E-ISSN:2454-9894 P-ISSN: 2454-9886
International Archives of
BioMedical and Clinical Research
(An Official Publication of "Ibn Sina Academy of Medieval Medicine & Sciences")
WWW.IABCR.ORG

Section Dentistry

Original Article

Factors Affecting Dental Implant Failure in Patients Reporting to Periodontology Department Khyber College of Dentistry Peshawar Pakistan

Muhammad Jamil[1], Hussam[2], Muhammad Ifham Khan Jadoon[3], Mahirah Iqbal[4], Wajeeha Urooj[5], Mashal Riaz[6]

[1]Demonstrator; [2]Assistant Professor and Head, Periodontology Department, Khyber College of Dentistry, Peshawar Pakistan. [3]Assistant Professor and Head of Periodontology Department, Ayub Dental Section, Ayub Medical College, Abbottabad, Pakistan. [4]Assistant Professor; [5]Lecturer, Department of Periodontology, Peshawar Dental College, Peshawar Pakistan. [6]Dental surgeon, Health Department, Khyber Pakhtunkhwa, Pakistan

ABSTRACT

Background: *To determine factors affecting dental implant failure in patients reporting to Periodontology department Khyber College of Dentistry, Peshawar.*
Methods: *This retrospective study was conducted on 50 consecutive cases having failed implants. Inclusion criteria were cases having age from 30 to 70 years, both gender and Pakistani nationals. Patients suffering from endocrine problems, chronic infectious disorders, periodontitis, using immunosuppressive drugs and pregnant females were excluded from study. Data like age, implant length, diameter and bone quality were recorded. The data were entered and analyzed in SPSS version 22. Descriptive statistics like mean and SD was calculated for continuous data and frequency and percentages were calculated for categorical variables. Factors for implant's failure were stratified by gender using Chi-square test. P≤0.05 was considered significant.*
Results: *The males were 29(58%) and females were 21(42%). The mean age was 51.3±9.73 years. The most common site of failure was maxillary posterior (n=18, 36%) followed by mandibular posterior (n=13, 26%) then by maxillary anterior (n=12, 24%). Most failure was seen in implants having length less than 10mm (n=24, 48%) followed by >11.5mm (n=17, 34%). The most failed implants were <3.5mm diameter (n=22, 44%) followed by >4.5mm (n=17, 34%). The common age in which implant failure was seen was above 50 years (n=23, 46%).*
Conclusion: *Most common factors for implant failure were posterior maxillary area, shorter length, thin diameter and increasing age.*

Keywords: *Implant, dental implant, failure, length, diameter*

Available Online: 31st December 2021

Article History
Received: 04.09.2021
Accepted: 13.09.2021

***Corresponding Author**

Dr. Hussam
Assistant Professor & Head,
Department of Periodontology, Khyber College of Dentistry, Peshawar – Pakistan
Email: h_siddiki@hotmail.com

INTRODUCTION

In past missing teeth were replaced with removable or fixed partial dentures.[1] Replacement of missing teeth with dental implants is now treatment option for majority cases.[2] In most patients dental rehabilitation through the dental implants is considered as the gold standard.[3]

Good osseointegration (achieving a direct union of living bone with the titanium surface of the implant) can be achieved if the proper treatment planning and surgical technique is used for implant.[3] Implant failure can occurs due to lack of function but most important factor is lack of osseointegration. The best management of failed implant is its earliest removal.[4]

Many factors affecting implant failure can be categorized into host, placement site, surgery, implant fixture and prosthesis-related.[5] Host-related factors are age, gender, cigarette habits, systemic conditions, and oral hygiene status. Site-related factors are position in arch, quantity and quality of bone.[6] Surgery-related factors are primary stability, implant's angulation and the experience of the operator. Implant fixture-related factors are surface roughness, length, diameter and microstructure of fixture. Prosthesis types, retention method, and occlusal forces are implant prosthesis related factors for failure.[7]

Albrektsson et al. conducted a study on factors for implant failure and reported that design and surface of implant, placement site, surgical technique, and occlusal loading were associated factors.[8] Another study showed that age of individual, length, diameter of implant, quality of bone, and location of implant were factors for failure.[9]

Access this article online	
Website: www.iabcr.org	Quick Response code
DOI: 10.21276/iabcr.2021.7.4.13	

How to cite this article: Jamil M, Hussam, Jadoon MIK, Iqbal M, Urooj W, Riaz M. Factors Affecting Dental Implant Failure in Patients Reporting to Periodontology Department Khyber College of Dentistry Peshawar Pakistan. Int Arch BioMed Clin Res. 2021;7(4):DA1–DA3.

Source of Support: Nil, **Conflict of Interest:** None

Although implant failure is very less now a days but the recognition of risk factors leading to implant is very important during treatment planning. There is scarcity of local literature on factors affecting implant failure. So, the objective of this study was to determine factors affecting dental implant failure in patients reporting to department of Periodontology Khyber College of Dentistry, Peshawar.

METHODS

This retrospective study was conducted at the department of Periodontics, Khyber College of Dentistry Peshawar from August 2020 to June 2021 on 50 consecutive cases with failed implants. Ethical approval was obtained from hospital ethical review committee. After in detail explanation of the purpose of study verbal informed consent was obtained from all participants. Inclusion criteria were cases who had failed dental implants, age range of 30 to 70 years, both gender and Pakistani nationals. Patients suffering from endocrine problems, chronic infectious disorders, using immunosuppressive drugs, pregnant females and cases with severe periodontitis were excluded from study.

Demographics like age and gender were recorded. A specialist periodontist using radiographs and clinical examination recorded data for implant length, diameter. Failed implants were who mobility greater than 1mm.

The data were entered and analyzed in SPSS version 22. Descriptive statistics like mean and SD was calculated for continuous data and frequency and percentages were calculated for categorical variables. Factors for implant failure were stratified by gender using Chi-square test. P≤0.05 was considered significant.

RESULTS

The males were 29(58%) and females were 21(42%). The mean age was 51.3±9.73 years. The age range was from 35 to 69 years. The most common site of failure was maxillary posterior (n=18, 36%) followed by mandibular posterior (n=13, 26%) then by maxillary anterior (n=12, 24%). The least common site for failure was mandibular anterior (n=7, 14%). (Fig 1)

Most common failure was seen in implants having less than 10mm (n=24, 48%) followed by >11.5mm (n=17, 34%). The most failed implants were with <3.5mm diameter (n=22, 44%) followed by >4.5mm (n=17, 34%). The common age in which implant failure was seen was above 50 years (n=23, 46%). (Table 1) The failure factors for dental implants among males and females were not statistically significant (P>0.05). (Table 2 & 3)

Fig 1: Location of failed implants

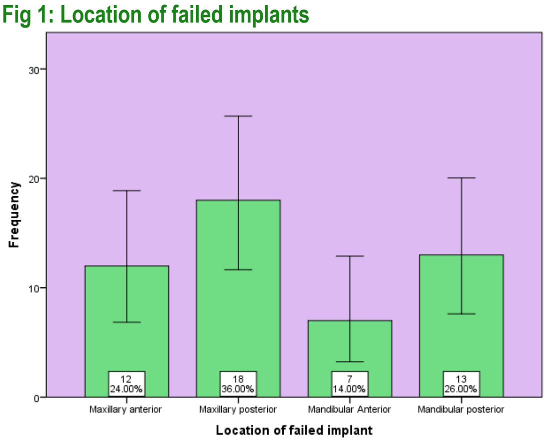

Table 1: Factors for failure of implant

Factors for failure		n	%
Implant length (mm)	<10	24	48.0
	10-11.5	9	18.0
	>11.5	17	34.0
Implant diameter (mm)	<3.5	22	44.0
	3.75-4.5	11	22.0
	>4.5	17	34.0
Age group (year)	<40	9	18.0
	41-50	18	36.0
	>50	23	46.0

Table 2: Factors for implant's failure stratified by gender

Factors for failure			n	%	P-value
Implant length	Male	<10mm	11	37.9	0.200
		10-11.5mm	7	24.1	
		>11.5	11	37.9	
	Female	<10mm	13	61.9	
		10-11.5mm	2	9.5	
		>11.5	6	28.6	
Implant diameter	Male	<3.5	13	44.8	0.199
		3.75-4.5	4	13.8	
		>4.5	12	41.4	
	Female	<3.5	9	42.9	
		3.75-4.5	7	33.3	
		>4.5	5	23.8	

Table 3: Location of failed implants stratified by gender

		n	%	P-value
Male	Maxillary anterior	5	17.2	.585
	Maxillary posterior	12	41.4	
	Mandibular Anterior	4	13.8	
	Mandibular posterior	8	27.6	
Female	Maxillary anterior	7	33.3	
	Maxillary posterior	6	28.6	
	Mandibular Anterior	3	14.3	
	Mandibular posterior	5	23.8	

DISCUSSION

This study was aimed to determine the factors associated with failed implants. Our findings showed that most common factors for implant failure was maxillary posterior, less than 10mm length, <3.5mm diameter and above 50 years age.

Adequate osseointegration of dental implants is pre-requisite for implant success. Many attempts had been made to increase osseointegration. Some of the methods used to augment osseointegration of dental implants are the increase in length, increase in diameter and alteration of surface.[10, 11]

However, in clinical practice we have anatomical limitations to use longer and thicker implants in some patients.

Our study showed that medium length of implant had less failure rate. Similar results has been reported in previous literature.[9,12] Length and diameter of dental implant plays an important role in success rate of implant. Longer and thicker the dental implant up to some extent increases the success rate. Increase length and diameter of implant increase the surface area and help in better osseointegration. However some studies found no difference between various implants length and their failure.[13,14] Many confounders can mask the effect of length on implant's success rate like learning curve of the clinician, primary stability of implant and bone's quality. The mechanism of failure of thicker implants (>11.5mm) can be attributed to more stress generation and less blood supply in surrounding thin cancellous bone.[15]

The current study showed that the most common site of failure was maxillary posterior followed by mandibular posterior then by maxillary anterior. The least common site for failure was mandibular anterior. Our findings showed that posterior location of dental implants is more vulnerable to failure. Similar results were reported in other studies.[9,12] The higher failure in posterior implants can be attributed to more occlusal forces in posterior teeth and high risk of dental plaque accumulation.[16]

Our findings showed that in old ages more implant failure was found. Similar findings were reported previously.[9,16] With increasing the risk of bone pathologies (osteoporosis and periodontitis etc) are more common and weaker osseointegration than younger patients. There is also decreased blood supply in old ages.[17]

There are limitations of this study. Our study is retrospective and is small sample. This cannot control confounders associated with implant failure like practitioner experience and primary stability. So further prospective and large sample studies are needed using multivariate analysis to control these confounders and determine the real effect of length, diameter and age on dental implant success.

CONCLUSION

Within the limitations of this study, it can be concluded that that most common factors for implant failure was posterior maxillary area, shorter length, thin diameter and increasing age.

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