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PROSTHODONTIC Insights

A Digest of Recent Trends, Techniques and Clinical Concepts of Dental and Facial Esthetics

Advanced Bone Loss Accentuates Aging

Thomas J. Balshi, D.D.S, F.A.C.P.

Tooth loss and the subsequent loss of alveolar bone is recognized as a significant etiologic factor in the aging appearance of the face. Removable prostheses have been used successfully, with patients having modest amounts of remaining bone, to maintain facial form. However, as patients age and the physiologic process of bone resorption continues, the position of the dentures also shift creating an edge to edge or pseudo class III appearance. (Figure 3) With continued bone resportion, vertical dimension diminishes and the mandible autorotates anteriorly and superiorly on closure (Figure 1 & 3).

This often creates an appearance of sadness in frontal view and in profile the chin tends to appear closer to the tip of the nose (Figure 1). In patients with extreme alveloar atrophy, particularly in the mandible, the total loss of alveolar bone requires the denture be supported by basal bone which has been known to resorb below the level of the genial tubercles (Figure 4). In conditions of extreme atrophy the thickness of the mandible may diminish to 4-5 mm in height, particularly in the area of the bicuspids. These mandibles are at risk for spontaneous pathologic fracture (Figure 5).

In patients with extreme mandibular atrophy the muscle attachments move superiorly and in some cases there is little or no attached mucosa overlying the crestal bone (Figure 6).

(Continued on Page 2.)

Figure 2
Postoperative frontal view.

Figure 1
Preoperative frontal and profile view of patient.

Advanced Bone Loss

(Continued from Page 1.

Figure 3
Lateral view of existing dentures showing pseudo-Class III appearance. Lateral view of edentulous ridges at vertical dimension of occlusion.

Figure 4
Preoperative lateral cephalometric view with radiogrpahic markers on anterior teeth showing the position of the existing denture teeth. Note the level of bone in relationship to the genial tubercles.

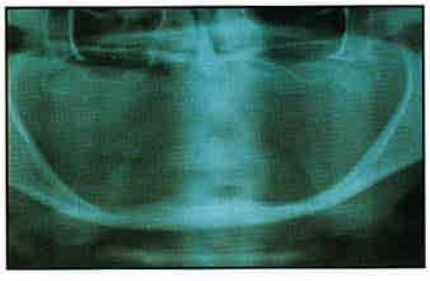

Figure 5
Preoperative panoramic view of the severely atrophic mandible.

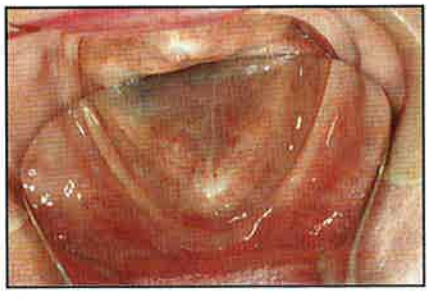

Figure 6
Occlusal view of mandibular edentulous ridge with high muscle attachments.

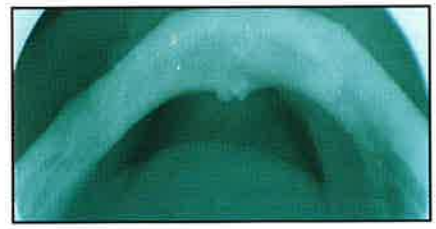

Figure 7
Occlusal radiograph used to determine the mandibular width.

Figure 8a
Postoperative panoramic radiograph with six osseointegrated Brånemark implants supporting a fixed mandibular prosthesis.

Figure 8b
Intraoral facial and profile views of teeth in Class I occlusion.

Figure 9
Postoperative lateral cephalometric view with six osseointegrated Brånemark implants supporting a fixed mandibular restoration.

Figure 10
Postoperative profile photograph showing improved facial support for the lower third of the face.

Reconstruction of the atrophic mandible can be accomplished ad modem Brånemark provided there is sufficient width of bone to permit placement of the titanium implants. An occusal radiograph (Figure 7) is a valuable aid in determining mandibular width.

A minimum bone height of 5 mm with a width of at least 7 mm, is recommended for a fixed prosthodontic implant reconstruction without bone grafting in the mandible. Implants of 3.75 mm diameter can be successfully placed in the anterior mandible. Bone quality in patients with severe atrophy is generally class I or class II requiring careful tapping of the screw threads prior to implant placement. Three to four months of unloaded healing is recommended prior to the placement of the fixed prosthesis (Figure 8 & 9). With the support of a fixed prosthesis, a class I occlusion and full support of the lower third of the face can be obtained (Figure 10).

This clinical example illustrates treatment of a 58 year old woman who had a significant medical history. The patient had been treated for severe osteomyelitis of the legs between the ages of 6 to 12. A hysterectomy was completed 14 years prior to implant treatment. The patient also had a history of an aneurism which was treated surgically; and she was diagnosed as hypothyroid and sporadically hypertensive. A diagnosis of mitral valve prolapse required premeditation prior to any surgical procedures. Medications included Synthroid (.2 mg.), aspirin (250 mg. daily), Dalmane as needed, Premarin, and Diazide. She had no history of smoking and used alcohol socially.

The patient's chief complaint was "ill-fitting dentures" both "functionally and esthetically". Successful treatment was accomplished in 1992 with the use of six Brånemark titanium implants in the anterior mandible. Three different implant sizes were used: the most distal implant was 7 mm x 3.75 mm, the two center implants were 10 mm x 3.75 mm, and the implants in-between were 8.5 mm x 3.75 mm. Osteotomy sites were prepared through the mandible to create a tenting effect with the periosteum at the inferior border of the mandible. Protrusion of the implant apex through the inferior border of the mandible can be clearly seen in Figure 8. This deliberate extension of the implant beyond the inferior border of the mandible is intended to induce apical bone growth over the more distal fixtures on both the right and left sides. This is quite evident when comparing the radiographs (1/7/93 & 6/19/96). Particularly evident is the bone growth over the apex of the most distal implant on the left side and on the right side. It is also interesting to note an increase in mandibular bone height in the areas beneath the posterior cantilevered pontics (Figure 11 & 12).

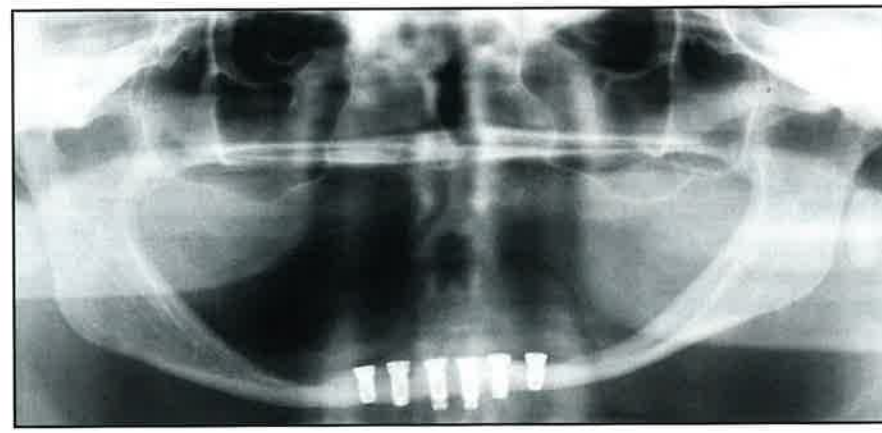

Figure 11
Panoramic radiograph with six osseointegrated implants immediately following stage I surgery. (1/7/93).

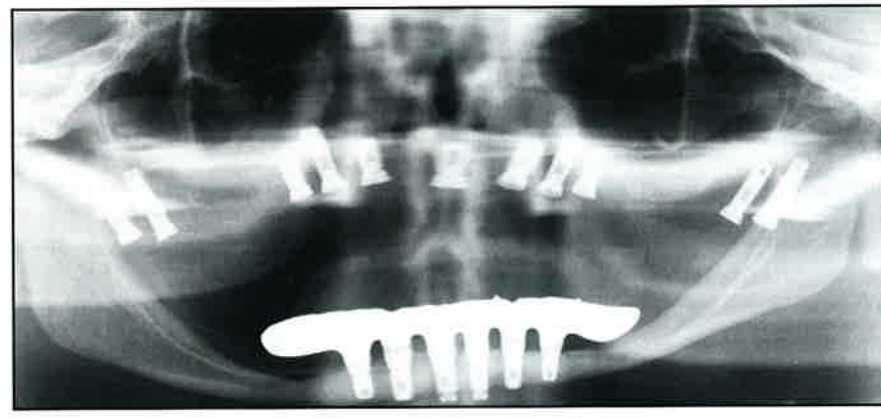

Figure 12
Postoperative panoramic radiograph 3 1/2 years following stage II surgery showing increased bone beneath the posterior cantilevered pontics. (6/19/96.)

Summary:

Patients with severe mandibular atrophy can be successfully treated with Brånemark implants. Patients undergoing implant treatment of the severely atrophic mandible must exercise extreme caution during the initial healing process (3-4 months) since the operated mandible is initially weak and susceptible to fracture. However, following the initial 3 months of osseointegration, an internal bone remodeling stimulus created by the osseointegrated implants has been shown to improve the strength of the mandible through increased bone dimensions.

Dietary factors related to preservation of oral and skeletal bone mass in women

M.P. Faine

Skeletal bone loss in adults increases the risk of bone fractures and may contribute to the loss of teeth in healthy postmenopausal women. The relationship of skeletal osteopenia to residual ridge resportion is unclear. Low bone mass in women is attributed to heredity, estrogen deficiency, a low lifetime calcium intake, and lack of regular physical activity. A high calcium intake will promote optimal bone growth in youth and decrease the rate of bone loss in the later postmenopausal period. In early menopause, estrogen is the only effective therapy for conserving bone in women. In older women, a high plasma level of vitamin D enhances calcium absorption, whereas high sodium, protein, alcohol, and caffeine intakes will cause increased urinary losses and negative calcium balance. Women who have a low intake of dairy foods may benefit from a refined calcium carbonate supplement that contains vitamin D. This article focuses on the nutritional factors that influence bone health, and many of the patients seen for implant dentistry are of this age group.

J Prosthet Dent 73:65-72;1995

Dental Management of the Geriatric Patients

The geriatric patient requires special consideration due to changes in their dentition from the aging process, the presence of pathologic disease, increased disabilities and social concerns.

Osteoporosis, characterized by decreased bone mass in the mandible, increased resportion, risk of fracture, and failure of osseointegration of implants, is common in the elderly. In addition, rheumatic arthritis can be manifested in the TMJ, resulting in severe osseous changes. Other problems may include, diminished short-term memory, confusion, increased motor response time, decreased intellectual performance, and depression.

Older patients often use multiple medications. Many of these medications have systemic effects or adverse reactions which manifest in the oral cavity. Some drugs prescribed in the course of dental treatment can also have adverse effects. A comprehensive medical history is important when treating these older patients. This may be made more difficult due to hearing loss, and cognitive deficits, such as poor short-term memory.

The elderly may also seek dental treatment at later stages of tooth decay due to decreased sensory levels in the teeth. In addition, root caries is common, the oral mucosa is more fragile, more abradable, and slower to heal, and there is an increased incidence of oral neoplasms. Intraoral screening should be performed every six months.

Dental offices should provide: easy access for wheelchairs; furniture and treatment rooms to sit comfortably and stand easily; large printed literature; well lighted reception areas; restrooms equipped with hand rails; and van or taxi services which could be coordinated with volunteer organizations to provide transportation. These services can also serve as practice builders.

In addition to the clinical aspects of dentistry, the psychosocial ramifications of aging must be integrated into the overall patient management in order to meet the dental needs of the geriatric patient.

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Reconstruction of the severely atrophic edentulous mandible with endosseous implants: A 10 year longitudinal study

E.E. Keller

A total of 61 patients with severe mandibular resorption underwent restoration with 303 Brånemark endosseous implants. If the bone height was greater than 4.0 mm and the width was greater than 5mm, a graft was not used. A simultaneous composite onlay bone graft from the anterior iliac crest was used if the bone height was less than 4.0 mm and the width was less than 6 mm. Nine patients require bone grafts, and 52 patients did not need bone grafts. Two hundred sixty implants were placed in the non-bone graft group, and 43 were placed in the bone graft group.

The median follow-up was 59 months for the non-bone graft group, and 42 months for the bone graft group. Eighteen implants were removed from the non-bone graft patients (93% survival) and four implants were removed from the bone graft patients (91% survival). The majority of implants were lost from the two most distal implant positions. Implant loss did not vary significantly in relation to implant length. Two non-bone graft patients experienced a stress fracture during the healing phase, and one bone graft patient experienced a fracture following facial trauma. These fractures healed with conservative managment.

Several patients developed hyperplastic tissue adjacent to implants that required surgical management. Temporary mental nerve paresthesia was common in all patients and resolved unless it was present before implant placement. Marginal bone loss was noted in 12 implants. An increase in bone volume was observed in most patients.

Dr. Keller concludes that endosseous implants can be used to support dental prostheses in patients with advanced mandibular bone resorption. In addition, placement of implants may prevent further bone resorption in these patients.

J Oral Maxillofac Surg 1995;53:305-320

Restoring lost vertical dimension of occlusion using dental implants: A clinical report

T. Balshi & G. Wolfinger

The successful rehabilitation of a patient with severe vertical overlap resulting from the loss of posterior occlusal support and excessive wear of the mandibular incisors is described. The treatment plan necessitated extraction of the remaining periodontally compromised mandibular teeth and placement of eight implants. Lost occlusal vertical dimension and morphologic facial height were restored using a fixed detachable implant supported mandibular prosthesis, and the maxillomandibular relationship was transformed from Class II to Class I.

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