



Analysis of pre-prosthetic surgeries performed in a private dental institution

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ABSTRACT

Pre-prosthetic surgery is part of the oral and maxillofacial surgery, which concerns restoration of facial form and oral function. Pre-prosthetic surgery is a surgery done to obtain a better anatomic environment and to provide proper supporting structures for denture construction. The aim of this study was to analyse the various pre-prosthetic surgeries performed in a private dental institution. In this retrospective study, digital case records of all patients who underwent pre-prosthetic surgeries in Saveetha Dental College and Hospital from June 2019 to March 2020 were reviewed. Demographic details of patients and types of pre-prosthetic surgeries performed were recorded from digital case records. Retrieved data was analysed using IBM SPSS Software Version 23.0. In this study, we observed that pre-prosthetic surgery was more commonly performed in the age group of 51-60 yrs (23.3%). Pre-prosthetic surgeries were done more in males than females. The most common type of pre-prosthetic surgery was valvuloplasty (62.2%), followed by frenectomy (20.7%). Statistically, a significant association was found between pre-prosthetic surgery and age group; pre-prosthetic surgery and gender; pre-prosthetic surgery and quadrant involved ($p < 0.05$). Within the limits of this study, it can be concluded that the most common pre-prosthetic surgery performed was valvuloplasty. Pre-prosthetic surgery was performed more in males and the age group of 51-60 years, mostly in the third quadrant.



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INTRODUCTION

Pre-prosthetic surgery is part of the oral and maxillofacial surgery, which concerns restoration of facial form and oral function. Pre-prosthetic surgery is a surgery done under local anaesthesia to obtain a better anatomic environment and to provide proper supporting structures for denture construction (Taylor, 1960). Surgical modification of the alveolar process and surrounding structures is the concern of the procedure to allow the fabrication of a comfortable, well-fitting and esthetic dental prosthesis (Devaki *et al.*, 2012). The ultimate goal of pre-prosthetic surgery is to rehabilitate the patient's

oral environment by restoring masticating function and restoration or improvement of facial esthetics.

Adverse changes in the denture bearing area which is caused by change in the jaw bone size, resulting in painful and ill-fitting denture when the dentures are worn for a long period of time (Hopkins, 1987). If the denture bearing area is left untreated, it can cause difficulty in speech and mastication. Painful and ill-fitting dentures can be detrimental to oral health as such problems may lead to denture-related diseases such as denture stomatitis and affects the patient's general quality of life (Rahman and Kumar, 2017).

The dental prosthesis has made great achievements in improving the successful use of prosthetic appliances in the edentulous patients through improved processing technique accuracy, development of better material and a good understanding of oral anatomy and physiology (Lytle, 1959; Hopkins, 1987). There is an increase in the number of elderly and medically compromised patients treated in dental clinics for bone loss. The bone loss pattern in maxilla and mandible differs.

Alveolar bones estimated to be subjected to mechanical loads for 15 to 20 minutes per day (Bates *et al.*, 1976). As tooth is lost, irreversible alveolar bone resorption occurs (Atwood, 1963; Carlsson and Persson, 1967). A continuous resorptive process is observed in an alveolar process which is often affected after tooth loss and bone resorption follows a predictable pattern; the labial aspect of alveolar crest reduces in width first followed by height reduction (Lindhe *et al.*, 2015; Newman *et al.*, 2006). In cases of completely edentulous patients, muscle training may be required to enhance gradual adaptation of the orofacial musculature to the denture.

(Kumar and Sneha, 2016; Patturaja and Pradeep, 2016) Patients who require dentures, either complete or partial, may observe that the process of denture adaptation is quicker and easier after undergoing pre-prosthetic surgery (Kumar and Rahman, 2017). Failure and success of prosthesis can be influenced by the selection of surgical procedures into treatment plans for removable dentures. A study conducted by Kalk *et al.* reported that surface areas are approximately 180% in the vestibular region and 126% greater in sublingual regions in groups who have undergone pre-prosthetic surgery compared to groups who did not undergo surgery. The same study also found that there is stability in denture in groups receiving pre-prosthetic surgery (Kalk *et al.*, 1992). Some studies announced that patients with atrophic mandibular ridges who were surgically treated were more satisfied with

wearing dentures compared to patients that were not surgically treated (Van Waas *et al.*, 1992; Matthew, 2007).

Over the past five years, innumerable clinical trials (Jesudasan *et al.*, 2015; Christabel *et al.*, 2016), surveys (Kumar, 2017; Abhinav *et al.*, 2019a) and article reviews (Packiri, 2017; Marimuthu *et al.*, 2018) had previously been conducted by our team. Currently, we are focusing on the types of pre-prosthetic surgery performed (Patil *et al.*, 2017). This study aims to evaluate the various pre-prosthetic surgeries performed in a private dental institution (Abhinav *et al.*, 2019b). This allows us to understand the range, capabilities and limitations of our conduct in pre-prosthetic surgical procedures as well as to establish a clear treatment plan in close coordination with all specialities to provide the best treatment outcome (Rao and Kumar, 2018; Jain *et al.*, 2019).

MATERIALS AND METHODS

Study design and study setting

This retrospective cross-sectional study was conducted in the department of oral and maxillofacial surgery, Saveetha dental college and hospital, Saveetha University, Chennai, to analyse the various pre-prosthetic surgeries performed at our institution from June 2019 to March 2020. The study was initiated after approval from the institutional review board with an approval number of SDC/SIHEC/2020/DIAS DATA/0619-0320.

Study population and sampling

After assessment in the Dental Information Archiving System (DIAS) of Saveetha Dental College, all case records of patients who underwent pre-prosthetic surgeries were included in the study with a total of 352 quadrants. The exclusion criteria Patients below 18 years of age, missing or incomplete data. Cross verification of data for errors was done with the help of an external examiner. Data was reviewed and information was verified with treatment photographs.

Data collection

Data on various pre-prosthetic surgeries that were performed were collected from digital case records by a single calibrated examiner.

The following parameters were observed and recorded: (i) Patient's age, (ii) gender, (iii) type of pre-prosthetic surgery and (iv) quadrant involved.

Statistical analysis

All data collected were entered in Microsoft Office Excel and analysed using SPSS version 23.0 and

results obtained. Descriptive statistics were used to report the distribution of age group, gender and type of pre-prosthetic surgery. Chi-square test was conducted to analyse the correlation between types of pre-prosthetic surgery with age, gender and quadrant involved. Significance test level was set at $p < 0.05$.

RESULTS AND DISCUSSION

In our study, pre-prosthetic surgeries were performed in a total of 352 quadrants among all patients. This includes 4.3% of patients in the 11-20 years of age, 21-30 years (12.5%), 31-40 years (11.9%), 41-50 years (19%), 51-60 years (23.3%), 61-70 years (20.5%) and 71-80 years (8.5%) (Figure 1).

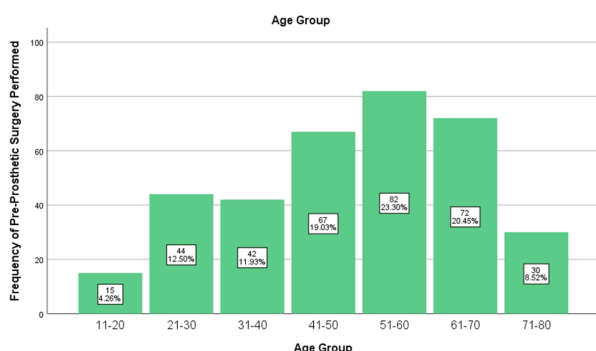


Figure 1: Bar chart depicting age-wise frequency distribution of pre-prosthetic surgery performed.

Our study population consisted of 46.9% females and 53.1% of males (Figure 2). Among 352 quadrants, valvuloplasty was done in 62.2% of quadrants, exostosis removal (0.6%), frenectomy (20.7%), ridge augmentation (3.4%), sinus lifting (2.6%), soft tissue excision for correction of alveolar ridge (4%) and vestibulopathy (6.5%) (Figure 3).

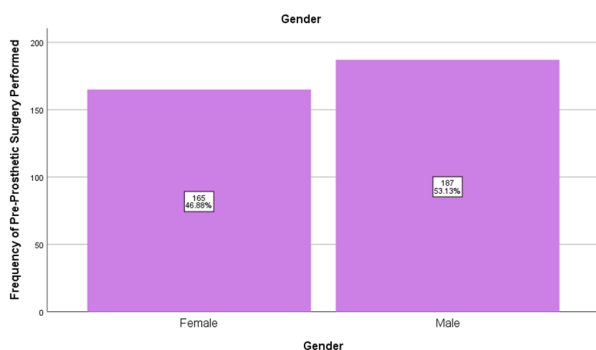


Figure 2: Bar chart depicting gender-wise frequency distribution of pre-prosthetic surgery performed.

Frenectomy was the most common surgery done

in the age group 11-20 years, 21-30 years and 31-40 years with 80%, 70.5% and 33.3% respectively. Alveoplasty was performed more in 41-50 years (71.6%), 51-60 years (80.5%), 61-70 years (90.3%) and 71-80 years (86.7%). Alveoplasty was commonly performed above 40 years and frenectomy was common in persons below 40 years of age and the results were statistically significant ($p < 0.001$). (Figure 4).

Alveoplasty was commonly performed in both males and females with 63.3% and 60.6%, respectively (Figure 5) with more surgeries performed in males. The results were statistically significant ($p < 0.002$).

The most common surgery for all four quadrants was valvuloplasty with the first quadrant (51.4%), second quadrant (82.6%), third quadrant (50.4%) and fourth quadrant (78.5%). Most surgeries were performed in the third quadrant and the results were statistically significant ($p < 0.001$) (Figure 6).

Figure 1, X-axis represents the age group and Y-axis represents the frequency of pre-prosthetic surgery performed. The age group of 51-60 years had a higher frequency of pre-prosthetic surgery performed (23.3%) compared to other age groups.

Figure 2, X-axis represents the gender and Y-axis represents the frequency of pre-prosthetic surgery performed. Frequency of pre-prosthetic surgery performed was higher in males (53.1%) compared to females (46.9%).

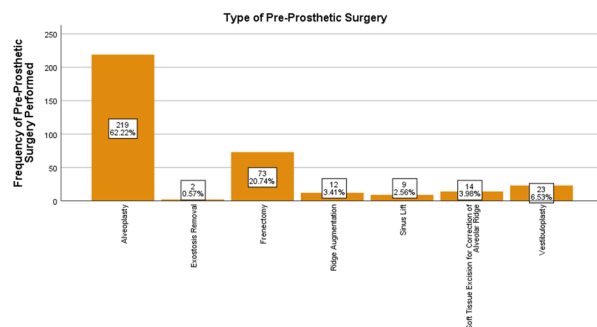


Figure 3: Bar chart depicting the frequency distribution of pre-prosthetic surgery performed based on the type of pre-prosthetic surgery.

Figure 3, X-axis represents the type of pre-prosthetic surgery and Y-axis represents the frequency of pre-prosthetic surgery performed. Alveoplasty (62.2%) was the highest pre-prosthetic surgery performed compared to other type of pre-prosthetic surgery.

Figure 4, X-axis represents the age group and Y-axis represents the frequency of pre-prosthetic surgery. Most joint surgery performed in the age group above

40 years was valvuloplasty (71.6% in 41-50 years, 80.5% in 51-60 years, 90.3% in 61-70 years and 86.7% in 71-80 years) and in below 40 years was frenectomy (80% in 11-20 years, 70.5% in 21-30 years, 33.3% in 31-40 years). Pearson chi-square value- 242.957, p-value- 0.000 ($p < 0.001$), hence statistically significant, proving valvuloplasty as highly joint pre-prosthetic surgery in age group above 40 years and frenectomy as highly joint pre-prosthetic surgery in age group below 40 years.

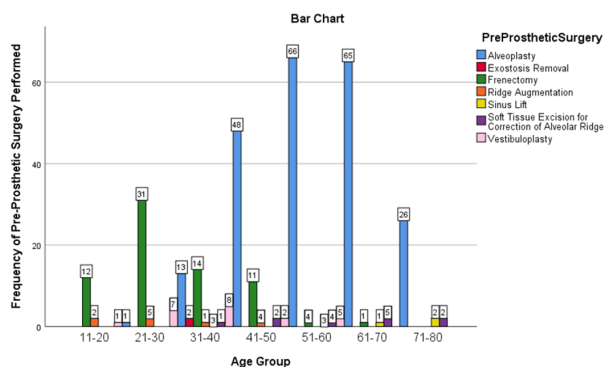


Figure 4: Bar chart depicting association between pre-prosthetic surgery and age group.

Figure 5, X-axis represents gender, and Y-axis represents the frequency of pre-prosthetic surgery. Pre-prosthetic surgery was performed more in males (53.1%) compared to females (46.9%). Alveoplasty was observed to be the most common surgery in both males (60.6% of males) and females (63.6% of females). Pearson chi-square value- 23.099, p value- 0.001 ($p < 0.002$), hence statistically significant, proving pre-prosthetic surgery was performed more in males compared to females.

Figure 6, X-axis represents the quadrant involved and Y-axis represents the frequency of pre-prosthetic surgery. Pre-prosthetic surgery was performed more in the third quadrant (32.1%) compared to other quadrants. Alveoplasty was the most common surgery in all the quadrants (51.4% in the first quadrant, 82.6% in the second quadrant, 50.4% in the third quadrant and 78.5% in the fourth quadrant). Pearson chi-square value- 105.447, p value- 0.000 ($p < 0.001$), hence statistically significant, proving pre-prosthetic surgery was performed more in the third quadrant compared to other quadrants

Pre-prosthetic surgery is conducted to prepare both the hard and soft tissues of the oral environment to accept prosthesis to provide comfort, restore oral function, esthetic and facial form. The procedure includes eliminating pain and discomfort after dental extraction or before denture fabrication process by surgically modifying the denture bear-

ing area for insertion of prosthesis or endosseous implants (Matthew, 2007). Failure to identify or address the need for preprosthetic surgery can be a burden for both clinicians and patients later on.

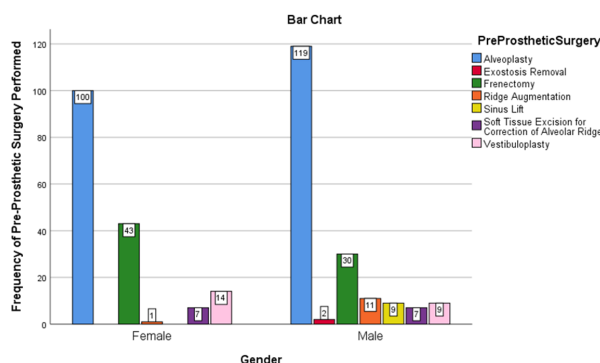


Figure 5: Bar chart depicting association between pre-prosthetic surgery and gender.

It may result in loss of productivity as patients require multiple visits to treat denture discomfort or failure. As a result of improved denture comfort and efficiency, quality of life of the patient can be improved as fear of dentures failing when speaking or eating is eliminated.

In this study, we observe that the most common type of pre-prosthetic surgical procedure is alveoplasty (62.2%) followed by frenectomy (20.7%), vestibulopathy (6.5%), soft tissue excision (4%), ridge augmentation (3.4%), sinus lift (2.6%) and exostosis removal (0.6%). Pre-prosthetic surgeries are done more in males than compared to females. The most common age group to undergo pre-prosthetic surgery is the 51-60 years age group (23.3%).

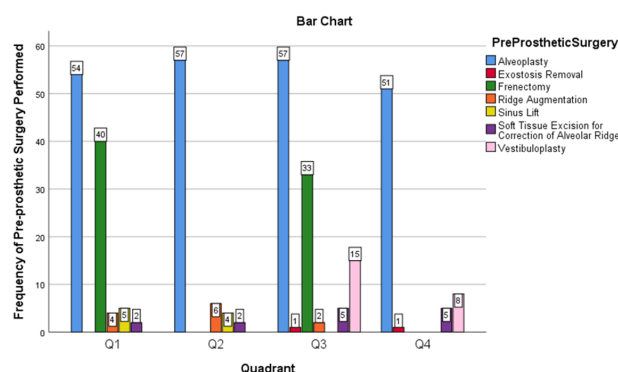


Figure 6: Bar chart depicting association between pre-prosthetic surgery and quadrant involved.

Our current study found that the most common pre-prosthetic surgery done was alveoplasty for both maxilla and mandible. Our study results are in accordance to that of studies conducted by Qiam et al. and Mishra et al. Both of the studies reported that

valvuloplasty is the most commonly prescribed pre-prosthetic surgery (Qiam *et al.*, 2014; Mishra *et al.*, 2017). However, Ferri *et al.* suggested that sinus lift is a much more common pre-prosthetic surgery in the maxilla (Ferri *et al.*, 2008). The variations in finding may be due to differences in age group, geographic location and socioeconomic status.

In our study, the most common age group to undergo pre-prosthetic surgery are patients of 51-60 years. Results of study by Gangmani *et al.* were similar to our study as they also reported patients of 60 years of age are common age groups who undergo pre-prosthetic surgery (Gangwani *et al.*, 2018). It is observed in our study that alveoplasty is more common in patients above 40 years and frenectomy is highly prevalent in patients below 40 years. This finding has significant clinical implications in our dental practice.

Based on gender, it was observed that males underwent more pre-prosthetic surgery than females. The most commonly performed surgery for both genders was valvuloplasty. A previous study was similar to our study finding and found that alveoplasty was common in males (Gangwani *et al.*, 2018).

In our study, the third quadrant was the most prevalent site for pre-prosthetic surgeries. Hillerup *et al.* also reported in their study that mandible is the most common site for pre-prosthetic surgery (Hillerup, 1982). In our study, the most common pre-prosthetic surgery performed in all the four quadrants was alveoplasty.

Limitations of the study

This study has limitations as it is conducted as a university-based study and the research results are only based on the regional population.

Future scope

Extensive research needs to be done with a larger sample population. Future studies can include other factors which may influence patients' acceptance and preference of pre-prosthetic surgery such as diverse location and socioeconomic status.

CONCLUSION

Within the limits of this study, it can be concluded that the most common pre-prosthetic surgery performed was alveoplasty. Pre-prosthetic surgery was performed more in males and the age group of 51-60 years, mostly in the third quadrant.

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Conflict of Interest

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

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