International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Clinical Evaluation of the Effect of Different Types of Fixed Prosthesis in Diabetic Patient

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Abstract: ***Aims: To evaluate the effect of different types of fixed prosthesison diabetic patient in term of success and failure. Materials and methods: This is a retrospective study of 53diabetic patients who visited the Diabetes and Endocrinology Hospital between January 2019 and May 2021. Patients underwent medical evaluation for their routine check-up were invited to take part in this study. Among the 53 patients, 6 patients were type I and 47 were type II. Results: The number of retainers, pontics, and the types of restoration were recorded, by examining 53 patients with 202 crown and bridge unites from the Diabetes and Endocrinology Hospital/Tripoli. The collected data related to the bridge area were then subjected to descriptive analysis. The result of the study revealed that swelling around the abutment was the most frequent complication, observed on 69.8% of all the patients while aesthetic was not counted for any of the patient. Conclusion: swelling and abscess around the abutment teeth were found to be the most complications in diabetic patients. Clinical significance: By knowing the reason of failures, a proper treatment plan can be made so that the prosthesis will have a long time prognosis.***

Keywords: Diabetes mellitus; Bridge Failure; Fixed Prosthodontics

1. Introduction

Diabetes Mellitus is a clinical syndrome specified by hyperglycemia due to absolute or relative deficiency of insulin. The two main types of Diabetes Mellitus include Type I or Insulin Dependent Diabetes Mellitus and Type II or Non-insulin dependent Diabetes Mellitus[1]. Management of the diabetic dental patient must take into consideration the impacts of diabetes on dental treatment, as well as a clear appreciation for the co morbidities that accompany long standing diabetes mellitus[2]. As the diabetes Mellitus is a nutritional metabolic disorder characterize by various oral and systemic problems. These patients when referred to dentist or prosthodontist for the provision of prosthetic treatment require multidisciplinary approach[2]. In this study special focus is emphasized on the different important factors to be kept in mind when providing fixed prosthodontics treatment for such patients.

The use of crown and bridgework to restore a patient‘s dentition is a treatment performs by practitioners on a regular basis. Despite advances in the materials and technologies used to construct such restorations, and with the cement used to hold them, failure and the need to replace crowns and bridges occurs. Failure to achieve the desired specifications of design for function and esthetics would fail the prosthesis. Most of the time, the failures are conditions that occur during or after performed fixed prosthodontics treatment procedures[3].

The reasons for failure may be divided into biological failures, mechanical failures, and esthetic failures. Mechanical failures are more directly under the influence of the clinician. Biological problems are less easily controlled and in some instances may be unrelated to the treatment or prosthesis.

More specifically, reasons of failure can be caries, uncemented restoration, over-contoured restoration, poor occlusal plane, periodontal disease, periapical involvement, failed post retained crowns, poor esthetics, crown perforation and defective margins of restorations[3,4].

The classification of failures was similar to those reported by Schwartz *et al.*[5], and Walton *et al.*[6]A restoration that required repair or replacement was considered a failure. A failure due to periodontal disease would exhibit soft tissue pathosis, alveolar bone loss, cervical pocket formation, and excessive mobility.

Evaluation of the most appropriate bridge design for diabetic patients has not been studied yet, thus this research paper aimed to clinically evaluate the different type of fixed prosthesis in patient with Diabetes Miletus.

2. Materials and Methods

The study was a retrospective examination study that conducted at the Diabetes and Endocrinology Hospital/Tripoli. Permission has been obtained from the committee in the Diabetes and Endocrinology Hospital prior to commencing the study. The classification of failures was similar to those reported by Schwartz et al. and Walton et al. to allow for comparison with previous studies. A restoration that required repair or replacement was considered a failure. A form was designed to record the data obtained from the patient. The prosthesis type, position, years of service, retainer/crown and pontic type were recorded.

The subjects in the study consisted of 53controlled diabetic patients, 6 of the patients were type1 and 47 type 2, 30 (57%) of the subjects were female and 23 (43%) were male, ranging from 32-70 years old of age with male to female ratio 29.7:70.3 (Figure1).

Patient recruitment: patients came to Diabetes and Endocrinology Hospital for routine medical evaluation for their routine check-up were invited to take part in this study(Figure 1). They were recruited in accordance with the study protocol. The subjects were requested to fill in the consent form and participate in the study.

A form was designed to record the data obtained from the clinical examination. The prosthesis type, position, years of service, retainer/crown and pontic type, and cause of failure, if any, were recorded. The clinical examination was conducted by one clinician standing in front of the subjects. Every subject was asked to sit in the dental chair in an upright position. Each case was examined carefully by use of sterile diagnostic instruments (oral mirror and round end probe) with the aid of chair light to evaluate all the prosthesis and surrounding area, then the data were recorded according to the previously prepared form.

3. Results

Data analysis

The data collected were entered to SPSS (statistical package for social science, Ink Illinois, USA) version 26

The length service of all restoration observed on this study was 60.4% less than 5 years as shown in (table 1).

Table 1: The length service of the prosthesis

The length service of all prosthesis		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5 years	32	**60.4**	60.4	60.4
	more than 5 years	21	39.6	39.6	100
	Total	53	100	100	

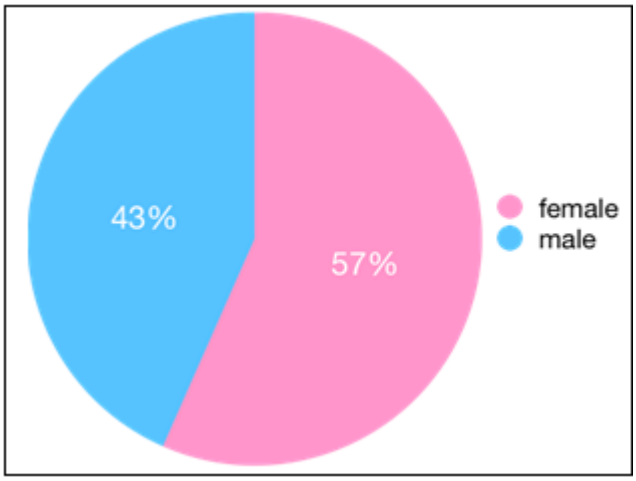

Figure 1: Male to female ratio

Swelling around the abutment was the most frequent complication, observed on 69.8% of all the patients while aesthetic was not counted for any of the patients (Figure 2). From the bar chart the abscess around the abutment was found 67.9% of all the cases; followed by pain 54.7% , bleeding with 39.6%, recession and pocked with 37.7% and caries with 30.2% respectively.

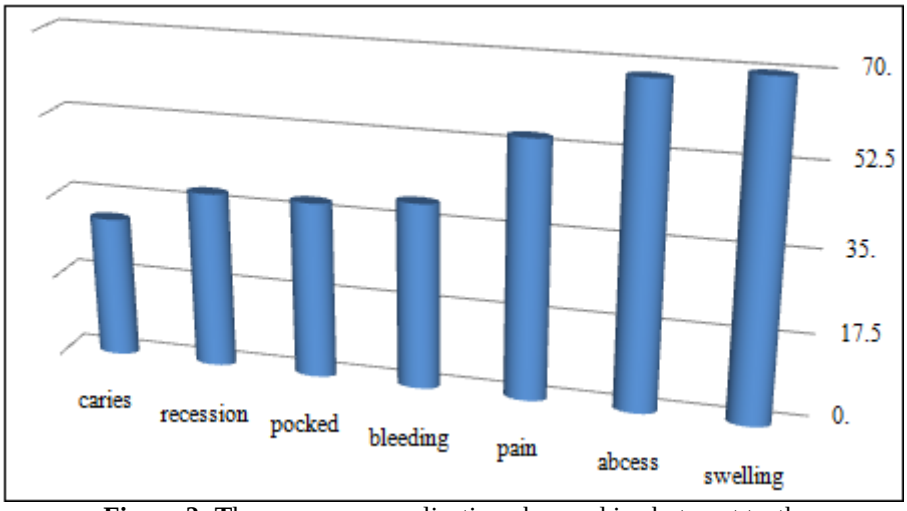

Figure 2: The common complication observed in abutment teeth

Types of restoration were recorded Figure3illustrates the percent of the different type of prosthesis. Fixed-fixed bridge was found to be the most used type of prosthesis observed on 69.8% of all the patients participated in the study, and cantilever type was observed on 24.5% of the cases.

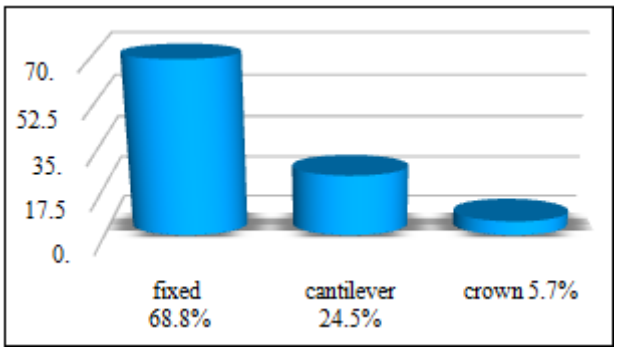

Figure 3: Type of Prosthesis

The study reveals that the most used unite numbers bridge observer was three unite bridge with 43.4% of the cases followed by four unite bridge 32.1%.

Table 3: Unites Number

Unite Number		Frequency	Percent	Valid Percent	Cumulative Percent
	2	2	3.8	3.8	3.8
	3	23	43.4	43.4	47.2
	4	17	32.1	32.1	79.2
	5	7	13.2	13.2	92.5
	6	3	5.7	5.7	98.1
	8	1	1.9	1.9	100
	Total	53	100	100	

Table 4: Finish Line Position

Finish line		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	supra gingival	20	37.7	37.7	37.7
	at gingival	14	26.4	26.4	64.2
	sub gingival	19	35.8	35.8	100
	Total	53	100	100	

4. Discussion

To the best of our knowledge, this study is the first assessing the effect of different types of fixed prosthesis on diabetic patients through a retrograde clinical evaluation, so it was difficult to make comparisons with previous studies reported in the literature.

The widespread of Diabetes Millets is growing, and its incidence and prevalence are expected to increase from 415 million in 2015 to 642 million in 2040[7]. The disease has two main types, in other word type 1 and type 2, with type 2 comprising the majority of the disease prevalence[7]. The results of current study showed that the swelling and the abscess were the most frequent complications observed in patients participated in the study with high percentages 69.8% , 67.9% followed by pain 54.7% , bleeding with 39.6%, recession and pocked with 37.7% and caries with 30.2% respectively. these complications may contributed to the oral manifestations that can be observed in diabetic patients such as periodontal diseases, dental caries, xerostomia, teeth loss, and delayed wound healing[7,8]

For patients seeking a fixed prosthesis like crown or fixed partial denture (FPD), the finish-line of the preparation should be placed supra-gingival and to provide chamfer finish-line on the facial aspect of prepared tooth as it is better than shoulder because shoulder can concentrate stresses on weakened tooth. Ante‘s law should be obeyed; minimal preparation like three quarter crown can be done on teeth like pre molar[9]. These are requested in non-diabetic patient, in case of diabetic patient caution must be taken to place finish line supra-gingiva as diabetic patients are more prone to develop periodontal diseases. In the current study most of the bridges were have sub-gingival finish line seen in 35.8%, even though supra gingival finish lines were seen in 37.7% of the prosthesis but it is contraindication for diabetic patient.

By reviewing the literature the fact was that dental restorations do not last forever; over 60% of all restorative dentistry involves the replacement of restorations. For intracoronal, direct restorations reasons for placement and replacement include primary caries, secondary caries, unacceptable marginal adaptation, and bulk fracture, fracture of the tooth, non-carious tooth substance loss and pain/sensitivity[10]. Primary caries has been repeatedly found to be the principal reason for the placement of initial restorations, and secondary caries (as diagnosed clinically) the most common reason for the replacement of existing restorations[11].

An American three-year study on 406 patients found 1320 units of crown and bridgework that were considered unserviceable[12]. In this study, the word ’unserviceable ‘was used because the authors felt it was wrong to classify a crown or bridge as a failure if it had been in service for 50 or more years and had simply worn out. This study, in agreement with others[12, 13] that considered crowns and bridges collectively, concluded that secondary caries was the largest single reason for failure (37%). Oral disease in general was considered to account for 60% of the failures. Other failures were mechanical in nature. The mean life of service of single crowns was 9.4 years. In the current study the length service of all prosthesis was less than 5 years in about 60.4% of the patients. Interestingly with agreement with our study aesthetics was not found to be a reason for crown replacement.

Walton et al.[12] published a similar study on crown and bridge failures. This found ’caries ‘to account for 22% of failures. Overall, oral disease was found to account for 29% of failures and mechanical reasons 70%. The mean length of service for crowns and bridges in their study were eight years. Again aesthetics was not found to be a reason for failure.

In the present study recession and poked found to be the most common reason for failure and according to the data collected this may provide new insights into the reasons for failure in diabetic patients at Tripoli area.

5. Conclusion

In conclusion swelling and abscess around the abutment teeth were found to be the most complications in diabetic patients and this is may explained by the fact that Diabetes is a risk factor for the prevalence and severity of gingivitis and periodontitis. therefore careful attention needed for the appropriate design selection for diabetic patients.

Oral and FPD hygiene maintenance is a pre-requisite for ensuring the long term successful of fixed prosthodontics treatment. With an increasing incidence and prevalence of Diabetes Mellitus, the role of oral health care provider becomes very important Providing safe and effective fixed prosthodontics care for patients with diabetes requires an understanding of the disease and familiarity with its clinical manifestations.

The purpose of any fixed prosthodontics treatment must be, to preserve the hard and soft tissues that are remaining rather than replacement of the lost part and these can be achieved if the prosthodontist knows the best treatment option for diabetic patient so prognosis of the FPD will last for long time.

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