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Influence of Crown Material and Margin Position on Gingival Health

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ABSTRACT

Background: Badly broken teeth are often restored with crowns (1), which should be compatible with existing hard and soft tissues and fulfill the functional and aesthetic requirements as well.
Objectives: to provide the patients with an evidence-based treatment by assessing the treatment outcome of crowning teeth. Determines the effect of the crown material on the gingival health.
Methods: Sixty-nine patients, which has had their teeth crowned in the dental clinics of the college of dentistry at King Khalid University, have been evaluated to assess the influence of the crowns material and margin location on the gingival health. The crowned teeth were compared to their sound contralateral counterparts in a split-mouth cross-sectional study design by the same examiner.
Results: Bleeding, mobility, color and recession were statistically significant with crowned in comparison to contra lateral ($p \leq 0.05$). Bleeding and mobility increases in contra-lateral compared to crowned. And abnormal color increases significantly in crowned compared to contra lateral ($p<.01$). as well, recession grade I increases in contra lateral, where grade II recession was significantly higher in crowned ($p<.01$).
Conclusion: Restoring a tooth with a suitable crown ought to be considered as the treatment of choice to reduce the risk of plaque retention to maintain prolonged dental health.

INTRODUCTION

Badly broken teeth are often restored with crowns(1), which should be compatible with existing hard and soft tissues and fulfill the functional and aesthetic requirements as well(2). Teeth restored with supragingival margins scored better bleeding index, plaque index and probing pocket depth index as compared to teeth restored with subgingival margins (1). A healthy gingiva exhibits scalloped margins, sulcus depth within the range of 1–3 mm and an adequate width of attached gingiva (3) . The most important factor controlling the effects of restorations on gingival health is the localization of the crown margin relative to the gingival margin(4). Several studies indicated that poor marginal adaptation, sub-gingival margin placement, and over-contoured crowns can contribute to localized periodontal inflammation(5).

This has forced clinicians and researchers to focus on the qualities of crowns in order to reduce the gingival inflammation (5).

This study is aimed at intigating the gingival health in patients treated with crowns at the dental clinincs of the college of dentistry, King Khalid University, Saudi Arabia.

MATERIALS AND METHODS

Study Setting

Dental clinics of King Khalid University in Abha, Saudi Arabia

Study Design

Cross sectional retrospective study

Study Population

The patients treated at the clinics of the College of Dentistry of King Khalid University in Abha, Saudi Arabia over the past four years.

Sample size and Technique

69 patients patients treated with crowns over the past four years.

Data collection

The inclusion/exclusion criteria:

Patient treated with crowns with no obvoius reasons for gingival inflammation such as poor oral hygiene. The presence of any reasons jeopradizing the ginigival health such as the presence of removable partial dentures in the arch scheduled for treatment was excluded 6.

Data analysis

The collected data was statistically analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics ver. 25) . Data was compared using 'Chi Square' test, $P \leq 0.05$ was considered statistically significant.

Ethical Considerations:

An ethical celarance was obtained from the ethical committee at the college of dentistry, King Khalid University. Each patient was given a consent form that explains the study. No personal information was obtained or stored.

Results:

To evaluate the clinical effect of crown margin position and crown material on the periodontal health. Contra-lateral tooth of same patient served as control.

Table 1: crowned vs. contralateral regarding bleeding, mobility, color and recession (n=69)

		Groups		P value
		Crowned	*Contralateral*	
Bleeding	Yes	26.1%	82.6%	.000**
	No	73.9%	17.4%	
Mobility	Yes	87%	97.1%	.028*
	No	13%	2.9%	
Color	Normal	39.1%	92.8%	.000**
	Abnormal	60.9%	7.2%	
Recession	Grade I	69.6%	91.3%	.001**
	Grade II	30.4%	8.7%	

***P<.01, * P≤.05*

Table 1 revealed that bleeding, mobility, color and recession were statistically significant with crowned in comparison to contra lateral (*p value ≤0.05*). that bleeding and mobility increases in contra-lateral compared to crowned. however, abnormal color increases in crowned compared to contra lateral (7.2%) (*p<.01*). moreover, recession grade i increases in contra lateral 91.3% compared to crowned, whereas grade ii recession was significantly higher in crowned (*p<.01*).

Table 2, review bleeding occurrence as number and percentage. Analysis of the data revealed that bleeding, mobility and recession were not statistically significant with subgingival margins in comparison to supragingival in both crowned or contra lateral (p value>0.05). However, statistically significant difference was found in mobility which was significantly increases in supragingival when compared to subgingival (p value<.05).

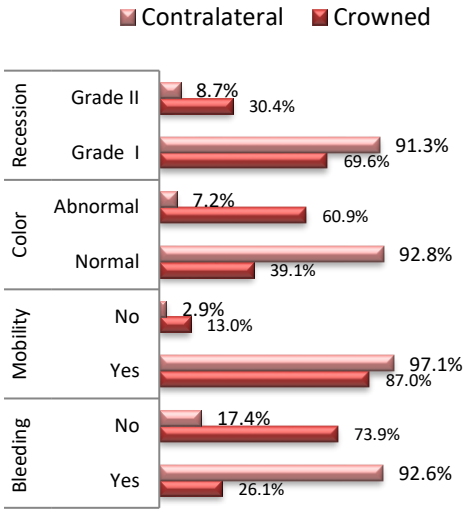
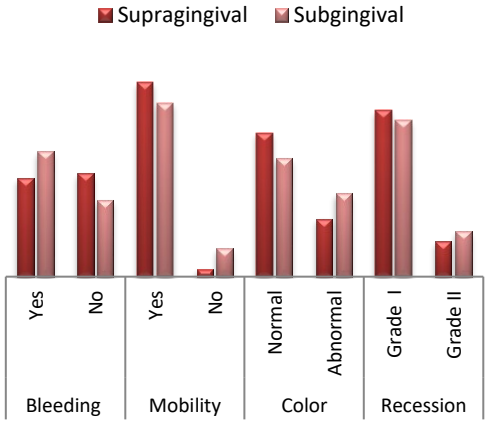


Table 2: subgingival vs. supragingival regarding bleeding, mobility, color and recession (n=69)

		Groups		P value
		Supragingival	*Subgingival*	
Bleeding	Yes	48.8%	62.1%	.121
	No	51.2%	37.9%	
Mobility	Yes	96.3%	86.2%	.032*
	No	3.8%	13.8%	
Color	Normal	71.3%	58.6%	.122
	Abnormal	28.7%	41.4%	
Recession	Grade I	82.5%	77.6%	.473
	Grade II	17.5%	22.4%	

** P≤.05*



DISCUSSION

This study performed to analyses the effect of the crown margin position on the gingival health, and determines the effect of the crown material on the gingival health. The reasons for designing the study on males only was that all participants were recruited from those who were treated at the male of the College of Dentistry, King Khaled University.

The study results showed an increase in PBI in majority of the study subjects(>73%). In addition, the abutment teeth scored significantly higher mean scores of Papillary Bleeding Index than the non-abutment teeth. This confirms with the study of Kosyfaki which states location of the crown margin, marginal fit, crown material, and crown contour all impact periodontal tissues(8).this study also supports the study of Reitmeier B who proved that intra crevicular crown margins caused twice as much gingival bleeding as compared to supra gingival crowns(9).Also it has been reported that the sub-gingival crown margins can contribute to localized periodontal inflammation because these margins can provide a protected environment in which the indigenous microbes mature into a more periodontopathic flora (10-11).Hypothetically, subgingival margins may result in a shift of healthy sub-gingival microflora to disease (12),and there is several other studies reporting a direct relationship between tooth/restoration margin discrepancies and periodontal tissue inflammation has been documented for artificial crowns with sub-gingival margins (13).

The recession increased in 73.7% study participants and the abutment teeth presented significantly greater compared to the non- abutments. This finding supports a previous study in which gingival tissues tended to bleed more frequently ,with a greater chance of gingival recession (14). It also supports the study that was conducted on 114 patients with 329 crowns which was observed that most of the crowns (59%) which were located sub-gingivally at the start of study after 5 years only 32% remained sub gingival(15).

In the present study, only 17.3% of the participants showed an increase in the mobility of abutments and it was not statistically significant.

The study results showed a statistically significant increase of the study subjects (>59%) in gingival discoloration in crowns made using nickel chromium alloy more than ceramic crowns. Similar observations were reported previously by Schmalz and Garhammer that metal ions could be released from metal ceramic prostheses through the corrosion process and the released ions could subsequently cause adverse reactions in the adjacent gingiva (16-17). Also It has been reported that one side effect of dental alloys, including Ni-Cr alloys, is discoloration of the adjacent gingiva. Histopathological analysis has indicated that

discolored gingiva may be related to the deposition of alloy micro-particles in gingival tissues(18-19).Valentine-Thon et al(20) reported that chronic low level metal exposure might result in metal sensitization and undesirable side effects, including chronic adverse effects on the surrounding tissues and cells. It is generally accepted that such pigmentation is caused by mechanical penetration of the metallic materials (21).

CONCLUSION

It can be concluded that the crown material and margin location does indeed influence the gingival health and, thus, should be cautiously planned for. If crown margins need to be placed close to the alveolar crest, crown-lengthening surgery or orthodontic extrusion should be considered to give enough tooth structure while simultaneously assuring the integrity of the biologic width.

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