A total of 30 generalised chronic periodontitis patients contributing 692 teeth were selected for this prospective study. All the patients were subjected to occlusal force analysis using T-Scan (Tekscan version 9.0 T-Scan™) and based on the occlusal force distribution, 538 teeth presented with high occlusal force among 30 patients. Then the patients were randomly assigned as either flap surgery (Group A) or flap surgery with coronoplasty (Group B). Group A included 262 teeth and Group B included 276 teeth. The clinical parameters assessed were probing pocket depth (PPD), clinical attachment level (CAL) and teeth mobility. Based on the clinical attachment loss, teeth were categorized into mild (5-6mm), moderate (6.1-7mm) and severe (7.1-8mm). The clinical parameters and T-Scan analysis were recorded in follow-up examination at the end of 3 months. ANOVA was done to compare the pre-operative occlusal force between teeth with mild, moderate and severe clinical attachment loss. Paired t test was done to compare PPD, CAL and occlusal force between baseline and 3 months within two groups. Independent t test was done to compare PPD, CAL and occlusal force between two groups. Mann-Whitney U test was done to compare the differences in mobility between the groups and Wilcoxon signed rank test was done to compare the differences in mobility within the groups. Pearson’s correlation was used to analyze the correlation between pre-operative occlusal force and clinical attachment loss and between post-operative occlusal force and clinical attachment level.

Results: Occlusal force was high among the teeth with severe clinical attachment loss as compared to mild and moderate clinical attachment loss. Inter group comparison showed that there was significant reduction in occlusal force and teeth mobility in teeth where periodontal flap surgery along with coronoplasty was done as compared to periodontal flap surgery alone. Within group comparison showed that there was significant reduction in occlusal force and all the clinical parameters assessed. There was a weak positive correlation between occlusal force and severity of periodontitis after periodontal flap surgery along with coronoplasty.

Conclusion: This study marks the step in analysing the relationship between occlusal trauma and severity of periodontal disease and the influence of occlusal adjustment on healing after periodontal therapy based on T-Scan evaluation among generalised chronic periodontitis patients. The results revealed that there was a significant relationship between occlusal force and severity of periodontitis and occlusal adjustment results in reduction in periodontal parameters but not statistically significant.

Keywords: Chronic Periodontitis; Occlusal Adjustment; T-Scan; Flap Surgery

Introduction

The role of occlusal trauma in the development of periodontitis is still in controversy in the field of periodontology. Occlusal trauma is defined as the tissue injury when there is an excessive occlusal force.30 Occlusal trauma can occur in a healthy periodontium (Primary occlusal trauma) or in a diseased periodontium (Secondary occlusal trauma). An association between excessive occlusal force and periodontitis was reported in the early 20th century. This association was later investigated histologically by various animal studies. In an animal study, it was found out that the excessive occlusal force changed the arrangement of principal fibres of periodontal ligament and hence the gingival inflammation entered directly into the periodontium.31. Later, another study suggested that inflammation appeared to begin in the gingiva and subsequently progressed into the adjacent periodontal supporting tissue. It was further proposed that inflammation progressed in an altered pathway in teeth subjected to occlusal trauma. The combined effect of occlusal trauma and bacterial plaque-induced inflammation was termed “co-destruction”.32

The theory of co-destruction was further interrogated by numerous researchers. In the 1970s, animal models with and without bacterial plaque were studied to explore the association between traumatic occlusion and periodontal disease. When oral hygiene was maintained and inflammation was controlled, occlusal trauma resulted in increased mobility and loss of bone density without loss of connective tissue attachment, during the length of the study. If the occlusal forces were removed, the loss of bone density...
was reversible. In contrast, when occlusal trauma was superimposed on periodontitis, there was an accelerated loss of connective tissue attachment⁴⁸. Based on the findings of these studies, it was concluded that without plaque-induced inflammation, occlusal trauma does not cause irreversible bone loss or loss of connective tissue attachment. Therefore, occlusal trauma is not a causative agent of periodontitis. None of the animal studies were able to reproduce all aspects of human periodontitis. In addition, the animal studies used excessive forces and were conducted for a relatively short duration. Nonetheless, the results from animal studies suggested that occlusal trauma does not cause periodontitis, but it may be a cofactor that can accelerate the periodontal breakdown in the presence of periodontitis.

Meanwhile, researchers began to investigate clinically the impact of occlusal trauma on periodontal parameters in periodontitis patients. Studies had found that teeth with occlusal discrepancies had significantly deeper initial probing depths, more mobility and poor prognosis than those teeth without occlusal discrepancies⁴⁹. Teeth with occlusal discrepancies demonstrated a significant increase in probing depth and a worsening prognosis with time⁵⁰. Multiple types of occlusal contacts, including premature contacts in centric relation, posterior protrusive contact, non-working contacts, combined working and non-working contacts were associated with significantly deeper probing depths and increased mobility⁵¹. In a more recent cross-sectional study, the non-working side contact was also associated with deeper probing depth and more clinical attachment loss.

Based on those observations, if occlusal trauma has any relationship to the progression of periodontitis, then its elimination should improve clinical periodontal conditions. Occlusal modifications in conjunction with periodontal therapy were studied for their effects on attachment levels, pocket depth, and tooth mobility in a series of investigations. The findings from these studies suggested that teeth that received occlusal reduction presented better improvement in clinical attachment level. However, between the groups with and without occlusal correction, there was no significant difference in reduction in tooth mobility or probing depth. On the contrary, Vollmer et al. and Hakkarainen et al. suggested that the occlusal adjustment as an adjunct to scaling and root planing had no additive effect on mobility or probing pocket depth⁵²,⁵³.

Apart from the clinical assessment, the occlusal factors acting on the teeth are examined by articulation paper marks, waxes, and pressure indicator pastes⁵⁴. However, none of the above methods quantify the magnitude, duration or frequency of force. Recently, Bio Research Associates, Inc and Tekscan Inc corporations have developed a commercially available system (T-Scan™) which quantifies and displays relative occlusal force information.

Literature evidence reveals that there are only a few intervention trials which assessed the effect of occlusal therapy as a supplement to periodontal therapy. Recently, a study was done to compare the occlusal distribution of forces prior to and after occlusal adjustment as an adjunct to scaling and root planing procedure using T-Scan™ system. However, none of the studies have utilized the quantification tool to diagnose or to assess the prognosis of the surgical periodontal therapy. In this context, the objective of this research was to compare and analyze the occlusal force distribution using T-Scan™ in chronic periodontitis patients before and after surgical periodontal therapy with and without coronoplasty.

Materials and Methods

This study was conducted from August 2021 to May 2022. Patients for this study were recruited from the outpatient section of the Department of Periodontics, Saveetha Dental College Chennai, Tamil Nadu. Thirty patients aged between 30-60 years of age (16 males, 14 females) diagnosed with generalised chronic periodontitis based on AAP criteria of 1999 were enrolled for the study. Written informed consent was taken from all the study participants. Ethical clearance was received from the Institutional Ethics Committee and Review Board (SRB/SDC/PERI0-1903/20/TH-01).

Inclusion criteria

Patients within the age range of 30-60 years irrespective of gender and with a minimum of 20 teeth in the oral cavity were enrolled for our study. Based on the AAP criteria, subjects were categorized as generalised chronic periodontitis when 30% of the sites were affected by the disease. Generalised chronic periodontitis patients with probing pocket depth (PPD) of ≥5mm and clinical attachment loss (CAL) of ≥4mm and teeth mobility of grade I and grade II mobility were included in the study.

Exclusion criteria

- The following patients were excluded from the study:
- Aggressive periodontitis
- Localised periodontitis
- Open/deep bite
- Patient underwent periodontal therapy for past 6 months
- Pregnant and lactating mother
- Smokers
- Obvious sign of trauma from occlusion

Clinical Examination

All the selected patients were subjected to full mouth clinical examination which included periodontal probing and charting. The clinical parameters include probing pocket depth (PPD), clinical attachment level (CAL) and teeth mobility. PPD, CAL and teeth mobility were measured using periodental probe (William Periodontal Probe). The evaluation and scoring of PPD and CAL were done on midbuccal, distobuccal, mesiobuccal, midlingual, distolingual and mesiolingual sites of all the teeth. Based on the clinical attachment level, teeth were categorized into mild (5-6mm), moderate (6.1-7mm) and severe (7.1-8mm). All the patients were subjected to analysis using T-Scan (Tekscan version 9.0 T-Scan™). The clinical examination and T-Scan analysis were carried out by a single examiner.

T-Scan analysis

All the selected subjects were asked to bite on the sensor in maximum intercuspation. The resultant change in electric resistance is converted into images on the screen. The program was operated in force analysis mode which provides the occlusal force percentage in maximum intercuspation in five different shades of colours. Blue colour denotes low occlusal force, green colour denotes mild occlusal force, yellow colour denotes medium, red colour denotes moderate and pink colour denotes high occlusal force (Figure 1). Patients were randomly assigned as either flap surgery or flap surgery with coronoplasty using an online randomizing application. Randomisation was done using an online random allocation software (RandomAlloc.exe. Version 1.0) where number of groups, number of teeth per group were fed, following which it generated random numbers. 262 teeth were included in Group A (flap surgery) and 276 teeth were included in Group B (flap surgery with coronoplasty). The treatment allocation of the teeth was prepared and sealed in numbered opaque envelopes and was opened during surgery. Allocation and surgical procedures were performed by one examiner whereas the clinical examination and T-Scan analysis were performed by another examiner.

Surgical procedure

Group A was treated with flap surgery, whereas Group B was treated with flap surgery and coronoplasty. Patients were asked to perform 0.2% chlorohexidine rinse pre-operatively. Following the administration of local anaesthesia (lignocaine with adrenaline 1:2,00,000), full thickness mucoperiosteal flap was elevated and debridement was done (Figure 2). For Group B, coronoplasty was done along with flap surgery (Figure 3). Flap was secured using direct loop suturing technique with 3-0 non-absorbable silk suture. The surgical site was protected with a non-eugenol periodontal dressing after suturing. The patients were prescribed Zerodol P (Aclofenac 100 mg + Paracetamol 325 mg) orally every 6th hour for 3 days. The clinical parameters and T-Scan analysis were recorded in follow-up examination at the end of 3 months.

Results

Table 1 shows comparison of pre-operative occlusal force between teeth with mild, moderate and severe clinical attachment loss and table 2 shows...
Tukey’s HSD Post-hoc Pair-wise comparison. Occlusal force was high among generalised chronic periodontitis patients with severe clinical attachment loss. There was a significant mean difference in occlusal force between moderate and severe clinical attachment loss (p = 0.000); mild and severe clinical attachment loss (p = 0.000) (Graph 1). On comparing occlusal force between molars and premolars, there was a significant increase in molars compared to pre-molars (p = 0.000) (Table 3, Graph 2). On comparing occlusal force between right and left side, there was a significant increase in left compared to right side (p = 0.035) (Table 4, Graph 3). Pearson’s correlation showed that there was a moderate positive correlation (r = 0.608) between pre-operative occlusal force and clinical attachment loss (p = 0.000) (Table 5, Graph 4). Inter group comparison was done three months after periodontal therapy showed that there was significant reduction in occlusal force in teeth where periodontal flap surgery along with coronoplasty was done as compared to periodontal flap surgery alone (p = 0.000). Within group comparison showed there was a statistically significant reduction in occlusal force between baseline and three months in both the groups (p = 0.000) (Table 6, Graph 5).

Graph 1: Distribution of pre-operative occlusal force based on the severity of clinical attachment loss. The above-mentioned bar chart represents distribution of pre-operative occlusal force between teeth with mild, moderate and severe clinical attachment loss. X-axis denotes the severity of clinical attachment loss. Y-axis denotes the mean occlusal force. The colour green denotes mild (5-6mm), blue colour denotes moderate (6.1-7mm) and red colour denotes severe clinical attachment loss (7.1-8mm). ANOVA shows that the mean occlusal force was high among teeth with severe clinical attachment loss and there was a significant mean difference in occlusal force between moderate and severe (p = 0.000), mild and severe (p = 0.000).

Graph 2: Distribution of pre-operative occlusal force between premolars and molars. The above-mentioned bar chart represents the distribution of pre-operative occlusal force between premolars and molars. X-axis denotes the groups based on teeth. Y-axis denotes the mean occlusal force. The colour blue denotes premolars and red denotes molars. Independent t test shows there was a significant increase of occlusal force in molars compared to pre-molars (p = 0.000).

Graph 3: Distribution of pre-operative occlusal force between right and left side. The above-mentioned bar chart represents the distribution of pre-operative occlusal force between right and left. X-axis denotes the groups based on the side of the teeth. Y-axis denotes the mean occlusal force. The colour blue denotes right side and red denotes left side. Independent t test shows there was a significant increase of occlusal force in the left side compared to the right side (p = 0.035).

Graph 4: Correlation of pre-operative occlusal force and pre-operative clinical attachment loss. The above scatter plot represents the Pearson correlation of pre-operative occlusal force and pre-operative clinical attachment loss. X-axis denotes the pre-operative clinical attachment loss and Y-axis denotes pre-operative occlusal force. Pearson’s correlation showed that there was a moderate positive correlation between pre-operative occlusal force and clinical attachment loss (p = 0.000).

Graph 5: Comparison of occlusal force between and within the groups. The above-mentioned bar chart represents comparison of occlusal force between and within the groups. X-axis denotes study groups and Y-axis denotes mean occlusal force. Blue colour denotes pre-operative occlusal force and green colour denotes post-operative occlusal force. Independent t test showed that the occlusal force reduction was significantly high in teeth where periodontal flap surgery along with coronoplasty was done (Group B) as compared to periodontal flap surgery alone (Group A) (p = 0.000). Paired t test showed there was a statistically significant reduction in occlusal force between baseline and three months in both the groups (p = 0.000).
Comparative Analysis of Occlusal Force Distribution Using T-Scan in Chronic Periodontitis Patients Before and After Periodontal Therapy

Saravanan R. "Comparative Analysis of Occlusal Force Distribution Using T-Scan in Chronic Periodontitis Patients Before and After Periodontal Therapy".

**Table 1:** Comparison of occlusal force based on severity of clinical attachment level mild CAL (5-6 mm), moderate (6.1-7 mm) and severe (7.1-8 mm).

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mean ± SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild CAL</td>
<td>5.715 ± 1.134</td>
<td>0.000*</td>
</tr>
<tr>
<td>Moderate CAL</td>
<td>5.897 ± 1.113</td>
<td></td>
</tr>
<tr>
<td>Severe CAL</td>
<td>7.621 ± 1.822</td>
<td></td>
</tr>
</tbody>
</table>

One way ANOVA was done to analyse the pre-operative occlusal forces between mild CAL (5.715 ± 1.134), moderate CAL (5.897 ± 1.113) and severe CAL (7.621 ± 1.822) between groups, p value is statistically significant (p = 0.000) *statistically significant difference p < 0.005.

**Table 2:** Pair-wise comparison between mild, moderate and severe clinical attachment level.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild vs Moderate CAL</td>
<td>-2.211</td>
<td>0.488</td>
</tr>
<tr>
<td>Moderate vs Severe CAL</td>
<td>-1.160</td>
<td>0.000</td>
</tr>
<tr>
<td>Mild vs Severe CAL</td>
<td>-1.431</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Tukey’s HSD Post-hoc pair-wise comparison done between mild (5-6 mm), moderate (6.1-7 mm) and severe (7.1-8 mm) clinical attachment level. In which mild vs moderate CAL shows (-0.221) and which is not significant (p > 0.488). In moderate vs severe CAL shows (-1.160) and mild vs severe (-1.431) which is statistically significant (p = 0.000) *statistically significant difference p < 0.005.

**Table 3:** Comparison of pre-operative occlusal force between premolars and molars.

<table>
<thead>
<tr>
<th>Tooth Type</th>
<th>Mean ± SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premolar</td>
<td>5.715 ± 1.134</td>
<td>0.000*</td>
</tr>
<tr>
<td>Molar</td>
<td>5.897 ± 1.113</td>
<td></td>
</tr>
</tbody>
</table>

Independent test was analysed in pre-operative occlusal force in right side (5.549 ± 4.005) and left side (7.900 ± 7.763) and the p value between right and left is significant (p = 0.000).

*Statistically significant difference p < 0.005.

**Table 4:** Comparison of pre-operative occlusal force between right vs left side.

<table>
<thead>
<tr>
<th>Occlusal force</th>
<th>Mean ± SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premolar</td>
<td>5.715 ± 1.134</td>
<td>0.000*</td>
</tr>
<tr>
<td>Molar</td>
<td>5.897 ± 1.113</td>
<td></td>
</tr>
</tbody>
</table>

Independent t test was analysed in right side (5.982 ± 4.644) and left side (6.997 ± 6.928) and the p value between right and left is significant (p < 0.035) *statistically significant difference p < 0.005.

**Table 5:** Comparison of occlusal force between and within the groups.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mean ± SD</th>
<th>Flap surgery with Coronoplasty</th>
<th>p-value (Independent test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>6.596 ± 1.659</td>
<td>6.383 ± 1.769</td>
<td>0.737*</td>
</tr>
<tr>
<td>Post-operative</td>
<td>5.987 ± 1.529</td>
<td>3.113 ± 0.311</td>
<td>0.000*</td>
</tr>
<tr>
<td>p value (Paired test)</td>
<td>0.000*</td>
<td>0.000*</td>
<td></td>
</tr>
</tbody>
</table>

Independent t test was done between groups in pre-operative flap surgery (6.596 ± 1.659) and pre-operative flap surgery with coronoplasty (6.383 ± 1.769) and pre-operative flap surgery (p > 0.737) which is not statistically significant and post-operative flap (5.987 ± 1.529) and post-operative flap surgery with coronoplasty (3.113 ± 0.311) and (p = 0.000) which is statistically significant. Paired t test within groups pre-operative flaps (6.596 ± 1.659) and post-operative flap surgery (5.987 ± 1.529) and post-operative flap surgery with coronoplasty (6.383 ± 1.769) and post-operative flap surgery with coronoplasty (3.113 ± 0.311) which shows statistically significant (p = 0.000).

**Table 6:** Comparison of clinical attachment loss between and within the groups.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mean ± SD</th>
<th>Flap surgery with Coronoplasty</th>
<th>p-value (Paired test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>6.807 ± 0.715</td>
<td>6.773 ± 0.641</td>
<td>0.894*</td>
</tr>
<tr>
<td>Post-operative</td>
<td>3.166 ± 0.082</td>
<td>3.140 ± 0.074</td>
<td>0.356*</td>
</tr>
</tbody>
</table>

Independent test was done between groups in pre-operative flap surgery (6.807 ± 0.715) and pre-operative flap surgery with coronoplasty (6.773 ± 0.641) and pre-operative flap surgery which is not significant (p > 0.894) and post-operative flap (3.166 ± 0.082) and post-operative flap surgery with coronoplasty (3.140 ± 0.074) and post- operatives shows (p > 0.356) which is not statistically significant. Paired t test done within groups pre-operative flap surgery (6.807 ± 0.715) and pre-operative flap surgery (6.773 ± 0.641) and post-operative flap surgery with coronoplasty (3.140 ± 0.074) and post-operative flap surgery with coronoplasty (3.140 ± 0.074) was done within the groups shows statistically significant (p = 0.000).

Inter group comparison was done three months after periodontal therapy showed that there was no statistically significant difference between the groups in terms of clinical attachment loss (p = 0.356). Within group comparison showed there was a statistically significant reduction in clinical attachment loss between baseline and three months in both the groups (p = 0.000).

**Table 7:** Comparison of probing depth between and within the groups.

<table>
<thead>
<tr>
<th>Probing depth</th>
<th>Flap surgery (Mean ± SD)</th>
<th>Flap surgery with Coronoplasty (Mean ± SD)</th>
<th>p-value (Independent test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>6.390 ± 0.181</td>
<td>6.403 ± 0.152</td>
<td>0.829*</td>
</tr>
<tr>
<td>Post-operative</td>
<td>3.166 ± 0.082</td>
<td>3.140 ± 0.079</td>
<td>0.369*</td>
</tr>
</tbody>
</table>

Independent t test was done between the groups in pre-operative flap surgery (6.390 ± 0.181) and pre-operative flap surgery with coronoplasty (6.403 ± 0.152) and pre-operative which shows is not statistically significant (p < 0.829) and post-operative flap (3.166 ± 0.082) and post-operative flap surgery with coronoplasty (3.140 ± 0.079) which is not statistically significant. Paired t test within groups pre-operative flap surgery (6.390 ± 0.181) and post-operative flap surgery (3.166 ± 0.082) and pre-operative flap surgery with coronoplasty (6.403 ± 0.152) and post-operative flap surgery with coronoplasty (3.140 ± 0.079) which shows statistically significant (p = 0.000).

Graph 6: Comparison of clinical attachment loss between and within the groups. The above-mentioned bar chart represents the comparison of clinical attachment loss between and within the groups. X-axis denotes study groups and Y-axis denotes mean clinical attachment loss. Blue colour denotes pre-operative clinical attachment loss and green colour denotes post-operative clinical attachment loss. Independent t test showed that there was no statistically significant difference in clinical attachment loss between both the groups (p > 0.536). Paired t test showed there was a statistically significant reduction in clinical attachment loss between baseline and three months in both the groups (p = 0.000).

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Inter group comparison was done three months after periodontal therapy showed that there was no statistically significant difference between both the groups in terms of probing pocket depth \(p = 0.369\). Within group comparison showed there was a statistically significant reduction in probing pocket depth between baseline and three months in the both the groups \(p = 0.000\).

Inter group comparison was done three months after periodontal therapy showed that there was a statistically significant difference between both the groups in terms of mobility \(p = 0.003\). Within group comparison showed there was a statistically significant reduction in mobility between baseline and three months in group A \(p = 0.033\) and Group B \(p = 0.001\) (Table). Pearson's correlation showed that there was a weak positive correlation \(r = 0.404\) between post-operative occlusal force and clinical attachment level \(p = 0.027\) (Table, Graph 8).

**Table 8:** Comparison of mobility between and within the groups.

<table>
<thead>
<tr>
<th>Mobility (Grade)</th>
<th>Pre-operative</th>
<th>Post-operative</th>
<th>(p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flap surgery</td>
<td>Flap surgery with coronoplasty</td>
<td>Flap surgery</td>
</tr>
<tr>
<td>0</td>
<td>1(6.7)</td>
<td>1(6.7)</td>
<td>4(26.7)</td>
</tr>
<tr>
<td>1</td>
<td>6(40)</td>
<td>5 (33.3)</td>
<td>8(53.3)</td>
</tr>
<tr>
<td>2</td>
<td>8(53.3)</td>
<td>9(60.0)</td>
<td>3(20)</td>
</tr>
<tr>
<td>(p) value</td>
<td>0.775*</td>
<td>0.033*</td>
<td></td>
</tr>
</tbody>
</table>

* Mann - Whitney U test (between groups) # Wilcoxon Signed Rank test (within groups).

In which Mann-Whitney U test between groups flap surgery pre-operative grade 0 mobility 1(6.7), grade 1 mobility 6(40) and grade 2 mobility 8(53.3). Flap surgery with Coronoplasty grade 0 mobility 1(6.7), grade 1 mobility 5(33.3) and grade 2 mobility 9(60.0) which is not statistically not significant \(p > 0.775\). Post-operative flap surgery grade 0 mobility 4(26.7), grade 1 mobility 8(53.3), grade 2 mobility 3(20) and Post-operative flap surgery with coronoplasty grade 0 13(86.7), grade 1 mobility 2(13.3) which is statistically significant \(p < 0.003\) and Wilcoxon Signed Rank test within groups pre-operative \(p = 0.033\) and post operative \(p = 0.001\)* statistically significant difference \(p < 0.005\).

**Graph 7:** Comparison of probing pocket depth between and within the groups. The above-mentioned bar chart represents the comparison of probing pocket depth between and within the groups. X-axis denotes study groups and Y-axis denotes mean probing pocket depth. Blue colour denotes pre-operative probing pocket depth and green colour denotes post-operative probing pocket depth. Independent t test showed that there was no statistically significant difference in probing pocket depth between both the groups \(p = 0.369\). Paired t test showed there was a statistically significant reduction in probing pocket depth between baseline and three months in both the groups \(p = 0.000\).

**Discussion and Conclusion**

The relationship between dental occlusion and periodontal alterations has been studied. Damage to the periodontal tissues caused by traumatic occlusal forces can lead to a transitional lesion and subsequent adaptation of the tissues [22]. Since occlusal trauma is a histologic event and the signs and symptoms are associated with other conditions, it is debatable if occlusion has any relationship with periodontitis [21]. This research was done to compare and analyze the occlusal force distribution using T-Scan™ in chronic periodontitis patients before and after surgical periodontal therapy with and without coronoplasty.

The present study results showed that there was a significant difference in T-Scan value (occlusal force) between teeth with mild, moderate and severe clinical attachment loss. Also, there was a positive correlation between occlusal force and clinical attachment loss. When the severity of periodontitis based on clinical attachment loss, between trauma from occlusion and balanced contact was assessed by Hutabarat IB et al., there was greater prevalence of severe periodontitis with more clinical attachment loss in teeth with trauma from occlusion than teeth with balanced contact. The results showed that based on the distribution of the number of trauma from occlusion and balanced contact teeth associated with the severity of periodontitis, there was a significant relationship between trauma from occlusion and severity of periodontitis.

In addition, total biting pressure and occlusal contact area were positively associated with the mean clinical attachment loss and mean probing pocket depth. Furthermore, it was suggested that balancing contacts with and without working contacts and centric prematurities were all associated with clinical attachment loss and an increased incidence of a less than good prognosis. Our findings are in accordance with the previous studies as the mean CAL was significantly associated with occlusal force. This highlights the fact that excessive occlusal force is a risk factor of periodontal destruction.

Also, in the present study it was found that the occlusal force was significantly higher in molars than premolars. This is similar to a study where the occlusal force was assessed by T-Scan II system among patients with moderate to severe periodontitis and it was suggested that high occlusal force was significantly related to mobility in upper posterior teeth and highest percentage of teeth bearing high occlusal force occurs in the molar region when compared to premolar region and anterior region [41].

Furthermore, the present study showed that when flap surgery was compared with flap surgery along with coronoplasty among patients with...
Comparative Analysis of Occlusal Force Distribution Using T-Scan in Chronic Periodontitis Patients Before and After Periodontal Therapy

In the present study, randomization was done across patients and not within a group. The study findings are in agreement with the previous study where it was found that the gain in clinical attachment level was not significantly more at analysing the role of occlusal adjustment in chronic periodontitis patients before and after surgical periodontal therapy.

Another study indicates a good reproducibility of the assessment for repeated lateral occlusal contact. One of the notable advantages of the T-Scan system is its accuracy for detecting high occlusal force contact points. However, a disadvantage lies in its inability to standardize the occlusal force\(^{11}\). Other limitations of our study include smaller sample size. Also, there is an interplay of numerous factors in the periodontal disease and occlusal trauma. So future studies with a longer follow-up period should be aimed at analysing the role of occlusal adjustment in chronic periodontitis patients before and after surgical periodontal therapy.

References


