Evaluation Of Abutment According to Acp Classification for Patients Undergoing Tooth Supported Full Mouth Rehabilitation - A Study in University Setting

Harini Srl1, Subhabrata Maiti2*, Vinay Sivaswamy3, Dhanraj Ganapathy4

1Postgraduate student, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, Email: 151909005.sdc@saveetha.com
2Assistant Professor, Department of Prosthodontics, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, Email: subhabratamaiti.sdc@saveetha.com
3Assistant Professor, Department of Prosthodontics, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai
4Professor and head of department, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077, Tamil Nadu, India

Abstract

The tooth supported full mouth reconstruction, regards one of the complex procedures for most dentists. It needs efficient diagnosis and elaborate treatment planning to establish optimum esthetics and function. The clinicians should do a proper evaluation of the abutment teeth. The objective of this study was to evaluate the abutments according to ACP classification for patients undergoing tooth supported full mouth rehabilitation. The data was collected from June 2019 to March 2020 at a private dental institution in Chennai and a total of 51 case records of patients requiring full mouth rehabilitation procedure was obtained. Chi-square test was applied to see associations of age, gender and abutment condition and there was statistical significance between age, gender and abutment condition with p value < 0.05. The results showed that 42% (n=21) of the patients were categorized as ACP Class I; 34% (n=17) as Class-II; 8% (n=4) as Class-III; and 16% (n=8) as Class IV. The study reported the high occurrence of Class I abutment condition in both male and female population with 38.5% (n=10) and 45.8% (n=11) respectively. The age wise distribution of abutment condition revealed that in group 1, there was equal distribution between Class I, Class II and Class IV with 28.6% (n=2). In group 2, most of the abutments were Class II with 50% (n=3). In group 3 and 4, most of the abutments were Class I with 66.7% (n=6) and 50% (n=6) respectively and Class II was common in group 5. In this study, it can be concluded most of the abutments were ideal or minimally compromised followed by moderately compromised abutments in all age groups and both the gender. Full mouth rehabilitation procedures were carried out more in females than in male population.

Keywords: Full mouth rehabilitation; ACP Classification; abutment; gender; age

DOI: 10.47750/pnr.2022.13.S07.066

1.INTRODUCTION

Full mouth rehabilitation is defined as the restoration of form and function of masticatory apparatus to as nearly a normal condition as possible. In general, any dental treatment that involves all teeth in the mouth is called full mouth reconstruction or full mouth rehabilitation. These patients may exhibit multiple missing teeth, numerous teeth with large restorations that are failing or exhibiting decay, fractured teeth, or badly worn teeth due to bruxism (teeth grinding) or other habits. Some patients with developmental disorders such as Ectodermal Dysplasia, Amelogenesis, or Dentinogenesis Imperfecta that will need extensive restoration of their teeth may be candidates for a full mouth reconstruction. Temporomandibular joint disturbance is another reason.

The objective of full mouth reconstruction is to minimise stress and strain during oral mechanism. In order to prevent these stresses from being destructive, the best thing to do is to distribute it evenly on a great area as possible, over as many teeth and as much tissue as possible, with the teeth providing a means by which the forces are distributed. In such cases, the evaluation of abutment teeth is very crucial. The factors affecting the abutment selection includes, crown root ratio, periodontal surface area, buccolingual dimensions of tooth, arch form, occlusal anatomy, presence of a parafunctional habit, root configuration, crown form and length, axial alignment, alveolar ridge form, span length, remaining tooth structure, esthetics and pulpal health.
Patients needing prosthodontic treatment exhibit a wide range of physical variations and health conditions\textsuperscript{8–10}. Full mouth reconstruction is a complete functional endeavor and it embodies the correlation and integration of all the component parts into one functioning unit. These conditions present the clinician with many challenges and potential pitfalls. A staged approach to restoring the collapsed dentition provides the clinician opportunity to evaluate how a patient will respond to occlusal and esthetic changes. The absence of organized diagnostic criteria for such patients has been a long-standing impediment to the effective recognition of risk factors that may affect treatment outcomes. Though there have been previous published classification efforts, these have not been widely used as it does not categorize the patients according to complexity of the abutment condition\textsuperscript{11}. To address this problem, the American College of Prosthodontists (ACP) charged a subcommittee on prosthodontic classification with the task of developing a classification system for the completely dentate patient consistent with the existing classification systems for complete and partial edentulism\textsuperscript{12}. Literature search shows many studies that evaluate the abutments based on various factors or fixed partial dentures. But there are very few studies that evaluate the abutments for tooth supported full mouth rehabilitation based on ACP classification. The objective of this retrospective study was to evaluate the abutments according to ACP classification for patients undergoing tooth supported full mouth rehabilitation.

2. Materials and Method

This retrospective study was conducted from June 2019 to March 2020, in the Department of Prosthodontics, in a private dental institution, Chennai, after taking ethical clearance from the Institutional Review Committee. All the patients suitable for full mouth rehabilitation treatment were included (Purposive sampling) in the study. A total of 66 case records were taken and those with missing entries were omitted. Finally, the dental status of 51 patients was obtained from the case sheet. It included age, chief complaint, history of presenting illness, relevant medical and dental history, and a thorough clinical examination of intraoral findings including periodontal status, arch form, occlusal anatomy, root configuration, crown form and length, axial alignment, alveolar ridge form, and pulpal health. Written informed consent was taken from each patient participating in the study. Case sheets of each patient were assessed as recommended and mentioned in “Parameters of Care for the Specialty of Prosthodontics” by the ACP, by the principal investigator (Prosthodontist). A summary of the Classification System for abutment condition is listed in table I. The selected patients were grouped according to their age (table II). Photographs and radiographs (Intra Oral Periapical radiographs) were used for cross verification of data to reduce errors. To minimise the sampling bias, the study was double blinded by an analyser and a reviewer.

Statistical analysis

The collected data was entered in Microsoft Excel 2010 and a specific statistical software, IBM SPSS 19.0 version was used to analyse the data. Frequency test was done for each group and Chi-square test was performed to see the associations with age, gender and abutment condition.

3. Results

A total of 51 patients suitable for full mouth rehabilitation were examined among whom 24(47.1\%) were males and 27(52.9\%) were females aged between 20-70 years (figure I). The results showed that 42\% (n=21) of the patients were categorized as ACP Class- I; 34\% (n=17) as Class-II; 8\% (n=4) as Class-III; and 16\% (n=8) as Class IV (figure II).

Association between age and abutment condition was obtained using Chi square test with p value = 0.03 and found to be statistically significant. The age wise distribution of abutment condition revealed that in group 1, there was equal distribution between Class I, Class II and Class IV with 28.6\% (n=2). In group 2, most of the abutments were Class II with 50\% (n=3). In group 3 and 4, most of the abutments were Class I with 66.7\% (n=6) and 50\% (n=6) respectively and Class II was common in group 5 (figure III, table III). Association between gender and abutment was determined using Chi square test (p value = 0.01) and was found to be statistically significant. The study reported the high occurrence of Class I abutment condition in both male and female population with 38.5\% (n=10) and 45.8\% (n=11) respectively, followed by Class II with 30.8\% (n=8) in male and 37.5\% (n=9) in female (figure IV, table IV).
Figure I: Pie chart showing frequency of gender in the study. Yellow represents male and orange colour represents female participation in the study. 48% of female and 52% of male participated in the study.

Figure II: Graph showing the frequency distribution of abutment condition according to ACP classification. X axis represents the abutment condition and Y axis shows the number of patients. The results showed the occurrence 42% (n=21) in Class-I (blue); 34% (n=17) in Class-II (green); 8% (n=4) in Class-III (brown); and 16% (n=8) in Class IV (purple).
Figure III: Age wise distribution of abutment condition. X axis shows age and Y axis represents the number of patients. In group 1, there was equal distribution between Class I (blue), Class II (green) and Class IV (purple). In group 2, most of the abutments were Class II. In group 3 and group 4, most of the abutments were Class I. Class II was common in group 5. Association between age and abutment condition was obtained using Chi square test with p value = 0.03 and found to be statistically significant.

Figure IV: The gender wise distribution of abutment condition. X axis represents gender and Y axis represents number of patients. Class I (blue) was common in both male and female population with 38.5% (n=10) and 45.8% (n=11) respectively, followed by Class II (green) with 30.8% (n=8) in male and 37.5% (n=9) in female. Association between gender and abutment was determined using Chi square test (p value = 0.01) and was found to be statistically significant.
Table I: Table showing the ACP classification for abutment evaluation.

<table>
<thead>
<tr>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal or minimally compromised tooth condition</td>
<td>Moderately compromised tooth condition</td>
<td>Substantially compromised tooth condition</td>
<td>Severely compromised tooth condition</td>
</tr>
</tbody>
</table>

No localized adjunctive therapy required. Pathology affecting the coronal morphology of 3 or fewer teeth in a sextant

Insufficient tooth structure available to retain or support intracoronal or extracoronal restorations—in 1 sextant. Pathology affecting the coronal morphology of 4 or more teeth in a sextant. Pathology may be present in 2 sextants and may occur in opposing arches.

Insufficient tooth structure to retain or support intracoronal or extracoronal restorations—in 2 sextants. Pathology affecting the coronal morphology of 4 or more teeth in 3 or more sextants. Pathology may occur in 3 sextants in the same arch and/or in opposing arches. Teeth require localized adjunctive therapy, i.e., periodontal, endodontic, or orthodontic procedure in 2 sextants.

Insufficient tooth structure to retain or support intracoronal or extracoronal restorations—in 3 or more sextants. Pathology affecting the coronal morphology of 4 or more teeth in all sextants. Teeth require localized adjunctive therapy, i.e., periodontal, endodontic, or orthodontic procedure in 3 or more sextants.

Table II: Table showing grouping of selected subjects in the study.

<table>
<thead>
<tr>
<th>AGE</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30 Years</td>
<td>1</td>
</tr>
<tr>
<td>31-40 Years</td>
<td>2</td>
</tr>
<tr>
<td>41-50 Years</td>
<td>3</td>
</tr>
<tr>
<td>51-60 Years</td>
<td>4</td>
</tr>
<tr>
<td>61-70 Years</td>
<td>5</td>
</tr>
</tbody>
</table>

Table III: Age wise distribution of abutment condition. In group 1, there was equal distribution between Class I, Class II and Class IV. In group 2, most of the abutments were Class II. In group 3 and group 4, most of the abutments were Class I. Class II was common in group 5. Association between age and abutment condition was obtained using Chi square test with P value = 0.03 and found to be statistically significant.

<table>
<thead>
<tr>
<th>AGE</th>
<th>CLASS I</th>
<th>CLASS II</th>
<th>CLASS III</th>
<th>CLASS IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP 1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>28.6%</td>
<td>28.6%</td>
<td>14.3%</td>
<td>28.6%</td>
</tr>
<tr>
<td>GROUP 2</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>33.3%</td>
<td>50.0%</td>
<td>0.0%</td>
<td>16.7%</td>
</tr>
<tr>
<td>GROUP 3</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>66.7%</td>
<td>33.3%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>GROUP 4</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Table IV: Gender wise distribution of abutment condition. The study reported the high occurrence of Class I abutment condition in both male and female population with 38.5% (n=10) and 45.8% (n=11) respectively, followed by Class II with 30.8% (n=8) in male and 37.5% (n=9) in female. Association between gender and abutment was determined using Chi square test (p value = 0.01) and was found to be statistically significant.

<table>
<thead>
<tr>
<th>GENDER</th>
<th>ABUTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CLASS I</td>
</tr>
<tr>
<td>MALE</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>38.5%</td>
</tr>
<tr>
<td>FEMALE</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>45.8%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>42%</td>
</tr>
</tbody>
</table>

Discussion

Previously our team has conducted numerous original studies over the past 5 years. The idea for this study stemmed from the current interest in our community. A definitive treatment depends on the careful examination of all available information, a sound diagnosis, and a realistic treatment plan that offers a favorable prognosis. Planning for full mouth reconstruction treatment should not be independent of other disciplines of dentistry and it is important that all the applicable parameters are taken into account. Abutments bear the stresses of mastication and the choice of abutment influences the prognosis of treatment. Thus, the importance of selecting a suitable abutment cannot be overemphasized. Thus, this study provides an overview of the prevalence of abutment conditions according to ACP classification among various age groups and gender, to facilitate long-term success of full mouth rehabilitation procedures.

In the present study, it was observed that the number of females who underwent full mouth reconstruction procedures were higher than that of male. This might be because the knowledge on dental treatments is significantly higher among the female than the male population. Lukacs et al 20 concluded that females bear a higher burden of dental caries compared to males. Higher caries prevalence among females has been traditionally attributed to earlier tooth eruption among girls and hence, longer exposure of their teeth to the cariogenic oral environment. From the frequency distribution of abutment conditions, it was found that most of the abutments were ideal or minimally compromised. Frencken et al21 had reported that with development of advanced dental procedures and knowledge on oral hygiene, the incidence of dental problems has decreased over the years. Further, the results show statistical significance between the age and the type of abutment condition. Ideal and minimally compromised abutments were high among all the age groups followed by moderately compromised abutments in 61-70 years. This might be due to age related changes in dentition. Severely compromised abutments were high in age group between 20-30 years and 51-60 years. Freilich et al22 recommended that periodontally compromised, mobile teeth be used as an abutment when there is a lack of other favorably distributed abutment teeth with greater levels of periodontal support; for a carefully selected patient with advanced loss of periodontal support who requires tooth replacement and who has a strong desire to retain the existing dentition; when the patient and dentist are committed to a fastidious plaque control program; when there is a recognition of the guarded prognosis associated with an FPD supported by periodontally compromised teeth because of the higher incidence of tooth fracture and pulpal problems.

The present study had a few limitations which include the fact that this retrospective study covered a duration of 10 months where only 51 patients were evaluated. However a higher number of patients could be evaluated in a longer period of time. Furthermore, the present study was conducted in only one province of the state and further studies that would cover all provinces should be conducted. Further, no specific information was provided on the socioeconomic status of the patients undergoing full mouth rehabilitation. The data observed from this retrospective study provides valuable information on the condition of abutments in patients undergoing full mouth rehabilitation. It also gives an idea of the dental status of the patients.
4. Conclusion
Within the limitations of this retrospective study, it was observed that full mouth rehabilitation procedures were carried out more in females than in male population. Most of the abutments were ideal or minimally compromised followed by moderately compromised abutments in all age groups and in both the gender.

5. Acknowledgement
We would like to acknowledge Saveetha Dental College and Hospital for providing complete patient details required for the study purpose and their constant help and support for this research.

6. Conflict Of Interest
The authors declare no conflict of interest.

REFERENCES