ORIGINAL RESEARCH

A retrospective study to evaluate success rate of dental implants in medically compromised patients

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ABSTRACT:
Background: A medically compromised patient (MCP) can be described, as the one who has a distinctive physical or mental feature regarding the people of the same age. In this sort of patients there is a higher risk of interactions between their disease and the implant surgery, implying a higher medical risk. Osseointegrated dental implants represent a highly predictable and widespread therapy for rehabilitation of the incomplete dentition. **Aim of the study:** To evaluate success rate of dental implants in medically compromised patients. **Materials and methods:** The present study was conducted in the Department of Oral and maxillofacial surgery of the dental institute. Study group consisted of medically compromised patients whereas control group consisted of normal healthy patients. Patient's age, gender and ASA status were studied for demographic profile. Clinical information retrieved from the files of the patients was preoperative, intraoperative and postoperative parameters. The periodontal status of all the patients before implant insertion was stable. **Results:** A total of 100 patients participated in the study. 50 patients belonged to study group and the other 50 patients belonged to control group. The number of failed dental implants in study group was 8 and was 3 in control group. **Conclusion**: Within the limitations of the present study, it can be concluded that the rate of implant failure was more evident in patients with medical comorbidities.
Key words: Dental implants, medically compromised, implant success rate.

Introduction:
A medically compromised patient (MCP) can be described, as the one who has a distinctive physical or mental feature regarding the people of the same age. In this sort of patients there is a higher risk of interactions between their disease and the implant surgery, implying a higher medical risk. This group need, therefore, to fill in a medical questionnaire and to undergo a previous exhaustive medical examination, which will help not only to determine the specific measures that must be adopted[1], but also to carry out the estimation of the patient's risk.[2] Osseointegrated dental implants represent a highly predictable and widespread therapy for rehabilitation of the incomplete dentition.[3]

Reported success rates for oral implants are high; however, there is a lack of longitudinal data with at least 5 years of follow-up.[4] It has been suggested that several risk factors may impair long-term implant survival including jaw location (anterior vs. posterior region and maxilla vs. mandible),[5] implant dimensions (length, diameter, and implant design),[6] simultaneous or staged bone augmentation procedures,[7] local bone density at the implant site,[8] and patient-related risk factors such as age, smoking, history of periodontal disease, diabetes mellitus, and osteoporosis.[9] Hence, the present study was conducted to evaluate success rate of dental implants in medically compromised patients.

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Materials and methods:
The present study was conducted in the Department of Oral and maxillofacial surgery of the dental institute. For the study, files of the patients selected for study were grouped into Study group and Control group. Study group consisted of medically compromised patients whereas control group consisted of normal healthy patients. Patient's age, gender and ASA status were studied for demographic profile. Clinical information retrieved from the files of the patients was preoperative, intraoperative andpostoperative parameters. The periodontal status of all the patients before implant insertion was stable. The assessment of survival of dental implants was done by evaluating clinical parameters during follow up and information from radiographs. The evaluation was done for implant stability, bone loss, signs of infection and level of bone around implant on the basis of clinical and radiographic situations. The classification of implants was done on the basis of their survival and success rate. The inability of dental implant to survive at its location or exposed threads of implants at follow up visit was determined as parameters for implant failure. The evaluation of number of exposed threads of implants was done using clinical and radiographic data from the records. Based on the determination of previous criteria, implants with more than 1 mm of marginal bone loss in 1st year and 0.2 mm marginal bone loss each subsequent year were considered as failed implants and were grouped accordingly. This criterion is still used today and is known as Bgold standard for implant success. The functional implants without clinical signs of infection or rejection at the examination time even with bone resorption seen radiographically were regarded in implant survival rate. The dental implants that meet the criteria for success were included in implant success rate. The evaluation of exposure of implant threads was done by selecting one implant with highest exposed threads as observed during followup visit. For the patients with more than one failed implants, only one implant was considered. Patients with uncontrolled diabetes, uncontrolled hypertension, post-radiation therapy and on IV bisphonates treatment were included in the study only after their condition was in stable stage. Patients with incomplete data in files and unavailable to follow up were excluded from the study. The collection of data for the study was done after obtaining ethical clearance from the ethical committee of the institute.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

Results:
A total of 100 patients participated in the study. 50 patients belonged to study group and the other 50 patients belonged to control group. The number of failed dental implants in study group was 8 and was 3 in control group. Extraction of dental implant was done for 3 teeth in study group and 1 implants in control group. On comparing the results were statistically significant for failed dental implants. (Table 1, Fig 1)

Table 1: Comparative analysis of success and failure rate of dental implants among study group and control group

Parameters	Study group	Control group	p-value
Total no. of participants	50	50	0.02
Number of dental implants failed	8	3	0.002
Number of dental implants removed	3	1	0.35

Fig 1: Dental implants failure and dental implants removed in study and control group
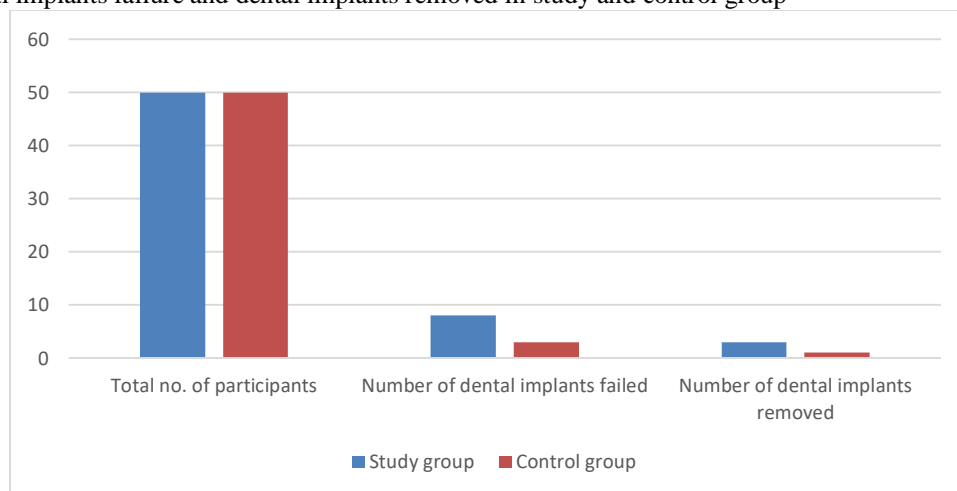
Discussion:

In the present study, we observed that the rate of dental implant failure was more evident in medically compromised patient. We observed that the number of failed dental implants in study group was 3 and was 1 in control group. Extraction of dental implant was done for 5 teeth in study group and 6 implants in control group. On comparing the results were statistically significant for failed dental implants. The results were compared with past studies in literature.

Gómez-de Diego R et al analysed the indications and contraindications of dental implants in medically compromised patients. A reference research was carried out on PubMed using the key words "implant" AND (oral OR dental) AND (systemic disease OR medically compromised), in articles published between 1993 and 2013. The inclusion criteria were the following: clinical studies in which, at least, 10 patients were treated, consensus articles, reviewed articles and meta-analysis performed in humans treated with dental implants, and which included the disease diagnosis. A total of 64 articles were found, from which 16 met the inclusion criteria. Cardiac systemic diseases, diabetic endocrine pathologies or controlled metabolic disorders do not seem to be a total or partial contraindication to the placement of dental implants. Tobacco addiction, and head and neck radiotherapy are correlated to a higher loss of dental implants. Patients suffering from osteoporosis undergoing biphosphonates therapy show an increased risk of developing bone necrosis after an oral surgery, especially if the drugs are administered intravenously or they are associated to certain concomitant medication. Parihar AS et al assessed failure rate of dental implant in medically compromised patients. This study comprised of 68 medically compromised patients of both genders who underwent dental implants 5 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. The age group of 30-40 comprised of 25 patients in group I and 35 in group II, 40-50 years had 27 in group I and 23 in group II and 50-60 years had 16 in group I and 10 in group II. Medically compromised patients were diabetes (25) with 30 dental implants followed by osteoporosis (16) with 17 dental implants, hypothyroidism (12) with 14 dental implants, organ transplant (10) with 12 dental implants and CVD (5) with 7 dental implants. Chi-square test was applied which revealed significant difference in patients. In group I, there were 18 (22.5%) and in group II, there were 4 (5.56%) dental implant failures. The difference with chi-square test found to be significant. They concluded that among medically compromised conditions, higher failure rate was found in diabetes.

Kim IH et al investigated outcomes following dental implantation in patients with special needs who required general anesthesia to enable treatment. Patients underwent implant treatment under general anesthesia at the Clinic for the Disabled in Seoul National University Dental Hospital between January 2004 and June 2017. The study analyzed medical records and radiographs. Implant survival rates were calculated by applying criteria for success or failure. Of 19 patients in the study, 8 were males and 11 were females, with a mean age of 32.9 years. The patients included 11 with mental retardation, 3 with autism, 2 with cerebral palsy, 2 with schizophrenia, and 1 with a brain disorder; 2 patients also had seizure disorders. All were incapable of oral self-care due to serious cognitive impairment and could not cooperate with normal dental treatment. A total of 27 rounds of general anesthesia and 1 round of intravenous sedation were performed for implant surgery. Implant placement was performed in 3 patients whose prosthesis records could not be found, while 3 other patients had less than 1 year of follow-up after prosthetic treatment. When the criteria for implant success or failure were applied in 13 remaining patients, 3 implant failures occurred in 59 total treatments. The cumulative survival rate of implants over an average of 43.3 months (15-116 months) was 94.9%. They concluded that for patients with severe cognitive impairment who are incapable of oral self-care, implant treatment under general anesthesia showed a favorable prognosis. Castellanos-Cosano L et al analyzed the characteristics of incident reports provided by dentists while using a specific brand of dental implants. The study was carried out in collaboration with Oxtein Iberia S.L.®, with the company providing access to the incident database in order to evaluate the characteristics of incidents from January 2014 to December 2017 (a total of 917 over four years). The data sheet recorded different variables during each of the stages of implant treatment, from initial implant placement to subsequent prosthetic rehabilitation. These variables included age, sex, systemic pathologies, smoking habits, bone quality, implant type, prosthesis type, and type of load applied, among others. SPSS Statistics was used to perform statistical analysis of the qualitative variables (univariate logistic regressions, χ^2 test, Haberman's adjusted standardized residuals). The total study sample consisted of 44,415 implants shipped from Oxtein® warehouses on the dates indicated, of which 917 implants (2.1%) were flagged due to reports of lack of primary stability, failed osseointegration, or implant failure within one year of placement. When analyzing incident reports, it was observed that 61.6% of incidents occurred in male patients, compared to 38.4% in female patients. The average age of patients in the reported cases was 56.12 ± 12.15 years. A statistically significant correlation was discovered between

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incidents of implant failure and tobacco use, diabetes, heart disease, poor oral hygiene, previous infection, poor bone quality, and bruxism ($p < 0.05$). A (statistically significant) higher rate of incidents was also observed in tapered, internal connection, Grade IV titanium, narrow, and short implants. They concluded that analysis of these implants reveals a higher rate of complication in short, tapered, internal connection and narrow-diameter implants.

Conclusion:

Within the limitations of the present study, it can be concluded that the rate of implant failure was more evident in patients with medical comorbidities.

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