

Insights

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



Mandibular Subperiosteal Implant Replaced with Osseointegrated Implants

Thomas J. Balshi

The patient was 42 years old and in good general health at initial presentation. She was employed full time as a clerk and took no drugs or medications with the exception of tobacco. Her chief complaint was severe pain, swelling, and discomfort associated with a mandibular subperiosteal implant (figure 1) which had been in place for twelve months. Additionally, the patient persistently had chronic inflammation. A maxillary complete denture was used to restore the edentulous arch. This denture was retained using mucosal inserts. Pain in both arches was exacerbated during occlusal function. The mucosal inserts also caused swelling and were mechanical irritants to the mucosal tissue.

The treatment plan prescribed immediate surgical removal of the mandibular subperiosteal implant followed by the delivery of temporary removable dentures. The severe infection associated with the subperiosteal implant compromised the effect of local anesthesia, requiring general anesthesia for its removal (figure 2). The patient experienced severe pain and swelling the following week.

One and a half weeks following removal of the subperiosteal implant,

continued on page 3

2nd International Congress on Tissue Integration in Oral, Orthopedic and Maxillofacial Reconstruction, Mayo 1990

Mechanical Aspects on a Branemark Implant Connected to a Natural Tooth

B. Rangert et al

Mechanical in vitro tests of the Branemark implant disclose that the screw-joint, which attaches the prosthetic gold cylinder and the transmucosal abutment to the implant fixture, constitutes a flexible system. This inherent flexibility of the implant seems to well match the mobility of a supporting tooth connected to the implant. Calculations of vertical load distribution based on the measured flexibility data, demonstrate that the forces are almost equally shared between tooth and implant, even without considering the flexibility of the surrounding bone or that of the prosthetic bridge. Therefore, from a mechanical point of view: *the therapy of a single Branemark implant connected to a natural tooth*

continued on page 5

Immediate Placement of Implants Into Extraction Sites: Surgical and Restorative Advantages

R. Lazzara

Placement of implants immediately into extraction sites has distinct surgical and restorative advantages. This form of therapy also expedites the completion of the final prosthesis.

Traumatic extraction of the natural tooth is a prerequisite. This is followed by thorough and complete debridement of the socket. The surgical site is then prepared in the usual manner, paying attention to parallelism and position. Preparation must extend well beyond the apex of the socket to insure implant stability. The implant is then placed so that it is situated well below the level of the surrounding alveolus and the area is covered with Gore-Tex® barrier membrane. This allows regeneration of a soft

continued on page 5

Implant Component Compatibility

P. Binon

Several alternative systems with fixtures and components that closely emulate the original design and treatment protocol of the Swedish Branemark System (Nobel-pharma AB) have become available. These products offer an attractive alternative because they are less expensive, offer more prosthetic flexibility, are easier to access, and are American products. Physically the replicates are similar in shape, size and thread design. Often, these "Branemark" clones are grouped together without distinction. It is likely that components from different manufacturers are used interchangeably in the construction of a prosthesis.

The coupling of imprecisely matched components can influence long term implant prognosis. The clinical implications

continued on page 5

Splinting Osteointegrated Fixtures to Teeth With Normal Periodontium

T.J. O'Leary et al

Six young adult male beagle dogs with healthy permanent dentition were used to study the response of the periodontium when an osteointegrated implant with no mobility is rigidly attached to a natural tooth with normal mobility. Mandibular P3 & P4 were extracted on the experimental side of each animal; the contralateral control side had P4 extracted. Seven weeks later titanium fixtures were implanted at P3 sites and allowed to osteointegrate for 10 weeks. Fixed partial dentures were then constructed using as abutments the implant & M1 on the experimental side and P3 & M1 on the control side. Procion red was administered to each dog 10 days

continued on page 5

Implant Consensus Update

2nd International Congress on Tissue Integration

P. Binon

In September 1990, the 2nd International Congress on Tissue Integration convened at the Mayo Medical Center in Rochester, Minnesota. The first meeting was held in Brussels five years earlier with a two fold objective: to evaluate through scholarly papers the basic science and clinical aspects of intra and extra oral, craniofacial, and orthopedic use of tissue integrated implants; and to arrive at a state of the art consensus report. Identical objectives were assigned to the 1990 congress. For four days, forty scientific papers, nine keynote speakers, 16 poster presentations and five consensus panels held the attention of the 500 plus participants from 32 countries. A condensed review of the basic science (J. Brunski, Chair) and intraoral (D. van Steenberghe, Chair) consensus reports follows.

Basic science; statements and criteria proposals: The properties of implant materials should be fully identified. Raw materials must meet minimal industry standards and be tested to avoid the inclusion of impurities that jeopardize tissue response. Currently, the most suitable materials for implantation are CP titanium, hydroxyapatite, and aluminum oxide ceramics. Some orthopedic alloys also show promise.

The increased use of coatings (HA and Ti) on other metal substrata requires

closer scrutiny. There was no consensus on coatings. Failure of ceramic coatings occurs, and its clinical significance is not yet understood. The effect of the coating on the bulk material has not been established.

Implant surface qualities should be well defined, reproducible, and free of contaminants. Cell behavior (contact guidance) can be influenced by surface cuts and grooves.

Biomechanics:

- 1) Biting forces: a quantitative understanding of loading is not yet available;
- 2) Bridge design: connector between bridge and number of fixtures, angulation, and loads are contributory to success;
- 3) Bone deformation may stress the interface;
- 4) Fixture stability and no loading is required for bone healing.
- 5) Microbial deposits may result in tissue inflammation and implant loss, therefore hygiene is imperative.

Five years favorable data shows bone grafts and extraction sites are acceptable for implants. Craniofacial implants also can be maintained. Implants in irradiated bone can, with caution, be effective.

Sensory input associated with implant fixtures can effect mastication, muscle activity, and occlusal perception.

Criteria for clinical success:

- 1) Immobility
- 2) absence of periimplant radiolucency
- 3) no pain or infection
- 4) no damage to adjacent structures
- 5) load bearing
- 6) positioned for prosthetic use.

Progressive marginal bone loss implies possible future failure.

Success rates: 95% after 5 years, and 90% after 10 years in anterior mandible; 85% in other locations.

Life table statistical methods must become the standard in scientific documentation. Annual exam includes:

- 1) assessment of any symptoms
- 2) soft tissue health
- 3) prosthesis stability; and
- 4) radiographs.

Advanced age is *not* a contraindication. In the very young, consider effects of jaw growth and tooth eruption. Applications include orthodontic treatment.

ICP Report 1/91

Immediate fixture Placement: A Treatment Planning Alternative

S. Parel *et al*

There is no long term evidence in the current literature supporting the contention that implant placement through an immediate extraction site will provide predictable results similar to those already achieved using the traditional Branemark approach. There would, however, appear to be an opportunity to place implants in a select group of patients, either mostly or completely in virgin bone, without violating the surgical concepts of osseointegration presently endorsed. This approach to immediate implantation would have the principal advantage, particularly in the mandibular arch, of eliminating the recommended period of edentulous healing, while minimizing the frustration inherent with the initial adaptation to a

mandibular removable prosthesis. There is also the theoretic and practical advantage of eliminating that period during which periodontally compromised teeth are lost over months to years through chronic progress bone loss. Although a healthy natural dentition is preferable to an artificially supported replacement, there are some patients who would benefit from the elimination of chronic periodontal disease in situations where tooth loss is inevitable. There is evidence that a similar approach of immediate fixture placement may become equally appropriate in the maxilla with further research.

Int J Oral & Maxillofac Implants 1990; 4:337-345

The Applicability of Osseointegrated Oral Implants in the Rehabilitation of Partial Edentulism: A Prospective Multicenter Study on 558 Fixtures

D. Van Steenberghe *et al*

When using the Branemark technique in the treatment of partial edentulism, the following questions have concerned clinicians:

- Can the load transfer through neighboring natural teeth during healing interfere with implant osseointegration?
- Considering the evident differences in resiliency, could or should implants be connected to the natural abutment teeth?
- Because of the presence of natural abutments, can the reduced freedom of location for the fixtures increase potential failure during surgery?

continued on page 4



Figure 1: Lateral radiographic view of the mandibular subperiosteal implant.

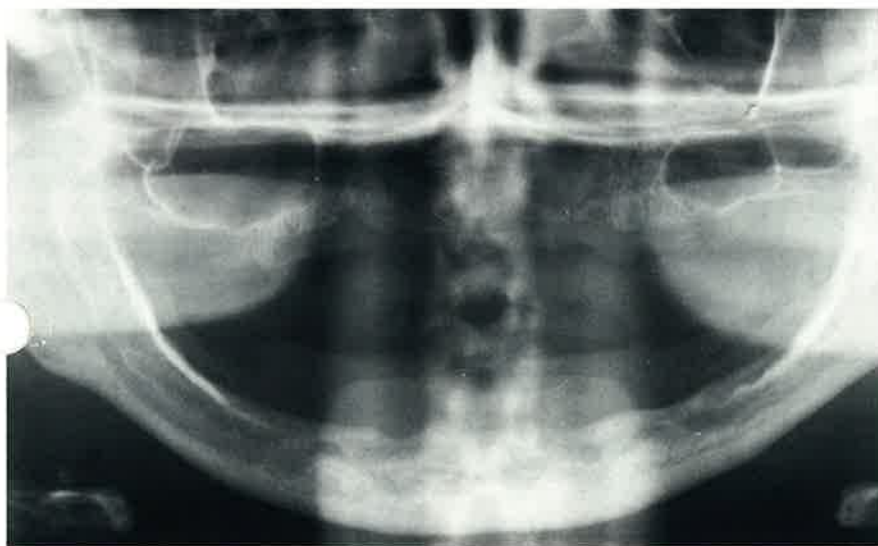


Figure 2: Resorbed mandibular ridge following removal of the subperiosteal implant.

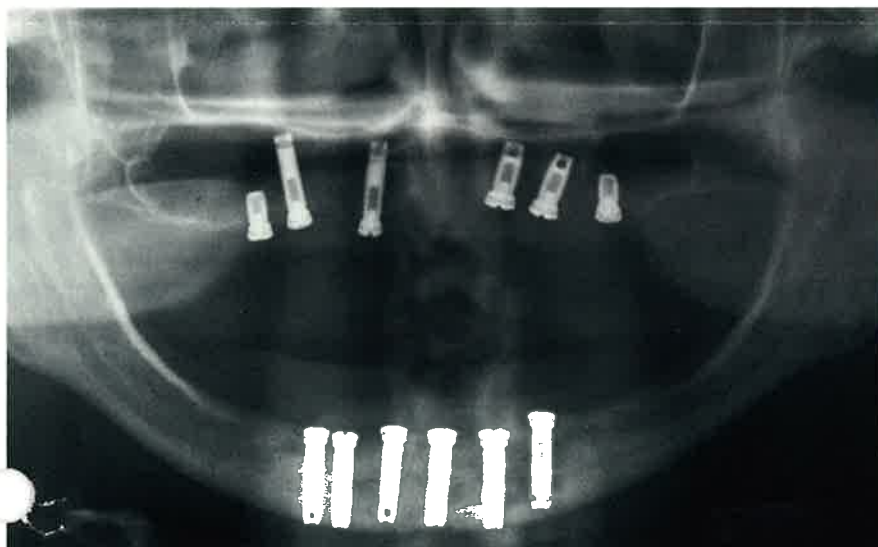


Figure 3: Fixtures placed in maxilla and mandible 5 weeks after removal of the mandibular subperiosteal.

Mandibular (continued)

provisional dentures, treated with soft tissue liners, provided the patient with improved facial esthetics and minimal function.

Five weeks following removal of the subperiosteal implant, six 18 mm Branemark implants were placed in the anterior mandible. In the maxillary, six Branemark implants were used; the most distal bilaterally were 7 mm long while the four anterior implants ranged between 10 and 18 mm (figure 3).

Contrary to post operative instructions, the patient insisted on daily, 24 hour use of the temporary removable dentures. Two months following fixture installation surgery, the maxillary right 7 mm fixture was lost. Even with the loss of this implant, the patient refused to remove her dentures at night.

Four months following fixture placement, the mandibular implants were exposed. The last fixture in the mandibular right was not osseointegrated and removed during the 2nd stage surgery (figure 4). This may have been due to overload and micro movements transmitted through the mucosa during the healing period, especially since this fixture was vertically higher than the other 5 fixtures (see figure 3).

At six months, the maxillary implants were uncovered. The other 7 mm fixture was not osseointegrated and was removed. Abutments were placed on the remaining four anterior fixtures (figure 4).

At the time of the maxillary uncovering the four remaining fixtures were stable and appeared to be osseointegrated. However, six months following the use of the maxillary overdenture with retentive clip bar, the most distal fixture on the left side had **deintegrated** and was removed. The gold clip bar was modified and the patient continued function with the same maxillary overdenture. This overdenture was devoid of palatal support and accounted for the additional loading placed on the remaining fixtures.

The final maxillary prosthesis was a three fixture supported palatless overdenture. The mandible was restored with a five fixture supported fixed prosthesis. The patient has been stable with these prostheses for the last four years (figure 5), with continuing functional and esthetic satisfaction. Four month oral hygiene visits were recommended for continued maintenance and ongoing analysis of the bone anchored prosthodontic treatment.

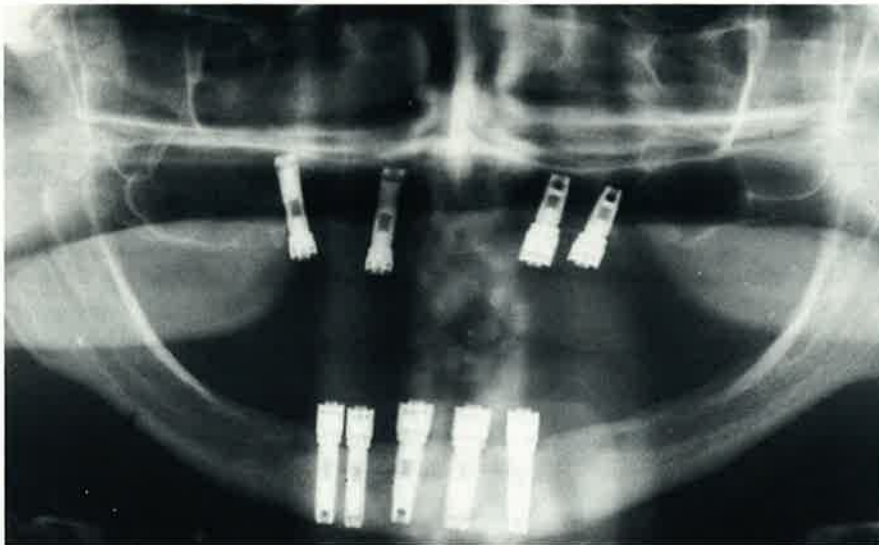


Figure 4: Last fixture on the right was not osseointegrated and removed at the mandibular 2nd stage surgery. The remaining maxillary 7 mm fixture was mobile at 2nd stage surgery and removed.

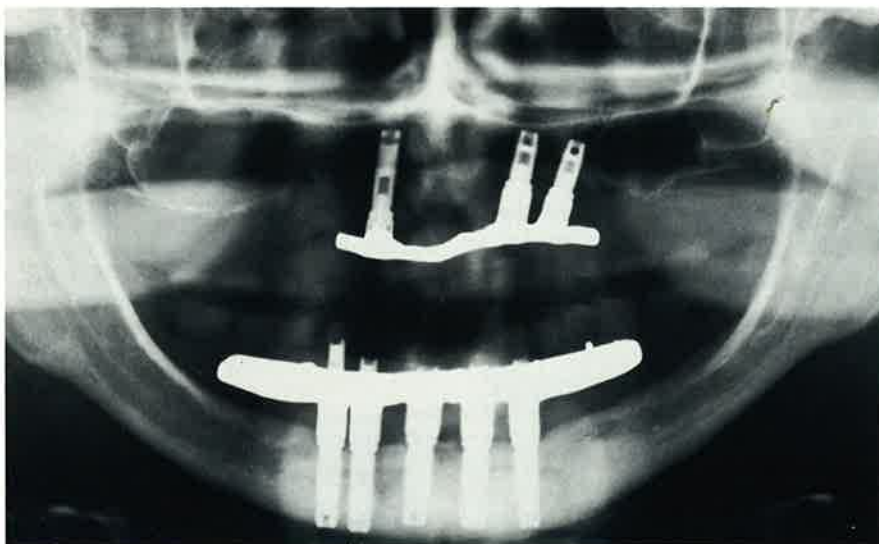


Figure 5: After 6 months of overdenture function the last fixture on the maxillary left deintegrated. The remaining 3 fixtures continued to support the palatless prosthesis for the following 4 years.

Applicability (continued)

- What is the impact of the period of time elapsed since the natural tooth extraction at the implant site?
- Is the influence of the periodontal status of the neighboring arch of importance?

The data from previous studies do not give a clear answer to these questions and must thus be complemented by a larger prospective study with a follow up of at least 5 years. In such a study, there must also be strict evaluation criteria for the detection of failures as well as monitoring of surrounding tissue reactions. Following such guidelines, this report is an interim presentation with an observation time of one year after prosthesis placement.

Nine clinical centers using the Brånemark System participated in a prospective study of 159 partially edentulous patients between 18 and 70 years of age. Clinical parameters evaluated were plaque index, gingivitis, pocket depth, bleeding index, tooth mobility, and stomatognathic function. Initially, 558 fixtures were placed and 521 remained in the study following prosthesis placement (199 prostheses in 154 patients). Fixtures were lost or unaccounted for because of nonintegration prior to prosthesis fabrication (19), patient withdrawal (11), prosthodontic reasons (6), and failure during prosthetic procedures (1). Failure was primarily attributable to unfavorable bone quality, sex (more in males), and smaller fixture size. Complications and failure related to other patient characteristics are presented. After 1 year of a 5-year study, preliminary results suggest that a success rate equal to or better than that obtained with edentulous patients may be expected.

Int J Oral Maxillofac Implants 1990; 5:272-281



Oral Hygiene Video For the Implant Patient

- Educate** your patients with a detailed film of home care techniques for implant patients.
- Reinforce** the hygiene instructions you have already shown your patients.
- Optimize** the time that your hygienist spends with home care instructions.
- Legal** documentation is verified by patient viewing homecare video.

1 Video \$ 25.00 5 Videos \$100.00

Return _____
Address _____

Please mail check and form to:
Institute for Facial Esthetics
467 Pennsylvania Avenue, Fort Washington, PA 19034
Tel: 215-643-5881 • Fax: 215-643-1149

PROSTHODONTIC
Insights

is published by Prosthodontics Intermedica and distributed without charge to qualified individuals. Please request a subscription on your organization's letterhead.



Fixed, Removable, and Implant Prosthodontics

Prosthodontics Intermedica
467 Pennsylvania Avenue
Fort Washington, PA 19034 U.S.A.
Telephone: 215-646-6334

Going West...

for the Academy Meeting in Vancouver?

Why not make a week of it!

Plan to Attend the Advanced Osseointegration Ski/Course

Place: Chateau Whistler Resort
Whistler, British Columbia

Dates: Saturday, February 22 to
Wednesday February 26, 1992

Presenters: Thomas J. Balshi, D.D.S.,
Robert A. Jaffin, D.M.D.
Stephen M. Parel, D.D.S.
Barbara Lord, R.D.H.
Bob Winkelman, C.D.T.
Ken Orth, C.D.T.

Contact: Institute for Facial Esthetics
Tel: 215-643-5881
Fax: 215-643-1149

For: Doctors \$725
Technicians 325
Hygienist/Assistants 125

Implant Component (continued)

of poor component fit and compatibility are:

1. Frequent loose screws
2. Chronic screw fracture
3. High bacterial plaque retention
4. Adverse soft tissue response
5. The loss of integration.

The purpose of this study was to evaluate machining accuracy, consistency, and compatibility of four manufacturers' components. Implant components from **Nobelpharma** (Branemark), **Collagen** (Osseodent), **Core-Vent** (Swede-Vent), and **Implant Innovations Inc. (3-I)** were evaluated for compatibility within and between systems. Variation in matching tolerances were noted between the four systems evaluated.

Preliminary results show that the 3-I two piece abutment and the SV-one piece abutment meet or exceed the machining and design criteria set by the Branemark System. Components from these two systems can be mated with each other and those of the Branemark System to achieve an acceptable level of compatibility. It is prudent to inspect the fit of all components on an implant fixture before use. Although these systems meet high machining standards, long term biological efficacy must still be documented in clinical trials.

Splinting (continued)

before euthanasia. Two dogs were terminated at 6 weeks, 6 months and 1 year after the insertion of the prostheses. Decalcified serial sections were stained with H&E. Unstained sections were examined with fluorescence microscopy for procion labeling. The fixtures were studied with SEM. Clinically, the fixed partial dentures were well tolerated with no evidence of mobility. Histologically, the implants were surrounded with bone which was initially woven and later was lamellar. Bone facing the implants was covered in areas by a thin layer of connective tissue which served as periosteum; bone remodeling resulted in areas of communication of endosteum to the bone surface. Implant sites showed areas of periosteal and endosteal bone labeling. SEM showed fibroblasts and collagen fibers adhering in areas to the fixture. Natural teeth serving as abutments showed occasional areas of surface resorption that had mostly reversed with cementogenesis. It was concluded that rigid attachment of an implant to a natural tooth was well tolerated.

Bone Formation at Dehisced Dental Implant Sites Treated with Implant Augmentation Material: A Pilot Study in Dogs

W. Becker et al

The effect of polytetrafluoroethylene (PTFE) membranes on the repair of exposed dental implant threads was studied. The second, third, and fourth premolars were removed from the left and right mandibular arches of two mongrel dogs. Following 3 months of healing, four 10 mm long Branemark implants were placed in each animal and a varying number of fixture threads were exposed after fixture placement. The PTFE membranes (Gore-Tex) were placed over four of the implants, covering the exposed threads and extending apically over the vestibular bone. The mucosa was adapted to cover the implants and sutured. Following 18 weeks of healing, the implants were examined clinically and histologically. The implants were stable with an average gain in bone height of 1.27 mm for implants covered with a PTFE membrane and 0.23 mm for control implants. Histologic examination revealed that exposed threads covered with a PTFE membrane had new bone deposition on the surface of the exposed threads, while the exposed control threads were covered with connective tissue. The study indicates that PTFE membranes may increase new bone formation adjacent to exposed implant threads (Beirme FOR IJOMJ).

Int J Periodont Rest Dent 1990; 10:93-101

Immediate (continued)

tissue covering at the time of Gore-Tex removal, approximately one month later. Reentry surgeries will demonstrate the regeneration of bone within the socket up to the cover screw as well as ridge remodeling.

This technique offers the clinician the opportunity to place implants in tooth positions as opposed to altered resorbed ridge positions thereby reducing prosthetic compromise. Immediate placement allows the fabrication of more normally shaped and sized crowns due to position of the implant. In addition, treatment time is reduced considerably when combining osseointegration at the apical portion with regeneration in the coronal portion of the fixture. Therefore longer fixtures may be placed.

Mechanical Aspects (continued)

should be considered without any additional element of flexible nature. The mechanical tests and the theoretical considerations however suggest that the transverse mobility of the connected tooth should be limited to avoid gold screw loosening. As the flexibility of the screw-joint dominates over that of the prosthetic bridge, it is suggested to allow the bridge unit to be stiff enough to secure the connection of the tooth abutment and to minimize the transverse motion of the bridge.



**Educational Opportunities
Sponsored By The Institute
For Facial Esthetics –
Pennsylvania's First Official
Branemark Training Center**

**Prosthetic Training Program
For The Branemark Method
Of Osseointegration**

***Two Day Course, Includes
Hands-on Instruction**

June 28-29, 1991

Nov. 15-16, 1991

***All courses are AGD accredited**

**Advanced Osseointegration
Ski Course:**

Feb. 22-26, 1992

Whistler, British Columbia

Information:

215-643-5881

A Long-Term Follow-Up Study of Osseointegrated Implants in the Treatment of Totally Edentulous Jaws

R. Adell et al

Specific criteria for the acceptance of dental implants have been published by NIH. More stringent demands were set forth by Albrektsson et al and Shulman et al. The aim of this report is to update the survival rates for fixtures and prostheses involved in the **treatment of total edentulism after using the osseointegration method for 25 years.**

A total of 4,636 standard fixtures were placed in 759 totally edentulous jaws of 700 patients and followed according to the osseointegration method for a maximum of 24 years by the original team at the University of Goteborg. Standardized annual clinical and radiographic examinations were conducted. A life-table approach was applied for statistical analysis. Sufficient numbers of fixtures and prostheses for a detailed statistical analysis were present for observation times up to 15 years. More than 95% of maxilla had continuous prosthesis stability at 5 and 10 years, and at least 92% at 15 years. The figure for mandibles was 99% at all time intervals. Calculated from the time of fixture placement, the estimated survival rates for individual fixtures in the maxilla were 84%, 89%, and 92% at 5 years; 81% and 82% at 10 years; and 78% at 15 years. In the mandible they were 91%, 98%, and 99% at 5 years; 89% and 98% at 10 years; and 86% at 15 years. (The different percentages at 5 and 10 years refer to results for different routine groups of fixtures with 5 to 10, 10 to 15, and 1 to 5 years of observation time, respectively.)

The results of this study concur with multicenter and earlier results for the osseointegration method. Based on these results, routine treatment of edentulism with fixed prostheses supported by osseointegrated fixtures appear to be a highly efficient method, giving predictable long-term results in large patient populations.

Int J Oral Maxillofac Imp 1990; 5:437-359

Prosthodontics Intermedica Institute For Facial Esthetics *Implant Research*

Patients in need of implants are accepted based on specific criteria relative to the particular research project.

Treatment of Osseous Defects Using Vicryl Mesh (Polyglactin 910) and the Branemark Implant: A Case Report

T. Balshi et al

The combined use of a Branemark titanium implant and Vicryl mesh as a barrier to soft-tissue ingrowth, promoting bone formation in areas of osseous defects offers new opportunities for the treatment of patients with compromised bone support at the implant site. The advantages of using Vicryl mesh are:

- 1) an additional procedure to remove the mesh is not required because it is an absorbable material
- 2) it exhibits no antigenic or pyrogenic effects; and
- 3) it is cost-effective.

This paper describes a maxillary central incisor with an apical osseous defect resulting from endodontic failure which was treated with the Branemark method of osseointegration for single tooth replacement. Vicryl mesh was used over the osseous defect site. New bone formation filling the defect and around the implant was observed five months following implant placement.

Int J Oral Maxillofac Implants 1991; 6:87-91

Histologic Comparison of Ceramic and Titanium Implants in Cats

E. Barth/C Johansson/ T Albrektsson

A qualitative and quantitative histologic comparison of the reparative processes around cylindrical glass-ceramic-coated and pure titanium implants placed in feline femurs was conducted. Six weeks after implant placement, bone specimens with inserted implants were prepared for histologic examination including histomorphometric quantification of the relative implant surface areas that were in contact with bone. The glass-ceramic implants were surrounded by a 0.2- to 0.5-mm envelope of bone. By contrast, the major part of the titanium implants (81% \pm 5%) was in direct contact with living lamellar or woven bone. Thus, titanium and glass ceramic evoked different reparative processes when implanted in bone, and only the titanium implants appeared to **become osseointegrated.** This histologic data correlated well with the conclusions from the previous study in which the two types of bone-implant interfaces were evaluated using EDXA.

Int J Oral Maxillofac Implants 1990; 5:227-231

Osseointegrated Implants in Edentulous Jaws: A 2-Year Longitudinal Study

Jan Ahlqvist et al

The most extensive long-term study of osseointegrated implants ad modum Branemark covers 1,997 implants in 284 patients. This report indicates persisting anchorage function of the implants in 81% of maxillary implants and in 91% of mandibular implants at observation periods of 5 to 9 years. Few follow-up studies of implants ad modum Branemark have been made outside the Branemark research group. The aim of the present investigation was to assess fixture survival, prosthesis stability, and marginal bone loss in a prospective study of patients treated at the University of Umea.

Osseointegrated implants in 50 edentulous jaws were studied during a 2-year observation period. The implant survival rate was 89% in the maxillae and 97% in the mandibles. No losses of osseointegration occurred in the mandibles, and it may be debated whether the five removed osseointegrated implants should be recorded as failures. If not, the survival rate would be 100%. The marginal bone loss averaged 1.7 mm in the maxillae and 1.1 mm in the mandibles. Most of this bone loss occurred during the first year. The bone loss was greater in jaws with a preoperatively minor resorption of alveolar ridge than in those with moderate or advanced resorption.

The bone loss was also greater at the medially positioned implants than at those more posterior. These findings suggest the need for considering the biomechanical effects of prosthesis extensions when planning prosthesis design.

Int J Oral Maxill of Implants 1990; 5; 155-163

September 21-23, 1991

INTERNATIONAL COLLEGE OF PROSTHODONTICS

4th Annual Meeting
International Conference Center
Hiroshima City, Japan

Theme:
Advanced Prosthodontics Worldwide

Hotel:
Ana Hotel, Hiroshima
Tel. (082) 241-1111, Fax (082) 241-9123

Contact:
T. Maruyama, DDS, PhD, FICD
Committee Chairman
Osaka University Faculty of Dentistry
Department of Fixed Prosthodontics
1-8 Yamadaoka, Suite-A
Osaka, Japan 565