Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Original research article

Biological, technical, esthetic and iatrogenic risk factors for tooth supported fixed partial dentures: A cross sectional study

[1]Dr. (Lt Col) Chandra Bhushan Singh Patel, [2]Dr. Ravi Jaiswal, [3]Dr. Arvind Patel, [4]Dr. Apurva Jha, [5]Dr. Balendra Pratap Singh

[1] Assistant Prof & Head, Department of Dentistry, Uma Nath Singh Autonomous State Medical College, Jaunpur, Uttar Pradesh, India

[2]UG Student, Department of Dental sciences, KGMU, Lucknow, Uttar Pradesh, India

[3]Assistant Professor & Head, Department of Anaesthesia, Uma Nath Singh Autonomous State Medical College, Jaunpur, Uttar Pradesh, India

[4]Assistant Professor, Department of Biochemistry, Autonomous State Medical College, Sonbhadra, Uttar Pradesh, India

[5]Professor, Department of Prosthodontics, KGMU, Lucknow, Uttar Pradesh, India

Corresponding Author:
Dr. Apurva Jha

Abstract

Aims and objectives: To assess tooth supported fixed prostheses failure through biological, technical, esthetic and iatrogenic factors.

Statement of Problem: Although dental literature is full of studies concerning crown and bridge failure, there is a paucity of valid research documenting the different risk factors prevalence of such failure.

Material and Methods: Patients visited the dental department with complaints in fixed dental prosthesis and fulfill the inclusion criteria were enrolled in the study. Ethical approval was taken from institutional ethical committee. A written informed consent was taken.

Study design and participants selection: One hundred fifty fixed partial denture wearers with the age group of 40-60 years were recruited in this cross-sectional study considering inclusion and exclusion criterion. Self-reported satisfaction was measured in terms of esthetic, function and cost. Examination of dental prosthesis, Abutment, adjacent Teeth, Mucosa were done as mentioned in the case sheet. Overall classification of FDP failure was measured as Manappallil's classification. All data were obtained by means of a questionnaire-interview, oral examination, and IOPA x-ray, if needed. Bivariate relationship and multiple logistic regression analyses were performed (α=.05).

Observation and Result: The key finding of this study were as under: -

The mean age of the patients in this study was 38.50 (±12.77) years. Most of the patients were males (67.3%) and were married. Majority of the patients were graduate & above (90.7%), non-vegetarian (90.7%). 73.3% of the patients were presented with dental history and. 28% with medical history. The tobacco habit was seen in 12.7% of the patients. Abutment was observed among all the patients. Vital was seen in 14%. The average survival time was 27.50 (±26.18) months. The appearance immediately after the insertion was good in 36.7%.

Chipping off ceramic technical failure was found in 4.7% of the patients and loss of retention was among 64% patients. Caries in abutment biological failure endodontic was seen in 18.7%. The failure grades based on severity was; grade III and IV was in 32% of the patients. The grade V was in 14% and grade II was in 13.3%.

Conclusion: This study showed flaws in preparation of tooth as well as fabrication of crown and bridges leading to different types of failure in fixed prosthesis.

Summary: Fabrication of crown should follow what we have read and trained during our training in dental school as much as possible and regular follow-up is the key of long-term success.

Keywords: Biological risk factors, Technical risk factors, Esthetic risk factors, Iatrogenic risk factors

Introduction

The art and science of fixed Prosthodontics was practiced dating back to 14th century, but the scientific concepts and techniques developed only in last 100 years only. Many of the changes are driven by technological developments and newly available materials [1]. But, a pertinent basic science continues to hold the fort. To achieve predictable success in this technically exacting and demanding field, there must be meticulous attention to every detail from the initial patient interview and diagnosis, and through the active treatment phases and to a planned schedule of follow up. Otherwise the results are likely to the unsatisfactory and frustrating for both dentist and patient resulting in disappointment and loss of

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

confidence. Although dental literature is full of studies concerning crown and bridge failure, there is a paucity of valid research documenting the different risk factors prevalence of such failure [2, 5].

Review of Literature

Fixed dental prosthesis (FPDs) are dental prostheses that are luted, screwed, or mechanically attached or otherwise securely retained to natural teeth, tooth roots, and/or dental implant abutments [6]. Bridges sometimes referred to as a fixed partial denture, look natural and literally bridge the gap where one or more teeth may have been. During the past decades, many types of FPDs or "bridges" have been used to replace missing teeth. Different studies mentioned different survival rate and tooth supported prosthesis and definition of survival is different in published literature [7]. This failure of fixed prosthesis is also depend upon how well dentists, technicians have prepared prosthesis and then how well patient follow the hygiene and regular follow-up [8]. Apart from this how well dentists prepared, cemented and design the prosthesis as well.

Material and Methods

Patients visiting the Dental department with complaints in fixed dental prosthesis and fulfil the inclusion criteria would be enrolled in the study. Ethical approval has been taken from institutional ethical committee. Before enrolling the participants detailed description of the study was provided and full opportunity was given to ask question and participants can opt out from the study at any time. If agreed, a written informed consent was taken.

Study design and participants selection

Study design

One hundred fifty fixed partial denture wearers with the age group of 40-60 years will be recruited from outpatient department in this cross-sectional study. Self-reported satisfaction will be measured in terms of esthetic, function and cost. Examination of dental prosthesis, abutment, adjacent teeth, mucosa would be done as mentioned in the case sheet. Overall classification of FDP failure was measured as Manappallil's classification [4] All data were obtained by means of a questionnaire-interview, oral examination, and IOPA x-ray, if needed. Bivariate relationship and multiple logistic regression analyses were performed (α=.05).

Investigative procedure

Each of the subject was examined once by the same dentist and following parameters were recorded for each abutment tooth present:

1. Gingival condition using the gingival index (GI) of Loe and Silness.
2. Accumulation of supra gingival plaque using Silness and Low plaque index (PI).
3. Tooth mobility will be recorded as follows –
4. no mobility
5. Mobility <1 mm in horizontal direction
6. Mobility>1 mm in horizontal direction
7. Mobility in vertical direction
8. Periapical pathology if any will be examined by using IOPA view/OPG of the concerned region

Sample size: 150 fixed partial denture wearers would be enrolled in the study.

Inclusion criteria

1. Tooth supported fixed partial denture wearer
2. Male and female age between 40-60 years
3. Able to respond and fill the questionnaire

Exclusion criteria

1. Implant supported/ semi-fixed tooth supported fixed prosthesis
2. Suffering from any systemic bone disorders/ metabolic disorders/malignancy/steroid therapy/radiotherapy on the basis of history and physician consultation
3. tooth supported fixed partial denture retained by acrylic extensions without proper abutment preparation

Observations and results

Table 1: Demographic profile of the patients

	n=150
Age in years, Mean ± SD	38.50±12.77
Gender, no. (%)	
Male	101 (67.3)
Female	49 (32.7)

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Marital status	
Married	103 (68.7)
Unmarried	47 (31.3)
Education	
Graduate& above	136 (90.7)
Intermediate	7 (4.7)
High school	7 (4.7)
Occupation	
Professional	48 (32.0)
Semi professional	26 (17.3)
Clerical-shop owner-farmer	7 (4.7)
Skilled worker	14 (9.3)
Semi-skilled worker	7 (4.7)
Unemployed	48 (32.0)

The demographic profile of the patients is given in the Table-1. The mean age of the patients was 38.50 (±12.77) years. Most of the patients were males (67.3%) and were married. Majority of the patients were graduate & above (90.7%).

Table 2: Distribution of survival time

Survival time in months (insertion to first complaint)	No. (n=150)	%
<12 months	40	26.7
12-24 months	55	36.7
>24 months	55	36.7
Mean ± SD	27.50±26.18	

The average survival time was 27.50 (±26.18) months (Table-7).

Table 3: Distribution of fixed prosthesis and patient's evaluation

	Male		Female		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
Appearance immediately after insertion						
Not appropriate	40	85.1	7	14.9	47	31.3
Fair	34	70.8	14	29.2	48	32.0
Good	27	49.1	28	50.9	55	36.7
Chi-square p-value	0.0001*					
Appearance now						
Not appropriate	67	82.7	14	17.3	81	54.0
Fair	20	58.8	14	41.2	34	22.7
Good	14	40.0	21	60.0	35	23.3
Chi-square p-value						
Capacity to chew						
Not appropriate	67	76.1	21	23.9	88	58.7
Fair	20	58.8	14	41.2	34	22.7
Good	14	50.0	14	50.0	28	18.7
Chi-square p-value	0.01*					
Capacity to speak						
Not appropriate	27	100.0	0	0.0	27	18.0
Fair	41	59.4	28	40.6	69	46.0
Good	33	61.1	21	38.9	54	36.0
Chi-square p-value	0.0001*					
Capacity to clean teeth and gums						
Not appropriate	54	72.0	21	28.0	75	50.0
Fair	33	54.1	28	45.9	61	40.7
Good	14	100.0	0	0.0	14	9.3
Chi-square p-value	0.002*					
Financial cost						
Not appropriate	60	68.2	28	31.8	88	58.7
Fair	34	70.8	14	29.2	48	32.0
Good	7	50.0	7	50.0	14	9.3
Chi-square p-value	0.33					
Going again for treatment						
Not appropriate	35	83.3	7	16.7	42	28.0
Fair	33	61.1	21	38.9	54	36.0
Good	33	61.1	21	38.9	54	36.0
Chi-square p-value	0.03*					

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Occlusion type						
Not appropriate	60	74.1	21	25.9	81	54.0
Fair	41	59.4	28	40.6	69	46.0
Good	0	0.0	0	0.0	0	0.0
Chi-square p-value		0.06				
Occluding dentition/restoration						
Not appropriate	94	72.9	35	27.1	129	86.0
Fair	7	33.3	14	66.7	21	14.0
Good	0	0.0	0	0.0	0	0.0
Chi-square p-value	0.0001*					

*Significant

Table-3 describes the distribution of fixed prosthesis and patient's evaluation. The appearance immediately after the insertion was good in 36.7%.

Table 4: Distribution of etiology

	No. (n=150)	%
Technical failure		
Chipping off ceramic	7	4.7
Occlusal tooth wear	0	0.0
Wear In Border B/w Porcelain and Metal	0	0.0
Loss of retention	96	64.0
Fractured frame work	34	22.7
Biologic failure-endodontic		
Caries in abutment	28	18.7
Endodontic complications	28	18.7
Pain/tender on percussion	28	18.7
Biologic failure-periodontic		
Sensitivity	7	4.7
Food entrapment	41	27.3
Bleeding from the gums	62	41.3
Probing pocket depth (>4 mm)	34	22.7
Mobility of abutment (grade)		
Normal	136	90.7
I	0	0.0
II	7	4.7
III	7	4.7
Esthetic failure		
Gingival recession	7	4.7
Traumatic loss of tooth	0	0.0
Psychological disorder	0	0.0
Extraction of abutment tooth planned	0	0.0
Ante's law followed	6	4.0
Finish line properly defined	20	13.3
Contact break	34	22.7

Table-4 presents the distribution of etiology. Chipping off ceramic technical failure was found in 4.7% of the patients and loss of retention was among 64% patients. Caries in abutment biological failure endodontic was seen in 18.7%.

Table 5: Distribution of failure grades based on severity

Grades	No. (n=150)	%
I	7	4.7
II	20	13.3
III	48	32.0
IV	48	32.0
V	21	14.0
VI	6	4.0

The grade III and IV was in 32% of the patients. The grade V was in 14% and grade II was in 13.3% (Table-5).

Discussion

Most of the subjects belonged to middle aged male, married, graduate which showed the person of young age getting more social exposure and earner of family are preferred to take fixed Prosthodontics treatment.

Majority of the prosthesis were made up of all metal and teeth were non-vital. This showed evidence of

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

preference of treatment after root canal treatment which increases chances of fracture of teeth. More than 60% of prosthesis showed more bulk which is detrimental to the health of periodontium leading to accumulation of plaque and trauma of gingiva [9].

Subjects (70%) having presented their case as failure have survival not more than two years. These findings showed faults in fabrication as well as patients ability or desire to maintain the prosthesis [10].

Patient's evaluation of the prosthesis did not show any significant association with gender or age including esthetics though few patient showed non satisfactory appearance immediately and later on. Loss of retention is most common technical failure [3]. Bleeding from gums is the most common periodontic reason to failure which showed association with bulkiness of the prosthesis lead to detrimental effect on gingiva.

Grade III and IV was most common in different subjects which need restoration replacement or replacement in addition to repair or reconstruction of supporting tooth [4].

Conclusion

This study showed flaws in preparation of tooth as well as fabrication of crown and bridges leading to different types of failure in fixed prosthesis.

Summary

Fabrication of crown should follow what we have read and trained during our training in dental school as much as possible and regular follow-up is the key of long-term success.

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