ITI WIDE NECK IMPLANTS : A 4-YEAR LIFE-TABLE ANALYSIS FROM A MULTI-CENTER STUDY WITH 186 IMPLANTS

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INTRODUCTION

Wide diameter implants were developed as rescue implants to the Ø 3.75-4.0 mm implants. Due to their greater contact with bone, they were recommended for soft bone sites. They were further used for molar replacement, instead of short standard implants. Recently however, lower success rates have been reported for these wider diameter implants, with failures mostly occurring during the first year.

Renouard et al. (1999) published a 1-year follow-up with 98 implants where 6 implants failed at 2-stage surgery (6.1 %) and 2 after 1 year of loading. The survival rate was 91.8 % after 1 year. Similarly, Ivanoff et al. (1999) compared the clinical outcome of implants of various diameters (Ø 3.75 mm, Ø 4.0 mm, Ø 5.0 mm) in a 3 to 5-year retrospective clinical report. The highest failure rate was observed for the Ø 5.0 mm, it was as high as 18 % (17/97).

The 5-year cumulative success rate was 73.0 %. In 1999, a large diameter SLA solid screw implant of 4.8 mm with a wide neck (WN) of 6.5 mm allowing for a better emergence profile and aesthetics was added to the ITI assortment (Straumann AG, Waldenburg, Switzerland). This paper reports on a prospective multi-center study with WN implants.

MATERIAL & METHODS

Since February 1998, 186 WN implants were placed in 164 patients (43.9% males, 56.1% females, mean age = 49.1 years), as shown in fig 1. All implants were placed in the posterior region (fig 2), most implants were inserted in the mandible (134 implants, 72.0%) while 52 (28.0 %) implants restored the maxilla.

Molar sites were 93.5 % and premolar sites were 6.5%. Implant distribution according to implant length was the following (fig 3): 14 (7.5%) implants were 12 mm long, 122 (65.6%) were 10 mm, 1 (0.5%) was 9 mm, 48 (25.8%) were 8 mm, one was 6 mm long. During surgery, bone sites were identified as normal bone for 68.3 % of the sites, dense bone for 11.8 % of the sites and soft bone for 19.9 % of the sites (fig 7). The residual vestibular and lingual bone lamellae around each implant were also measured during implant placement. Both lamellae (oral and vestibular) > 1mm were measured for 161 implants (86.6%).

One lamella (oral or vestibular) < 1 mm was measured for 17 implants (9.1%), both lamellae < 1 mm was measured for 8 sites (4.3%) only (fig 8). The implants were restored with single crowns and short-span fixed bridges (fig 4). Single crowns (fig 10) were 82 (44.1 %) in the mandible and 25 (13.4 %) in the maxilla, 52 (28.0 %) implants were part of a fixed partial denture (fig 12) in the mandible, 27 (14.5 %) implants participated to fixed partial denture in the maxilla.

The mean follow-up was 19.1 months. The lowest follow-up was 2 months and the longest was 50 months, 121 implants passed the 1-year control. 7 implants (3.8 %) were lost to follow-up.

Inclusion criteria were large and not restrictive (fig 5). Smokers (20.4 %), bruxing patients, patients with non optimal hygiene and medical risk patients like diabetes, HTA, and HIV+ were included. Exclusion criteria (fig 5) were local inflammation and patients treated for cancer in the oro-cervical sphere. Survival criteria were (fig 6) : 1) absence of implant mobility, 2) absence of peri-implant radiolucency as determined by X-rays, 3) absence of recurrent peri-implantitis.

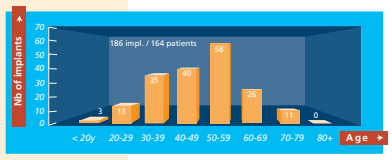

Fig 1 Age distribution according to implant
Of the 164 patients, 56.1 % were females.

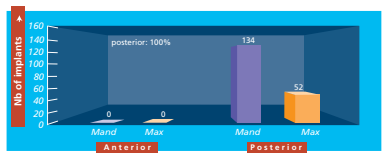

Fig 2 Implant distribution according to quadrant
All implants have been placed in the posterior region. Most implants (72 %) rehabilitated the mandible.

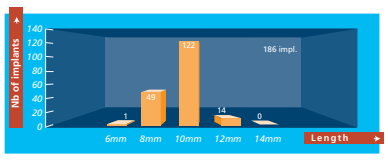

Fig 3 Implant length
Most implants were 10 mm long implants. Implants longer than 12 mm were not placed.

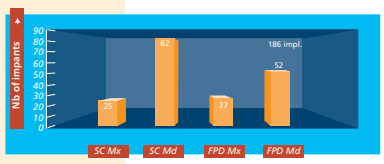

Fig 4 Indications
Most restorations were single crowns in the mandible

SC Mx : Single Crown in the Maxilla
SC Md : Single Crown in the Mandible
FPD Mx : Fixed Partial Denture in the Maxilla
FPD Md : Fixed Partial Denture in the Mandible

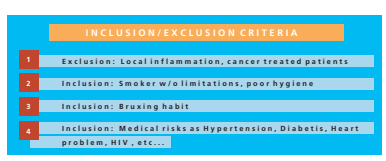

Fig 5 Inclusion / Exclusion Criteria

Fig 6 Survival Criteria

RESULTS

After surgery, no permanent sensory disorder was recorded. One early failure (0.5 %) and one late failure (0.5 %) occurred (fig 9). The early failure happened at a 8 mm long implant after 6 weeks of healing. The late failure happened suddenly at a 10 mm implant after 14 months of loading. No sign of crestal bone loss due to overloading or peri-implant radiolucency was detected radiographically. Before implant placement, a biopsy taken at this site revealed an unusually abundant presence of mast cells.

During the follow-up period, no peri-implantitis was observed. As shown in figure 11, the 4-year cumulative survival rate was 98.61 %, the 1-year survival rate for 121 implants was 99.45 %.

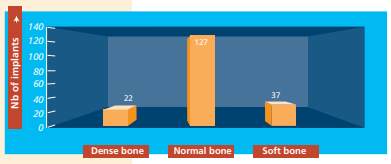

Fig 7 Bone quality distribution

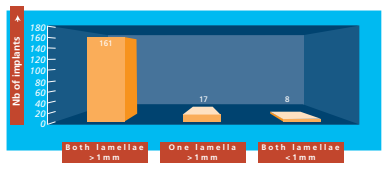

Fig 8 Residual lamellae
Most implants (86.1 %) had both oral and vestibular lamellae > 1mm.

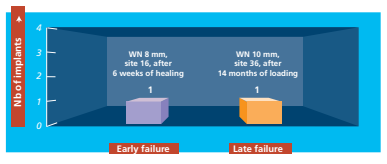

Fig 9 Failures
One early failure (0.5 %) and one late failure (0.5 %) occurred.

Fig 10 Mandibular Single Molar replacement.
2-year follow-up.

LIFE TABLE ANALYSIS

Time	Implants at risk	Drop-out	Failures	Success rate on period	Cumulative success rate
0-1 y	184	2	1	99.45%	99.45%
1-2 y	118	3	1	99.15%	98.61%
2-3 y	46	1	0	100%	98.61%
3-4 y	16	1	0	100%	98.61%

Fig 11 Life Table Analysis
Two failures happened during the first 2 years. The 4-year cumulative survival rate was 98.61 %.

Fig 12 Mandibular 2-unit molar FPD.
6-month follow-up.

DISCUSSION & CONCLUSIONS

A high survival rate was observed for these WN implants, comparable to standard ITI implants. Similar survival rates were observed during the healing period but also during the first year of loading. This is in contrast to other studies with large diameter (Ø 5.0 mm) implants and machined surfaces (Renouard et al. 1999, Ivanoff et al. 1999). These authors reported more early failures and an increased rate of late failures during the first year of loading. To explain this unexpected high failure rate, they suggested that this implant was often used as a rescue implant when the standard implants were not considered suitable or when they did not reach initial stability. The present WN implant was placed mostly in the molar area, not as a rescue implant. It was the implant of choice because the oro-vestibular alveolar ridge dimension permitted it. In addition, the last drill preparing the implant bed has a 4.2 mm diameter; for 86.6 % (161 implants) of the sites, it allowed larger than 1 mm residual vestibular and oral bone lamellae. It is possible that when a lamella is > 1mm, a better blood supply permits a suitable bone remodeling with minimal crestal bone loss.

This WN implant design requires smaller bone volumes than other wide Ø implants. It permits satisfactory aesthetics for molar replacement, avoiding excessive mesiodistal overcontouring of the superstructure. The large bone to implant contact with the textured SLA surface probably permits a better interfacial stress distribution, particularly under demanding biomechanical conditions, i.e. single molar replacement. These results, although satisfactory, warrant confirmation.

In conclusion, this study documented that large diameter (Ø 4.8 mm) ITI implants with a SLA surface achieve high survival rates, equivalent to the well documented standard (Ø 4.1 mm) implants.

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