ORIGINAL RESEARCH

Assessment of long-term survival of dental implants in patients with cardiovascular disease

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ABSTRACT

Background: Dental implants have become a reliable treatment option to replace missing teeth and achieve aesthetics and function with good long-term prognosis. The present study was conducted to assess assessing the long-term success/survival of dental implants in patients with cardiovascular disease (CVD).

Materials & Methods: Patients with CVD were put in group I and equal number of patients were put in group II. Patients were recalled regularly for follow up at the interval of 6 months. In all cases, prosthesis and implant survival and marginal bone loss was assessed.

Results: Group I patients had 112 implants and group II had 136 implants. The mean marginal bone loss at 1 year in group I was 1.12 mm and in group II was 0.9 mm, at 3 years in group I was 3.1 mm and in in group II was 1.1 mm. The difference was significant (P< 0.05). In group I, implant failure rate was 25% and in group II was 7%. The difference was significant (P< 0.05).

Conclusion: Cardiovascular disease (CVD) is the risk factors for dental implant failure. A high failure rate was observed in CVD patients as compared to healthy subjects.

Key words: Cardiovascular disease, dental implant, Risk factors

Introduction

Dental implants have become a reliable treatment option to replace missing teeth and achieve aesthetics and function with good long-term prognosis. Tooth extraction initiates a cascade of events that results in alveolar ridge reduction in the width and height. This reduction is reported to be approximately 5–7 mm of the horizontal and 1 mm of the vertical bone dimension with most changes occurring within the first three months following extraction. The extension of bone resorption may challenge restorative-driven implant placement or additional surgical procedures may be required prior to an ideal implant

placement. This may lead to increased treatment cost, morbidity, complications and treatment time.

Cardiovascular disease (CVD) compromises the blood flow which may restrict oxygen or nutrients in the osseous tissue, thus is hypothesized to have higher risk of osseointegration failure. Cardiovascular diseases (CVD) are a group of diseases that include atherosclerosis, congestive heart failure, coronary artery disease, hypertension, and vascular stenosis. It has been proposed that restricted supply of oxygen and nutrients to tissues may negatively affect osseointegration in patients with CVD.

Dental implants have become a common choice among the treatment options for missing teeth rehabilitation since they were first introduced by Branemark in the 1970s.[1] Implant failure is the first instance at which the performance of the implant, measured in some quantitative way falls below a specified and acceptable level.[2] Implant failure is defined as the total failure of the implant to fulfil its purpose (functional, aesthetic or phonetic) because of mechanical or biological reasons. Implant failure is the inadequacy of the host tissue to establish or to maintain osseo-integration. The present study was conducted to assess assessing the long-term success/survival of dental implants in patients with cardiovascular disease (CVD).

Materials & Methods

The present study comprised of 84 patients having cardiovascular disease (CVD) who received 112 dental implants of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Patients with CVD were put in group I and equal number of patients were put in group II. Patients were recalled regularly for follow up at the interval of 6 months. In all cases, prosthesis and implant survival and marginal bone loss was assessed. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## Results

Table I Distribution of patients

Groups	Group I	Group II
Status	CVD	Healthy
Implant number	112	136

Table I shows that group I patients had 112 implants and group II had 136 implants.

Table II Comparison of marginal bone loss

Marginal bone loss	Mean (mm)		P value
	1 year	3 years	
Group I	1.12	3.1	0.05
Group II	0.9	1.1	0.13
P value	0.36	0.01	

Table II, graph I shows that mean marginal bone loss at 1 year in group I was 1.12 mm and in group II was 0.9 mm, at 3 years in group I was 3.1 mm and in in group II was 1.1 mm. The difference was significant (P< 0.05).

Graph IComparison of marginal bone loss
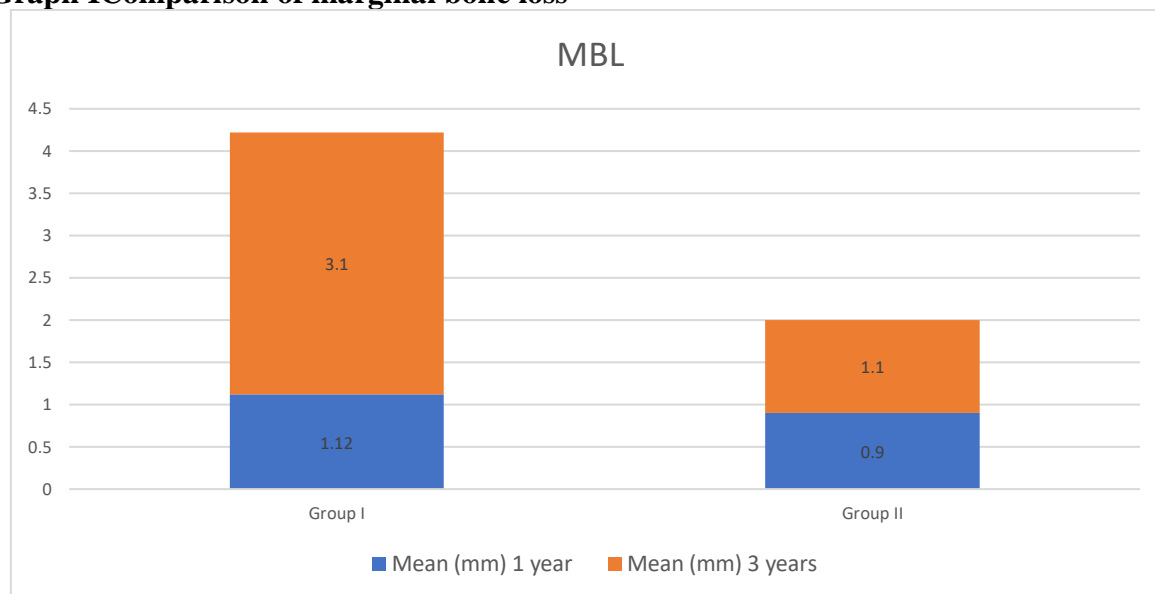
Table III Assessment of failure rate

Failure rate	Percentage	P value
Group I	25%	0.01
Group II	7%	

Table III shows that in group I, implant failure rate was 25% and in group II was 7%. The difference was significant (P< 0.05).

Discussion

Dental implants are one of the most successful treatment choices for edentulous areas.[7] The surgical and rehabilitation phases of dental implant surgery are greatly affected by the history and clinical examination of the patient.[8] Surgical procedure for dental implant requires minimal trauma and circumvent excessive bleeding and stress.[9] Moreover, a patient requiring dental implant has a number of fears such as fear of pain during the procedure.[10,11]

The present study was conducted to assess assessing the long-term success/survival of dental implants in patients with cardiovascular disease (CVD).We found that group I patients had 112 implants and group II had 136 implants.

Nobre et al[12] investigated the outcome of immediate function of dental implant rehabilitations in diabetic patients with and without coexisting cardiovascular diseases (CVD). This study included 70 diabetic patients (33 females and 37 males, average age: 59 years old), rehabilitated with 352 implants and divided into two groups (CVD: 38 patients; non-CVD: 32 patients). Diabetes mellitus was defined as fasting plasma glucose $\geq$ 7.0 mmol/l (126 mg/dl) or 2 h plasma glucose $\geq$ 11.1mmol/l (200 mg/dl). Seven patients (10%) were lost to follow-up (one patient in the CVD group; and six patients in the non-CVD group). One prosthesis failed in the non-CVD group, rendering a 97.4% survival rate, compared to 100% in the CVD group (non-significant difference between groups; P = 0.359). Ten implants failed in 7 patients: CVD group with eight implant failures in 5 patients (86.7% cumulative survival rate) versus two implants in 2 patients in the non-CVD group (93.8% cumulative survival rate) with a non-significant difference between both groups (P = 0.365). The average (95% confidence interval) marginal bone loss at 1- and 5-years was 0.95 mm (0.66 mm; 1.23 mm) and 1.52 mm (1.20 mm; 1.88 mm), respectively in the CVD group; and 0.78 mm (0.40 mm; 1.16 mm) and 1.54 mm (0.86 mm; 2.31 mm), respectively for the non-CVD group; with no significant

differences between groups at 1 year (P = 0.979) and 5 years (P = 0.300). Complications occurred in 38 patients (CVD group: 21 patients; non-CVD group: 16 patients); with a non-significant difference between both groups (P = 0.660). Implant rehabilitations represent a valid treatment for diabetic patients with or without coexisting CVD, with a good risk/benefit ratio.

We observed that mean marginal bone loss at 1 year in group I was 1.12 mm and in group II was 0.9 mm, at 3 years in group I was 3.1 mm and in in group II was 1.1 mm. We found that in group I, implant failure rate was 25% and in group II was 7%. Mello et al searched the literature and identified 30 studies published until November 2016 with a minimum follow-up time of 6 months. They concluded that immediate implants exhibited a significantly higher failure rate than delayed implants and they reported that immediate implant placement should be used with caution. Khadivi et al[13] surveyed implant treatment outcome of patients with cardiovascular diseases. A retrospective analysis of 246 consecutively treated patients was conducted. The patients comprised a CVD interest group of 39 patients, and control subgroups of 98 healthy and 109 patients with a history of other systemic disease. Differences in implant failure rates between the groups were not found to be significant. Though the sample size is small, these results suggest that CVD may not be a risk factor for successful osseointegration.

Neves J et al[14] identified the possible risk factors for implant failure and peri-implant pathology in a population of systemically compromised patients. This retrospective clinical study included a total of 721 systemically compromised patients (422 women, 299 men), with an average age of 51 years rehabilitated with dental implants. The average follow-up time was 7.3 years. The patients' demographic variables (age and gender) and clinical variables (implant location, type of implant surface, and systemic conditions) were recorded. Outcome measures were implant failure and peri-implant pathology. Multivariate logistic regression disclosed increased age (patients over 40 years of age) as a risk factor for implant failure (OR = 2.63) and hepatitis as a risk factor for peri-implant pathology (OR = 3.74). Multivariate linear regression disclosed rheumatologic and cardiac diseases to be correlated with a higher number of failed implants.

The limitation the study is small sample size.

Conclusion

Authors found that cardiovascular disease (CVD) is the risk factors for dental implant failure. A high failure rate was observed in CVD patients as compared to healthy subjects.

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