Interdisciplinary Treatment Planning in Transitioning Periodontally Hopeless Dentition

A clinical case review

INTRODUCTION

Decreasing risk in an advanced periodontally diseased dentition presents a great challenge for both dentist and patient. For the patient, confronting the reality of transitioning from a natural, hopeless dentition to a removable prosthesis is likely the greatest oral change he or she will ever experience.[1] Psychological distress and functional concerns due to tooth loss and the need to adapt to a new and diminished masticatory system are compounded by additional challenges, such as a decreased sense of taste and temperature. A thorough and frank discussion with a patient explaining the differences and expectations between chewing with natural teeth versus dentures is critical.[2] Additionally, a full understanding of the differences between tissue-supported and implant-retained dentures enables patients to make an educated choice for their future. Having this dialogue allows the patient to be more familiar with the treatment options available and adopt a more accepting attitude toward the advice and professional suggestions the dentist provides.

The following case demonstrates staged treatment utilizing different modalities to treat a patient with advanced periodontal disease. While reducing overall risk and improving prognosis should always drive treatment decisions, orthodontics and restorative dentistry can delay and stage the ultimate loss of periodontally involved teeth while providing acceptable interim outcomes.[3]

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CLINICAL CASE OVERVIEW

Patient History and Chief Complaint

A 54-year-old woman presented with a chief complaint of being unable to eat properly (Figure 1). She was self-conscious of her upper teeth because they were shifting and moving (Figure 2) and was concerned about a missing lower anterior tooth (Figure 3). Throughout her life, the patient had irregular dental visits that were usually prompted

by pain and resulted in extraction. The patient was treated in the practice one year earlier for pain in tooth No. 21 (Figure 4). The tooth was treated with root canal therapy, a core build-up, and full-coverage crown. At the time, the patient was informed she had advanced periodontal disease and advised to schedule a comprehensive treatment plan appointment to address the hopeless prognosis of numerous teeth (Figure 5 and Figure 6). She appeared to understand and said she was not surprised by the diagnosis, but she did not return to the practice until a year later. The patient is an employee at a local grocery store, with limited discretionary income.

DIAGNOSTIC OPINION

Periodontal

The examination revealed severe bleeding upon probing throughout the mouth. Probing depths were in the range of 5 mm to 8 mm around teeth Nos. 7 through 10 and No. 31. Radiographic bone loss greater than 4 mm existed throughout the mouth, with intrabony defects found on teeth Nos. 7 through 10, 28, and 30. Teeth Nos. 7 through 10 had class III mobility, while Nos. 6, 24, 28, and 30 exhibited class I mobility. Gingival recession of more than 2 mm was noted on teeth Nos. 6 through 8, 11, 20, 22, 24, 28, and 31 (Figure 7).

Risk: *High*
Prognosis: *Poor (hopeless teeth Nos. 7 through 10 and No. 30)*

Biomechanical

Upon clinical examination, two acceptable amalgam restorations were found. Tooth #28 had a small overhang of the filling, while tooth No. 31 had an extensive amalgam restoration compromising the structural integrity of the tooth. There was no indication of active caries.

Risk: *Moderate*
Prognosis: *Fair*

Functional

The patient had minimal attrition. Secondary occlusal traumatism was noted on teeth Nos. 22, 24, and 28. Clinical examination revealed a unilateral click on the right side upon opening. Due to the absence of the posterior teeth, the patient developed a collapsed bite with a loss of vertical dimension (Figure 8). Differential diagnosis was that the patient exhibited occlusal dysfunction.

Risk: *Moderate*
Prognosis: *Fair*

Figure 1: The tooth No. 8 shifted labially, and the incisal edge is outside of the wet and dry lip border.

Figure 2: Excessive diastema as a consequence of the patient's chewing pattern and advanced periodontal disease.

Figure 3: Note the extent of the advanced periodontal disease on tooth No. 8.

Figure 4: Distal shift of the premolars as a consequence of missing molars.

While reducing overall risk and improving prognosis should always drive treatment decisions, orthodontics and restorative dentistry can delay and stage the ultimate loss of periodontally involved teeth while providing acceptable interim outcomes.

Dentofacial

In repose, teeth Nos. 7 and 8 were labially positioned compared to the adjacent teeth (Figure 9 and Figure 10). The upper lip displayed medium dynamics, whereas the lower lip exhibited high dynamics.

Risk: *Medium to High*
Prognosis: *Poor*

Medical

The patient is a healthy 54-year-old woman without any medical conditions or contraindications to dental care.

Risk: *Low*
Prognosis: *Good*

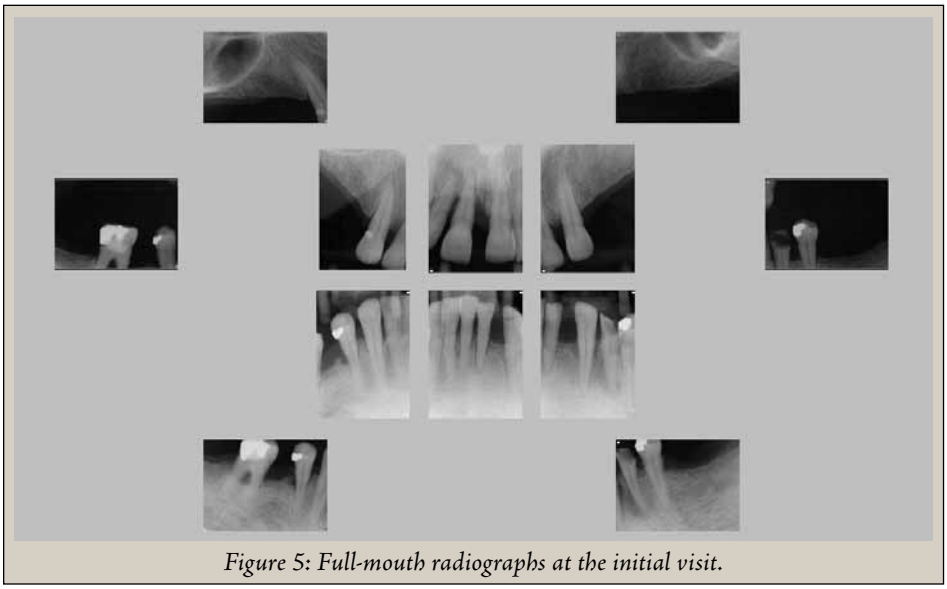

Figure 5: Full-mouth radiographs at the initial visit.

TREATMENT GOALS

After discussing with the patient the high risk periodontal condition of her teeth while being mindful and sensitive to her concerns, realistic treatment goals were established. The treatment goal for the mandibular arch was to stabilize the periodontal disease and create a favorable condition for future restorative work. In the maxillary arch, the goal was to treat the periodontally hopeless situation by removing all remaining teeth and allowing the bone and tissue to heal to establish a stable, healthy environment for implant placement. The subsequent plan was to fabricate an implant-retained full maxillary denture. Overall, the final outcome was to ensure stable second premolar occlusion.

TREATMENT PLAN AND PHASES

With the patient's input, the following treatment plan was developed and planned in phases.

1. Remove all remaining upper teeth and fabricate an immediate full denture.
2. Extract tooth No. 31 and perform limited orthodontic treatment in the lower arch.
3. Place 4 tissue level implants in the upper arch and one bone level implant in the lower arch.
4. Fabricate an upper implant-retained full denture.
5. Place an implant-retained abutment and crown in the location of tooth No. 29, and create a direct composite pontic to temporarily close the space created by missing tooth No. 23.

Phase I:

Extractions, Immediate Denture, and Orthodontics

All maxillary teeth were removed and an immediate complete denture delivered (Figure 11), thereby lowering the patient's periodontal risk in the maxillary arch. This treatment followed all necessary record taking and pre-delivery appointments required to ensure a successful result, which is not the focus of this article. Additionally, tooth No. 31 was removed to improve the patient's biomechanical risk from moderate to low. The limited orthodontic treatment on the mandibular arch began concurrently with the extractions and maxillary denture delivery. The purpose of the limited orthodontic treatment was to close the gaps between the lower teeth and try to stabilize their periodontal condition for the interim by improving the vertical load on the compromised, periodontally involved teeth.[4] Orthodontic treatment also created a more optimal tooth alignment in the lower arch. This was deliberately planned in preparation

for and gradual transition into implants due to their periodontal risk and poor prognosis. The transition could be into an implant-retained fixed crown and bridge prosthesis or an implant-retained complete lower denture when necessary. The decision would depend upon the patient's desires and financial concerns.

Phase II:

Planning Implant Placement

Following a 4-month waiting period from the delivery of the maxillary immediate denture, a CAT scan of the maxillary arch was taken, with subsequent computer planning to determine the optimal location for 4 maxillary implants. The plan was to place the implants in the positions of the canines and second premolars (Figure 12). Anatomical landmarks, particularly in the maxillary arch, usually do not allow implant parallelism. Fortunately, Locator attachments (Zest Anchors, Inc. Escondido, CA) provide some allowance for the expected divergence, although it is still best to try to achieve as much parallelism as possible between implants during placement (Figure 13). The more parallelism between implants, the easier denture seating becomes and less resultant wear of the plastic retentive gaskets that fit over the Locator attachments occurs. Clearly decreased gasket wear results in improved longevity and decreased need for replacement during the life of the prosthesis.

Figure 6: Irregular mandibular occlusal plane and extensive advanced periodontal disease.

Figure 7: Tooth No. 30 has furcation involvement and a hopeless prognosis.

Figure 8: Loss of occlusal vertical dimension as a consequence of the absence of posterior teeth.

Figure 9: Flaring of the upper teeth due to the advanced periodontal disease.

Figure 10: Note the labial position of tooth No. 8 in comparison to the adjacent teeth.

Figure 11: Lips in repose with immediate denture and finished orthodontic treatment.

Phase III:

Implant Placement

Following implant placement planning, the surgical phase commenced, during which 4 tissue level implants were placed (Figure 14) in the upper arch and one bone level implant was placed in the No. 29 position (Figure 15).

Phase IV:

Post-Orthodontics and Replacement of No. 23

After completing orthodontic treatment, a bonded lingual wire was placed on the lower anterior teeth. The benefit of this wire was that it accomplished three goals:

1. It served as a bonded retainer following orthodontic treatment.
2. It acted as a periodontal splint for the periodontally compromised teeth.[5]
3. It anchored the composite pontic in the No. 23 position (Figure 16).

A direct composite pontic was bonded onto teeth Nos. 22 and 24 and the lingual wire as a temporary esthetic solution until the patient could determine how and when she wanted to proceed with further treatment. Long term, the patient knew and understood that she has two options:

1. Receive an implant-retained fixed bridge extending from teeth Nos. 23 through 26, with implants in the Nos. 24 and 26 location, or
2. Opt for an implant-retained removable appliance.

Both options represented significantly better choices than a conventional removable partial or full denture (Figure 17).

Phase V:

Delivery of Final Prosthesis

In the last phase of the present treatment plan, the maxillary implant-retained denture was delivered (Figure 18 and Figure 19),

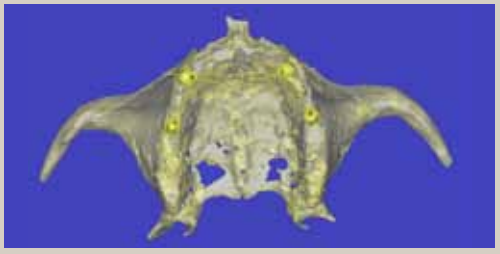

Figure 12: Ideal position of dental implants in the upper arch allows the patient to add two more implants in the future to restore the first molars and transition from an implant-retained to an implant-supported prosthesis.

Figure 13: Lateral view of the implants shows divergence in two planes.

Figure 14: Ideal position of the implants in the upper arch.

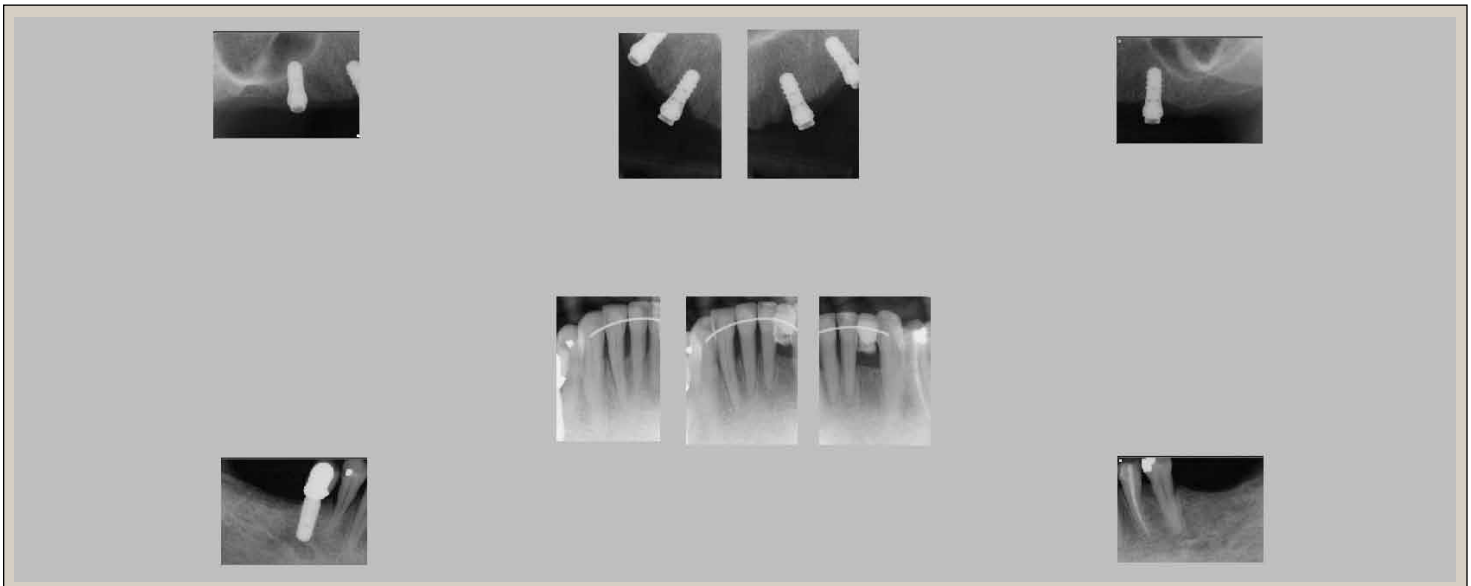

Figure 15: Full-mouth radiographs after treatment.

Figure 16: Closed spaces between the premolars and canines after orthodontic treatment and bonded retainer that also serves as a periodontal splint.

Figure 17: Improved occlusal plane in the lower arch. The No. 23 pontic was purposely fabricated shorter so pressure during mastication would not dislodge it.

Figure 18: The upper denture wax-up mounted in centric relation on the articulator.

Figure 19: Final upper prosthesis in the mouth.

Figure 20: Final lower arch shows interdental spaces closed, implant retained porcelain-fused-to-metal crown in the space of No. 29, and bonded composite pontic in the place of No. 23.

Figure 21: Intercuspation in the posterior region as a result of limited orthodontic treatment.

Figure 22: Elevated vertical occlusal dimension now enables significantly improved mastication, even with second premolar occlusion.

Figure 23: Final result demonstrates improved occlusal vertical dimension and occlusal planes.

along with the implant abutment and porcelain-fused-to-metal crown for tooth No. 29 (Figure 20). The occlusal vertical dimension was greatly improved (Figure 21 and Figure 22) following the limited orthodontics, and the patient was able to enjoy the benefits of a much more efficient masticatory system (Figure 23).[6]

COMMENTARY

As for future treatment planning on the mandibular arch, the patient realized that the current anterior treatment is not a long-term solution and that she currently has two choices available to her in the future, assuming no drastic changes occur. When the patient decides or it becomes necessary to address the mandibular anterior area, her options are to receive an implant-retained bridge extending from teeth Nos. 23 through 26, or an implant-retained removable prosthesis. Both options represent significantly better choices than a conventional removable partial or full denture. If the patient chooses an implant-retained fixed 4-unit bridge extending from Nos. 23 through 26, she will have the option to phase and finalize restoration of her remaining mandibular arch with fixed, implant-retained options and avoid a removable prosthesis. This future treatment plan could be staged and phased, which is crucial for a patient on a limited budget.

An additional consideration is the patient's high lower lip dynamics (i.e., she shows all of her lower anterior teeth, as well as her gingival tissues, during maximum smile). This presents a high risk with a fair to poor prognosis when the time comes for restoration.

It also is challenging to preserve bone and gingival architecture for esthetic emergence profiles of pontics if the abutments are too far apart. Until the patient can continue optimal treatment with a 4-unit fixed cantilever implant bridge from teeth Nos. 23 through 26, with implants in the Nos. 24 and 26 locations, maintaining teeth Nos. 24 and 26 will be important to help preserve the crestal bone and allow a more favorable emergence profile of her future pontics. While her dentofacial risk assessment would not change, her dentofacial prognosis and result would improve.

CONCLUSION

Transitioning from a natural dentition to a removable prosthesis is very traumatic for patients; this can be mitigated through frank discussion and careful consideration of options and expectations. Whenever possible, it is best to encourage patients to restore their broken dentition with prostheses that are implant-retained because they do not interfere with daily functions like eating, talking, and smiling as much as a tissue-supported prosthesis. Sometimes delaying the removal of all remaining teeth at one time and allowing proper staging can help make the transition easier for patients. It is rare that a dentition is in such dire condition that it necessitates removal of all remaining teeth at once. Selecting those teeth that can be maintained for a few extra years, with great cooperation and vigorous periodontal maintenance from the patient,[7] can allow staging and delivery of an optimal treatment plan for the future. In difficult financial times and for patients with a limited budget who cannot afford an ideal treatment plan all at once, this solution addresses immediate needs and provides stability until long-term options are attainable.

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