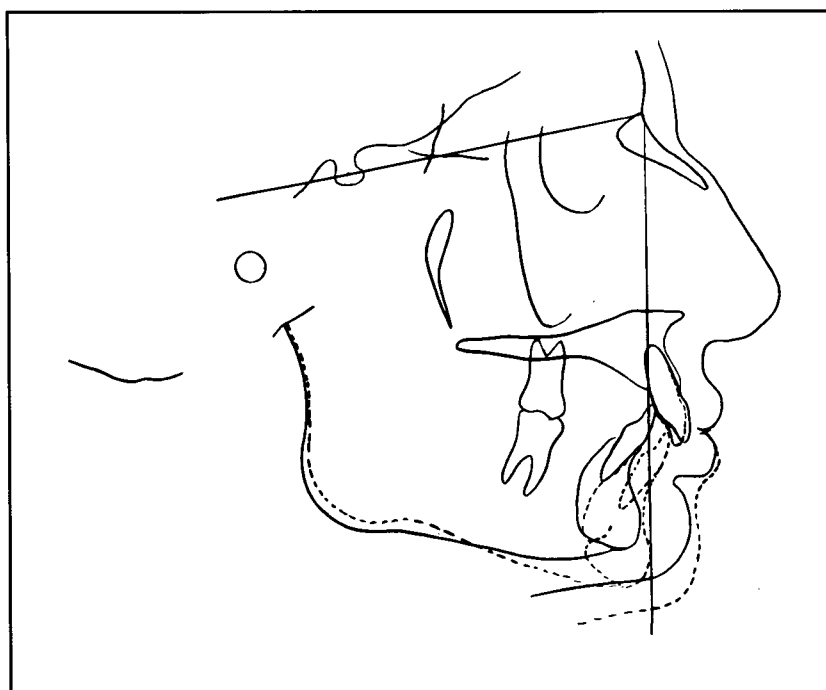


Figure 9

first as anchorage to correct the mandibular dental midline and retract the mandibular anterior teeth, then subsequently as a prosthetic abutment.

Full fixed orthodontic appliances would be used to align all teeth and coordinate the arches for the orthognathic surgery.

Before orthodontic treatment was initiated, the mandibular left second molar was hemisected, following root canal therapy on the distal root.

Figure 8A-B
Posttreatment radiographs.

Figure 9
Posttreatment superimposed cephalometric tracings.



Figure 10A

Figure 10A-B
Postreconstruction
photographs.



Figure 10B

This was done in order to keep as much tooth structure as possible for the eventual dental reconstruction. Also, a free gingival graft was placed to provide an adequate zone of attached gingiva for the distal root of the mandibular left second and third molars.

Treatment progress

Prior to starting orthodontic treatment, the implant was placed in the position determined jointly by the orthodontist, oral surgeon, and restorative dentist. Placing an implant prior to orthodontic treatment and orthognathic surgery is much more complex than positioning it post-treatment. The team must take into account future dental and maxillomandibular surgical movements, which are difficult to accurately predict. The position of the implant is based on orthodontic, occlusal, and prosthetic objectives. A surgical template to duplicate the agreed-upon position was fabricated, and the oral surgeon used it as a guide during the surgical placement. A provisional restoration for the implant was placed 6 weeks after the surgical procedure. The temporary crown had the dental anatomy of a premolar, and a premolar band was placed to provide for the orthodontic attachment.

A maxillary occlusal splint was fabricated to allow for the placement of the mandibular fixed appliance. It was adjusted for even, flat plane contact. After 3 months, maxillary bands and brackets were placed. After 8 months, with several rebondings and rebandings because of the occlusion, the teeth were aligned and .018 x .025 stainless steel archwires were in place and ready for the orthognathic surgical procedures. The implant had provided anchorage to move the

mandibular right canine and first premolar distally. This helped correct the mandibular dental midline, which was deviated to the left. The implant was also used for anchorage to upright the mandibular incisors, which were moved lingually during treatment. Without the implant, these movements would have required the application of very difficult and complex extraoral forces.

The surgical procedure consisted of mandibular lengthening of 6 mm and genioplasty augmentation. Orthodontic finishing took 5 months and the case was debanded 13 months after initiation. As part of the finishing procedures, the mesiodistal widths of the incisors were reduced to help close the triangular spaces created by previous loss of the gingiva papilla.

At the completion of treatment, full coverage Essix retainers were fabricated and fitted. These were to be used during the reconstruction as a template for provisional restorations.

Final results

All objectives of treatment were achieved. Overjet and overbite relationships are ideal, the canines are Class I, and the dental midlines coincident (Figure 6). The vertical dimension has increased, lip posture has improved (Figure 10), and the patient is ready for prosthetic reconstruction. The implant has remained stable and will serve as an abutment for a fixed prosthesis (Figure 7).

Cephalometric superimpositions of the initial and final radiographs show an increase in lower facial height of 10 mm, mandibular advancement of 6 mm, and uprighting and retraction of the mandibular incisors (Figure 9). There was no change in the patient's temporomandibular joint noise, but headaches and muscle soreness have decreased.

Conclusion

Orthodontic treatment for the partially edentulous patient can present many challenges for the orthodontist. A multidisciplinary approach, including the use of implants for anchorage and restoration, may be necessary.

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