The Use of Root Form Implants in Overdenture Treatment for the Atrophic Mandible: A Clinical Report

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Four short root form implants were inserted in an atrophic mandible and the case restored with a lower connecting bar and an overdenture, opposing a complete maxillary denture. Root form implants were selected, as opposed to a subperiosteal implant in this case. The patient had a favorable medical history, appeared healthy, did not smoke, drink, or do illicit drugs, and had good bone quality.

Key Words: atrophic mandible, root form implant, overdenture, subperiosteal implant

INTRODUCTION

Dr Gustav Dahl of Sweden inserted the first lower subperiosteal implant in 1940. Dr Dahl applied for a Swedish patent on March 27, 1941, which was granted on August 27, 1942. Dr Dahl set up his own Vitallium laboratory in 1939. His first periosteal implant was a mesh frame fabricated from Vitallium with screws used to connect the abutments to the mesh framework.¹

Subperiosteal implants rest on bony surfaces below the periosteum.

The design of subperiosteal implants has changed considerably throughout the years due to the research of a number of clinicians, including Goldberg and Gershkoff, ² Lew,³,⁴ Jermyn,⁵ Cranin,⁶ and Linkow.⁷

The mandibular subperiosteal implant is utilized primarily when significant alveolar atrophy has occurred and the resultant implant restoration will be supported by a basal bone foundation. Unlike root form implants, subperiosteal implants must be customized for individual patients. They can be complete or unilateral. Subperiosteal implants are primarily used to support overdentures,⁶,⁸,⁹ although they can be used in any part of either jaw to support a variety of prosthodontic options.

The subperiosteal implant has been proven to be a reliable prosthesis to restore and rehabilitate the atrophic lower edentulous arch.⁶,⁸,⁹ Because subperiosteal implants must be customized, experienced and knowledgeable dental laboratory technicians must be available in full-service laboratories to fabricate subperiosteal implants and the necessary prostheses as prescribed by dentists.

There are cases of significant lower residual ridge reduction when root form
implants can be successfully used in place of subperiosteal implants. The case of a 76-year-old patient is presented.

**Clinical Report**

A 76-year-old edentulous African-American woman presented for treatment in June 2010. Her last teeth were extracted approximately 50 years previously and in her own words she was “unable to wear my lower denture and cannot chew solid food properly.” Aside from a penicillin allergy, the patient’s medical history was noncontributory. Radiographs revealed a severely atrophic mandible, with approximately 8 mm of ridge height available (Figure 1).

While subperiosteal implants can be considered as an option in cases of severe residual ridge resorption, it was decided to place 4 short root form implants, restored with a CAD-CAM milled connecting bar and removable overdenture prosthesis. The patient’s favorable medical history and healthy physical appearance allowed her to be considered a candidate for dental implant surgery.

Implant surgery was performed in July 2010. Under infiltration anesthesia, a crestal incision was made that split the keratinized tissue between the mental foramina. Care was taken when approaching the foramen and blunt dissection was used to locate the openings.

Four external hex regular-platform Branemark System Shorty implants, 4.1 mm in diameter and 7 mm in length, were inserted (Figure 2). A previously fabricated surgical template was used as a guide for position and angulation of the implants.

Several months after an uneventful healing period, primary and final impressions...
were taken for a conventional upper complete denture and an implant level impression was made for a CAD-CAM generated overdenture bar (Figure 3).

After verification of an accurate and passive fit of the bar (Figure 4), a pick-up impression was made, a master cast fabricated, and a cobalt chromium framework constructed for the overdenture prosthesis. Maxillary and mandibular wax trial denture arrangements were verified clinically and approved by the patient. The prostheses were processed and inserted in November 2010 (Figure 5). Home care was carefully explained and demonstrated. The patient was extremely pleased with the function and esthetics of the definitive prostheses (Figure 6).

**DISCUSSION**

The diameter and length of an endosseous dental implant and its stability at placement are critical factors in achieving and maintaining integration. Research has suggested that short implants experience lower survival (higher failure rates) when compared with longer implants. It has been recommended that root form implants be as long and as
wide as possible, within the anatomic limitations of the patient.\textsuperscript{10,11}

This does not mean that the use of short implants is contraindicated. As long as bone volume is reasonable, bone quality is good, and the patient has a favorable medical history, looks reasonably healthy, does not smoke, drink, or use illicit drugs, and satisfactory home care can be expected, there is nothing contradictory about using short implants.

The documented case history presented in this article illustrates the use of root form implants in a severely atrophic mandible. Although subperiosteal implants may have been the treatment of choice from the 1950s to the middle of the 1980s, root form implants can and continue to be used successfully to treat the atrophic mandible, as documented in the case history. The authors recognize that there are clinicians, both nationally and internationally, who may have selected a subperiosteal implant for the case presented, but we strongly believe that root form implants were the treatment of choice.

\section*{REFERENCES}