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First molar replacement with an osseointegrated implant

First molar replacement with an osseointegrated implant

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The effective use of two osseointegrated Brånemark implants for the replacement of a single first molar is described. A first molar lost to endodontic failure was replaced using two 10-mm titanium fixtures in the area previously occupied by the mesial and distal roots of the molar. The use of multiple fixtures in the molar area provided a better distribution of forces to the alveolar bone. At 1-year recall, the patient exhibited excellent oral hygiene and normal function. Adequate bone dimensions are a prerequisite to this treatment. (Quintessence Int 1990;21:61-65.)

Introduction

The efficiency of the Brånemark method of osseointegration for restoration of the completely edentulous jaw is well documented.¹⁻⁵ Restoration of the partially edentulous patient using osseointegration is also illustrated in the dental literature.^{6,7} Replacement of the single tooth using a single osseointegrated implant is also reported^{8,9} as a viable treatment method; however, most examples of single-tooth replacement are illustrated by anterior teeth.

This article describes the effective use of two osseointegrated Brånemark implants for the replacement of a single molar. Adequate bone dimensions are a prerequisite to this treatment.

Case report

Patient history

The patient was a 39-year old woman in excellent general health and with no known allergies or sensitivities to medications. However, she had difficulty with previous restorative and endodontic therapy, particularly



Fig 1a Preoperative clinical view of a long-standing acrylic resin provisional fixed partial denture in the mandibular left posterior area to replace the first molar.

in the mandibular left posterior area. Endodontic failure led to the loss of the first molar 2 years before the initial examination. Efforts to replace the missing tooth were incomplete when the patient presented for prosthodontic evaluation (Fig 1a).

The patient's primary concern focused on the difficulty of, and her frustration in, performing ideal plaque control procedures in the area of the provisional fixed partial denture. She expressed a desire to restore the area with individual teeth.

Clinical and radiographic examination

Initial clinical evaluation examination revealed a severely worn acrylic resin provisional fixed partial denture, replacing the first molar, extending from the first

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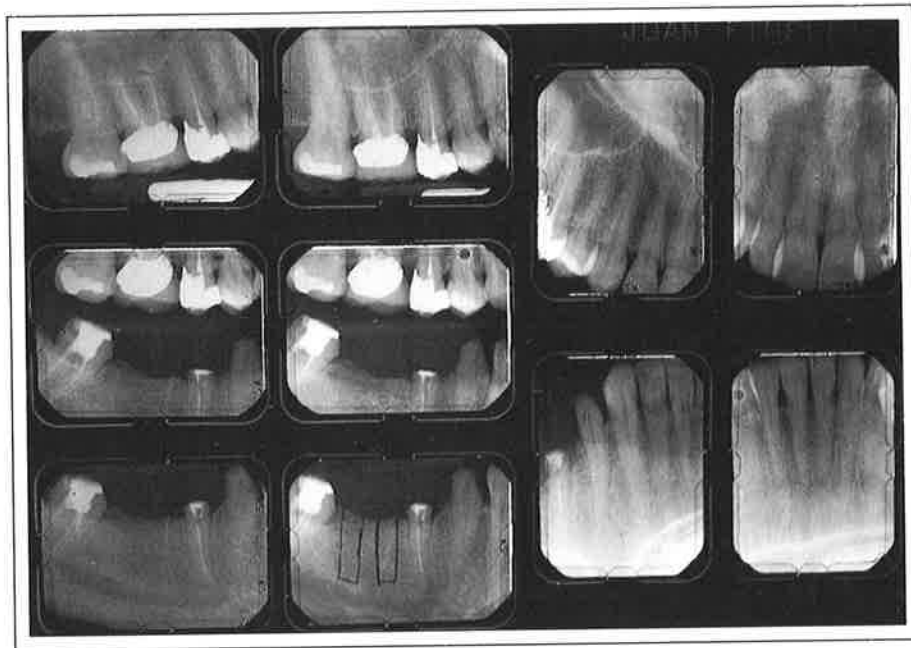


Fig 1b Preoperative radiographs indicate adequate mature bone available for fixture placement in the first molar area.

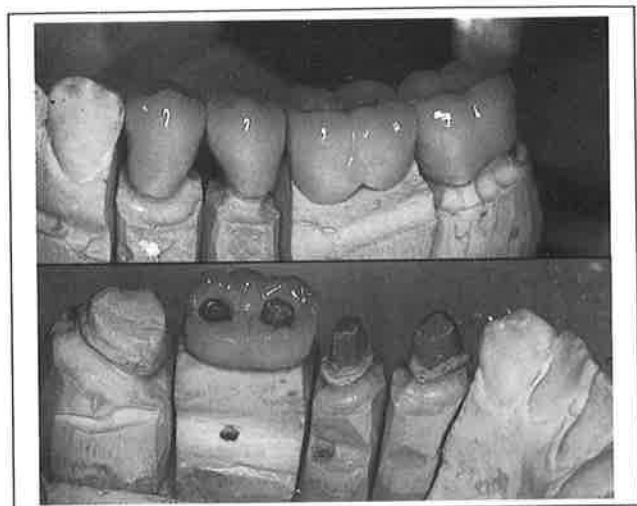


Fig 2 (top) Facial view of the completed individual restorations. (bottom) Holes in the central fossa of tooth 19 provide access to the gold prosthetic screws.

premolar to the second molar. Periodontal health in the area appeared clinically excellent. Radiographic examination (Fig 1b) indicated completed endodontic treatment for the second premolar and second molar. The first premolar had been prepared for a complete crown, without indication for endodontic treatment.

Treatment

A precision surgical guidestent,⁵ fabricated after re-preparation of the abutment teeth and restoration of the second premolar with a cast gold post and core, enabled the surgical placement of two 10-mm titanium Brånemark fixtures (implants). These fixtures were placed in the area previously occupied by the mesial and distal roots of the mandibular left first molar.

During the initial healing period, the patient continued to wear a newly fabricated four-tooth provisional fixed partial denture, which had adequate relief in the pontic area to prevent any pressure on the surgical site.

Following the 3-month healing period, the second stage of the surgical procedure was performed. Three-millimeter titanium abutment connectors were securely fastened to both fixtures.

To obtain an accurate relationship between the titanium fixtures, the impression copings were joined together using autocuring acrylic resin. Conventional retraction of the gingival sulcus tissues was used, and an elastic impression was made using vinyl polysiloxane. After the master impression was made, the acrylic resin provisional restoration was recemented to the abutment teeth. The area beneath the pontic was modified with additional acrylic resin to contact the abutment connectors lightly; however, no cement was used over the abutment cylinders.¹⁰

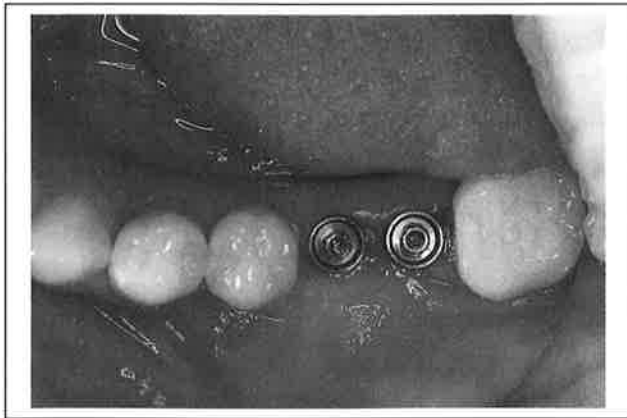


Fig 3 Conventional porcelain-fused-to-gold crowns are cemented individually to the abutment teeth. Titanium abutments are positioned in the mesial and distal root areas.

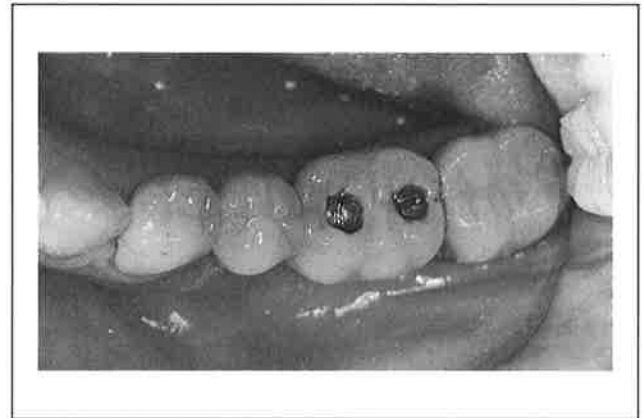


Fig 4 The final single-tooth, tissue-integrated prosthesis replacing the mandibular left first molar restores the integrity of the arch.



Fig 5 The buccolingual dimensions of the single-tooth, tissue-integrated prosthesis provides normal contours and esthetics.

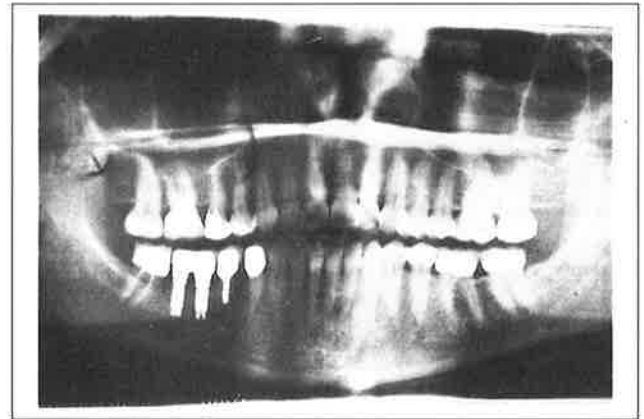


Fig 6 Postoperative pantomograph illustrates an intact complete dentition.

The laboratory procedures included the fabrication of individual crowns, made of porcelain fused to high-gold-content alloy, for the first and second premolars and the second molar. Two gold prosthetic cylinders securely fastened to the brass abutment analogs were incorporated into the substructure for the tissue-integrated molar replacement. Porcelain was applied to the tissue-integrated prosthesis framework for the first molar. The dropping of porcelain powder into the screw access openings from the occlusal surface was avoided (Fig 2).

Delivery of the final prosthodontic restoration included confirmation that proximal contact, allowed the patient to perform traditional oral hygiene pro-

cedures using dental floss between the restored teeth and the tissue-integrated prosthesis. The crowns were cemented to the teeth with zinc oxyphosphate cement (Fig 3). Delivery of the porcelain-fused-to-gold, tissue-integrated molar replacement (Fig 4) followed thorough removal of all excess cement. The buccal and lingual contours of the tissue-integrated prosthesis, as well as the individual crowns, restored the arch alignment, the occlusal plane, function, and esthetics (Fig 5).

The postoperative pantomograph (Fig 6) illustrates the completed restoration of the mandibular left posterior. The preoperative periapical radiograph (Fig 7a) clearly shows the inferior alveolar canal and proposed

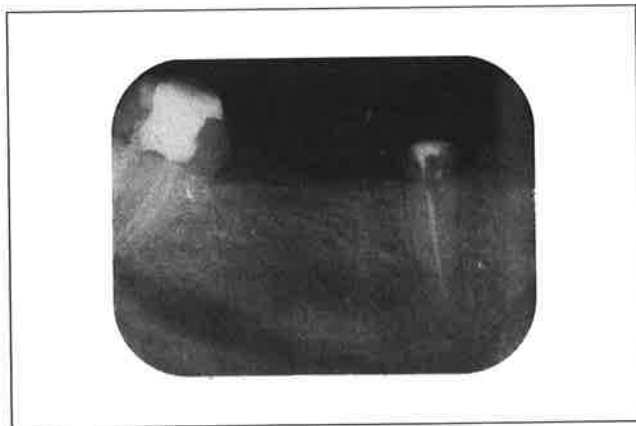


Fig 7a Preoperative periapical radiograph shows the inferior alveolar canal and proposed implant receptor site.

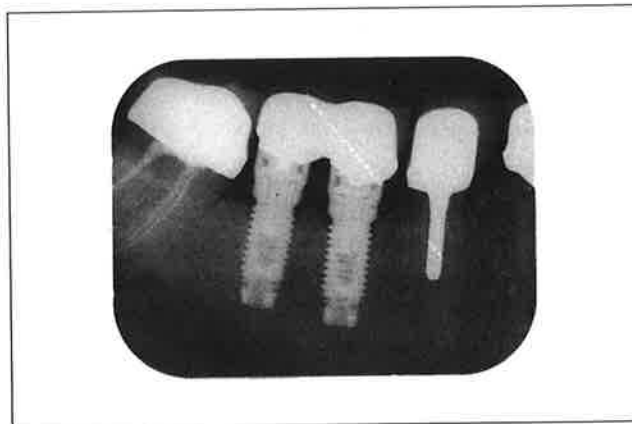


Fig 7b Postoperative periapical radiograph confirms the accurate fit of the individual conventional crowns and the single-molar, tissue-integrated prosthesis.

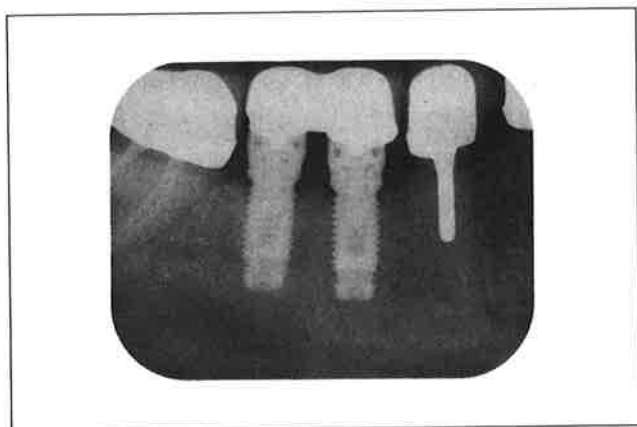


Fig 7c Radiograph 1 year postoperatively.

implant receptor site. The postoperative periapical radiograph (Fig 7b) confirms the accurate fit of the individual conventional porcelain-fused-to-gold crowns and the single-molar, tissue-integrated prosthesis at the time of delivery. Radiographic examination of the treated area 1 year later indicated a stable periodontal condition for the restored teeth, with little or no bone loss associated with the osseointegrated fixtures (Fig 7c).

Oral hygiene

After the restoration was completed, the patient's level of frustration regarding oral hygiene techniques was alleviated. Plaque-control instruction included the use of a custom-angled end-tufted toothbrush, Superfloss

(Educational Health Products, Inc) between the two titanium abutments, an interproximal brush between the implant-supported molar and the adjacent natural dentition, and Peridex oral rinse (Procter & Gamble) as a plaque-suppressing agent.

One year following the delivery of the final prosthesis, the patient continued to exhibit superb oral hygiene and indicated that she enjoyed normal function without conscious recollection of her partial edentulism.

Discussion

Although conventional fixed partial prosthodontics would traditionally have been prescribed for a patient presenting with this clinical condition, the Brånemark method of osseointegration was used because of the patient's strong desire to avoid having a splinted prosthesis and her desire to have this quadrant restored with individual restorations.

Summary

A method of replacing a missing single molar using two osseointegrated fixtures has been described. This clinical example illustrates a conservative approach to prosthodontic treatment that fulfilled the patient's desire for individual-tooth restoration and simultaneously restored integrity of the arch, function, and esthetics.

The use of osseointegrated fixtures should be considered a conservative approach to the replacement of lost molars. Availability of single-tooth replacement systems compatible with Brånemark osseointegrated

fixtures permits the use of a single fixture to accomplish the same clinical results; however, it is my opinion that multiple fixtures in the molar area provide better distribution of forces to the alveolar bone.

In the mandibular arch, the inferior alveolar canal may prevent the placement of long fixtures. However, it appears that the stability provided by two 10-mm long osseointegrated fixtures yields a bone-anchored restoration with a crown/root ratio similar to that of the natural dentition. It is my opinion that use of two fixtures offers greater prosthesis stability for molar replacement than does the use of a single fixture, not because the strength of the single-fixture osseointegrated interface cannot withstand functional forces, but rather because the distribution of stress to the contact areas of the machined screw joint components improves when multiple abutments are used.

Additional long-term studies are needed to ascertain the effectiveness of this treatment method.

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