RETROSPECTIVE STUDY ON 205 FIXTURES INSERTED IN UPPER JAW

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The rehabilitation of the edentulous maxilla is a relatively common clinical problem and to submerge dental implants during the healing period is a major prerequisite to obtain implant osseointegration. It is believed that micromovement of implants, due to functional forces at the bone-implant interface during wound healing, could induce the formation of fibrous tissue rather than bone, leading to a clinical failure. In addition, the coverage of an implant is also thought necessary to prevent infection and epithelial down-growth. Usually, the second surgical procedure was performed after three months in the mandible and six months in the maxilla. Since no report is available on a new type of implants, a retrospective study was performed on fixtures inserted in upper jaw. A total of 205 two-piece implants (FMD srl, Rome, Italy) were inserted in maxilla, 111 in female and 94 in males. The median age was 59 ± 10 (min-max 24-80 years). Twenty four diabetic patients were enrolled, 141 had periodontal disease and 96 were smokers. Two surgeons performed operation. Fixtures were placed in 6 totally edentulous patient, 9 single missing teeth and 190 partially edentulous subjects. Twenty one implants were placed in post-extraction sockets; GBR was performed onto 26 fixtures and 3 were immediately loaded. There were 109 single crowns, 96 implants bearing 2 or greater bridges. Two implants were lost, survival rate = 99.02%. Among the studies variables immediate loaded implants on single tooth rehabilitations (p=0.03) have a worse clinical outcome. Then peri-implant bone resorption (i.e. delta IAJ) was used to investigate SCR. Among the remaining 203 implants, 20 fixtures have a crestal bone resorption greater than 1.5 mm (SCR = 89.13). Statistical analysis demonstrated that diabetes (p=0.001) and periodontal disease (p=0.047) had a worse outcome. In conclusion FMD implants are reliable devices for oral rehabilitation with a very high SCR and SVR.

The rehabilitation of the edentulous maxilla is a relatively common clinical problem.

Missing dentition can be replaced by dentures (not appreciated by the patient because of their instability, discomfort and negative psychological impact), or implant-supported prosthesis, which could be the ideal solutions, although the lack of sufficient bone volume is a common problem (1). So, although dental implants have been accepted as a viable treatment option for completely and partially edentulous patients (2, 3), the bone heights between 10 and 12 mm are considered the minimal amount of bone required to place implants of sufficient length to guarantee a good prognosis (1).

However, the posterior region of the mouth is a challenge for rehabilitation with oral implants. The survival rates for implants in the posterior maxilla and the mandible have varied (2, 4). The implant restoration can be obstructed by resorption of alveolar ridge, the presence of the inferior alveolar nerve, the floor of the sinus, poor bone quality, and high occlusal forces. Especially in the posterior maxilla, the proximity of the maxillary sinus and insufficient quality and quantity of alveolar bone to achieve implants favorable anchorage may create problems for implant rehabilitation Moreover, most current research on modern implant surfaces fails to identify an anatomical risk associated with specific implant surfaces (5, 6).

Management of edentulous patients with dental implants has proved to be a safe procedure with predictable

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outcomes. So, a number of solutions have been described to accomplish implant placement in these sites, such as sinus lift or the use of short/tilted implants.(7)

Autogenous bone grafting is considered the gold standard procedure for augmenting atrophic jaws. However, Felice et al. (1) demonstrated that the use of short implants achieved the same successful outcome in half of the time at a cheaper cost and with less postoperative discomfort.

Here we analyses a large series of two-pieces implants (FMD srl, Rome, Italy) in order to evaluate their survival (i.e. total number of fixtures still in place at the end of the follow-up) and success rate (i.e. peri-implant bone resorption).

MATERIALS AND METHODS

A) Study design/sample

To address the research purpose, the investigators designed a retrospective cohort study. The study population was composed of patients admitted at the private practice for evaluation and implant treatment by M.A.L. and M.A.B. between January 1996 and October 2011.

Subjects were screened according to the following inclusion criteria: controlled oral hygiene and absence of any lesions in the oral cavity; in addition, the patients had to agree to participate in a post-operative check-up program.

The exclusion criteria were as follows: bruxists, consumption of alcohol higher than 2 glasses of wine per day, localized radiation therapy of the oral cavity, antitumor chemotherapy, liver, blood and kidney diseases, immunosupressed patients, patients taking corticosteroids, pregnant women, inflammatory and autoimmune diseases of the oral cavity.

B) Variables

Several variables are investigated: demographic (age and gender), anatomic (tooth site, jaws), implant (length, diameter and type), related pathologies (diabetes, smoke, periodontal disease, edentulness), surgical (surgeon, post-extraction, guided bone regeneration - GBR), and prosthetic (immediate loading, number of crowns) variables.

The predictor of outcome are the percentage of implants still in place at the end of the follow-up period (i.e. survival rate – SVR) and the peri-implant bone resorption. The latter is defined as implant success rate (SCR) and it is evaluated according to the absence of persisting peri-implant bone resorption greater than 1.5 mm during the first year of loading and 0.2 mm/years during the following years (8).

C) Data collection methods

Before surgery, radiographic examinations were done with the use of intra-oral radiographs and orthopantomographs.

Peri-implant crestal bone levels were evaluated by the calibrated examination of intra-oral radiographs and orthopantomograph x-rays after surgery and at the end of the follow-up period. The measurements were carried out medially and distally to each implant, calculating the distance between the implants' neck and the most coronal point of contact between the bone and the implant. The bone level recorded just after the surgical insertion of the implant was the reference point for the following measurements. The measurement was rounded off to the nearest 0.1 mm. The radiographs were performed with a computer system (Gendex, KaVo ITALIA srl, Genova, Italia) and saved in uncompressed TIFF format for classification. Each file was processed with the Windows XP Professional operating system using Photoshop 7.0 (Adobe, San Jose, CA), and shown on a 17" SXGA TFT LCD display with a NVIDIA GÈ Force FX GO 5600, 64 MB video card (Acer Aspire 1703 SM-2.6). By knowing dimensions of the implant, it was possible to establish the distance from the medial and distal edges of the implant platform to the point of bone-implant contact (expressed in tenths of a millimeter) by doing a proportion.

The difference between the implant-abutment junction and the bone crestal level was defined as the Implant Abutment Junction (iAJ) and calculated at the time of operation and at the end of the follow-up. The delta IAJ is the difference between the IAJ at the last check-up and the IAJ recorded just after the operation. Delta IAJ medians were stratified according to the variables of interest.

D) Surgical protocol

All patients underwent the same surgical protocol. An antimicrobial prophylaxis was administered with 1g Amoxycillin 875mg + Clavulanic acid 125mg twice daily for 5 days starting 1 hour before surgery. Local anesthesia was induced by infiltration with articaine/epinephrine and post-surgical analgesic treatment was performed with 600 mg Ibuprofen twice daily for 3 days. Oral hygiene instructions were provided.

Two-piece implants (FMD srl, Rome, Italy) were inserted with a flap elevation approach. The implant neck was positioned at the alveolar crest level. Guided bone regeneration could be performed in the same surgical step. A second operation was then performed after four months to loading by means a provisional prosthesis. The final restoration was usually delivered within 8 weeks. All patients were included in a strict hygiene recall.

E) Data analysis

Pearson-chi square test was used to detect those variables statistically associated to SVR and SCR.

RESULTS

A total of 205 two-piece implants (FMD srl, Rome, Italy) were inserted in maxilla, 111 in female and 94 in males. The median age was 59 ± 10 (min-max 24-80 years). Implants replaced 30 incisors, 11 cuspids, 93 premolars and 71 molars. Implant' length was $x \leq 10$ mm, $10{,}30 \leq x \leq 12.30$, equal to 13 mm and $x \geq 14$ mm in 68, 104, 13 and 20 cases, respectively. Implant' diameter was narrower than 3.5 mm, equal to 3.8 mm and wider than 4.0 mm in 22, 20, 163 cases, respectively. There were 38, 40, 123 and 4 Elisir, I-fix, Shiner, and Storm implant types, respectively. All the implant bodies received the same

Fig. 1. *Dental Implant*

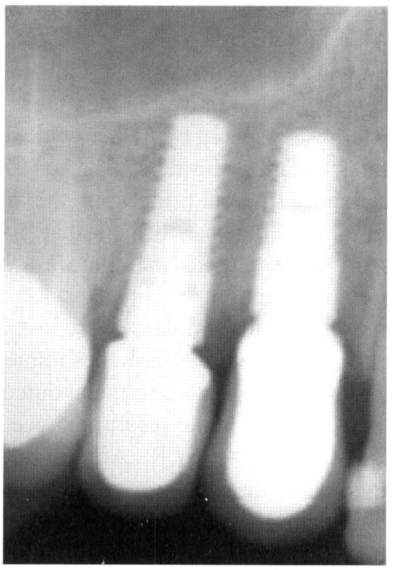

Fig. 2. *Implants inserted in upper jaw*

surface treatments (i.e. sand blasting and acid etching) while the neck was left smooth in Elisir, shiner, storm types. I-fix received the same surface treatment involving the neck too.

Twenty four diabetic patients were enrolled, 141 had periodontal disease and 96 were smokers. Two surgeons performed operation. Fixtures were placed in 6 totally edentulous patient, 9 single missing teeth and 190 partially edentulous subjects. Twenty one implants were placed in post-extraction sockets; GBR was performed onto 26 fixtures and 3 were immediately loaded. There were 109 single crowns, 96 implants bearing 2 or greater bridges.

The overall mean follow-up was ±63 months.

Two implants were lost, survival rate = 99.02%.

Among the studies variables immediate loaded implants (p=0.03) on single tooth rehabilitations have a worse clinical outcome.

Then peri-implant bone resorption (i.e. delta IAJ) was used to investigate SCR.

Among the remaining 203 implants, 20 fixtures have a crestal bone resorption greater than 1.5 mm (SCR = 89.13).

Statistical analysis demonstrated that diabetes (p=0.001) and periodontal disease (p=0.047) had a worse outcome.

DISCUSSION

The posterior region of the mouth is a challenge for implant rehabilitation.

Implants retained maxillary overdentures seem to be affected most frequently, and they show high failure rates, as well as greater marginal bone loss, compared with mandibular implants. A lower density frequently characterizes maxillary bone, as opposed to mandibular bone.

The anatomic and morphologic structure of the maxilla and the reduced bone volume caused by a high degree of resorption are considered to be critical in implant long-term success, indeed maxillary implants are generally loss successful than those in the mandible (9).

However, although the long-term prognosis of partially dentate patients treated with implants in the posterior maxilla and mandible, there are few studies comparing different implant designs (5, 6).

In Hutton et al. (10) study the implant failure rates of mandibular-implant-supported overdentures were 3,3%,, whereas the implant failure rates for maxillary overdentures were 27,6%.

Various studied demonstrated that bone contacts differs when different titanium implant surface are used; significant advantages exist for roughened titanium surface implants in comparison to smoother titanium implant surfaces. Different implant manifactures have sought to enhance their surface topography and coatings; for example Institute Straumann manufactures implants with an SLA (sandblasted, large-grit, acid-etched) implant surface, while the Swiss Plus System has self-tapping apical threads and a microtextured surface on the intraosseous portion of the implant body (11).

Schwartz-Arad et al. (12) reported an implant survival rate of 83,5%, for removable maxillary implants after 10

years, while the success criteria were only 41,9% when using the Albrektsson et al. (13).

On the contrary, fixed prostheses in the maxilla are more successful than removable dentures. Prospective long term studies presented by Fisher et al. show implant survival rates ranging from 95,5% to 97,9% where evaluating fixed full-arch bridges in the maxilla (14). Gallucci et al. (15) also affirmed that fixed implant prostheses in the edentulous maxilla are a scientifically validated treatment option.

In the present report 2 implants were lost, survival rate = 99.02%. Among the studies variables immediate loaded implants (p=0.03) have a worse clinical outcome.

Then peri-implant bone resorption (i.e. delta IAJ) was used to investigate SCR. Among the remaining 203 implants, 20 fixtures have a crestal bone resorption greater than 1.5 mm (SCR = 89.13). Statistical analysis demonstrated that diabetes (p=0.001) and periodontal disease (p=0.047) had a worse outcome.

In conclusion FMD implants are reliable devices for oral rehabilitation with a very high SCR and SVR.

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