

Periodontal consideration for patients with fixed orthodontic appliance in Ramadi city

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Key words:

Periodontal disease, fixed orthodontic appliance, Ramadi city

Abstract

Fixed orthodontic appliances facilitate plaque accumulation and the consequent development of generalized moderate hyperplastic gingivitis . This longitudinal study was to assess the periodontal health of the patients undergoing orthodontic treatment in Ramadi city.

Materials and Methods: A clinical study was conducted by Examining 208 first molars 108 with labial bond and 100 with band. Teeth with orthodontic bands, 58 of them cemented with glass ionomer cement (Ketac-Cem, Espe, Germany)& 42 cemented with glass inomer cement with chlorohexidin diglunata in 18% , then the plaque index, gingival index & Pocket depth were measured on the first molars. **Results:** during orthodontics treatment Plaque and Gingival indices and Pocket depth was significantly higher than in pre &post treatment .Adolescents showed more plaque accumulation and gingival inflammation than adults the Plaque and Gingival indices and Pocket depth were all significantly higher for banded maxillary and mandibular molars than for the analogous bonded molars. This study show the band cemented with glass inomer cement only is highly significant in Plaque and Gingival indices and Pocket depth than cemented with chlorohexidine glass inomer cement.

The findings of this study are predicated on the delivery of preventive periodontal treatment in conjunction with orthodontic treatment to prevent the anticipated periodontal destruction.

Introduction

Orthodontic therapy may affect the periodontium by favoring plaque retention, by direct injury to the gingiva as a result of overextended bands(band remain attach to the molar throughout

duration of orthodontic treatment), and by creating excessive forces, unfavorable forces or both on the tooth and supported structure (1,2). Importance of oral hygiene in orthodontic patients is always intensified to prevent any further periodontal disease. In the absence of oral hygiene maintenance, plaque accumulation on orthodontic appliance components is paving way to destruction of periodontal tissues.(3, 4)

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Due to greater tooth area covered and complex nature of the orthodontic appliances make it difficult to maintain oral hygiene so fixed appliances facilitate plaque accumulation and the consequent development of generalized moderate hyperplastic gingivitis and enamel decalcification.(5-7) Their development may be prevented by the slow release of an antimicrobial, such as chlorhexidine (5,8,9) from the adhesives and cements used to attach the fixed appliance components¹⁰ or from varnishes applied around bonded attachments.(11,12)

The aim of this study was to assess periodontal health of the patients undergoing orthodontic treatment from the start of the treatment (pre-ortho), at the six months of the treatment (intra-ortho) and after the end of the treatment (post-ortho) and compare between the banded and bonded molar , adult and adolescent maxillary and mandibular first molar and between band cemented by glass ionomer cement and chlorhexidine glass ionomer cement.

Material and Methods

A clinical study was conducted by examining 208 first molars (104 maxillary and 104 mandibular first molars) 108 with bond(buccal tube) and 100 with band, 52 patients , 26 adult & 26 adolescent was randomly selected for participation in the study from orthodontics clinic in Ramadi city. All had been wearing fixed Roth value 0.022. Orthodontic bands cemented with glass ionomer cement (Ketac-Cem, Espe, Germany) for 58 teeth and 42 cemented with glass ionomer cement and chlorhexidin diglunrate in 18% while 108 teeth bonded by composite for molar tube bonding. Before treatment, the groups received equivalent guidelines with regard to oral

hygiene and motivation of the patients for brushing and flossing. Additional oral hygiene instructions were given during orthodontic treatment only if necessary. Other inclusion criteria included the following: absence of chronic medical disease

or condition that could affect their periodontium (such as diabetes mellitus, juvenile periodontitis, congenital heart disease, blood dyscrasias ,or history of rheumatic fever) and did not take antibiotics in the 3 months preceding the study, Clinical examination was performed by a single examiner, periodontics specialist included in the study. The periodontal recordings consisted of assessments of pocket depth and two clinical indices, the plaque index (13) (to measure plaque accumulation) and the gingival index (14). Pocket depth was defined as the distance from gingival margin to the bottom of the clinical of the clinical pocket and was measured with a calibrated William's periodontal probe.

For each patient assessment were made at two representative sites, on the mesiobuccal and distobuccal aspects of the maxillary first permanent molar and the mandibular first permanent molar were carried out for each patient before appliance placement ,at,6, months after appliance placement and 6 months after fixed appliance and retainer removed. Statistical analysis is done by T test and one way anova using SPSS.

Result

Mean values, standard deviations and the P value for Plaque index, gingival index and pocket depth, of the first molars during orthodontics treatment was significantly higher than in pre &post treatment group ($p < 0.05$) this show in table no 1.

Results

Mean values, standard deviations and the P value for Plaque index, gingival index and pocket depth, of the first molars during orthodontics treatment was significantly higher than in pre &post treatment group ($p < 0.05$) this show in table no 1.

Destruction of periodontal tissues increased in patients from beginning of orthodontic treatment till the end of treatment.

in this study the age of the patients (9-37)years old mean age is 19.96 SD \pm 9.15

adolescent have more periodontal problem than adult this is show in table 2.

Maxillary molar more significantly in Plaque index, gingival index and pocket depth than mandibular molar ($p < 0.05$).

During the period of active orthodontic treatment the values for the Plaque and Gingival indices and Pocket depth were all significantly higher for banded maxillary and mandibular molars than for the analogous bonded molars (table 4).

in this study show the band cemented with chlorohexidine glass inomer cemnt is higher significant ($p < 0.05$) than cemented with glass inomer cement.

Discussion

In this study the periodontal status before, during and after the placement of fixed orthodontic appliances was evaluated in the patients who were selected for orthodontic treatment. Study was performed to evaluate the status of the periodontium clinically around the bands placed on the molars during the course of the orthodontic treatment. This study show a significantly change in the periodontal status of the patients receiving fixed orthodontic treatment as show in table (1). The study results supported the hypothesis and showed a significant change in periodontal status of the patients. This agrees with the results of Naranjo et al(2006) who reported that the placement of orthodontic appliance influenced the ecological environment by the accumulation of the biofilm at the retentive sites (15). Similar results were observed by Ristic(2008) (16) who was a marked increase in both the clinical and microbiological parameters in 3 months' time after the fixed appliance placement(17). Gingival enlargement and inflammation are often transient and resolves within weeks of rebonding (18). Adolescents whether banded or bonded, showed more plaque accumulation and gingival inflammation than adults before and with advancing time during orthodontic treatment in table (2). There are several possible reasons why less plaque accumulation and gingival inflammation levels were found for adults

than adolescents during orthodontic treatment. First, adults generally have teeth that are more fully erupted and have longer clinical crowns than adolescents. For this reason, bonded attachments and band margins in adults can be located further occlusally with respect to the gingival margin than is usually possible in adolescent, thus facilitating plaque removal. (19) Secondly, the increased hormonal levels that occur during pubertal growth during adolescence are associated with an increased degree of periodontal inflammation and gingival hyperplasia. (20) Thirdly, the periodontal indices used in this study were weighted heavily toward inflammatory changes such as redness, swelling and bleeding that are characteristics of gingivitis, a condition which is more prevalent in adolescents than in adults. (21), It was also noted that maxillary molars in general exhibited a greater amount of periodontal inflammation during treatment table (3). This is also in agreement with several earlier studies(22- 24) the banded molar in the all sample is more significantly in plaque index, gingival index& pocket depth than bonded molar table (4) this is agreement with finding of Monica et al (2012),Sadiq and Badea(2008) and Boyed and Baumrind (1992). (25-27)

A highly probable explanation for the differences in periodontal status between banded and bonded molars is that plaque removal on the banded molars was made more difficult by the overhanging gingival margins of the orthodontic bands, causing prolonged gingival inflammation and finally loss of attachment and increasing probing pocket depth. (28) An alternative possible explanation for increasing pocket depth is the mechanical injury caused by the sub gingival placement of orthodontic bands(29). The cytotoxic effects of cement and/or band material can partially explain the gingival response(25, 30, 31). Nickel can have an influence over the periodontal status of allergic orthodontic patients, leading to local and systemic inflammatory reactions

.It is therefore necessary that orthodontists provide their patients with oral hygiene instructions and constant motivation.(16, 32,33)

In this study the chlorohexidine was studied together with the cement materials to improve bacterial control and decrease periodontal disease so the banded molars cemented with Glass ionomers cement only show highly significant in plaque index, gingival index and pocket depth than banded molars with Glass ionomers cement in addition of Chlorohexidine as show in table (5) this agree with Skold et al (1998), Beyth et al(2003), Botelho(2003) and Weibull(1951) (9,11,34,35) who show the addition of Chlorohexidine at a concentration of at least 10% of the liquid material was efficient for protection against S.

mutans and decrease the plaque index,gingival index and pocket depth .

Due to the fact that orthodontic appliances favor the accumulation of certain pathogens in high concentrations, it is necessary to identify this patient group before treatment starts. Thus, appropriately designed appliances that respect periodontal integrity and health may be indicated. Patients with high periodontal risk need to be programmed for routine check-ups for plaque control and scaling throughout the orthodontic treatment period. Furthermore, it is very important to perform meticulous scaling and possibly root planning after orthodontic appliance and use of chlorohexidine with cement in addition as mouthwash to decrease periodontal problem(36, 37).

table (1): Plaque index ,gingival index and pocket depth pre ,during and post orthodontic treatment

	Pre treatment Mean SD	During treatment Mean SD	Post treatment Mean SD	P value
<i>Plaque index</i>	1.11 ± 0.51	1.89 ± 0.52	1.27 ± 0.41	0.03
<i>Gingival index</i>	1.09 ± 0.52	1.80 ± 0.63	1.24 ± 0.24	0.00*
<i>Pocket depth</i>	1.39 ± 0.46	2.80 ± 1.03	1.41 ± 0.45	0.02

Highly significance p<0.001

Table (2): Plaque index, gingival index and pocket depth pre, during and post orthodontic treatment in adult and adolescent

		adult Mean SD	adolescent Mean SD	P value
<i>pre treatment</i>	<i>Plaque index</i>	0.99 ± 0.48	1.02 ± 0.44	0.76
	<i>Gingival index</i>	1.19 ± 0.58	0.98 ± 0.50	0.16
	<i>Pocket depth</i>	1.18 ± 0.37	1.53 ± 0.42	0.003
<i>During treatment</i>	<i>Plaque index</i>	1.63 ± 0.60	1.92 ± 0.34	0.04
	<i>Gingival index</i>	1.73 ± 0.48	2.11 ± 0.55	0.01
	<i>Pocket depth</i>	2.48 ± 0.62	4.2 ± 1.11	0.00*
<i>Post treatment</i>	<i>Plaque index</i>	1.32 ± 0.44	1.25 ± 0.33	0.53
	<i>Gingival index</i>	1.14 ± 0.40	1.05 ± 0.94	0.49
	<i>Pocket depth</i>	1.19 ± 0.34	1.51 ± 0.33	0.001

Highly significance p<0.001

Table (3): Plaque index, gingival index and pocket depth in maxillary and mandibular teeth .

	Max. Mean SD	Man. Mean SD	P value
<i>Plaque index</i>	1.92 ± 0.34	1.63 ± 0.60	0.003
<i>Gingival index</i>	2.1 ± 0.55	1.75 ± 0.45	0.01
<i>Pocket depth</i>	4.2 ± 1.10	2.4 ± 0.61	0.02

table (4):Plaque index,gingival index and pocket depth in bonded and banded first molar teeth.

	Bond Mean SD	Band Mean SD	P value
<i>Plaque index</i>	1.71 ± 0.51	2.09 ± 0.46	0.01
<i>Gingival index</i>	1.63 ± 0.56	2.20 ± 0.59	0.004
<i>Pocket depth</i>	2.33 ± 0.70	3.65 ± 1.21	0.00*

Highly significance p<0.001 *

table (5)Plaque index,gingival index and pocket depth in band cemented with GIC and with chlorhexidine GIC.

	GIC Mean SD	CHL GIC Mean SD	P value
<i>Plaque index</i>	2.29 ± 0.46	1.94 ± 0.42	0.03
<i>Gingival index</i>	2.07 ± 0.62	2.39 ± 0.51	0.05
<i>Pocket depth</i>	4.39 ± 1.11	3.12 ± 1.00	0.000*

Highly significance p<0.001 *

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