A controlled clinical trial of implant-retained mandibular overdentures: 10 years’ results of clinical aspects and aftercare of IMZ implants and Brånemark implants

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Key words: aftercare, clinical aspects, dental implants, overdenture

Abstract: The aim of this prospective randomized controlled clinical trial was to evaluate the clinical outcomes and prosthetic aftercare of edentulous patients with a mandibular overdenture retained by two IMZ implants or two Brånemark implants during a 10-year period. Patients were allocated to the IMZ group \(n = 29\) or the Brånemark group \(n = 32\) by a computerized balancing method. In the IMZ group, four implants were lost during the 10-year follow-up (survival rate: 93%). In the Brånemark group, nine implants were lost (survival rate: 86%). All patients were re-operated successfully. Multiple prosthetic revisions were necessary in both groups; especially the precision attachment system in the overdenture (23% of the total number of revisions) and the denture base and teeth (26% of the total number of revisions) were subject to frequent fracture. From this study, it can be concluded that both the IMZ implant and the Brånemark implant systems supporting an overdenture are functioning well after 10 years of follow-up. There are no indications of a worsening of clinical or radiographical state after 10 years.

Problems involving lack of stability and retention of a lower denture can often be solved using endosseous implants to which an overdenture can be attached. One of the first studies on overdentures retained by endosseous implants was published by Stalblad et al. (1985). Since then, numerous articles have appeared dealing with this subject, concluding that it is a very successful therapy (Chao et al. 1995; Batenburg et al. 1998). However, the literature on prospective studies of overdentures retained by endosseous implants, with a follow-up period of at least 10 years, is limited. Buser et al. (1999) reported an implant 10-year survival rate of 96.2% mainly in the anterior region of the mandible. Mericske-Stem et al. (2001) reported a 91.4% 10-year survival rate, but this group comprised not only mandibular overdentures but also fixed partial dentures and single crowns. Ferrigno et al. (2002) reported a 10-year survival rate of 95.9% of a group treated with overdentures or fixed full-arch bridges. Comparison of implant systems is optimal in a randomized clinical trial (Antczak-Bouckoms & Chalmers 1988; Barmes 1990). Only a few studies have been published with two or more different endosseous implant systems in one prospective study on mandibular overdentures with a follow-up of at least 5 years (Meijer et al. 2000, 2001). A prospective study with at least a 10-year follow-up and with a comparison between two or more implant systems has never been published. The
number of complications and the amount of aftercare related to the superstructure and prosthesis are important with respect to the choice of components. Some studies are known, which address prosthetic aftercare of at least 5 years [Hemmings et al. 1994; Versteegh et al. 1995; Wismeyer et al. 1995; Watson et al. 1997; Visser et al. 2002]. The aim of the present randomized clinical trial was to evaluate a set of clinical items and prosthetic aftercare of edentulous patients with a mandibular overdenture retained by two IMZ implants or two Brånemark implants during a 10-year period.

Material and methods

Patient selection
Patients with persistent problems when wearing conventional complete dentures due to reduced stability and insufficient retention of their lower dentures were selected for the study. They were all healthy patients and had been referred to the Department of Oral–Maxillofacial Surgery and Maxillofacial Prosthetics of the University Hospital Groningen by their general practitioner. The patients were informed about the different implant systems, possible risks and the method for assignment to the treatment groups. Informed consent was obtained from all participants. The study was approved by the hospital medical ethical committee. The inclusion criteria for the study were: edentulousness in the upper and lower jaw; and stability of the lower denture, a mandibular bone height between 8 and 25 mm as measured at the symphysis on a lateral cephalometric radiograph, and no previously made mandibular dentures, ‘age’ of the present lower denture and the mandibular bone height [Zielhuis et al. 1990]. Characteristics of the two groups are listed in Table 1. There were no relevant differences between the composition of the groups.

Surgical and prosthodontic procedures
All the patients were treated at the University Hospital Groningen by two experienced oral–maxillofacial surgeons and two experienced prosthodontists. The implants were inserted into the interferominal region of the mandible, and after a 3-month osseointegration period the second-stage surgery was performed [Brånemark et al. 1985; Kirsch & Mentag 1986]. Non-osseointegrated implants were removed and, after a healing period, new implants were placed. All the patients were treated with an overdenture on a round-shaped bar [Cendres & Metaux, Biel, Switzerland] with the Ackerman clip retention system [Preat Corporation, Santa Ynez, CA, USA]. With the Brånemark implant system, standard abutments of 4 mm height were used, with the IMZ implant system, titanium connectors of 4 mm height were used. A new maxillary denture was made. A uniform prosthetic procedure was performed for all the patients [teeth: Ivoclar-Vivadent, Ellwangen, Germany; acrylic resin base material: Vertex-Dental B.V., Zeist, the Netherlands]. A balanced occlusion and monoplane articulation with porcelain anterior teeth and acrylic resin posterior teeth was used in both the groups. The base of the overdenture was composed of acrylic resin without a metal reinforcement. The patients were subjected to a strict oral hygiene programme.

Clinical measurements
The clinical analysis included the following parameters:

- Plaque index according to Mombelli (score 0–3) [Mombelli et al. 1987].
- Presence of calculus around each implant (0 = no calculus, 1 = some degree of calculus).
- Bleeding index according to Mombelli (score 0–3) [Mombelli et al. 1987].
- Gingiva index according to Löe and Silness (score 0–3) [Löe & Silness 1963].
- Probing depth, which was measured with a periodontal probe [Merit-B, HuFriedy, Chicago, IL, USA] at four sites around the implants.
- Lip or chin dysesthesia, which was tested by touching the skin with a cotton pellet.

The clinical items were scored 1, 5 and 10 years after functional loading of the implants.

Radiographical evaluation
Rotational panoramic radiographs were taken 1 year after functional loading of the implants and 5 and 10 years after functional loading. Possible bone loss around the implants was classified according to the following scale:

0 = no apparent bone loss,
1 = reduction of bone level not exceeding one-third of the length of the implant,
2 = reduction of bone level exceeding one-third of the length of the

| Table 1. Characteristics of the groups at the baseline of the study |
|----------------------------------------|--------|--------|--------|--------|
|                                       | IMZ group (n = 29) | Brå group (n = 32) |
|----------------------------------------|--------|--------|--------|--------|
| Age (years)                            | 59     | 55     | 11     | 12     |
| Gender number (male/female)            | 9/20   | 12/20  |        |        |
| Edentulous period lower jaw (years)     | 23     | 19     | 11     | 9      |
| Number of mandibular dentures          | 3      | 3      | 1      | 1      |
| ‘Age’ present lower denture (years)     | 8      | 7      | 5      | 5      |
| Mandibular bone height (mm)            | 17     | 17     | 5      | 4      |
implant, but not exceeding one-half of the length of the implant.

3 = reduction of bone level exceeding one-half of the length of the implant.

Recording of surgical and prosthetic aftercare

The following surgical items were scored during the 10 years of follow-up:

- implant loss and re-implantation,
- treatment of gingival hyperplasia,
- placement of palatal mucosa grafts around the implants.

The following prosthetic items were scored during the 10 years of follow-up:

- broken abutments or coping screw,
- new or repair of bar and/or gold cylinders,
- new clips or fastening of loose clips,
- relining upper denture,
- relining lower denture,
- repair denture base or denture teeth,
- readjustment of occlusion,
- new upper denture,
- new lower denture.

Surgical items were counted from the day of the implant operation procedure until 10 years after insertion. Prosthetic items, however, were taken into account from 6 months after placement of the prosthesis until 10 years after insertion of the implants. Prosthetic alterations within 6 months were considered as part of the prosthetic treatment procedure.

Clinical implant performance scale

To compare different implant systems, the clinical implant performance scale (CIP scale) was used (Milholland et al. 1973; Geertman et al. 1996; Boerrigter et al. 1997; Van Waas et al. 1997). Each complication has a rating on a five-point rating scale. The highest rating given to each patient was used for the analysis. The CIP scale included the following ratings:

- 0 = success; no complications,
- 1 = minor complications,
- 2 = complications with a chance of recovery or stabilization of the present situation,
- 3 = serious complications that may lead to failure of the implant system,
- 4 = failure of the implant system.

Minor complications (CIP = 1) were gingival hyperplasia, relining of maxillary or mandibular denture, readjustment of occlusion, clip loosening, coping screw loosening, broken abutment, a slight disturbance of the mental nerve, probing depth = 6 mm and X-ray score 1 along with probing depth = 5 mm.

Complications with a chance of recovery or stabilization of the present situation (CIP = 2) were correction of a non-fitting superstructure, fracture of the superstructure, a severe disturbance of the mental nerve, X-ray score 1 along with probing depth = 6 mm and X-ray score 2 along with probing depth = 5 mm.

Serious complications (CIP = 3) were scored in the case of an X-ray score 2 along with probing depth = 6 mm, X-ray score 3.

Failure of the implant system (CIP = 4) was removal of one (or two) implants after the superstructure was placed.

Data analysis

In analyzing the clinical aspects, the \( \chi^2 \) test and the Mann-Whitney \( U \)-test were used [SPSS version 9.0]. A significance level of 0.05 was chosen.

Results

The clinical evaluation after 1 year could be carried out in 28 patients in the IMZ group due to one non-attendance patient and 31 patients in the Brånemark group (one drop-out due to death). After 5 years, again 28 patients in the IMZ group (one non-attendance) and 28 patients in the Brånemark group (two non-attendance, two death) were seen. After 10 years, the clinical evaluation could be carried out in 28 IMZ patients (one non-attendance) and in 25 Brånemark patients (two non-attendance, four death, one moved abroad). The aftercare during 5 and 10 years could be recorded for all 29 IMZ patients and for 30 Brånemark patients after 5 years (two death) and for 27 Brånemark patients after 10 years (four death, one moved abroad).

Differences in the number of patients between clinical evaluation and aftercare can be explained by the fact that the aftercare can be scored from the patient’s record, whereas the patient himself is not present at the appointment for evaluation (non-attendance). It was assumed that drop-out and non-attendance were independent of the clinical state of the patients.

Clinical analysis

The mean scores on the indices for plaque, gingiva, bleeding and calculus were very low at all three evaluation moments (Table 2). There was a significantly better gingiva score for the Brånemark group at the 1-year evaluation. The mean probing depth of 4.9 mm in the IMZ group and 3.6 mm in the Brånemark group after 1 year, which is a significant difference. At the 5-year evaluation, there was no significant difference anymore, but after 10 years the probing depth was again significantly larger in the IMZ group. The results show a reduction in the probing depth of 4.9 mm [IMZ group] and 3.6 mm [Brånemark group], at the 1-year evaluation to 3.7 mm [IMZ group] and 3.3 mm [Brånemark group] at the 5-year evaluation. Between 5 and 10 years, there was a rise to 4.7 mm [IMZ group] and 3.4 mm [Brånemark group]. Four patients (two in the IMZ group, two in the Brånemark group) complained at the 1-year evaluation about dysesthesia of the lip or chin. After 5 and 10 years, none of the patients complained about these items.

Radiographical analysis

Table 3 shows the bone level scores 1, 5 and 10 years after insertion of the dentures. Of each implant, the most unfavorable value was taken to quantify the bone level. The bone level at 1 year around the implants is significantly higher in the IMZ group compared with the Brånemark group. At the 5-year evaluation, there is no significant difference. After 10 years, the bone level is significantly higher in the Brånemark group. Comparing the bone levels between 1 and 10 years of the IMZ group, there is no significant difference, whereas in the Brånemark group the bone level at 10 years is significantly higher than at the 1-year evaluation.

Analysis of surgical and prosthetic aftercare

Eight implants (three IMZ implants in two patients, five Brånemark implants in three patients) were lost during the first year of follow-up (all during the osseointegration period of 3 months). Another five implants were lost between 1 and 5 years (one IMZ implant, four Brånemark implants in two patients). No implants were lost between 5
Table 2. Mean values (SD) of plaque index, gingiva index, bleeding index, calculus index and probing depth at the 1-, 5- and 10-year evaluation and significance level of the differences between the implant systems (χ² test)

<table>
<thead>
<tr>
<th>Score</th>
<th>IMZ (n = 28)</th>
<th>Brånemark (n = 31)</th>
<th>Significance</th>
<th>IMZ (n = 28)</th>
<th>Brånemark (n = 28)</th>
<th>Significance</th>
<th>IMZ (n = 28)</th>
<th>Brånemark (n = 25)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean plaque index (SD) (possible score 0–3)</td>
<td>0.5 (0.6)</td>
<td>0.5 (1.0)</td>
<td>Not significant</td>
<td>0.7 (0.7)</td>
<td>0.5 (0.8)</td>
<td>Not significant</td>
<td>0.8 (1.0)</td>
<td>0.8 (1.0)</td>
<td>Not significant</td>
</tr>
<tr>
<td>Mean gingiva index (SD) (possible score 0–3)</td>
<td>0.5 (0.6)</td>
<td>0.2 (0.6)</td>
<td>Significance P = 0.014</td>
<td>0.3 (0.4)</td>
<td>0.3 (0.5)</td>
<td>Not significant</td>
<td>0.3 (0.7)</td>
<td>0.4 (0.6)</td>
<td>Not significant</td>
</tr>
<tr>
<td>Mean bleeding index (SD) (possible score 0–3)</td>
<td>0.8 (0.6)</td>
<td>0.6 (0.8)</td>
<td>Not significant</td>
<td>0.1 (0.3)</td>
<td>0.1 (0.3)</td>
<td>Not significant</td>
<td>0.7 (0.7)</td>
<td>0.6 (0.6)</td>
<td>Not significant</td>
</tr>
<tr>
<td>Mean calculus index (SD) (possible score 0–1)</td>
<td>0.2 (0.4)</td>
<td>0.1 (0.3)</td>
<td>Not significant</td>
<td>0.3 (0.4)</td>
<td>0.1 (0.3)</td>
<td>Not significant</td>
<td>0.3 (0.5)</td>
<td>0.2 (0.4)</td>
<td>Not significant</td>
</tr>
<tr>
<td>Mean probing depth (mm) (SD)</td>
<td>4.9 (1.3)</td>
<td>3.6 (1.2)</td>
<td>Significance P = 0.0002</td>
<td>3.7 (1.0)</td>
<td>3.3 (0.9)</td>
<td>Not significant</td>
<td>4.7 (1.8)</td>
<td>3.4 (1.0)</td>
<td>Significance P = 0.0003</td>
</tr>
</tbody>
</table>

Table 3. Frequencies of bone level scores around IMZ implants and Brånemark implants 1, 5 and 10 years after insertion of the denture

<table>
<thead>
<tr>
<th>Score</th>
<th>IMZ implants (n = 56)</th>
<th>Brånemark implants (n = 56)</th>
<th>IMZ implants (n = 56)</th>
<th>Brånemark implants (n = 56)</th>
<th>IMZ implants (n = 56)</th>
<th>Brånemark implants (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>38</td>
<td>18</td>
<td>45</td>
<td>49</td>
<td>37</td>
<td>47</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
<td>41</td>
<td>10</td>
<td>6</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mean score</td>
<td>0.4</td>
<td>0.8</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>P-value (Mann–Whitney)</td>
<td>0.0004</td>
<td>0.30</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0 = no apparent bone loss, 1 = reduction <1/3 of implant length, 2 = reduction between 1/3 and 1/2 of implant length, 3 = reduction >1/2 implant length.

Discussion

The clinical scores are comparable with those of Batenburg et al. [1994], Geertman et al. [1996] and Meijer et al. [1998], in whose studies the same criteria were used. Apparently, a tight oral hygiene regimen to which patients in these studies were subjected, provides healthy peri-implant soft tissues. Regarding the reduction in probing depth between the 1-year evaluation and the 5-year evaluation, some bone growth in the first few years is possible, but can also be ascribed to the low reliability of the probing depth measurement, because probing is very painful for most patients. Since a standardized probing force was not used in this study and there were different observers at the 1-year evaluation and the 5- and 10-year evaluation, inter-observer differences could be large and may have caused this reduction. Four patients complained about dysesthesia of the lip or chin at the 1-year evaluation. At the 5- and 10-year evaluation this problem was not present anymore. None of the involved implants was positioned in the direct vicinity of the alveolar nerve. Probably there were only minor disturbances in sensibility, which disappeared in time.

The rotational panoramic radiograph is widely used for the evaluation of bone around dental implants in edentulous mandibles. However, this technique suffers...
This significant difference can possibly be explained by the different surgical techniques, with the use of an intra-oral filmholder, would be favorable (Meijer et al. 1992). Because of the use of panoramic radiographs at the beginning of the study, this technique was continued and evaluation of bone level changes was carried out in proportion to the length of the implants instead of directly in millimeters (Batenburg et al. 1994, Geertman et al. 1996). No bone loss could be detected around 57% of the IMZ implants at the 1-year evaluation, whereas around the Brånemark implants bone loss could be observed around 15%. This significant difference can possibly be explained by the different surgical procedures of the implant systems. The Brånemark system uses a countersink for the neck of the implants, which is not used for the IMZ system. After 5 years, there is no difference anymore between the two systems, whereas after 10 years the difference is in favor of the Brånemark group. Comparing the 1- and 10-year results of both groups, it can be noticed that the bone level around the IMZ implants remains stable and the bone level around the Brånemark implants increases during the 10 years. It is possible that the removed bone from the countersink comes back to the level of the surrounding bone during a remodelling process after 1 year. Because of the difficulties in measuring bone level on panoramic radiographs, one may not draw firm conclusions with respect to this item.

Eight implants were lost during the osseointegration period. Another five implants were lost after construction of the prosthesis. All the patients were re-operated successfully. Including loss of implants during the osseointegration period gives a survival rate of 89% after 5 years. This is rather low compared with the studies of Buser et al. (1999) [96.2%], Mericske-Stern et al. (2001) [91.4%] and Ferrigno et al. (2002) [95.9%]. In not all studies is it very clear if implants lost during the osseointegration period are included. If not, a survival rate of 96% can be noted in this study. Despite the unequal number of lost implants [four in the IMZ group, nine in the Brånemark group], this difference is not significant.

When analyzing the prosthetic aftercare, the large number of broken abutment/loose coping screws in the IMZ group became noticeable. In almost all cases, this appeared to be the 4 mm high titanium connector of the 3.3 diameter implant. With the 4.0 diameter implants no broken abutments occurred. All overdentures were initially provided with two Ackermann clips. It appeared in time that these small clips were subject to fracture or loosening of the retention flanges. As alternative Friatec clips (which fitted on the same round bar) were applied in case clips fractured repeatedly or the bar was changed into a thick egg-shaped Dolderbar with matching clips. Multiple repairs of denture base and teeth can be noticed. The relatively large bar superstructure results in a large space in the frontal base of the overdenture. Increased chewing force may exceed the strength of the available acrylic resin. Acrylic resin posterior teeth were used in combination with porcelain anterior teeth. In time, the protrusive articulation was obstructed because of the abrasion of the posterior teeth, which could result in loss of stability of the upper denture and/or fracture of anterior teeth. To prevent abrasion, porcelain posterior teeth were used later on. Multiple corrections of the precision attachment system were also mentioned in the studies of Hemmings et al. (1994), Versteegh et al. (1995) and Watson et al. (1997). Apparently, the connection of the removable part (overdenture) to the fixed part (bar superstructure) is very critical. A firm fixation of the retentive flanges in the acrylic resin of the denture base and also a solid construction of the retentive system itself is necessary to reduce prosthetic aftercare.

### Table 4b. Prosthetic aftercare during 10 years of follow-up

<table>
<thead>
<tr>
<th></th>
<th>Period 0–5 years</th>
<th>Period 5–10 years</th>
<th>Total period 0–10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMZ group (n = 28)</td>
<td>Brån group (n = 30)</td>
<td>IMZ group (n = 29)</td>
</tr>
<tr>
<td>Broken abutments/loose coping screws</td>
<td>13</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>New bar/gold cylinders</td>
<td>1</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>New/fastening clips</td>
<td>8</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Relining upper denture</td>
<td>8</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Relining lower denture</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Repair denture base/teeth</td>
<td>14</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Readjustment of occlusion</td>
<td>3</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>New upper denture</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>New lower denture</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Total number of aftercare actions</td>
<td>56</td>
<td>64</td>
<td>73</td>
</tr>
</tbody>
</table>

### Table 5. Clinical Implant Performance scale after 5 and 10 years of follow-up

<table>
<thead>
<tr>
<th>CIP scale</th>
<th>5 years</th>
<th>10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMZ group (n = 28)</td>
<td>Brån group (n = 28)</td>
</tr>
<tr>
<td>Score 0</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Score 1</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Score 2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Score 3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Score 4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mean</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>P-value (Mann-Whitney)</td>
<td>0.98</td>
<td>0.30</td>
</tr>
</tbody>
</table>
Zusammenfassung

Das Ziel dieser randomisierten prospektiven und kontrollierten klinischen Studie war, die Befunde der prothetischen Nachsorge bei zahnlosen Patienten zu erübrigen, die eine Zeitspanne von 10 Jahren eine Unterkieferhybridprothese auf zwei IMZ-Implantaten oder zwei Bränemarkimplantaten getragen hatten. Die Patienten ordneten man mit einem komputergesteuerten Auswahlverfahren der IMZ-Gruppe (n = 29) oder der Bränemark-Gruppe (n = 32) zu. Im IMZ-Gruppe gingen in der 10-jährigen Versuchsphase vier Implantate verloren (Überlebensrate von 93%). In der Bränemark-Gruppe gingen neun Implantate verloren (Überlebensrate von 86%). All diese Patienten konnten erfolgreich nachgepflanzt werden. In beiden Gruppen waren zusätzlich erhebliche prothetische Eingriffe notwendig. Insbesondere die Präzisionen der Hybridprothesen (23% aller Reparaturen) und der Prothesenbasis und -zähne (26% aller Reparaturen) mussten oft wegen Fraktur repariert oder ersetzt werden. Aus dieser Studie kann man schliessen, dass sich sowohl das IMZ-System wie auch das Bränemarksystem gut eignen, um eine Hybridprothese über eine 10-jährige Beobachtungszeit zu fixieren. Es gibt nach 10 Jahren keine Anzeichen einer Verschlechterung des klinischen oder des röntgenologischen Zustandes.

Résumé

Le but de cet essai clinique contrôlé randomisé et prospectif à été d’évaluer les conséquences cliniques et prothétiques chez des patients edentés avec une prothèse mandibulaire retenue par deux implants IMZ ou ad modum Branemark durant une décennie. Les patients ont été répartis soit dans le groupe IMZ (n = 29) soit le Branemark (n = 32) par ordinateur. Dans le groupe IMZ, quatre implants ont été perdus durant cette décennie ce qui signifie un taux de survie de 93%. Dans le groupe Branemark, neuf implants ont été perdus entraînant un taux de survie de 86%. Tous les patients ont été réopérés avec succès. Des révisions prothétiques multiples ont été nécessaires dans les deux groupes, le système d’attache de précision dans la prothèse (23% du nombre total des révisions) et la base de la prothèse et les dents (26% du nombre total des révisions) sujets à de multiples fractures. Tant les implants IMZ que les Branemark sont des implants permettant de fixer une prothèse qui fonctionne bien après une décennie. Il n’y avait aucune indication d’une dégradation de l’état clinique ou radiographique après cette durée.

References


