

## 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 discloses 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

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### 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

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### 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

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# 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?

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

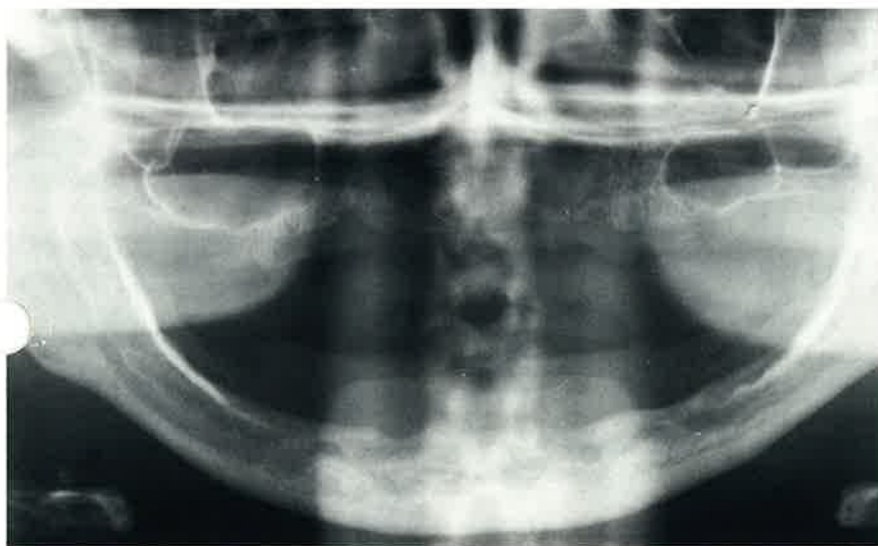


Figure 2: Resorbed mandibular ridge following removal of the subperiosteal implant.

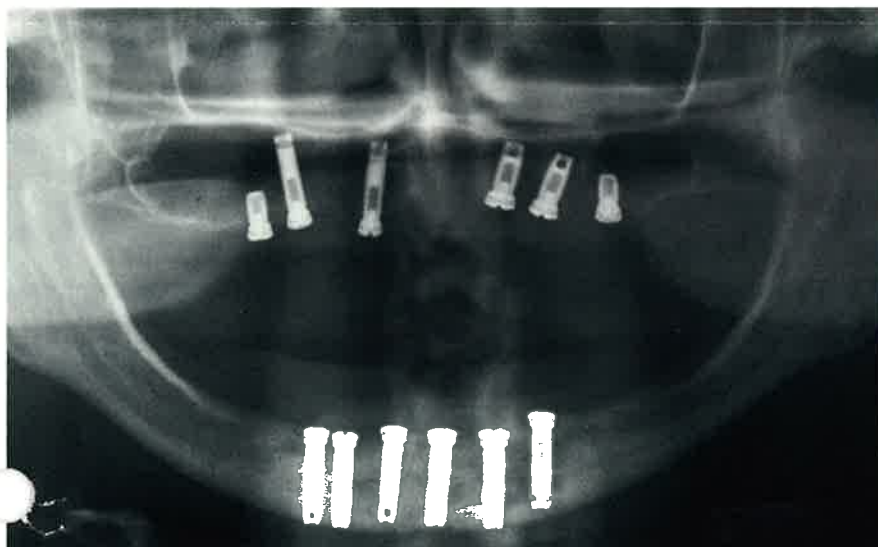


Figure 3: Fixtures placed in maxilla and mandible 5 weeks after removal of the mandibular subperiosteal.

## 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.

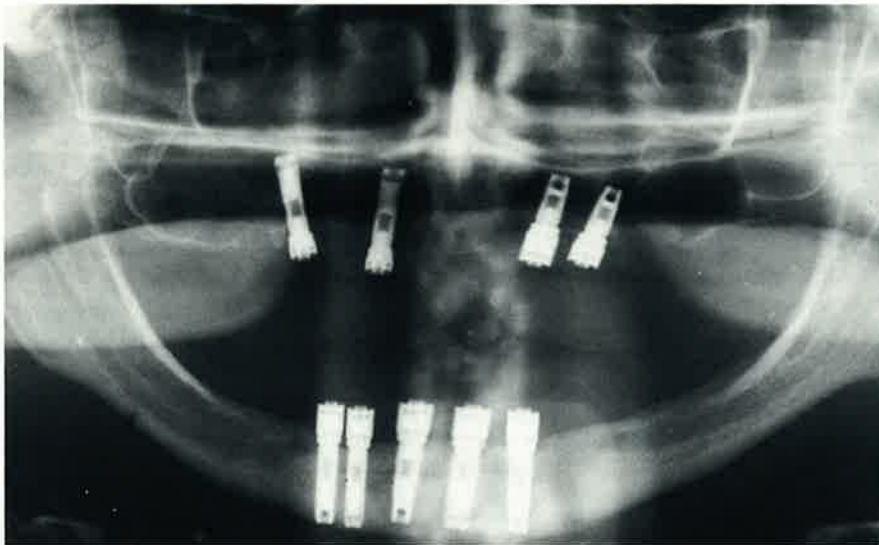


Figure 4: Last fixture on the right was not osseointegrated and removed at the mandibular 2nd stage surgery. The remaining maxillary 7 mm fixture was mobile at 2nd stage surgery and removed.

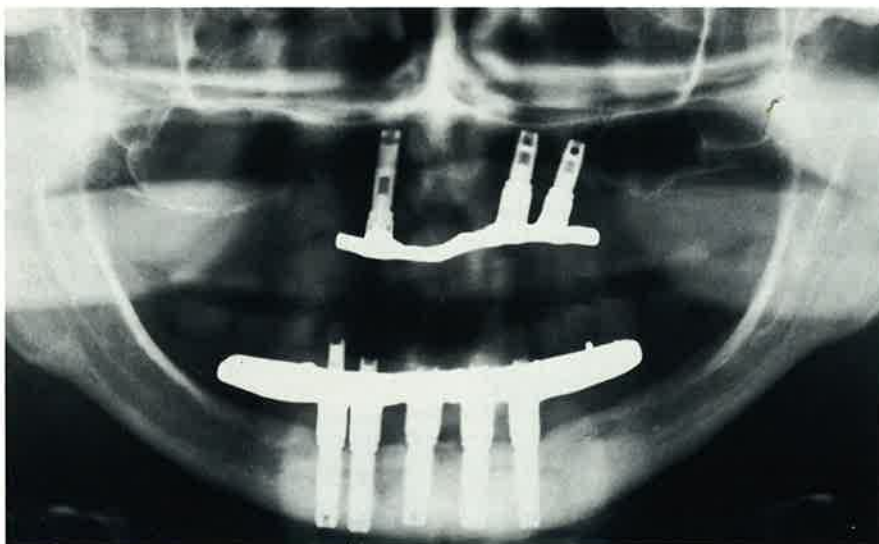


Figure 5: After 6 months of overdenture function the last fixture on the maxillary left deintegrated. The remaining 3 fixtures continued to support the palatless prosthesis for the following 4 years.

**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 Branemark 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*



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