Evaluation of dental implants failure rate in medically compromised patients: A randomized case control study

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Abstract

Aim: The present research was done to evaluate dental implant failure in medically compromised patients compared to control group.

Materials and Method: This randomized control study comprised of 50 medically compromised patients of both genders who underwent dental implants 7 years ago (Group I). Equal number of healthy subjects was taken as control (Group II). Amount of bone loss around the implant over 1mm of bone loss in the first year and over 0.3 mm bone loss every subsequent year were considered as failures.

Results: The most commonly seen medically compromised patients were diabetes (20) with 24 dental implants followed by Hypothyroidism (12) with 15 implants, osteoporosis (8) with 15 dental implants, organ transplant (7) with 8 dental implants and CVD (3) with 3 dental implants. There was statistically significant difference (p< 0.05). The implant failure was 15 (30%) in group I, and 3 (6%) in group II. At first year, in group I, mean bone loss around implant was 1.18 mm and 0.4 mm in group II. Up to 5 years, in group I, mean bone loss around implant was 2.8 mm and 1.3 mm in group II.

Conclusion: Among medically compromised conditions, higher failure rate was found in diabetes.

Keywords: Dental implant, Medically compromised, Failure

INTRODUCTION

Dental implants (DI) are widely regarded as the best treatment option for tooth loss. Dental caries and periodontal diseases are two of the most common causes of tooth loss. 1 Dental implant therapy is the most effective treatment option for tooth replacement. The most common age range for implant therapy has been reported to be above 40 years or between 51 and 60 years, implying that patients who require dental implant therapy usually have systemic comorbidities. 2

The type of bone, the amount of bone, the length of the edentulous jaw segment, hidden pathologies such as root pieces, inflammatory processes, and other factors all play a role in implant success. 3 Systemic conditions such as hypothyroidism, diabetes, mellitus, bleeding disorders, thyrotoxicosis, xerostomia, smoking, osteoporosis, CVS, and others make dental implant treatment difficult. 4 Myocardial infarction and cerebrovascular accident, cardiac transplant, immunosuppression, active treatment of malignancy, drug abuse, and psychiatric disorders are absolute contraindications. 5 The current study was carried out to determine the failure rate of dental implants in medically compromised patients compared to control group.
Materials & Methods

The department of prosthodontics and oral implantology conducted this prospective case controlled study. It included 50 medically compromised patients of both genders who had dental implants seven years ago (Group I). A similar number of healthy subjects were used as controls (Group II). Patients aged 30-60 years, with a complete medical and dental history, and who had a dental implant 7 years ago met the inclusion criteria. Exclusion criteria included a history of chemotherapy or radiation therapy, as well as an incomplete patient record.

Name, age, gender, and other information were obtained from the patient's record file. Failures were defined as bone loss around the implant of more than 1mm in the first year and more than 0.3mm in each subsequent year. Any signs of infection close to the implant structure that could lead to implant instability and displacement were also documented. Subsequent radiographs were used to confirm the failure. Patients were recalled on a regular basis, and intra-oral periapical and panoramic radiographs were taken. The radiological finding was obtained from the patient's case file.

The obtained data was statistically evaluated with SPSS package (22.0 version, Inc.; Chicago, IL) using Mann-Whitney test, chi square test at P value less than 0.05 was considered significant.

Result

Table I, shows distribution of 50 patients in each group; group I (medically compromised) with 62 dental implants and Group II (healthy subjects) with 65 implants.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group I (Medically compromised)</th>
<th>Group II (Control) (Healthy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Implants</td>
<td>62</td>
<td>65</td>
</tr>
</tbody>
</table>

Table II, shows that age group 30-40 comprised of 17 patients in group I and 12 in group II, 40-50 years had 25 in group I and 27 in group II and 50-60 years had 8 in group I and 11 in group II. Mann Whitney test was applied which showed significant difference in distribution of patients in both groups (p< 0.05).

<table>
<thead>
<tr>
<th>Age group (Years)</th>
<th>Group I</th>
<th>Group II</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40</td>
<td>17</td>
<td>12</td>
<td>0.01</td>
</tr>
<tr>
<td>40-50</td>
<td>25</td>
<td>27</td>
<td>0.16</td>
</tr>
<tr>
<td>50-60</td>
<td>8</td>
<td>11</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Mann-Whitney test, p< 0.05 was significant.

Table III, shows that most commonly seen medically compromised patients were diabetes (20) with 24 dental implants followed by Hypothyroidism (12) with 12 implants, osteoporosis (8) with 15 dental implants, organ transplant (7) with 8 dental implants and CVD (3) with 3 dental implants. Chi-square test was applied which revealed significant difference in patients (p< 0.05).
Table III medically compromised patients and distribution of dental implants

<table>
<thead>
<tr>
<th>Medically compromised patients</th>
<th>Number of patients</th>
<th>Number of implants</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>20</td>
<td>24</td>
<td>0.053</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>8</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Organ transplant</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>CVD</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Test used: Chi- square test,  p< 0.05 was significant.

Table IV shows that in group I, there were 15 (30%) and in group II, there were 3 (6%) dental implant failures. At first year, in group I, mean bone loss around implant was 1.18 mm and 0.4 mm in group II. Up to 5 years, in group I, mean bone loss around implant was 2.8 mm and 1.3 mm in group II. The difference with chi- square test found to be significant p< 0.05).

Table IV Failure rate in both groups

<table>
<thead>
<tr>
<th>Failure</th>
<th>Group I</th>
<th>Group II</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>15 (30%)</td>
<td>3 (6%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Bone loss (mean) (mm) 1st year</td>
<td>1.18</td>
<td>0.4</td>
<td>0.03</td>
</tr>
<tr>
<td>Bone loss (mean) (mm) up to 5 years</td>
<td>2.8</td>
<td>1.3</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Chi- square test, p< 0.05 was significant.

Discussion

The use of implants is increasing as a result of recent advances in the field. The medical condition of the patient is critical for implant placement. When compared to unhealthy subjects, the placement is quite simple and easy. Special precautions must be taken before implant placement in medically compromised patients, such as those with hypertension, diabetes, hypothyroidism, severe bleeding disorders, and so on.

Aging alters biological activity by changing the inflammatory, regenerative, and remodelling phases of the healing process. 6 It prolongs the inflammatory phase and reduces new tissue formation in the regenerative phase by decreasing angiogenesis and the number of mesenchymal stem cells, which are the progenitors of new bone formation. 7 The current study was carried out to determine the failure rate of dental implants in medically compromised patients.

Santosh et al8 discovered no difference in the success or failure of dental implants between medically compromised patients and control groups. Kachadia et al9 discovered that group A had 331 implants that were intact and healthy, accounting for 83.37% implant success. Group B had 287 implants that were intact and healthy, accounting for 89.96% implant success. Neves et al10 included 721 systemically compromised patients in their study (422 women, 299 men). They discovered that increased age (patients over 40 years of age) was a risk factor for implant failure (OR = 2.63) and hepatitis was a risk factor for peri-
Implant pathology (OR = 3.74) after 7.3 years of average follow-up time. Diabetes was associated with higher risk of implant failure and peri-implant pathology similar to our results.

Based on their findings, Nguyen et al concluded that SDIs are a reliable treatment option, particularly for medically compromised patients, to avoid sinus lifting or vertical bone grafting.11 Ata-Ali J et al12 conducted a meta-analysis on the impact of bisphosphonates on implant survival rates and concluded that bisphosphonates have no negative effect on implant survival rates and that their use does not reduce their success rate.

Conditions such as cardiovascular disease (CVD) reduce blood flow, which may restrict oxygen or nutrients in the osseous tissue, raising the possibility of osseointegration failure. In type 2 diabetes, hyperglycemia reduces clot quality, the number of osteoclasts, and collagen production, all of which are essential for bone regeneration. 11

Implantable dental device Procedure is the preferred treatment for missing teeth. Diabetes, hypothyroidism, CVS, and other diseases have a negative impact on the success of dental implants. The current study was carried out to determine the failure rate of dental implants in medically compromised patients. Diabetes had a higher failure rate when compared to other medical conditions. This study guide for careful case selection in medically compromised condition for dental implant to achieve long term prognosis for primary care.

Further studies are required to validate our findings.

Conclusion

Dental implants are more successful. However, diabetes, CVS, hypothyroidism, and other conditions make treatment difficult. Diabetes had the highest failure rate among medically compromised conditions.

REFERENCES