Prevalence of Anterior Maxillary Osteotomy Procedure in Skeletal Class II Malocclusion-A Retrospective Study

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Abstract

Background: Skeletal class II malocclusion is one of the frequent problems occurring in the orthodontic and maxillofacial surgical practice. Skeletal class II malocclusion involves craniofacial discrepancies, which can be adjusted when patients are adolescent. Anterior Maxillary Osteotomy (AMO) is one of the commonest procedures done for the correction of maxillary excess. The anterior segmental maxillary osteotomy was first performed in 1921 by Cohn-Stock. Several modifications were done regarding approaches for AMO by Wassmund, Wundere and Cupar. Cupar's method is the most preferred approach by the surgeons. The aim of this study is to determine the prevalence of AMO in treatment of skeletal class II malocclusion. **Materials & Methods:** A retrospective study was conducted in the Department of Oral and Maxillofacial Surgery. The records from June 2019 till 2020 were screened and the relevant information regarding type of treatment, age and gender was gathered and tabulated. Descriptive analysis and chi square tests were performed to determine the statistical significance. **Results:** Among 152 patients included in study, 10 (6.6%) patient had undergone AMO and 142 (93.4%) patients underwent other surgical and orthodontic treatment. The maximum AMO procedures were done in the age group of 26-30 yrs (2.63%) when compared to other surgical and orthodontic procedures. There was no significant difference found in prevalence of AMO procedure age and gender p-0.06 and p-0.67 ($p<0.05$). **Conclusion:** Within the limit of this study we can conclude that the prevalence of the anterior maxillary osteotomy procedure is less as compared to the other orthognathic and orthodontic procedures. The prevalence of AMO procedure was maximum in the age group between 26-30 years. No significant difference was seen between the prevalence of the procedure in males and females. Awareness about surgical treatment and presurgical counselling should be done for patients with dento-skeletal deformities.

Keywords:

AMO; Anterior maxillary osteotomy; Skeletal class II malocclusion

Introduction

The anterior maxillary osteotomy procedure is primarily used for repositioning of the anterior segment of the maxilla along with the teeth present posteriorly, superiorly or inferiorly as indicated. [1] The anterior segmental maxillary osteotomy was first performed in 1921 by Cohn-Stock [2] in which a wedge shaped palatal bone was removed through a transverse incision made on the palatal side and the elastic force was used to retract the anterior segment. Several modifications were done regarding approaches for AMO by Wassmund, [3] Wundere [4] and Cupar. [5]

Cupar's method is the most preferred approach by the surgeons as it provides access for removal of bone under direct visualization through the nasal floor. The bone is removed from the lateral, superior and posterior palatal surfaces in slice until the segment is placed in the desired position according to the prefabricated splint.

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Previously our team had conducted numerous studies which include in vitro studies, [6] review, [7,8] survey [9-12] and clinical trials. [13-20] Now, we are focusing on retrospective studies. Previously our team has a rich experience in working on various research projects across multiple disciplines. [21-35]

Now the growing trend in this area motivated us to pursue this project. In this study, the prevalence of anterior maxillary osteotomy procedure amongst the patients with skeletal class II malocclusion and its correlation with age and gender is focused.

Methodology

Study setting

This retrospective study was conducted among patients reporting to the Outpatient Dental Department of Oral Surgery Clinic at Saveetha Dental College, Chennai during the period between June 2019 to May 2020 and was approved by the Institutional Research Board (SDC/SIHEC/2020/DIASDATA/0619-0320).

Data collection

A total of 86000 patient records were reviewed and analyzed. All the cases of skeletal class II malocclusion from June 2019 to May 2020 were screened. Patients who had undergone treatment for skeletal classII malocclusion were included in the study.

There was no specific inclusion or exclusion criteria for the age and the sex. Patients were divided according to their treatment into the groups 'AMO' and other treatment among patients with skeletal class II malocclusion. The participants were divided into age groups that included 16-20 years, 21-25 years, 26-30 years, 31-35 years, 35-40 years, 41-45 years and 46-50 years. Also the subgroups were divided according to gender (males and females). All data was gathered and tabulated using Microsoft Excel.

Statistical analysis

Descriptive statistics was performed to find the prevalence of anterior maxillary osteotomy procedure for the treatment of skeletal class II malocclusion according to age and the sex. Chi-square test was performed to determine the association between the type of treatment done with age and gender of the patients with skeletal class II malocclusion and statistical significance. SPSS software used to perform the statistical tests. The associations was considered to be statistically significant if the probability value was less than 0.05 ($p<0.05$).

Results and Discussion

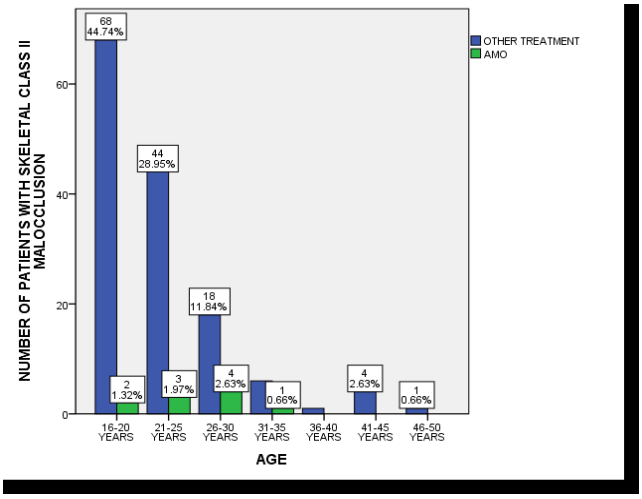
Total 152 cases were included in this study. There were 71 (46.4%) males and 81 (58.6%) females with. Age group 16-20 years had 46.4 % of patients, group 21-25 had 30.3%, group 26-30 had 15.1% of patients, age group 36-40 years and 46-50 years had 7% of patients, 3.9% and 2.6% of the patients were present in the age group 31-35 years and 41-45 years respectively. Out of 152 patients 10 (6.6%) patients had undergone AMO procedure and 142 (93.4%) patients underwent other surgical and orthodontic procedures during the specific period of time. The maximum number of AMO procedures were done during the age group 26-30 years. Total 4 (40%) males and 6 (60%) underwent the AMO procedure for skeletal class II malocclusion. The association between age and treatment did not show statistical significance ($p<0.06$). Also the association between gender and treatment showed no statistical significance ($p<0.67$) [Table 1, Table 2, Graph 1].

Table 1: Represents the frequency distribution of patients with skeletal class II malocclusion according to the age groups. Highest number of patients were observed in the age group between 16-25 years (46.6%); followed by age group 21-25 years (30.3%); age group 26-30 years (15.1%); age group 31-35 years (3.9%); 36-40 years (0.7%); age group 41-45 years (2.6%); 46-50 years (0.7%).

Age groups	Frequency	Percentage
Age grp 16-20	70	46.1
Age grp 21-25	46	30.3
Age grp 26-30	23	15.1
Age grp 31-35	7	3.9
Age grp 36-40	1	0.7
Age grp 41-45	4	2.6
Age grp 46-50	1	0.7
Total	152	100

Table 2: Represents the frequency distribution of patients with skeletal class II malocclusion according to the gender. Number of female patients (53.6%) involved in the study were more than the male patients (46.6%).

Gender	Frequency	Percentage
Male	71	46.4
Female	81	53.6
Total	152	100



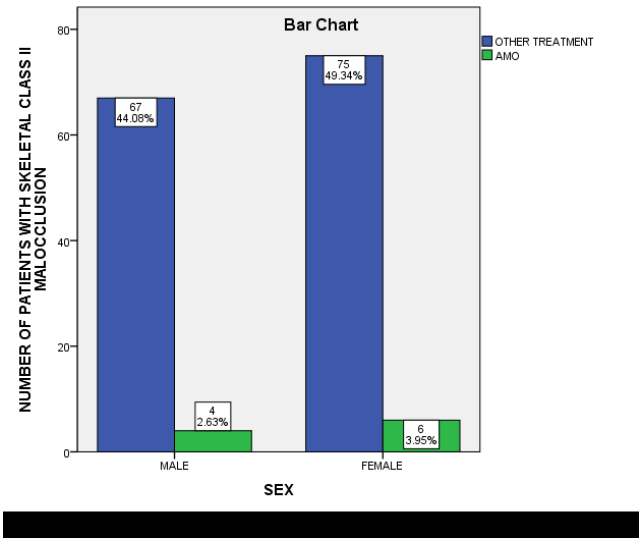
Graph 1: Bar graph reveals the association of type of treatment done for skeletal class II malocclusion with age of the patients. X-axis denotes age groups of the individuals. Y-axis denotes the number of patients with skeletal class II malocclusion. AMO procedures done are more in the age group of 26-30 years (Green) when compared to other age groups. The association between age and treatment did not show statistical significance p=0.06 (p<0.05).

Skeletal class II malocclusions are presented with maxillomandibular skeletal disharmony with underdeveloped mandibular growth and/ or maxillary excess which leads to convex profile. [36] Treatment of Class II malocclusions should ideally focus first on improving the skeletal discrepancy using functional appliances during the active growth phase of an individual. [37] Dentoalveolar compensations, reduced overjet and the severity of the Class II malocclusion, are still the major effect of functional appliances. In adults, the maxillomandibular position in relation to cranial base can be adjusted with orthognathic surgery to improve the facial esthetics. However, part of the Class II malocclusion can be treated with dentoalveolar compensation alone and also other methods have been advocated in the literature. Our institution is passionate about high quality evidence based research and has excelled in various fields. [38–44] Anterior maxillary osteotomy is a simple and reliable procedure in the management of dentofacial deformities. However, there is very little information available in the literature about this procedure. Due to the recent advancements in orthodontic-orthognathic treatments and the associated complications, the necessity of anterior maxillary osteotomy is declined. [45] The complications observed in AMO perioperatively are similar to that reported in Le fort I osteotomies and vary from minor complications like dentinal hypersensitivity to the loss of osteotomy segment due to avascular necrosis. [46] Some of the complications in anterior maxillary osteotomy are completely different from those which are encountered during a Le fort I osteotomy. Difficulty in the planning with the movement of the segment with desired vascularity is the main concern. [47] Apart from this complications like airway disturbances, undesirable occlusion, increased interdental spacing also soft tissue and vascularity related complications like patalal tear, palatal hematoma, partial necrosis of the segment and butthole defect are advocated in the literature.

The anterior maxillary osteotomy was used very commonly in earlier times of the orthognathic surgery; however, it is slowly getting phased out due to advancement in the orthodontic-orthognathic surgical treatment planning, and improved in the results using planned full jaw procedures. Some surgeons still prefer to perform the anterior maxillary osteotomy over other orthodontic-orthognathic surgical procedures. This study has been done to evaluate the prevalence of the anterior maxillary osteotomy procedures amongst other orthodontic and orthognathic surgical procedures. In this study it was observed that 10 (6.6%) patients had undergone AMO procedure while 142 (93.4%) patients underwent other orthodontic and surgical procedures. The number of patients treated with surgical procedures were less than the patient treated with orthodontic treatment. The limitations of the study includes, less sample size and the duration of the study. The association between age and treatment did not show statistical significance (p<0.06). Also the association between gender and treatment showed no statistical significance (p<0.67) maybe because of the inadequate sample size [Table 3, Graph 2].

Table 3: Represents the frequency distribution of patients with skeletal class II malocclusion according to the type of treatment done. Number of female patients (53.6%) involved in the study were more than the male patients (46.6%).

Type of treatment	Frequency	Percentage
Other treatment	142	93.4
AMO	10	6.6
Total	152	100



Graph 2: Bar graph represents association between gender and the type of treatment done for skeletal class II malocclusion with age of the patients. X-axis represents the gender of the patients and Y-axis denotes the number of individuals within skeletal class II malocclusion. AMO procedures done are more in the females compared to males. There is no significant difference in the prevalence of AMO according to the gender p=0.67 (p<0.05).

Conclusion

Within the limit of this study we can conclude that the prevalence of the anterior maxillary osteotomy procedure is less as compared to the other orthognathic and orthodontic procedures. The prevalence of AMO procedure was maximum in the age group between 26-30 years. No significant difference was seen between the prevalence of the procedure in males and females. Awareness about surgical treatment and presurgical counselling should be done for patients with dento-skeletal deformities.

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