

## Prediction of 10-year Survival in ITI Implant

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### Abstract:

**Objective:** Whilst many questions and doubts still remain, today the use of dental implants has gained an increasing popularity amongst patients as well as dentists. The aim of this study is to analyze the survival rate in using such implants over a 10 year period.

**Materials and Methods:** In this study, 3050 ITI implants placed in 1000 patients with the mean age of 49.5 years (54.4% males and 44.6% females) during 1050 stages were evaluated for the survival rate. The present study is a descriptive, time based analysis of all the files of patients that have been treated using dental implants over a period of 10 years. General information, number of implants in each jaw, type of implant surface, type of edentulous area, time span of Prosthodontic therapy and the endurance of the implants were gathered.

**Results:** Incidence of failure was as low as 2% and the number of implant failures was 23 implants (0.7%). These failures were seen in 13 implants in the upper jaw of 12 patients and 10 implants in the lower jaw of nine patients. In other words, the comprehensive survival rate was seen in 98% of the patients and 99.3% of the implants.

**Conclusion:** The use of dental implants in treatment of missing teeth is favorable regardless of the subject's age, sex and type of the edentulous area and a very high survival rate seems feasible.

**Key Words:** Dental Implants; Survival Rate; Retrospective Studies

*Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2008; Vol: 5, No.1)*

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Received: 21 February 2007

Accepted: 29 August 2007

### INTRODUCTION

Nowadays, the use of dental implants in treatment of various types of edentulous areas has become a routine and acceptable mode of treatment gaining an increasing popularity and various short-term, intermediate and long-term reports prove the accomplishment of a high frequency of survival.

For example, in a study carried out by Wagenberg et al [1] in 2006, from a total of 1925 implants placed as intermediate place-ments, only 77 were lost out of which 71 being

in the osseointegration stage, and the rest being in the subsequent stages; hence, the im-plant survival rate was 96%. In another study by Telleman et al [2] in 2006, from a total of 115 Hollow Screw (HS) and Hollow Cylinder (HC) implants used for overdentures, in a pe-riod of 10 years on 38 patients, only four were lost, one in the osseointegration stage, and three after 10 years, thus, depicting a survival rate of 96.6% and 96.1% for HS and HC im-plants respectively.

In 2005 another study was carried out by

Schwartz-Arad et al [3], from a total of 285 implants on 62 patients placed with an intention of making upper and lower overdentures, the reported cumulative survival rate was 95.4%.

Also in the study performed by Cordaro et al [4], 19 patients with 72 natural teeth were treated with 90 implants in the form of complete fixed prosthesis with the implants and the natural teeth jointed together. In this study only one of the implants was lost while three of them showed more than 2 mm crestal bone resorption. Therefore, the survival rate over a period of 24 to 92 months was reported to be 99%.

In a prescient multicenter study by Friberg et al [5] in 2005, 187 patients treated with 478 implants by 43 surgeons in 22 different centers over a period of one year were analyzed and only five of the implants were lost out of which three were placed in the G IV bone, hence giving us a 98.9% cumulative survival rate. Eckert SE et al [6] analyzed 17 articles on the survival rate of dental implants and composed a study over a five year period on 7398 implants of six different systems and reported a survival rate of 96%.

In another study by Degidi et al [7], the survival rate for 388 implants placed in the completely edentulous upper jaws of 43 patients put to immediate use, was reported to be 98% in five years. A study carried out by Engfors et al [8] in 2004 compares the survival rates of implants placed in patients of over and under than 80 years of age. In 133 edentulous patients over 80 years of age, a total of 761 and 670 Branemark implants were placed in over and under 80 years of age patients respectively. In a five year period, the survival rate for patients over 80 was proven to be 93% and 92.6% was reported for those under 80.

In the study carried out by Perry et al [9] in 2004, from a total of 1099 Frialit-2 implants placed for 442 patients, the survival rate reported was 90.05%. This study was carried out

over a period of five years. According to the study by Rosenberg et al [10] in 2004, out of 1511 implants used for 334 patients, 932 were placed for 151 patients with a history of periodontal disease and 588 were used in 183 patients with none. Over a period of 13 years, the rate of survival in patients with intact periodontal tissues was reported as 93.7% and that of those with prior periodontal problems was 90.7%.

The relative survival rate in the use of implants with smaller diameter was studied by Vigolo et al [11]. In this 10-year study, from a total of 192 implants used in 165 patients, only nine were lost, out of which four were at the stage of osseointegration and five were in the stage of loading. Hence, the survival rate of such implants was reported to be 95%. In the study done by Strietzel et al [12], out of 1554 Frialit-two implants for 504 patients, the survival rate of 94.8% was noted upper jaw 92.6%, lower jaw 96.7%.

Also, a study was carried out by Kahovi et al [13] in 2004 in an academic institution in which implants were placed by under and postgrad students. From a total of 303 placed implants over a period of 36 months, 12 were lost. The rate of survival was thus 96%. In the study of Miashita et al [14] in 2003, from a total of 1444 Branemark implants that were used for 365 patients over a 10 year period, the rate of survival for the ones used in the upper jaw was reported as 87 %, and for those used in the lower jaw it was 99%.

In the study of Garlini et al [15] in the year 2003, out of 555 implants 244 patients, 18 implants were lost in six patients at the stage of osseointegration, but at the stage of loading in five years, no incidence of failure was reported, hence, the survival rate reported was 98.5%. In the year 2003, Carr et al [16] conducted a survey in which out of 674 single stage implants used for 308 patients over a time span of one to 78 months, the survival rate was 97%. According to the study by Le-

vine et al [17] in 2003, out of a total of 675 ITI implants placed as posterior single teeth for 471 patients, the reported incidence of survival was 99.1% as observed over one to 78 months. In yet another study by Levine et al [18] carried out in the year 1999, from a total of 174 single tooth implants for 129 patients, for a period of two years the survival rate reported was 95.5%. In the long term study of Merickse et al [19] in 2001, the average survey period was 14.1 years. 172 Hollow cylinder ITI implants were placed in 71 patients, with 84.6% survival. In a study by Buser et al [20] in 2002, the rate of survival of implants placed in autogenic bone regenerated jaws was evaluated in which. None of the 61 placed implants were lost resulting in 100% survival in a five-year period.

In the study of Cormelini et al [21] in 2004, a total of 30 immediately loaded implants were kept under observation for a period of one year, and the rate of survival was reported as 96.7%. Nevins et al [22] in 1998 reported the survival rate of 526 implants placed in regenerated bone to be 97.5% over a time span of six to 74 months. Another study by Buser et al [23] in 1997, illustrates the survival rate 96.7% for a total of 2359 ITI implants placed in 1003 patients over a period of eight years.

In the present study, health factors and the survival rate for a total of 1000 patients having had received 3050 ITI implants over a 10-year period (1995 to 2005) are assessed.

## MATERIALS AND METHODS

In this study 3050 ITI implants (47.7% maxilla, 52.3% mandible) placed in 1050 stages for 1000 patients with the mean age of 49.5 years (54.4% males and 44.6% females) were evaluated for the survival rate. The majority of the implants used in the mandible were first molars and most of the ones used in the maxilla were first premolars. Most of the implants were of 12 mm length and 4.1 mm width. Regarding the surface of the implants, 83% had

SLA surface and the remaining were TPS. The majority of the edentulous area types were of Kennedy's Class I i.e. free end edentulous areas.

The present study is a descriptive, multicenter, time based analysis of all the files of patients who have been treated using dental implants over a period of 10-years commencing from 21/03/1995 to 21/05/2005 in Tehran. General information (such as age, sex, ...), number of implants in each jaw, length, diameter, type of implant surface, type of edentulous area, time span of prosthodontic therapy, and the endurance of the implants were extracted from patient files and analyzed respectively.

## RESULTS

Out of the 1000 study cases, the incidence of failure was as low as 2% corresponding to 21 cases and the number of failed implants was 23 out of the 3050 implants comprising only 0.7% of the cases. In other words, the comprehensive survival was seen in 98% of the patients and 99.3% of the implants. Cases of failure were only seen in 13 implants in the upper jaws of 12 patients and 10 implants in the lower jaws of nine patients.

Out of the 13 cases of failure in the maxilla, five were in the anterior region and eight pertained to the posterior region. These included four cases of anterior single tooth replacement, one case of anterior partial prosthesis, one case of posterior partial prosthesis, four cases of free end partial prosthesis, and three cases of fixed complete prosthesis.

Out of the 10 failed cases in the lower jaw, two were in the anterior and eight were in the posterior region, corresponding to two cases of anterior partial prosthesis, one case of posterior single tooth replacement, six cases of free end partial prosthesis, and a single case of fixed complete prosthesis. Out of the 21 patients in whom implants had failed, two were in the second and third, three in the fourth, six in the fifth, nine in the sixth, and one in the

seventh decade of life. Sixteen patients were males (76.2%), and five patients were females (23.8%).

The surface type of nine of the failed implants was TPS, while 14 had SLA surfaces. Regarding the time of surgery, in three of the failed cases immediate implantation and in 18 of them late implantation was performed. Out of the 21 patients in whom implants had failed, in 12 patients, no Biomaterial of any kind was used, while for the other nine, bone grafts in five cases and a combination of bone graft and membrane material in four of them were used. The lengths of the 23 failed implants were as follows: two 6 mm, six 8 mm, ten 10 mm and five 12 mm implants. In regards to the implant diameter four 3.3 mm, ten 4.1 mm, one 4.8 mm, and eight HS implants were failed.

Out of the 13 implants that had failed in the upper jaw, one was in the central, three in the lateral, one in the canine, three in the first premolar region, two in the second premolar, two in the first molar and one in the second premolar region. Out of the 10 failed implants in the mandible, two were in the lateral, two in the second premolar region, five in the first molar, and one implant in the second premolar region.

## DISCUSSION

The incidence of failure was as low as 2% corresponding to 21 cases and the number of failed implants was 23 out of the 3050 implants comprising only 0.7% of the cases. Thus, considering it advocating a very liable survival prophecy, it can be concluded that dental implants can be considered as definitive treatment plans with absolutely predictable prognosis.

Results obtained from this study benefit from a certain degree of preeminence while compared with various similar articles. For example, the study carried out by Buser et al [23] on 2259 implants over a period of eight years, depicts a 96.7% survival rate. Also, Eckertse et al [6] in his study, while implementing other investiga-

tions, reports a 96% survival rate for 7398 implants over a period of five years. Accordingly, it is noted that by considering proper patient selection criteria, and precisions of surgical and prosthodontic procedures, one can confidently select dental implants as a definitive treatment plan. Out of the 23 failed implants involved in this study, 13 implants belonged to the maxilla and 10 to the mandible, which proves no significant relationship between the lost implants in either of the jaws; whereas, in some references there are more failure reports in the upper jaw [12].

In addition, out of the mentioned 23 failed implants, seven belonged to the anterior region and 16 to the posterior. This difference could be due to the better access for dental hygiene techniques in the anterior region and greater occlusal forces of mastication in the posterior region. Another possible reason for such a might be due to the more favorable bone quality in the anterior regions of both jaws. Also, of the 21 patients in whom implants failed, 16 were males and five were females. Better dental hygiene in females and greater incidence of cigarette smoking in males, might account for such a difference.

Comparing different lengths of the failed implants in this study, it does not seem improper to say that the incidence of failure is in an inverse proportion to the length of the implant used. With regards to profuse failures of the implants with 6 mm of length, the use of under 8 mm long implants does not seem advisable.

As for the different diameters of the failed implants, evidently, implants having a diameter of 4.1 mm seem most reliable as far as the survival rate is concerned. Furthermore, the use of HS type implants, due to their high incidence of failure, is not recommended. Moreover, such types are no longer, probably due to the same reason. Regarding implant surface, a slightly lower incidence of failure in implants with SLA surface is observed compared to those with TPS surface.

## CONCLUSION

The use of dental implants can be definitely recommended for treating all edentulous areas. Loss of dental implants is more probable in the posterior region as compared to the anterior region in either of the jaws. Prospect of survival is in direct proportion to the length of the implant used. Incidence of failure of dental implants is greater in men than in women. The location of the implant, whether in the maxilla or the mandible, does not affect the survival rate. The use of dental implants with standard diameter (4.1 mm) and 6 mm of length is more advisable. The more favorable surface of dental implants seems to be SLA compared to TPS.

## ACKNOWLEDGMENT

The author appreciates the cooperation and assistance of the Dental Research Center, Tehran University of Medical Science.

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