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Original Research

Enhancing gingival health in traumatized teeth via orthodontic interventions

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ABSTRACT:

This article examines the impact of orthodontic treatment on gingival conditions, focusing on 20 patients with malpositioned mandibular incisors linked to gingival recession. The study's objective was to document the effects of orthodontic therapy on gingival health, particularly the improvement in gingival recession and overall gingival index.

Patients were evaluated before and after undergoing orthodontic treatment. Clinical measurements were meticulously recorded using intraoral photographs and a calibrated periodontal probe to assess changes in gingival recession and health. Initial observations noted that the orthodontic intervention led to early signs of spontaneous recovery in gingival health around the mandibular central incisors.The findings indicated that, following orthodontic treatment, there was a notable improvement in the condition of the gums surrounding the misaligned incisors. This improvement suggests that orthodontic therapy can positively influence gingival stability and health. The observed recovery in gingival conditions supports the hypothesis that correcting malpositioned teeth can enhance overall gingival health and potentially reduce recession and related issues.

By documenting these clinical outcomes, the study contributes valuable insights into the relationship between orthodontic treatment and gingival health. The results underscore the importance of considering gingival conditions when planning and executing orthodontic treatment, highlighting the potential benefits of addressing malpositioned teeth not only for dental alignment but also for improving gingival health and stability.

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INTRODUCTION

The displacement of the marginal tissue apical to the cemento-enamel junction is known as gingival or soft tissue recessions, and it can impact the labial, lingual, and/or interproximal areas[1]. More than 90% of persons 50 years of age and older are reported to have gingival recession, which is known to worsen and become more common with age[2]. The most common afflicted areas are the labial aspects of the maxillary molars and mandibular incisors[3]. Although the aetiology is not fully known, it is believed to be complex in nature, involving both precipitating and predisposing variables. The former includes anatomical and morphological features such crowding, ectopic tooth eruption, thin buccal mucosa, dehiscence of the alveolar bone, and the presence of abnormal fraenula. Factors that precipitate the condition include traumatizing dental brushing and piercings[4].

In regards to treatment, etiology, categorization, epidemiology, and necessity of treatment in addition to emphasizing the indications for treatment, which may include hypersensitivity, concerns about appearance, and the need for better dental hygiene. The advantages of Miller's classification of gingival recession were highlighted in terms of enabling a prognostic assessment to be made[5]. The treatment goals emphasized the significance of total root coverage and optimal management of plaque.

During orthodontic treatment, it was emphasized how crucial it is to promptly rectify any harmful effects on the gingival tissues or alveolar bone. This can be achieved by combining the right amount of root torque with the best possible oral hygiene practices for the patient. Additionally, in order to minimize gingival recession, it was stressed how important it is to identify any risk factors, such as tissue biotype and alveolar bone thickness. Inappropriate orthodontic

movements, such as dento-alveolar expansion and derotation, have been shown to cause significant individual variations in the soft tissue. Additionally, orthodontic intrusion and traumatic occlusion correction are important, and interceptive treatment during the mixed dentition has been shown to be effective in guiding the correct eruption of the permanent teeth into the periodontal envelope.

There is contention concerning the connection between gingival recession and orthodontics, and there is currently a dearth of conclusive evidence-based studies in the literature. Gingival recession develops as a result of several circumstances, and its etiology can often be complex[6]. Diverse perspectives regarding the connection between orthodontics and gingival recession can be found in the scientific literature that is currently published. Gingival recession may not be a result of orthodontic treatment, as some recent research has not revealed a cause-and-effect relationship.[7-9] Whether gingival recession can spontaneously improve during orthodontic movement is another contentious question in the literature. The research on growing patients has shown this pattern; however, there is less evidence for adult patients.The main objective of this study is to compare pre- and post-treatment lower anterior crowding patients with localized gingival recession in order to assess the lower anterior crowding with spontaneous improvement of gingival recession following orthodontic therapy.

METHODOLOY

The study was conducted in collaboration with the Department of Orthodontics and dentofacial orthopaedics, and Sathyabama Dental College and Hospital, Chennai.The aim of this article is to present a clinical example of 20 patients who was referred to the Orthodontic department for treatment of malpositioned mandibular incisors related to localised gingival recession. Patients with crowding&localised gingival recession were selected who came for Orthodontic treatment .The patients were assessed for gingival recession abnormalities. The study adhered to the following inclusion and exclusion criteria.

SAMPLE SIZE CALCULATION - Estimating the Sample Size Leaning on prior research by Morten GodtfredsenLaursen (2020), the sample size was estimated using the Sample Size Calculator at a 95% level of significance with a 10% margin of error to achieve 80% power of the study. The expected kappa coefficient was assumed to be 0.66. Twenty was determined to be the minimal sample size that was needed. Thus, 20 samples were used in the investigation.

Inclusion criteria

1. Patients with detectable cemento-enamel junctions (CEJs) at teeth with gingival recession who have one or more labial gingival recessions.
2. Patients with plaque and gingivitis who practice proper dental hygiene score lower than 1.
3. Patients with less than 10% blood upon probe.

Exclusion Criteria

1. those who don't have buccal gingival recession.
2. Individuals whose plaque score is higher than 1.
3. Patients exhibiting more than 10% blood upon probe.
4. tooth with a CEJ restoration or prosthetic crown.

Dental or root abrasion present at the CEJ level.

Assessment of Gingival Recession Using Miller's Classification

The examiner evaluated gingival recession problems. An American Board-Certified Periodontist with five years of experience taught each examiner on Miller's gingival recession classification system. The examiners categorized a subset of flaws using Miller's categorization (M).

According to table 1, Miller (1985) suggested a classification system for gingival recession based on the gingival margin's position in relation to the mucogingival junction (MGJ) and the amount of hard and soft tissue lost in the interdental area.

Table 1

Miller's Class	Criteria
Class I	Marginal tissue recession does not extend to the mucogingival junction. There is no loss of bone or soft tissue in the interdental area.
Class II	Marginal tissue recession extends to or beyond the mucogingival junction. There is no loss of bone or soft tissue in the interdental area.
Class III	Marginal tissue recession extends to or beyond the mucogingival junction. There is bone and soft tissue loss interdentally or mispositioning of the tooth.
Class IV	Marginal tissue recession extends to or beyond the mucogingival junction. There is severe bone and soft tissue loss interdentally or severe tooth malposition.

After looking over the recession faults, the examiner categorized them using Miller's approach. The same examiners reexamined and evaluated the recession faults following four months of active orthodontic therapy. The gingival recession was not surgically treated during the research. Nonetheless, the patients were educated about recession problems and orthodontic treatment options.

RESULT

MS Excel 2016 was used to fabricate the data sheet. IBM SPSS Corp. in Armonk, New York for Windows, Version 25.0, was used for the statistical analysis. The demographic characteristics of the study population was presented in terms of frequency and percentages. One-way ANOVA statistics and Paired T Test statistics were applied to calculate the inferential statistics between the different variables. The statistical constant was fixed at $p<0.05$.

1. Demographic characteristics of the study population

a. Mean age of the study population- 23.80±6.709

The mean age of the study population was23.80±6.709.

b. Gender distribution of the study population

The gender distribution of the study population had 45% male and 55% female. The same have been graphically represented in Figure 1.

	Frequency	Percent
Male	9	45.0
Female	11	55.0
Total	20	100.0

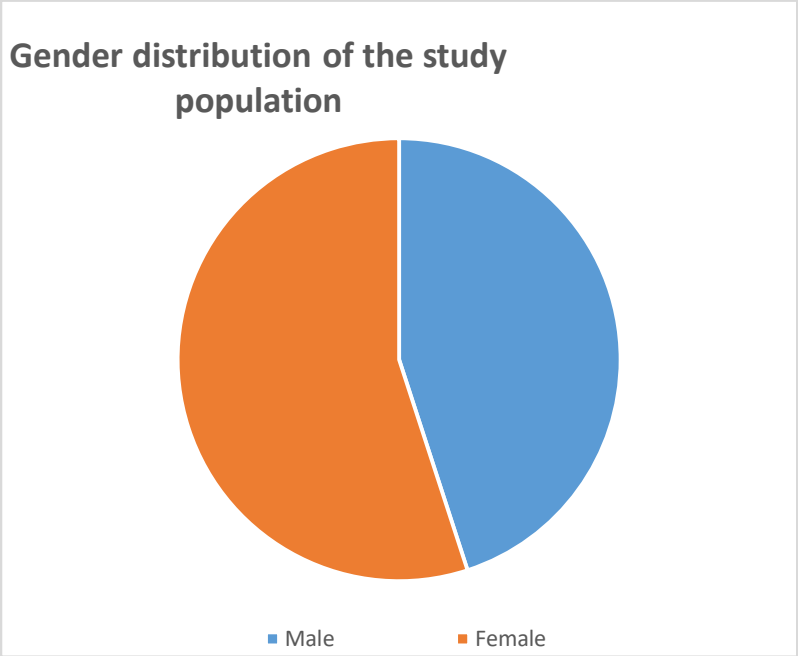

Figure 1: Graphical representation of the Gender distribution of the study population

2. Pre and post comparison between the study parameters

a. Gingival Recession

More number of Grade 1 and Grade 2 was noted in post treatment as compared to pre-treatment. Grade 3 was present in pre-treatment only. There was a statistically significant difference noted ($p<0.0001$). The same have been graphically represented in Figure 2.

	Pre-treatment		Post-treatment		T Score	P Value
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)		
Grade 1	5	25.0	13	65.0	11.522	<0.0001*
Grade 2	8	40.0	7	35.0		
Grade 3	7	35.0	0	0		

*statistically significant

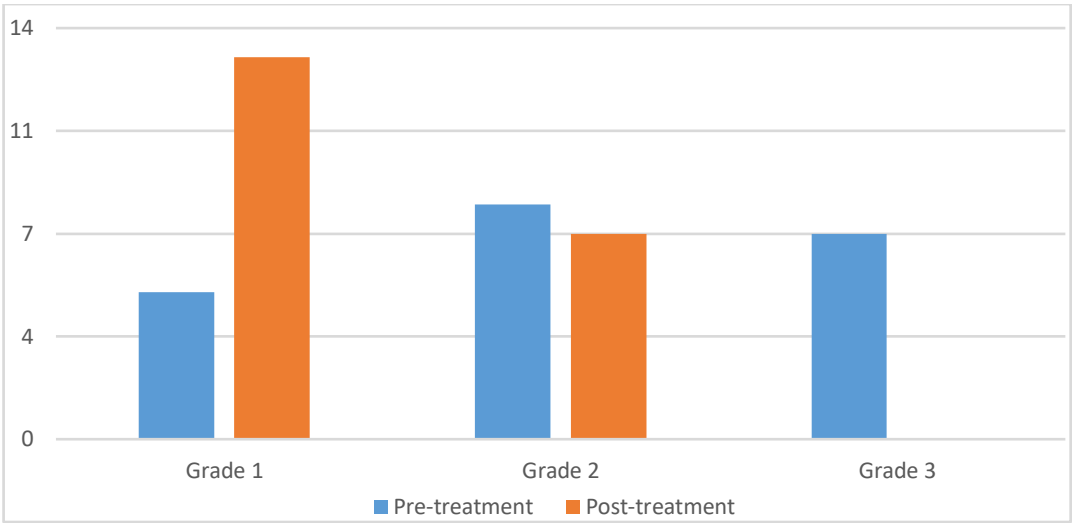

Figure 2: Graphical representation of the Gingival Recession for pre and post treatment

b. Gingival Index

The gingival index score was recorded pre-treatment (2.10±0.788) and post-treatment (1.35±0.489). The difference in the mean scores (.750±.444) were statistically significant (p<0.0001).

Pre-treatment		Post-treatment			Δ_Mean	Std. Dev	95% Confidence Interval of the Difference		T	P value
Mean	SD	Mean	SD				Lower	Upper		
2.10	0.788	1.35	0.489	Pre-treatment gingival recession - post treatment gingival recession	.750	.444	.542	.958	7.550	<0.0001*

*statistically significant

3. Pre and post comparison between the study parameters as compared gender wise

a. Gingival Index

The pre and post treatment comparison between the study parameters were compared gender-wise. The pre and post treatment scores were recorded it was seen that the mean scores were reduced post treatment. No statistically significant difference was noted between the gender. The same have been graphically presented in Figure 4.

		N	Mean	Std. Dev	95% Confidence Interval for Mean		F Score	P Value
					Lower Bound	Upper Bound		
Pre-treatment gingival index	Male	9	.514	.160	.390	.638	1.385	.255
	Female	11	.427	.167	.314	.540		
	Total	20	.466	.166	.388	.544		
Post treatment gingival index	Male	9	.311	.145	.199	.423	1.997	.175
	Female	11	.218	.147	.119	.317		
	Total	20	.260	.150	.190	.330		

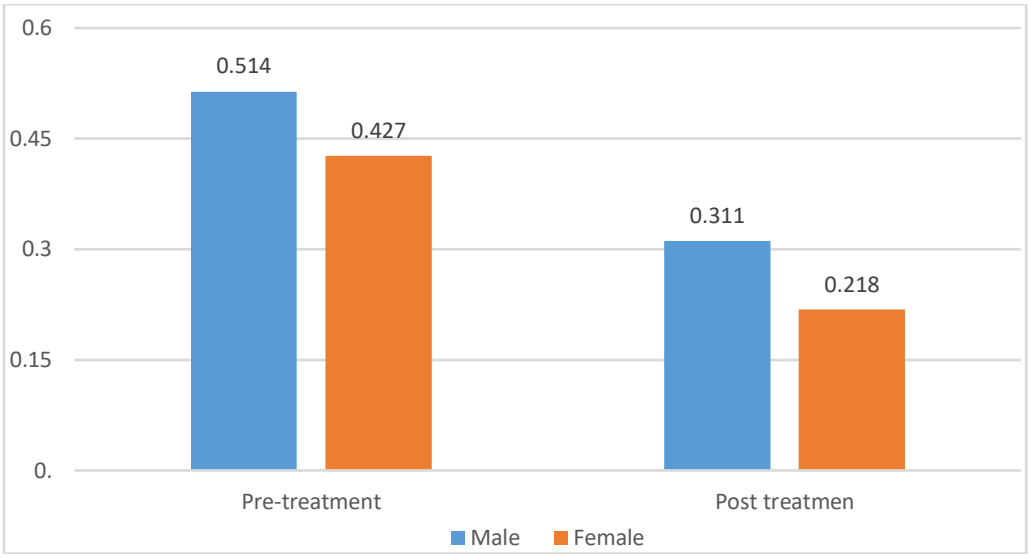

Figure 4: Graphical representation of the gender-wise comparison of the Gingival Index

DISCUSSION

The primary objective of this investigation is to evaluate the lower anterior crowding associated with spontaneous improvement of gingival recession following orthodontic therapy by comparing patients with localised gingival recession before and after treatment.The demographic characteristics included in this study were 9 males and 11 females were selected with satisfying our inclusion criteria. Gender-wise comparisons of gingival recession were made between the research parameters before and after orthodontic therapy.In supporting our study , similar study conducted by Shah, Rucha in 2015 concluded that There is no discernible link between gingival biotype and age, gender, or the presence of recession[10].

A 2017 study by Aniruddha Joshi et al. compared and evaluated the gingival biotypes of the two sexes using metrics from radiography, photography, and clinical assessment. They concluded that The periodontal probe was hidden in the case of the male participants in this study, indicating thicker gingiva than that of the female participants. Males have a thicker gingival biotype than females, according to various writers who employed the probe translucency method. These data support their findings[11-13].

Tugnait and Clerehugh talked about how important it is to put teeth in the alveolar bone because recession is unlikely to occur if teeth are relocated within that bony housing. According to a recent study, all teeth exhibiting gingival recession larger than 3 mm after orthodontic treatment had pronounced facial tooth shapes caused by alveolar bone dehiscence. Gingival recession was found to be closely associated with teeth that were positioned incorrectly outside of the alveolar bone housing. The tooth in this clinical sample was positioned outside of the alveolar bone, which may have accelerated the development of gingival recession. Correcting the gingival defect (periodontics with a gingival graft) and tooth alignment (orthodontics) was the goal of the multidisciplinary treatment plan[14].

Additionally, Slutzkey and Levin assessed individuals who had a history of periodontal disease and found a high association between the degree and course of gingival recession and prior orthodontic treatment. More proclined teeth have a higher incidence and severity of gingival recession, according to a recent systematic review.Even spontaneous improvement of gingival recession in children receiving6 or no treatment has been demonstrated in certain trials. When teeth are relocated lingually in youngsters, the clinical height of the crown falls and the width of the connected, keratinized gingiva widens. On the other hand, the gingival breadth shrinks as teeth migrate in a face direction.Six In a different study, the researchers demonstrated that children's mandibular incisor gingival recession frequently improves with time and that restorative care may not be required for the developing dentition[15,16].

A follow-up study revealed that the children who continued to experience gingival recession had a higher likelihood of having more proclined and irregularly positioned mandibular incisors, as well as a bigger basal bone disparity between both arches. In essence, their unique jaw structure and facial morphology predisposed them to an incapacity for gingival recession to heal on its own. It has been suggested that growing is the cause of gingival recession in children that spontaneously corrects[17-19]. Despite the fact that our patient's gingival recession spontaneously improved following orthodontic therapy.

CONCLUSION

Our research revealed that there were more cases of Grade 1 and Grade 2 gingival recession observed after therapy than there were before. Only in the pre-treatment phase was Grade 3 evident.Following orthodontic treatment, gingival recession significantly

improves. No statistically significant difference was noted between the gender.

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