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Evaluation of survival and risk factors of dental implants - A retrospective follow up study.

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Abstract

Introduction: The present study aimed to evaluate the early survival rates of implants and determine the related influencing factors.

Methods: All patients receiving dental implants between 2019 and 2020 were included in the study. The variables in the study was survival rate of implants, according to age, sex, maxilla/mandible, implant position, immediate implant, implant diameter, implant length and other related factors. The Chi-square test was used to screen all factors, and those with $p < 0.05$ were further introduced into a multiple logistic regression model to illustrate the risk factors for early survival rates of implants.

Results: The present study includes 128 cases (70 males and 58 females) who had single implant placement. After implantation, 117 implants were retained, and the early survival rate was 91.40%. Patients aged 30–60 years (OR 2.542), immediate implant placement (OR 3.742), and implant length < 10 mm (OR 3.972), were said to possess risk factors conducive to early survival rates.

Conclusions: The early survival rate of implants in our cases exceeded 91%, with risk factors including age, tooth position, implant length and immediate implant placement.

Keywords: Implant placement, Survival rate, Risk factors

Introduction

Implants have been recognized as the 'third set of teeth', since they are beautiful, comfortable, and have good chewing efficiency, making them feel like natural teeth.[1] Dental implant therapy has become a popular treatment modality for the rehabilitation of missing teeth. Although the long-term success of dental implants has been reported in many studies, several risk factors

associated with implant, surgery, and patient-related components may disturb long-term implant survival.[2] With the rapid advancement of dental implant the rapeutics, the current trend is now geared toward enhancing esthetics and patient comfort. Establishing intact papillae and gingival contour around implants is of utmost importance, especially in patients who display soft tissue during function, such as speaking and smiling.[3-4]

Despite the high survival rate in many studies, implant-supported prostheses are not free from complications and morbidity, and their longevity is limited not only by bio logic complications but also by prosthetic main tenance requirements and the restoration issues[5-6] Long-term collection and analysis of data are of the utmost importance when evaluating a procedure such as dental implant placement. It should help the clinician assess a given condition and predict its future clinical course, as well as help in decision making with regards to additional therapy, frequency of follow-up, and hygiene appointments.[7-8]

Most clinical studies have shown the early survival time of implants to be mainly concentrated in the first year or two after implantation, and most implant failures occur during early osseointegration and early mastication.[9-10]At present, clinical studies report the possible risk factors as follows: patients' general condition, local bone conditions in the implant area, patients' bad habits, implant model, surgical placement technique, early loading, etc.[11-12]

Therefore, study and analysis of the main risk factors affecting the early survival rate of implants are crucial. We retrospectively analysed the early survival rates and the influencing factors of implants placed from 2018 to 2020 to find the early survival rates of implants and determine the related influencing factors.

Materials and methods

Study population

The present study includes patients who underwent single tooth dental implant placement over a period of 1 year between April 2019 and March 2020.The ethical clearance was obtained from institutional ethics committee. The patients met the diagnostic criteria for a single tooth dental implant, patients who are having no contraindications to surgery and the patients whose informed consent was provided were included in study while the patients who were receiving therapy in the head and neck region, had renal or liver disease, had uncontrolled diabetes mellitus, had chronic use of steroids, suffered from alcoholism, drug abuse, and local pathology or inflammation at the site of surgery, and had severe periodontal diseases; and did not follow the doctor's advice at the stage of Osseo-integration after implantation were excluded from the present study. Patients were told not to smoke after implant placement, especially during the wound-healing stage. Patients who did not keep review appointments or respond to inquiries after placement were also excluded from the study.

The dentists completed the patient's personal implant file immediately after placing implant i.e. first stage surgery, recording the patient's gender, age, implant position, whether it was an immediate implant, implant diameter, length and general condition. The second stage surgery by the dentist was done 3 to 6 months after implant placement. All restorations were fixed.

Statistical analysis

Baseline characteristics were described. Descriptive statistics in terms of frequency and percentages, according to gender, age, maxilla/ mandible, implant position, immediate implant, implant diameter and other related factors.

The Chi-square test was conducted to determine the differences between and among the groups. Variables associated with significant differences ($p < 0.05$) in Chi-square tests were subsequently introduced into the multivariate logistic regression model to further ascertain a simultaneous effect on failure rate. Analyses were performed with SPSS (Version 22).

Results

128 single- tooth implants were included in the study, with 70 males and 58 females. The average age of this cohort was 42.00±5.4 years. After implant place ment,117 implants were retained with the survival rate was 91.60%.

Failure occurred in11 implants with major cause of failure found to be infection (5), periodontal diseases (2), poor oral hygiene (2) and improper occlusion due to early stress (2).

The variables that might influence the survival rate of dental implants were studied. According to gender, the survival rate of 90.00% was for males compared with 93.11%for females (Table 1). Implant position also influenced the survival rate. The survival rates of implants in anterior teeth, premolars, and molars were 87.50%, 84.21%, and94.80%, respectively. Different implant lengths had significantly different survival rates. The survival rates of implants shorter than 10 mm, between 10 mm and13 mm, and longer than 13 mm were 92.75%, 92.59%, and 81.81%, respectively. Patients undergoing immediate implant placement had significantly lower survival rates than those with delayed implant placement. (Table 2).

Variables that showed statistically significant differences in early survival rates were introduced into the multivariable logistic regression analysis, including patient age, implant position, whether implantation was immediate, and implant length.

Compared with patients aged older than 40 years, those younger than 30 years showed statistically significant differences in survival rates. Immediate implant showed statistically significant result. Other variables—in cluding implant position (premolar, molar and anterior teeth) and implant length did not show statistical significance relative to survival rates (Table 3).

Discussion

Implant therapy is regarded as a safe and reliable method of treating patients with complete or partial edentulism. Since the average life expectancy is progressively increasing, patients need more dental implants. Long-term success and survival rates of Osseo integrated implants have been reported in a number of studies.[13]The success and success rates of dental implants placed by specialists have been well documented in numerous studies. The use of dental implants as a replacement for missing teeth has been increasing steadily, probably owing to the high predictability and survival rates, as reported in numerous studies[14,15]

Overall, the survival rates of the implants in the long-term evaluation presented here, are within the reported rates in the literature both on the implant level and the patient level. It is important to emphasize though, that proper analysis with cumulative survival analysis is of utmost importance when reporting on long-term results for such large cohorts.[16]

Clinical literature reports and our research results, the above factors easily led to early implant failure for the following reasons like patients failed to maintain good oral hygiene due to the stress of work. Immediate implantation requires higher primary stability and sealing of soft and hard tissues and is more susceptible to bacteria and poor micromotion during healing, the risk of implant failure increased.[17]Meijer et al.[18] reported a survival rate of 73.3% in implants placed immediately

in the molar area. Ji et al.[19] found that delayed placement led to higher implant survival.

The key to reducing the rate of early implant failure is to strengthen learning and training, improving the diagnostic level of the doctors (the ability to evaluate implant difficulty and make a reasonable treatment plan) as well as their surgical implant techniques. This will guide us in preventing and reducing early implant failure in clinical practice and provide some referential experience for clinical implant counterparts.

Long-term evaluation and follow-up for every implant patient are particularly important in order to identify early signs of these conditions. Early detection and proper intervention are crucial for favourable treatment outcomes.[20]

Implementation science intends to identify the barriers and present implementation strategies in an effort to enhance the uptake of these approaches. It is about trying to implement the knowledge we have into the daily practice ensuring our patients are receiving evidence - based treatments. The employ Ment of evidenced - based research is required to provide optimal treatment for patients. Research is undeniably critical for patient care; however, we must be able to apply it and therefore, there is a need for more implementation science in dentistry.

Retrospective studies, as their nature might present some risk of bias, which is a limitation of this study, however, studies like that are still important to assess risk factors over a long-term follow-up of a large number of patients and implants. Some of these limitations are related to confounding factors that cannot always be identified in retrospective analysis of cases. Multivariate analysis is an attempt to control some of the confounders but bias can still be present as part of the retrospective nature of this study. Long-term data from other practice-based groups will enable comparison of the results and further analysis of confounding factors.

Conclusion

This study reported on analysis of success, risk factors and survival of dental implants in a patient who had single implant placement. The early survival rate of implants in our cohort exceeded 91.40%. Though the results are promising and encouraging in terms of survival, it is important to emphasize the potential risk factors and consider them prior to dental implant placement.

Table 1: Comparison of patient's basic characteristic on survival rate

Variables		Total		Survival		P-value
		Frequency	Percentage	Frequency	Percentage	
Gender	Male	70	54.68	63	90.00	0.051
	Female	58	45.31	54	93.11	
Age	< 40 years	54	42.18	51	94.55	0.043
	>40 years	74	57.81	66	89.19	
Dentition	Maxilla	68	53.12	61	89.70	0.065
	Mandible	60	46.87	56	93.33	
Implant position	Anterior	32	28.00	28	87.50	0.001
	Premolar	19	14.84	16	84.21	
	Posterior	77	60.15	73	94.80	

Table 2: Implant factors that affected the early survival rate.

Variables		Total		Survival		P-value
		Frequency	Percentage	Frequency	Percentage	
Immediate implant	Yes	24	18.75	17	77.27	0.001
	No	104	81.25	99	95.19	
Implant length	< 10 mm	69	53.90	64	92.75	0.003
	10-13 mm	37	28.90	35	94.59	
	>13mm	22	17.18	18	81.81	
Implant Diameter	< 4.2mm	68	53.12	60	88.23	0.056
	>4.2 mm	60	46.87	57	95.00	

Table 3: Multivariable logistic regression analysis for survival rates

Variables		Odd's ratio	95% ci	P-value
Age	< 40 years	2.542	1.243-3.753	0.029
	>40 years	Reference	Reference	
Implant position	Anterior	Reference	Reference	
	Premolar	0.835	0.537-1.487	0.754
	Posterior	0.745	0.385-1.742	0.438
Immediate implant	Yes	Reference	Reference	0.002
	No	0.742	0.436-0.876	
Implant length	< 10 mm	3.972	1.482-5.935	0.026
	10-13 mm	1.213	0.845-1.542	0.625
	>13mm	Reference	Reference	

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