Eugenio Romeo
Matteo Chiapasco
Andrea Lazza
Paolo Casentini
Marco Ghisolfi
Marco Iorio
Giorgio Vogel

Implant-retained mandibular overdentures with ITI implants

A comparison of 2-year results between delayed and immediate loading

Authors' affiliation:
Eugenio Romeo, Matteo Chiapasco, Andrea Lazza, Paolo Casentini, Marco Ghisolfi, Marco Iorio Giorgio Vogel, Department of Medicine, Surgery and Dentistry, University of Milano – Milan, Italy

Correspondence to:
Dr Eugenio Romeo
Clinica Odontostomatologica
Via Beldiletto 1/3
20142 Milano
Italy
Tel: + 39 2 503 19000
Fax: + 39 2 503 19040
e-mail: Eugenio.Romeo@unimi.it

Key words: dental implants; edentulous mandible; endosseus implants; immediate loading; mandibular prosthesis; non-submerged; osseointegration; overdenture.

Abstract: This prospective study has been designed to compare the results of immediate and delayed loading of implant-retained mandibular overdentures after a 2-year follow-up. Twenty patients have been randomly divided into two groups. Group 1 patients (test group) received four ITI implants in the intraforaminal area of the mandible. Octa® abutments were immediately screwed on implants; 2 days after surgery, the implants were rigidly connected with a U-shaped Dolder gold bar and loaded with an overdenture. Group 2 patients (control group) received, in the same area, the same type and number of implants, which were left to heal according to the standard protocol. At 3–4 months, Octa abutments were screwed on the implants and the same prosthetic procedure of the test group was applied. The minimum follow-up period lasted 2 years, with recall appointments at 2 weeks, 1, 3, 6 months, 1 year and every following year postoperatively, evaluating: MPI, MBI, PD, Periotest® and radiographic peri-implant bone resorption. Success criteria according to Albrektsson et al. were used. Only one implant out of the 40 of group 2 failed, whereas none failed in group 1. No statistical difference of the clinical parameters evaluated was noticed in the two groups. Therefore, immediate loading of implants, if connected with a U-shaped bar, can provide the same results of the 'traditional' technique as far as osseointegration and short-term survival rates of implants are concerned. Moreover, this method significantly shortens the treatment period, thus increasing patient satisfaction.

The atrophic totally edentulous mandible may cause relevant problems as far as the stability of a removable denture is concerned. The use of implant-supported overdentures can overcome these problems and has proved to be reliable in the long-term (Mericske-Stern et al. 1994, 2000; Wismeijer et al. 1995, 1997, 1999;) and satisfactory to the patient (Wismeijer et al. 1995; Gotfredsen et al. 1989).

Usually implants are left to heal unloaded for at least 3 months to obtain osseointegration (Buser et al. 1991; Bernard et al. 1995), but this healing period may cause some discomfort to the patients due to the instability of the provisional denture. In addition, due to the presence of healing abutments, one-stage implants are not really unloaded in edentulous patients during the healing period.

As demonstrated by Ledermann (1979, 1983) and Graber & Besimo (1991), micro movements and non-axial load can be prevented connecting three or four implants with a bar, allowing osseointegration to occur normally, also in case of immediate loading with an overdenture (Szmukler et al. 1998). However, to date, only a few prospective studies concerning this method (Spiekermann et al. 1995; Chiapas-

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co et al. 1997; Gatti et al. 2000) have been published.

The aim of this prospective study was to evaluate the effect of immediate loading, using bar-retained overdentures, on osseointegration of ITI implants, and to compare these results with delayed loading.

Material and methods

During a 2-year period (1997–1999), 20 patients, 8 males and 12 females, aged between 42 and 73 years (mean age 63.2 years), presenting with complete mandibular edentulism of at least 3 months' duration and having functional problems with a complete denture, were selected for prosthetic rehabilitation by means of implant-retained mandibular overdentures.

Patient inclusion criteria

Only healthy patients were included in this study. Jaw bone quantity and morphology as well as skeletal relationship were evaluated before surgery with a profile and a panoramic radiograph.

Inclusion criteria were as follows:

- Adequate oral hygiene;
- Total edentulism in the mandible (for at least 3 months before implant placement);
- Absence of local inflammation;
- Absence of oral mucosal diseases;
- No history of local radiotherapy;
- Residual bone volume in the intraforaminal area should be enough to receive four screw-type titanium implants, at least 3.3 mm in diameter and 10 mm in length;
- Class 1-2-3 bone according to Lekholm & Zarb classification (1985).

Patient exclusion criteria

Criteria used for excluding patients from this study were as follows:

- Insufficient bone volume in the intraforaminal area of the mandible to receive 4 implants at least 3.3 mm in diameter and 10 mm in length;
- Severe intermaxillary skeletal discrepancy;
- Gagging reflexes;
- Severe clenching habits or bruxism;
- Patients who had already received and lost implants in the intraforaminal area;
- Drug or alcohol abuse;
- Heavy smokers (more than 20 cigarettes per day);
- Patients who had received local radiotherapy to the head and neck region for malignancies;
- Patients undergoing antiblastic chemotherapy;
- Patients affected by severe chronic renal disease;
- Patients affected by severe chronic liver disease;
- Uncontrolled diabetes;
- Haemophilia, bleeding disorders or anticoagulant therapy;
- Metabolic bone disorders;
- Immunocompromised patients, including those affected by HIV;
- Steroid treatment at time of evaluation;
- Pregnancy at time of evaluation;
- General contraindications for surgical procedures;
- Poor oral hygiene;
- Mucosal disease such as lichen planus.

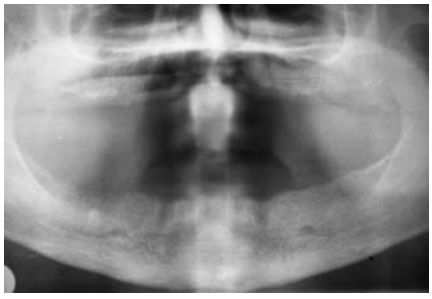

Fig. 1. Preoperative panoramic radiograph.

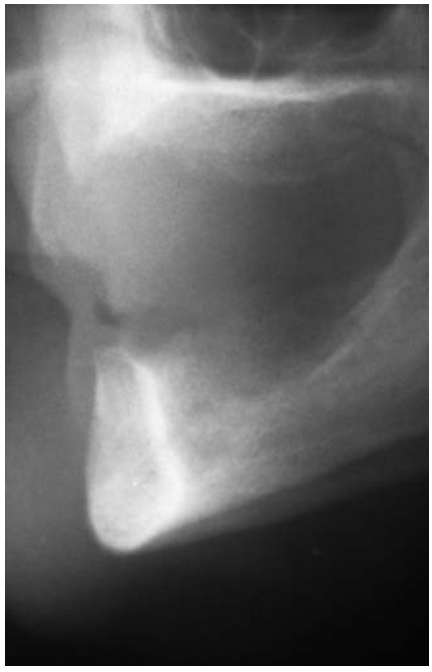

Fig. 2. Preoperative cephalometric radiograph.

Surgical and prosthetic protocol

To correctly plan implant position and to analyse local anatomy, in addition to the panoramic and profile radiographs (Figs 1, 2), alginate impressions were taken preoperatively and casts of the maxilla and mandible were fabricated and mounted into an articulator (Weingart & Ten Bruggenkate 2000). The available interocclusal space and the number of dental units to be replaced were evaluated on the mounted casts. An acrylic template, with holes drilled in the ideal position for implant insertion, was prepared.

Patients were thoroughly informed about this study and each patient signed an informed consent.

Patients were randomly attributed to the test (immediate loading) or control (delayed loading) group, each one made up of 10 patients.

Before surgery, patients had a mouthwash with chlorhexidine-digluconate 0.12% for 1 min. In both groups patients received oral antibiotics (starting 1 h before surgery and continuing till the third postoperative day), and non-steroidal analgesics postoperatively.

The surgical protocol was the same for both groups as far as the insertion of the implants was concerned. The same surgeon performed the surgical procedure in all patients.

Implant insertion was performed under local anesthesia. The surgical procedure started with an intraoral crestal incision, extended from the molar area of one side to the opposite side, with distal releasing incisions in order to identify both mental foramina. Subperiosteal dissection of mucoperiosteum was obtained both buccally and lingually, to identify and visually control both sides of the symphysis. When indicated, a flattening of the alveolar crest was performed with a bur, under irrigation with sterile saline, in order to obtain a larger and flat bony base.

Implant sites were prepared according to the standard ITI procedure. Four titanium implants, 3.3 or 4.1 mm in diameter and at least 10 mm in length, were placed anterior

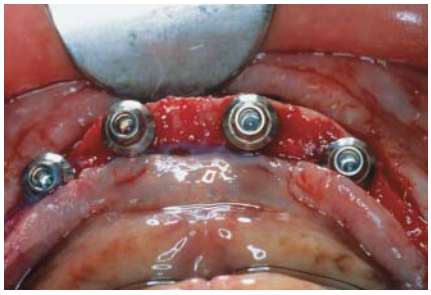

Fig. 3. Intraoral view at the end of surgical procedure after placement of four ITI implants in the intraforaminal area of the mandible.

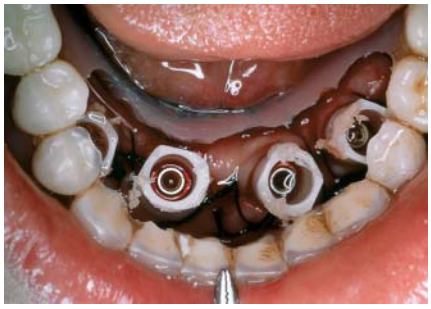

Fig. 4. First impression, using plastic caps and patient's modified denture.

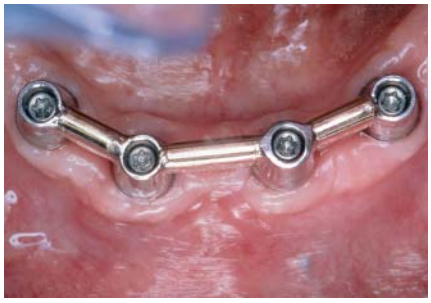

Fig. 6. Intraoral view 2 years after final prosthetic rehabilitation.

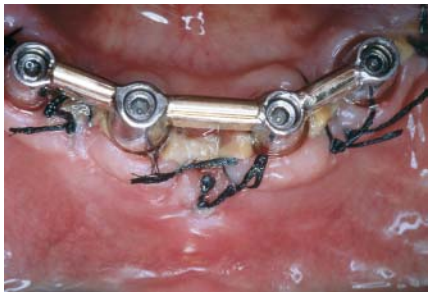

Fig. 5. The bar inserted 1 day after surgery.

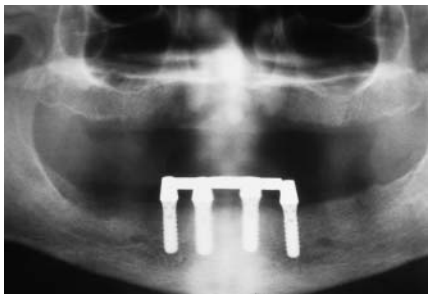

Fig. 7. Panoramic radiograph 2 years after final prosthetic rehabilitation.

to the mental foramina, following – whenever possible – the indications provided by the previously made acrylic templates (Fig. 3). No engagement of lower mandibular cortical bone was obtained, according with literature data for ITI implants (Buser et al. 2000).The mucoperiosteal flaps were accurately sutured around the implants.

Postoperative care included rinsing with 0.12% chlorhexidine-digluconate mouthwash two times per day for 2 weeks, and a soft diet for 2 weeks. Sutures were removed 8–10 days postoperatively.

After implant insertion, treatment differed in the two groups. In the test group, instead of using healing caps, 4 Octa abutments were immediately screwed to the implants at 35 Ncm, under dynamometric control. In some cases the torque-controlled screwing of the Octa abutment caused the rotation of the implant, so the abutment was screwed by hand. In fact, the torque-controlled screwing of the abutment is not a *conditio sine qua non* for passive adaptation of the bar, because prostheses' gold copings fit on the implant shoulder, so the vertical position of the Octa is not relevant for bar adaptation. The screwing of the Octa at 35 Ncm was, in these cases, performed 3 months postoperatively, when osseointegration was obtained.

Using plastic transfer caps inserted on implants, an impression was immediately taken (Impregum F®, ESPE Dental AG, Seefeld, Germany) using the patient's modified denture as an impression tray (Fig. 4). On the cast obtained, which incorporated Octa implant/abutment analogs, prefabricated screwed copings were connected with self-curing resin (DuraLay®, Reliance Dental MFG Co., Worth, IL, USA) and after 12 h, when the polymerization was completed, the connections were sectioned.

The following day, the copings were screwed on implants and connected again with a small amount of the same self-curing resin (Assif et al. 1996). This step is extremely important to avoid the loss of precision caused by resin contraction. The final impression was taken using a previously prepared patient denture. The master casts were prepared and a U-shaped Dolder bar constructed, soldering the ITI bar gold copings with bar segments. The spark-erosion (Evans 1997; La Barge 1997) technique was used to increase passive fit. Clips incorporated in the denture base formed the retention system.

Two days after surgery, the bar was screwed to the abutments (Fig. 5) and fit accuracy of the bar was checked intraorally by means of the Sheffield's test. If passive fit was achieved, the bar was definitively screwed to the abutments at 15 Ncm and the patient wore the overdenture immediately.

In the control group, standard titanium healing caps were used and implants were left to heal in a not-submerged way for 3–4 months. Patients wore the mandibular denture relined with a soft material (Hydro-Cast®, Kay-See Dental MFG Co., Kansas City, MO, USA) immediately after surgery.

After the healing period, Octa abutments were screwed to implants at 35 Ncm under dynamometric control. The following prosthetic procedures were the same as in the test group.

Follow-up visits were scheduled for 2 weeks and 1, 3, 6 and 12 months after surgery during the first year and annually thereafter.

Clinical parameters evaluated

Every implant was evaluated individually after removal of the bar at 3, 6, 12 and 24 months after the beginning of prosthetic load. The following clinical parameters were recorded:

Radiographic assessment of marginal bone loss

To detect any vertical bone loss around implants, a panoramic radiograph was taken immediately after implant insertion, 6, 12 and 24 months after the beginning of the prosthetic load.

To correct dimensional distortion, the apparent dimension of each implant was measured on the radiograph and compared to the actual implant size.

Crestal bone level was recorded as the

most coronal direct bone-implant contact. Measurements were made mesial and distal to each implant by means of a transparent millimeter ruler, measuring the distance between the apex of the implant and the first visible contact with the implant surface. The measurements were made to the nearest half-millimeter.

Peri-implant soft tissue health

The following parameters were evaluated, in accordance with Mombelli et al. (1987):

- Assessment of bleeding – Modified Bleeding Index (MBI):

Score 0 – no bleeding when periodontal probe is passed along the gingival margin adjacent to the implant;
Score 1 – isolated bleeding spots visible;
Score 2 – blood forms a confluent red line on margin;
Score 3 – heavy or profuse bleeding;

- Assessment of plaque accumulation – Modified Plaque Index (MPI):

Score 0 – no detection of plaque;
Score 1 – plaque recognized only by running a probe across a smooth marginal surface of the implant;
Score 2 – plaque can be seen at a glance;
Score 3 – abundance of soft matter;

- Peri-implant Probing Depth (PD):.

Probing has been performed at four sites for each implant, buccal, lingual, mesial, and distal.

Implant mobility

Implant mobility was tested using Periotest® (Siemens AG, Bensheim, Germany) measurements for each implant at the time of abutment connection, 3, 6, 12 and 24 months after the beginning of the prosthetic load.

Success criteria

Success criteria according to Albrektsson et al. (1986) were used. The only modification made by the authors was the relationship between success rate and observation time, due to the shorter follow-up (2 years).

- An individual, unattached implant was immobile when tested clinically;
- A radiograph did not demonstrate any evidence of peri-implant radiolucency;
- Vertical bone loss was less than 0.2 mm annually following the implant's first year of service;
- Individual implant performance was characterized by absence of signs and symptoms such as pain, infection, neuropathies, paresthesia or violation of the mandibular canal.

In the context of the above, a 95% success rate at the end of a 2-year period was expected.

Statistical analysis

Descriptive analysis of raw data has been performed with commercial statistical software (Stat View 5.0®, SAS Institute inc., Cary, NC, USA). With the same software package the pertinent comparisons between the relevant variables in the two groups have been calculated. The Mann–Whitney U-test has been used to compare MBI, MPI, PD and Periotest between the two groups.

The Student test has been used to compare peri-implant bone resorption between the two groups: in connection with statistical evaluation, a *P*-value of 0.05 was considered statistically relevant.

Results

Postoperative recovery was uneventful for all patients in both groups. None of the patients treated was withdrawn during the follow-up. In the control group, one implant was lost 1 year after loading because of peri-implantitis. In this case the implant was removed, and the bar modified and screwed to the remaining three implants.

The cumulative success rate of implants after 2 years of functional loading was therefore 100% in group 1 (immediate loading) and 97.5% in group 2 (delayed loading), whereas the success rate of overdenture-supporting bars was 100%.

Peri-implant bone resorption

No statistically significant differences were found between the two groups ($P > 0.05$) as far as mean peri-implant bone resorption measured at 3, 6, 12 and 24 months after the beginning of prosthetic loading is concerned (Table 1).

Peri-implant tissue parameters

No statistically significant differences were found between the two groups as far as peri-implant soft tissue parameters (MBI, MPI, PD and Periotest) are concerned (Tables 2, 3 and 4).

Implant mobility

No statistically significant differences were found between the two groups as far as implant mobility evaluated with Periotest® is concerned (Table 5).

A clinical case of group 1 is presented in Figs. 1–7.

Discussion

Primary stability and absence of early loading are considered fundamental prerequi-

***Table 1*. Bone resorption at 6, 12 and 24 months after the beginning of the prosthetic load (mean ± standard deviation of the mean). No statistically significant difference was present (Student's t-test, P > 0.05)**

	6 months	12 months	24 months
Test Group (immediate loading)	0.13 ± 0.22 mm	0.21 ± 0.12 mm	0.41 ± 0.12 mm
Control Group (delayed loading)	0.13 ± 0.22 mm	0.19 ± 0.24 mm	0.37 ± 0.22 mm

***Table 2*. Modified Bleeding Index (MBI) scores at 3, 6, 12 and 24 months after the beginning of the prosthetic load (mean ± standard deviation of the mean). No statistically significant difference was present (Student's t-test, P > 0.05)**

	3 months	6 months	12 months	24 months
Test Group (immediate loading)	0.56 ± 0.43	0.49 ± 0.40	0.53 ± 0.34	0.13 ± 0.15
Control Group delayed loading)	**0.56 ± 0.64**	**0.49 ± 0.53**	**0.53 ± 0.50**	**0.16 ± 0.36**

Table 3. **Modified Plaque Index (MPI) scores at 3, 6, 12 and 24 months after the beginning of the prosthetic load (mean ± standard deviation of the mean). No statistically significant difference was present (Student's t-test, $P > 0.05$)**

	3 months	6 months	12 months	24 months
Test Group (immediate loading)	0.99 ± 0.56	0.74 ± 0.47	0.78 ± 0.58	0.61 ± 0.48
Control Group (delayed loading)	**0.99 ± 0.74**	**0.74 ± 0.63**	**0.57 ± 0.68**	**0.51 ± 0.74**

Table 4. **Probing Depth (PD) at 6, 12 and 24 months after the beginning of the prosthetic load (mean ± standard deviation of the mean). No statistically significant difference was present (Student's t-test, $P > 0.05$)**

	3 months	6 months	12 months	24 months
Test Group (immediate loading)	2.11 ± 0.63 mm	2.19 ± 0.55 mm	2.51 ± 0.46 mm	2.33 ± 0.28 mm
Control Group (delayed loading)	2.10 ± 0.79 mm	2.18 ± 0.68 mm	2.51 ± 0.59 mm	2.28 ± 0.63 mm

Table 5. **Periotest® values at 3, 6, 12 and 24 months after the beginning of the prosthetic load (mean ± standard deviation of the mean). No statistically significant difference was present (Student's t-test, $P > 0.05$)**

	3 months	6 months	12 months	24 months
Test Group (immediate loading)	−4.25 ± 0.67	− 4.48 ± 0.55	− 4.53 ± 0.55	− 4.85 ± 0.62
Control Group (delayed loading)	−3.93 ± 0.76	− 4.18 ± 0.50	− 4.48 ± 0.51	− 5.05 ± 0.55

sites for osseointegration of endosseous implants. For this reason, a waiting period of between 3 and 6 months is usually recommended (Brånemark 1993).

The method described in this study, which utilizes four implants rigidly connected by a curved U-shaped bar allows a very good stabilization of the implants, despite immediate loading. Thus, implants seem not to be exposed to movements that may compromise osseointegration, as demonstrated by Graber & Besimo (1991) and Ledermann (1979, 1983).

Despite the limitations caused by the small sample of patients and the relatively short observation period, this study showed that success rates of immediately loaded implants are not only comparable with those obtained in case of delayed loading, but are also consistent with the results reported in the literature concerning implant-retained overdentures with delayed loading (Albrektsson et al. 1988, Patrick et al. 1989; Quirynen et al. 1991a, 1991b; Arvidson et al. 1992; Johns et al. 1992).

Many authors tested several different systems to connect implants supporting overdentures. Results showed that success rates were not correlated to the connection system used (Naert et al. 1994; Wismeijer et al. 1999). Moreover, in a two-stage procedure, the common opinion that the magnitude of stresses on the bone around each implant would decrease, distributing the prosthetic load on an increasing number of implants (Skalak 1983; Jennings & Lilly 1992), has not been confirmed by other authors (Meijer et al. 1994). However, the number of implants inserted, their distribution and the type of rigid connection appear to be critical in the case of immediate loading (Ledermann 1979, 1983; Graber & Besimo 1991).

The choice of a U-shaped Dolder gold bar is based on the fact that, with this kind of bar shape, it is possible to minimize rotational movements and to transfer loads to implants mostly in a vertical direction. Other bar designs, like Ackermann bars with a round cross-section or Dolder bars with an oval cross-section, and the use of two implants, which permit a straight and not an arch-form arrangement of the bar, may not prevent rotation of the denture as well as non-axial load of the implants (Ledermann 1979, 1983; Frischherz 1985a, 1985b; Graber & Besimo 1991), thus leading to a potential higher risk of lack of osseointegration. The choice of four implants and a U-shaped Dolder bar that rigidly connects them is based on the idea that only this number of implants and this bar shape can guarantee stability and avoid movements which could compromise osseointegration. However, it is worth noting that this statement is not yet supported by scientific evidence.

It is very important to underline that this technique has been applied only in the intraforaminal area of the mandible, where good bone quality is frequently found. In particular, immediate loading of implants was performed only in case of class 1-2-3 bone, according to the classification of Lekholm & Zarb (1985).

Maxillary bone is, in contrast, frequently characterized by lower density. In a 3-year follow-up reported by Hutton et al. (1995) the implant failure rate was 3.3% in case of mandibular implant-supported overdentures, whereas it was 27.6% for maxillary overdentures. Possible application of immediately loaded implants in the maxilla will have to be further investigated in the future.

Results from this study showed that marginal bone loss values as well as soft tissues peri-implant parameters around implants did not differ between the two groups and were consistent with those reported by other authors (Adell et al. 1981, 1990; Albrektsson et al. 1986; Lekholm et al. 1986; Chaytor et al. 1991; Leimola-Virtanen et al. 1995; Spiekermann et al. 1995). This seems to confirm that immediate loading of implants does not compromise bone-to-implant and soft tissue-to-implant interface.

Peri-implant probing was routinely performed, although it is uncertain to what extent it is possible to use such a measurement to indicate implant success rates. Some authors (Quirynen et al. 1991; Schou et al. 1993; Lang et al. 1994) found a direct correlation between peri-implant bone loss and peri-implant probing. On the other hand, other authors have pointed out that there is no evidence that probing depth is related to implant success and have demonstrated that the presence of deep pockets around implants is not necessarily correlated to marginal bone loss (Lekholm et al. 1986; Smith & Zarb 1989).

Clinical evaluation of implant mobility with the handles of two dental mirrors may be considered a parameter of low sensitivity, because extensive resorption of bone around implants may be associated with implant stability if some parts are

still in an ankylotic connection with bone. More precise methods for the evaluation of implant mobility such as Periotest are to be preferred, although recent publication (Isidor 1998) demonstrated that this method presents low sensitivity as well.

Radiographic evaluation of crestal bone level around implants by means of a panoramic radiograph may be criticized because this kind of radiograph can be rather imprecise. Panoramic films have been used in this investigation because it can be quite difficult to obtain intraoral radiographs in completely edentulous patients, because these patients frequently refer to great discomfort at the insertion of the intraoral film due to jaw resorption.

Last but not least, implant-retained overdentures solve stability problems caused by atrophic alveolar ridges, thus being well accepted by and satisfactory to patients (Wismeijer et al. 1995, 1997, 1999; Mericske-Stern et al. 2000).

Conclusion

The purpose of this study was to evaluate the reliability of immediately loaded implants in the intraforaminal area of edentulous mandibles with implant-supported overdentures and to compare the short-term results of osseointegration and survival of implants with delayed loading.

Preliminary results from this study, despite the limitations due to the small number of patients and implants and the short observation time, seem to indicate that by placing four implants of adequate length and diameter in the intraforaminal area of the mandible, osseointegration can take place despite immediate loading, without reducing the success rates.

This procedure can consistently reduce the length of prosthetic rehabilitation, without compromising the short-term outcome of implants. Success rates after 2 years of prosthetic loading do not differ significantly between the two groups and are consistent with the results reported in the international literature concerning implant-supported overdentures with delayed loading.

Résumé

Cette étude prospective a été envisagée pour comparer les résultats de la charge immédiate à celle retardée de prothèses amovibles mandibulaires ancrées sur implants après deux années. Vingt patients ont été séparés au hasard en deux groupes. Le groupe test a reçu quatre implants ITI dans la partie intraforamen de la mandibule. Des piliers Octa® ont été immédiatement vissés sur les implants; deux jours après la chirurgie les implants étaient connectés de manière rigide en utilisant des barres en or de Dolder en forme de U et recouverts par une prothèse amovible. Les patients du groupe contrôle ont reçu dans la même zone, les mêmes type et nombre d'implants qui ont suivi le protocole standard. Trois à quatre mois après, des piliers Octa® ont été vissés sur des implants et le même processus prothétique a été suivi. Le suivi de deux années avec des rappels à deux semaines, un, trois, six mois et un an et ensuite annuellement évaluait MPI, MBI, PD, Periotest® et la résorption osseuse paroïmplantaire par radiographie. Les critères de succès suivant Albrektsson *et al.* (1986) ont été utilisés. Seul un des 40 implants du groupe contrôle a échoué. Aucune différence statistique des paramètres cliniques évalués n'a été mise en évidence entre ces deux groupes. Donc la charge immédiate des implants, si ceux-ci sont reliés par une barre en forme de U, peut entraîner le même succès que la technique traditionnelle en ce qui concerne l'ostéointégration et le taux de survie à court terme des implants. De plus, cette méthode écourte significativement le temps de traitement et apporte ainsi davantage de satisfaction au patient.

Zusammenfassung

Diese Langzeitstudie hatte zum Ziel, die Zweijahresresultate von sofort und verzögert belasteten Implantaten unter Hybridprothesen im Unterkiefer zu vergleichen.

Man teilte 20 Patienten zufällig auf zwei Gruppen auf. Die Patienten der Gruppe 1 (Test-Gruppe) erhielten 4 ITI-Implantate in die Region zwischen den beiden Foramina mentale gesetzt. Direkt anschliessend schraubte man Octa®-Sekundärteile auf die Implantate; zwei Tage nach der Chirurgie wurden die Implantate mit einem U-förmigen Doldersteg aus Gold starr verbunden und mit einer Hybridprothese belastet.

Die Patienten der Gruppe 2 (Kontrollgruppe) erhielten in derselben Region dieselbe Anzahl vom identischen Implantattyp, die man aber anschliessend gemäss dem Standardprotokoll einheilen liess. Drei bis vier Monate später wurden auch auf diese Implantate Octa®-Sekundärteile aufgesetzt und die Patienten erhielten dieselbe prothetische Rekonstruktion wie die Testgruppe.

Die minimale Nachuntersuchungszeit betrug zwei Jahre, mit einem empfohlenen Recall erstmals nach 2 Wochen, dann nach 1, 3 und 6 Monaten und schliesslich nach einem Jahr. Nachher betrug das Recallintervall 1 Jahr. Jedesmal untersuchte man den MPI, MBI, PD, Periotest® und die röntgenologische periimplantäre Knochenresorption. Zur Beurteilung des Erfolgs wandte man die Kriterien nach Albrektsson et al. (1986) an. Von den 40 Implantaten der Gruppe 2 kam es zu einem Misserfolg, bei der Gruppe 1 hatte man keinen Misserfolg. Man stellte bei den klinisch erhobenen Parametern zwischen den zwei Gruppen keine statistisch signifikanten Unterschiede fest.

Somit kann die Sofortbelastung von Implantaten, verblockt mit einem U-förmigen Steg, dieselben Resultate bezüglich Osseointegration und kurzzeitige Überlebensrate von Implantaten zeigen, wie die "traditionelle" Technik. Zusätzlich verkürzt diese Methode signifikant die Behandlungszeit und verbessert selbstverständlich die Zufriedenheit der Patienten.

Resumen

Este estudio prospectivo se diseñó para comparar los resultados de sobredentaduras mandibulares implantosoportadas de carga inmediata o diferida tras dos años de seguimiento.

Se dividieron veinte pacientes aleatoriamente en dos grupos. Los pacientes del grupo 1 (grupo de prueba) recibieron 4 implantes ITI en el área interforaminal de la mandíbula. Se atornillaron pilares Octa® inmediatamente sobre los implantes; dos días tras la cirugía los implantes se conectaron rígidamente con una barra Dodler de oro con forma de U y se cargaron con una sobredentadura.

Los pacientes del grupo 2 (grupo de control) recibieron, en el mismo área, el mismo tipo y número de implantes, dejándose cicatrizar de acuerdo con un protocolo estándar. Tres o 4 meses mas tarde, se atornillaron pilares Octa® sobre los implantes y se aplicó el mismo procedimiento prostético que en grupo de prueba.

El periodo mínimo de seguimiento duró dos años, con unas citas de seguimiento a las 2 semanas, 1, 3, 6 meses, un año y cada año siguiente tras la operación, evaluando: MPI, MBI, PD, Periotest® y reabsorción ósea periimplantaria radiográfica. Se usaron los criterios de éxito según Albrektson et al. (1986). Solo fracasó un implante de los 40 del grupo 2, mientras que del grupo 1 no fracasó ninguno. No se observó ninguna diferencia significativa en los parámetros clínicos de los dos grupos.

Por lo tanto, la carga inmediata de implantes, si se conectan con una barra con forma de U, pueden proporcionar los mismos resultados que la técnica tradicional en lo que respecta a osteointegración y a índices de supervivencia a corto plazo. Mas aún, este método acorta significativamente el periodo de tratamiento incrementando por ello la satisfacción del paciente.

要旨

本前向き研究では、インプラント維持の下顎オーバーデンチャーの即時荷重と晩期荷重の結果を２年後の追跡調査によって比較した。患者２０名を無作為に２群に振り分けた。グループ１（試験群）の患者には、下顎オトガイ孔間に４本のＩＴＩを埋入し、即時にインプラントにOcta®アバットメントをスクリューで固定した。術後２日後にインプラントにU字型ゴールド製ドルダー・バーをリジッドに連結し、オーバーデンチャーを装着した。グループ２（対照群）の患者にも、同じ様式で、同じ種類と数のインプラントを入れたが、標準プロトコールに沿って治癒期間を設けた。３ヶ月から４ヶ月後にインプラントにOcta®アバットメントを、スクリューで固定し、試験群と同じ補綴治療を行った。最小追跡期間は２年であり、リコール来院は、治療２週間後、１ヶ月後、３ヶ月後、６ヶ月後、１年後及びその１年後に行い、ＭＰＩ、ＭＢＩ、ＰＤ、ペリオテスト® 及びレントゲン像によるインプラント周囲の骨吸収を評価した。Albrektsson 等（１９８６）に基づく成功の基準を採用した。グループ２のインプラント４０本のうち１本だけが失敗したが、グループ１には失敗したものは無かった。評価した臨床的パラメータには、２群間の統計的な有意差はなかった。従ってインプラントの即時荷重は、U字型バーを連結する場合には、骨性統合とインプラントの短期成功率に関する限りは、"伝統的な"方法と同じ結果を達成することができる。さらに同方法は治療期間を大幅に短縮するので、患者の満足度が増加する。

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