



The periodontal status of mandibular incisors in patients with angle's class ii malocclusion treated with orthodontic therapy or orthognathic surgery with orthodontic therapy: A single centered retrospective study

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ABSTRACT

Malocclusion is any deviation from physiologically acceptable contact between opposing dental arches. Occlusal trauma is a term used to describe injury resulting in tissue change within the attachment apparatus which may occur in a healthy or reduced periodontium. Clinically one of the tests to assess trauma from occlusion is the fremitus test with confirmatory test for trauma from occlusions such as histological evaluation of a block section biopsy or modern aids like T-scan. Considering these findings Angles Class II molar relation with or without skeletal Class II relation has great influence in underlying periodium. The present study was aimed at correlating the relation between angles class II malocclusion treated with orthodontic therapy alone or combined with orthognathic surgery and the periodontal status of mandibular incisors. The study was a single centered retrospective university design, using patient records for the comparison of the entire patient outflow of a dental college in Chennai from 1st June 2019 till 1st March 2020. The included patients were individuals with angles class II malocclusion treated by orthodontic therapy alone or combined with orthognathic surgery. In this study, we observed that the periodontal status of mandibular incisors was mostly healthy with the incidence of gingivitis associated at a higher tendency in patients treated by fixed orthodontic appliance therapy along with orthognathic surgery. There was also a negative correlation of non-extraction cases and periodontal status suggesting orthodontic extraction cases have a relatively healthy periodontium which was both clinically and statistically significant.



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INTRODUCTION

Malocclusion is defined as any deviation from physiologically acceptable contact between opposing dental arches. Occlusal trauma is a term used to describe injury resulting in tissue change within attachment apparatus, including periodontal ligament, supporting alveolar bone and cementum as result of occlusal force. This pathological change may occur in an intact or reduced periodontium. Clinically one of the tests to assess trauma from occlusion is the fremitus test which is subjective based on the operator performing it, the only confirmatory test for trauma from occlusion is the his

Table 1: Tabulated relation between periodontal status of teeth and treatment done for individual patients

Periodontal Status of Mandibular incisors	Treatment done		Total
	Orthodontic therapy	Orthodontic therapy with Orthognathic surgery	
Healthy	317	0	317 (76.9%)
Periodontitis	9	2	11(2.6%)
Gingivitis	52	30	82 (19.9%)
Gingival recession	2	0	2(0.4%)
Total	380	32	412

Table 2: Extraction/Non-extraction cases and periodontal status of teeth

Periodontal Status of Mandibular incisors	Type of case		Total
	Non Extraction	Extractions	
Health	58	259	317 (76.9%)
Periodontitis	11	0	11(2.6%)
Gingivitis	82	0	82(19.9%)
Recession	2	0	2(0.4%)
Total	153	259	412

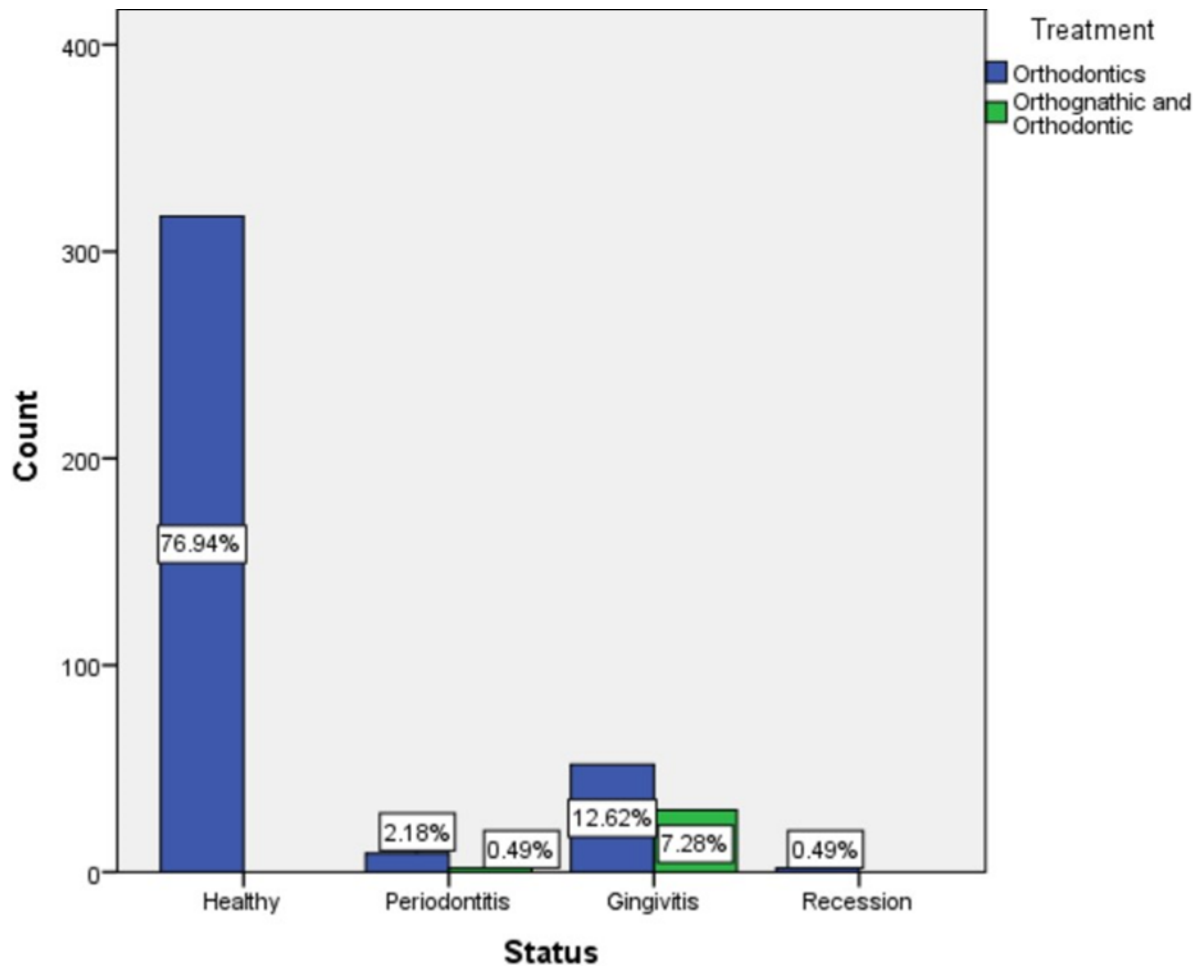
tological evaluation of a block section biopsy.

Considering these findings Angles Class II molar relation with or without skeletal Class II relation has great influence in the underlying periodontium. In case non-contact occlusion between upper and lower anterior teeth dystrophy of periodontium occurs while in the case of skeletal class II, there is a change in the direction of orientation of occlusal forces. This along with the prevalence of Class II malocclusion among an Indian population, where North Indian population 10-15% compared to south Indian population 5% and racial and ethnical affinity for bimaxillary protrusion (Missier *et al.*, 2018). Literature also suggests class I malocclusion is most prevalent in India followed by Class II, class III. There is also a consideration of extraction of complicated orthodontic cases with periodontitis and single rotated tooth or crossbite which are replaced by angulated implants or esthetic correction of a gummy smile (Ramesh *et al.*, 2017; Kavarthapu and Thamaraiselvan, 2018).

Periodontal literature rationale for trauma from occlusion given by Glickman in 1969 which suggested the pathway of the spread of plaque-associated gingival lesion can be changed if forces of an abnormal magnitude are acting on teeth harbouring subgingival plaque (Glickman, 1962; Ramesh *et al.*, 2016). Contrary to these findings, Waerhaug's concluded that angular defects occur equally fre-

quently in teeth with trauma from occlusion than teeth without it (Waerhaug, 1979). Similar studies done among pedodontic patients suggested that crowding of lower anterior teeth had a detrimental effect on periodontal health (Öz and Küçükeşmen, 2019; Ramesh, 2016). Application of these concepts in regenerative periodontal therapy involves the use of provisional splints to reduce trauma from occlusion and favour healing and regeneration postoperatively after flap surgery or for provisional fractured tooth stabilisation (Jochebed and Ganapathy, 2020; Vignesh, 2019). They also utilise modern regenerative materials in combination to conventional open flap debridement such as PRF,PRP, natural herbal products as an adjunct to periodontal surgical therapy in deep periodontal pockets (Panda, 2014; Thamaraiselvan *et al.*, 2015). There is also a possible role of stem cells in the future of regenerative periodontal therapy but studies at this point of time are still in in-vitro settings and not randomised clinical trials (Avinash *et al.*, 2017; Ravi *et al.*, 2017).

However, limited literature is present associating periodontal status of teeth and Angles class II malocclusion (Sadowsky and BeGole, 1981). This study aims at providing a relation between angles class II malocclusion treated with orthodontic therapy alone or combined with orthognathic surgery and the periodontal status of mandibular incisors to fill



Graph 1: The association between the periodontal status of mandibular incisors and treatment done for individual patients

this void in the literature.

MATERIALS AND METHODS

The current study was performed as a single centred retrospective university-based design, using dental information archiving software for the comparison of the entire patient outflow of Saveetha Dental College and hospital, Chennai from 1st June 2019 till 1st March 2020. Considering university-based setting treatments are relatively affordable across the larger Chennai population (Wennstrom *et al.*, 1987; Zasčiurinskienė *et al.*, 2018). The segregation of data was initiated after ethical approval from Saveetha university scientific review board. The included patients were individuals with angles class II malocclusion treated by orthodontic therapy alone or combined with orthognathic surgery.

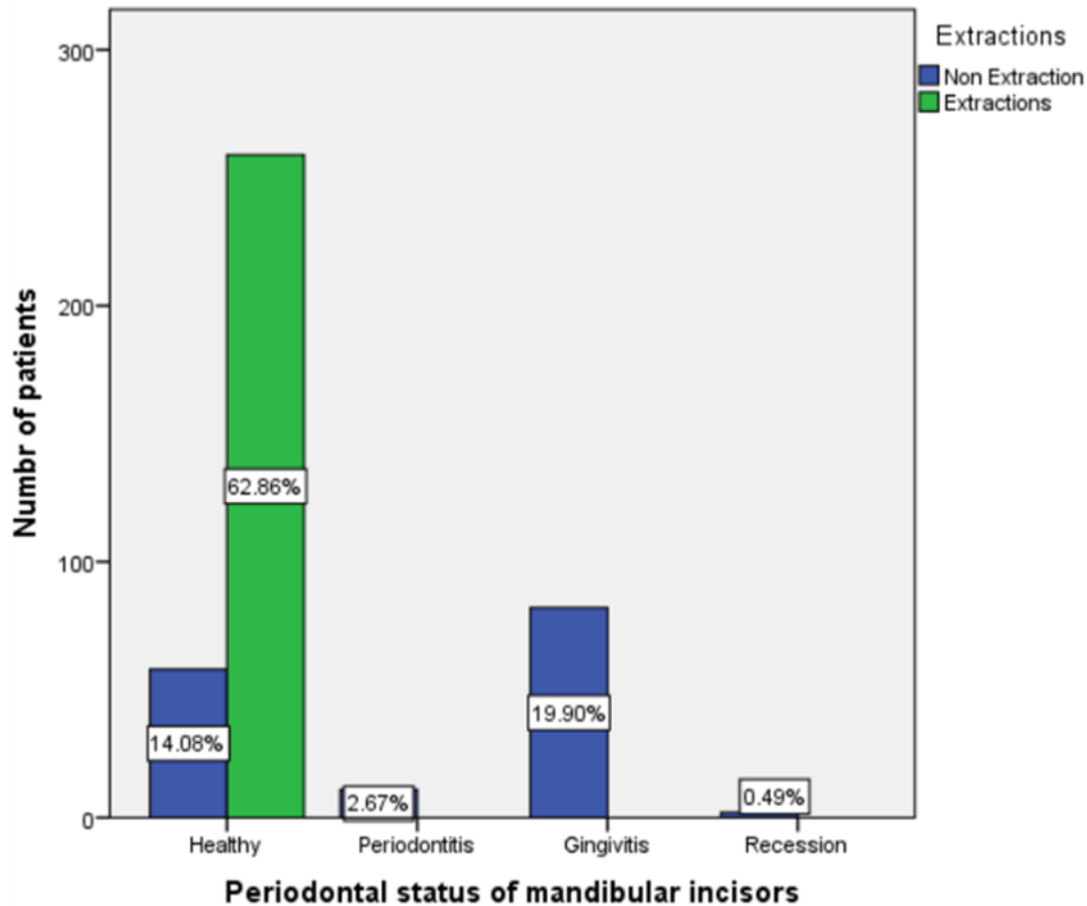
All individuals included in this study were screened by a single operator while treatment was done by multiple operators supervised by faculty from the Department of Orthodontics and Periodon-

tics, Saveetha dental college and hospital. Individuals excluded from this study were based on (i) pregnancy, or lactating mothers (ii) patients are currently smoking (iii) patients with uncontrolled systemic disease (iv) patients under medication (v) Incomplete data collection in terms of radiographic status and periodontal status or broken appointments.

The parameters assessed in this study included (i) the type of Angles Class II malocclusion (ii) type of treatment done (iii) periodontal status of mandibular incisors (iv) type of case extraction or non-extraction.

Statistical Analysis

Among all obtained findings, there was no statistical significance between the periodontal status of mandibular incisors and type of class II malocclusion or treatment done using Chi-square test in Spss version 23. The only significant parameters were the negative correlation between non-extraction cases and periodontal status of mandibu-



Graph 2: Graphical illustration of extraction/non-extraction cases and periodontal status of mandibular incisors

lar incisors. (-0.696) when a p value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

A total of four hundred and twelve patients were included in this study who were diagnosed with Angle's Class II malocclusion being treated in the college at present. Three hundred and eighty cases amongst them were treated by orthodontic fixed appliance therapy alone while the remaining 32 were treated by orthognathic surgery and fixed appliance therapy combined (Table 1). Periodontal status of mandibular incisors was healthy in 317 cases while 82 cases had gingivitis, 11 cases had periodontitis and remaining 2 cases had a gingival recession (Table 1, Graph 1).

In this study, we observed that the periodontal status of mandibular incisors was predominantly healthy irrespective of treatment done with the incidence of gingivitis associated at a higher tendency with patients receiving fixed orthodontic appliance therapy along with orthognathic surgery (7.28%) which was clinically and statistically significant

(Graph 1). However, there was also a negative correlation of non-extraction cases and periodontal status suggesting orthodontic extraction cases have a relatively healthy periodontium which was both clinically and statistically significant ($p < 0.05$) (Table 2, Graph 2).

While treating interdisciplinary cases involving multiple dental disciplines periodontal medicine along with its associated chronic obstructive pulmonary disease and systemic viral infections must be kept in consideration (Ramesh *et al.*, 2016; Priyanka, 2017).

Studies comparing treatment protocols where supra and subgingival debridement along with cause-related periodontal therapy was performed prior to orthodontic treatment showed attachment level gains in sites with probing depth less than 4mm (Stenvik and Mjor, 1970). In case of studies comparing the combined effect of surgery, orthodontics patients with periodontitis, it was observed that post complete therapy periodontal bone resorption was stabilised and the bone deficit was improved (Halimi and Zaoui, 2013; Mootha *et al.*, 2016).

The use of molecular biomarkers to diagnose periodontal disease and assess underlying molecular pathways involved is evident in research, however evidence of accurate markers to confirm the role of trauma from occlusion in periodontal disease is still questionable (Khalid, 2016, 2017).

Systematic reviews demonstrated that orthodontic therapy was associated with 0.03mm gingival recession, 0.13mm alveolar bone loss and 0.23mm of increased pocket depth when compared to no orthodontic intervention (Bollen, 2008; Varghese, 2015). This leads to the question of whether orthodontic therapy has a significant enough effect on the periodontium of teeth. Initial periodontal literature by Stenvik A (1970), Wennstrom (1987) Sadowsky (1981) suggested orthodontic tooth movement had a significant effect on underlying periodontium but was also a key factor in the correction of underlying malocclusion (Lindhe and Ericsson, 1976; Ericsson and Lindhe, 1982).

A possible justification for the above-obtained results (Table 1, Graph 1) could be the envelope of motion of orthodontics camouflage based treatment as well as surgical repositioning of teeth. When teeth are moved beyond the housing of alveolar bone confines, they could result in extensive destruction of the periodontium (Tania and George, 2019; Polson and Reed, 1984). The above-included cases that did not cross alveolar housing extensively enough to cause bone loss but disrupted healthy gingiva inducing a diseased state. Another possible cause for the above-mentioned finding could be an alteration of gingival inflammation pathway into underlying tissue induced by excessive Occlusive force (Glickman, 1962; Ramamurthy and Irfana, 2017). There is also the possibility of the extent of local factors present after orthognathic surgery with extensive postoperative pain leading to fear of patients to maintain appropriate oral hygiene practices, including brushing. This could act as a factor affecting the periodontium rapidly deteriorating an individual's periodontal health and accelerating its destruction (Nadar and Dinesh, 2016; Sheethalan et al., 2016), Table 2.

CONCLUSIONS

Within the limits of this study, mandibular incisors were predominantly healthy with maximal incidence of gingivitis associated with orthognathic surgery along with orthodontic fixed appliance therapy in non-extraction cases.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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