
Four Single-Tooth Implants as Supernumerary Premolars in the Treatment of Diastemas and Microdontia: Report of a Case

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The osseointegration concept involving single-tooth implants has become a valuable treatment component in many orthodontic situations. This case report illustrates the use of single-tooth implants as supernumerary teeth in the treatment of diastemas.

(INT J ORAL MAXILLOFAC IMPLANTS 1998;13:706-709)

Key words: single-tooth implants, supernumerary teeth

Brånemark's osseointegration concept involving the use of titanium implants has been in clinical use since 1965.¹ It was originally intended for completely edentulous patients and later found useful application in partially edentulous patients with predictable and successful results.² Implants have also been used as attachments for hearing aids, prosthetic ears and noses, and various other maxillofacial prostheses.^{3,4} Wide application of the technique by other disciplines, such as orthopedics, to anchor artificial arms and legs is also well documented. Orthodontic applications involving the use of implants for dental and facial orthopedic anchorage have been reported.⁵ Some of these have taken advantage of the development and long-term predictability of single-tooth implants,⁶ the most common being maxillary lateral incisor agenesis and missing central incisor following trauma.⁷ This case report describes the use of single-tooth implants in the form of supernumerary teeth.

Case Report

A healthy 16-year-old white female patient presented for orthodontic evaluation. Her chief complaints were that she did not like "the spaces between her teeth" and wanted her lips to be "thicker and more to the outside."

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Clinical examination revealed the following: the patient's profile was straight with rather thin and flat lips (Fig 1). Intraorally, a Class I malocclusion with bilateral crossbite and anterior edge-to-edge bite was noted. There were spaces between the teeth associated with a relative microdontia (Table 1).⁸ A total of 12.5 and 11.7 mm of space was measured in the maxillary and mandibular arches, respectively (Fig 2). Oral hygiene was good, the periodontium appeared healthy, and probings were all within normal limits. Pretreatment panoramic radiograph revealed missing third molars. The dentition was not restored; however, proximal carious lesions were seen on all first molars. The bone level appeared to be within normal limits, and there was good overall root parallelism (Fig 3).

Treatment Plan. The objectives in the treatment of this malocclusion were to (1) solve the space problem between the teeth, (2) advance the incisors to achieve better lip support, (3) achieve normal overbite and overjet relationships, and (4) reduce the bilateral crossbite.

Closing the diastemas orthodontically by bringing the teeth together would upright the anterior teeth even more as they were moved lingually. This would have an adverse effect on the profile and therefore would not address one of the patient's chief complaints. Furthermore, a high tendency for future relapse could be expected with such a procedure if some type of permanent splinting of all the teeth was not provided. The only remaining feasible options to solve the space problem without bringing the anterior teeth lingually were to redistribute the spaces as

Table 1 Mesiodistal Diameter of the Patient's Teeth as Compared with the Norm*

Tooth	Mediodistal diameter (mm)	
	Patient	Norm
Maxillary		
Central incisor	6.68	8.67
Lateral incisor	5.52	6.78
Canine	6.54	7.49
First premolar	5.65	6.60
Mandibular		
Central incisor	4.48	5.46
Lateral incisor	5.16	5.92
Canine	5.23	6.58
First premolar	5.77	6.78

*From Moyers RE et al.⁸



Fig 1 Pretreatment facial profile.



Figs 2a to 2c Pretreatment intraoral photographs.

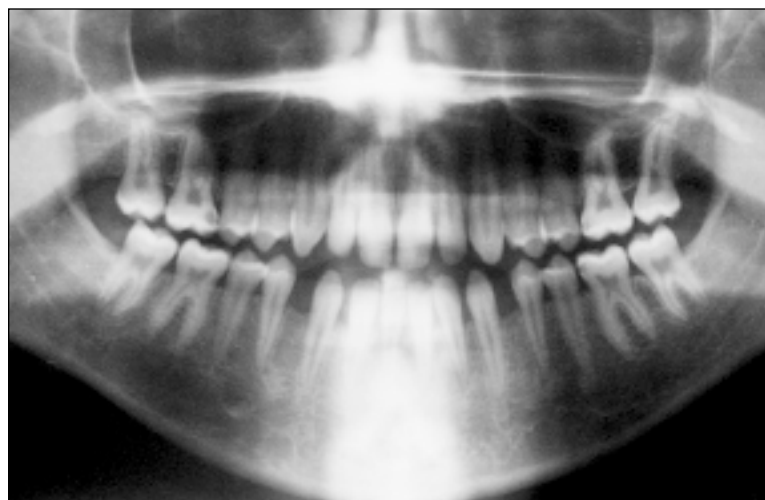


Fig 3 Pretreatment panoramic radiograph.



Figs 4a and 4b Occlusal views of maxillary and mandibular arches after orthodontic space distribution and implant placement.

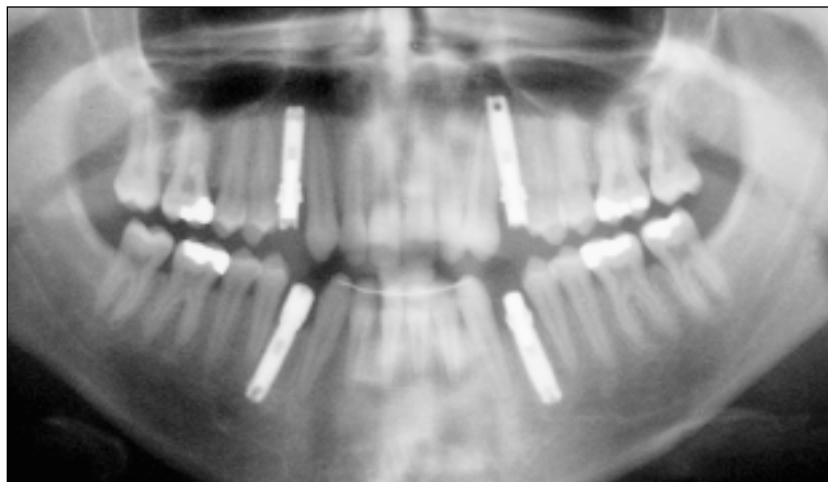
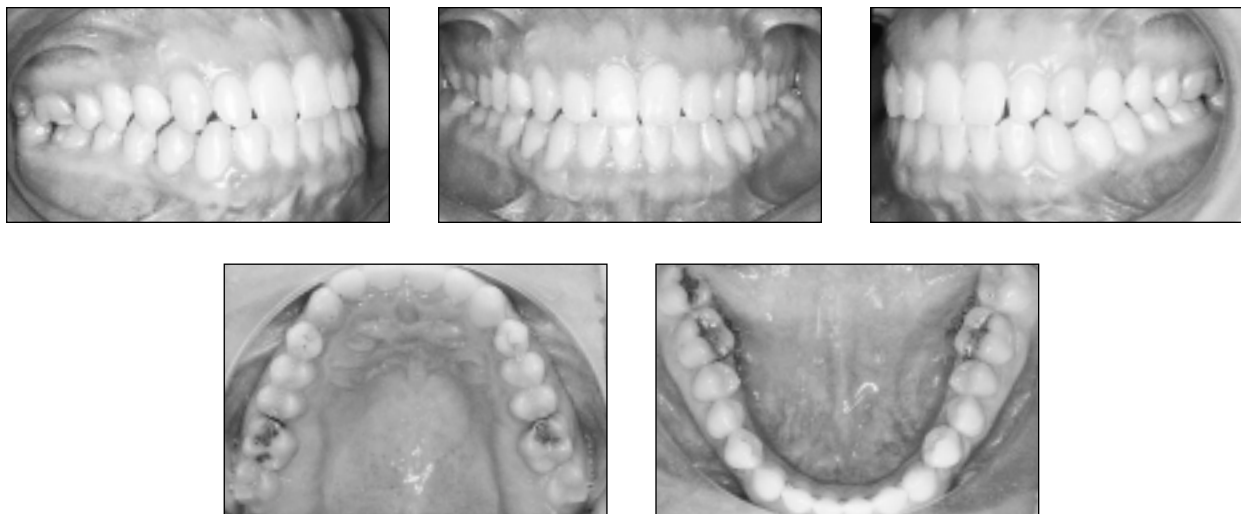


Fig 5 Posttreatment panoramic radiograph.

needed between the six maxillary and mandibular teeth to allow for larger prosthetic crowns after orthodontic treatment, or consolidate spaces at the distal of the canines bilaterally and plan for four single-tooth implants as supernumerary premolars. The first option would obviously be very invasive for a 16-year-old patient with perfectly healthy anterior teeth. The second option was therefore adopted. It allowed space closure and proclination of the anterior teeth, thus addressing all the patient's chief complaints. Furthermore, it would reduce the relapse tendency following orthodontic appliance removal while saving sound tooth structure. This solution would not affect tooth size, and therefore teeth would still look rather small after treatment. However, this was not a concern for the patient.

Treatment. Orthodontic treatment was initiated with the correction of the bilateral crossbite. A fixed tissue-borne jackscrew appliance was used to expand the maxillary arch.⁹ The patient was instructed to turn the screw once a day for approximately 3 weeks until some degree of crossbite overcorrection was obtained. The same appliance acted as a retention

device for 5 months after stabilization of the screw. The expander was then removed, and edgewise fixed appliances were placed on all maxillary and mandibular teeth. Spaces were redistributed distal to the canines with the help of chain elastics and open coil springs. The patient was monitored regularly by the prosthodontist and by the periodontist who was scheduled to place the implants. As soon as adequate spaces and proper root parallelism were obtained, four Brånemark implants (Nobel Biocare, Gothenburg, Sweden) were placed (Fig 4). The occlusion was then finished and detailed during the time needed for osseointegration. Meanwhile, implants were uncovered, healing caps were placed, and later, temporary crowns were fabricated before fixed appliance removal. Total orthodontic treatment time was 24 months, including implant placement, osseointegration, and temporization. Retention was obtained with a removable Hawley appliance in the maxilla and a lingually bonded 0.0215-inch spiral wire on the incisors and canines in the mandible.¹⁰ This bonded wire will remain indefinitely, whereas the removable maxillary retainer was worn full time for 1



Figs 6a to 6e Posttreatment intraoral photographs.

year, and then only at night for 1 more year. Patient treatment was completed with four ceramic crowns.

Results and Conclusion

The posttreatment panoramic radiograph taken 9 months after implant placement shows adequate root and implant parallelism (Fig 5). Occlusal, lateral, and frontal photographs show four supernumerary premolars well integrated in the dental arches in terms of size, shape, contour, and emergence profile along with complete space closure (Fig 6). Favorable facial change with improved lip fullness can be seen on the posttreatment profile photograph (Fig 7). The patient was very pleased with the final outcome. Both the treatment plan and the results were successful in addressing her chief complaints.



Fig 7 Posttreatment facial profile.

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