

## Analysis of Skeletal Malocclusion Patients Opting Only for Orthognathic Surgery Without Orthodontic Treatment

Research Article

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### Abstract

In this era, orthodontics has advanced from simple dental corrections to a form of correction that provides a harmonious relationship between functional stability and esthetic enhancements of an individual's craniofacial structure. The need of obtaining this harmonious relationship is what ultimately led to the practice of orthognathic surgeries. Using the orthognathic approach, the ability to correct not only skeletal components and soft tissues were possible but the end result also optimizes the esthetic component. The aim of this study was to analyze skeletal malocclusion patients opting only for orthognathic surgery. A total of 18 patients who have completed their orthognathic surgery treatments were evaluated. Their age, gender, and skeletal malocclusion was obtained from patient records at Saveetha Dental College and Hospitals from June 2019 to March 2020. Both frequency test and chi-square test were done through IBM SPSS Statistical Analysis. From this study, a total of 12 (66.7%) of the patients who have opted only for orthognathic surgery were diagnosed with Class II Skeletal Malocclusion while the remaining (33.3%) were diagnosed with Class III Skeletal Malocclusion. Within the limits of this study, Class II Skeletal Malocclusion patients showed a higher prevalence in undergoing only orthognathic surgery.

**Keywords:** Skeletal Malocclusion; Class II; Class III; Orthognathic Surgery; Orthodontic Treatment.

### Introduction

In cases where patients have gone beyond the age of any occurrence of growth modifications or instances where the dentofacial conditions are too severe, orthognathic surgery becomes the main treatment option that aids in repositioning the maxilla, mandible as well as the chin. It comes to no surprise as the growth status of an individual is essential in determining the type of orthodontic/orthopedic intervention that is required [1]. Additionally, the fundamental key of orthodontics is the movement of teeth through the alveolar bone which is the result of forces acting on it [2]. Thus, it is important to evaluate the skeletal growth pattern before it's too late since it plays a major role in early detection, which will affect the subsequent treatment planning [3, 4].

In this modern era, orthognathic surgical treatments function to

provide both corrections to jaw deformity as well as various adjunctive procedures to refine hard and soft tissue contours. Esthetic harmony has become one of the major objectives of orthodontic treatment [5]. This harmonious relationship should include changes in regard to not only aesthetics but also the function and health of a patient's dentition [6], which can be obtained from such surgical procedures. Some of the adjunctive procedures include genioplasty, septorhinoplasty and suction lipectomy of the neck [7]. Undergoing orthognathic surgeries is considered an essential component to prevent unwanted tooth movement during an orthodontic treatment as it directly uses anchorage devices during such therapies [8]. Furthermore, orthognathic surgery also helps attain proper skeletal changes rather than solely focusing on the dental changes [9].

For some patients, the combined cost of orthodontic and orthog-

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nathic treatment becomes a burden [10]. Besides, treating such jaw discrepancies and malocclusion may be perceived variably to insurance carriers. As a result of the escalated cost in treatments [11], practicing professionals should be conscious of this and help plan a specific treatment that takes this issue into consideration [7].

Orthodontics have advanced from simple dental corrections to a form of correction that provides a harmonious relationship between functional stability and esthetic enhancements of an individual's craniofacial structure [12]. The need of obtaining this harmonious relationship is what ultimately led to the practice of orthognathic surgeries [13, 14]. Using the orthognathic approach, the ability to correct not only skeletal components and soft tissues were possible, but the overall end result also optimizes the esthetic component. To accomplish this, both the orthodontist and the surgeon need to work together to correctly diagnose both dental and skeletal deformities, and in the end, devise a proper treatment plan for the patient [15]. With the help of an orthodontist, the basic biomechanical principles can be applied together during the surgical procedures [16]. Orthodontic mechanics plays a vital part in a particular treatment outcome as it depends on the quantification of force that is delivered [17]. Previously our team has a rich experience in working on various research projects across multiple disciplines [18-32].

The aim of this study was to analyze the prevalence of skeletal malocclusion patients opting only for orthognathic surgery without pre and post surgical Orthodontics. The main purpose being that by determining the relation between both skeletal malocclusions and orthognathic surgery, it can directly provide a better insight on this topic. With this, it can allow for a better diagnosis, proper treatment planning and favourable prognosis for the patient [33].

## Materials And Methods

A single centre retrospective study was done in an institutional setting. The ethical approval was received from the institution's ethical committee. The study involved selected patients data who were diagnosed with skeletal malocclusion and had only undergone orthognathic surgery. The necessary approvals in gaining the datas were obtained from the institutional ethical committee (SDC/SIHEC/2020/DIASDATA/0619-0320). The number of people involved in this study included 3 people (guide, reviewer and researcher).

### Selection of Subjects

From a total case record of 508 patients with skeletal malocclusion, a total sample size of 18 patients who have only undergone orthognathic surgery from the period of June 2019 to April 2020 were selected for this study. There were three people involved in this study (guide, reviewer, and researcher). All available data were taken into consideration.

### Data Collection

The patient's details were retrieved from the institution's patient record management software (Dental Information Archiving Software). Data regarding patients age, gender and skeletal maloc-

clusion were taken into consideration for this study. Cross verification of the data was done with the help of photographs. The data was manually verified, tabulated and sorted.

### Inclusion Criteria

All patients who were diagnosed with Class II and Class III skeletal malocclusion. All patients who had undergone orthognathic surgery. All age groups were taken into account.

### Exclusion Criteria

All patients diagnosed with Class I skeletal malocclusion. All patients who have undergone orthodontic treatments. Repetitive records were excluded as well.

### Statistical Analysis

The tabulation of data was analysed using SPSS software (IBM SPSS Statistics 26.0). The method of statistical analysis that was used in this study was the Chi-square test to compare two proportions. The analysis was done for: age, gender and skeletal malocclusion of the patients.

## Results And Discussion

### Skeletal Malocclusion

Based on the study that was conducted, a total of 12 (66.7%) patients who have opted only for orthognathic surgery were diagnosed with Class II Skeletal Malocclusion while the remaining 6 (33.3%) patients were diagnosed with Class III Skeletal Malocclusion. [Figure 1]

### Age Group and Gender

Analysis of the distribution in age groups showed that a total of 9 (50.0%) patients were in the 26-35 years age group while there were 7 (38.9) patients in the 15-25 years old age group and the remaining 2 (11.1%) of them were in the 36-55 years old age group. [Figure 2]

In regard to the gender distribution, a total of 8 (44.4%) patients were females while the remaining 10 (55.6%) were males. [Figure 3]

### Gender and Skeletal Malocclusion

In regard to Class II Skeletal Malocclusion patients, a total of 7 (38.9%) orthognathic surgery patients were females while 5 (27.8%) patients were males. When Class III Skeletal Malocclusion patients were analyzed, a total of 5 (27.8%) orthognathic surgery patients were males as compared to only 1 (5.6%) patient who was a female. [Figure 4]

When the significance between these two was analyzed, it showed no statistical significance ( $p=0.94$ ).

### Age Group and Skeletal Malocclusion

When the age group of these patients was analyzed, patients di-

Figure 1. Bar chart represents the percentage distribution across the skeletal malocclusion of patients opting only for orthognathic surgery. X-axis represents the type of skeletal malocclusion and Y-axis represents the percentage of patients undergoing orthognathic surgery. Patients with Class II skeletal malocclusion (purple) showed a higher prevalence in undergoing only orthognathic surgery compared to patients with Class III skeletal malocclusion (blue).

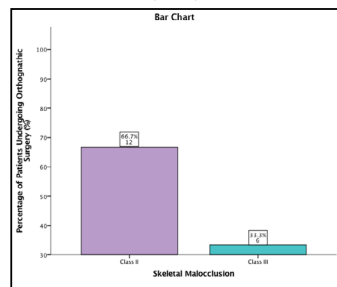


Figure 2. Bar chart represents the percentage distribution across the age group of patients opting only for orthognathic surgery. X-axis represents the age group and Y-axis represents the percentage of patients undergoing orthognathic surgery. The age group ranging between 26-35 years old (orange) showed a higher prevalence in undergoing only orthognathic surgery compared to both the age groups ranging from 15-25 years old (green) and 36-55 years old (yellow).

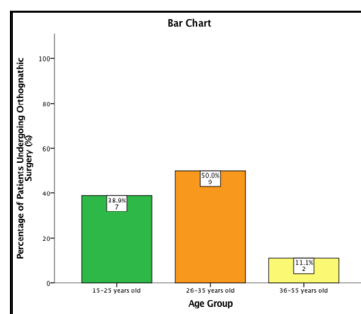


Figure 3. Bar chart represents the percentage distribution across the gender of patients opting only for orthognathic surgery. X-axis represents the gender and Y-axis represents the percentage of patients undergoing orthognathic surgery. Males (blue) showed a higher prevalence in undergoing only orthognathic surgery compared to females (pink).

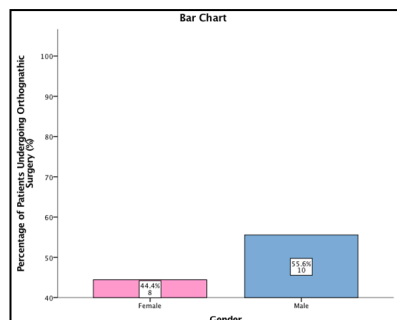
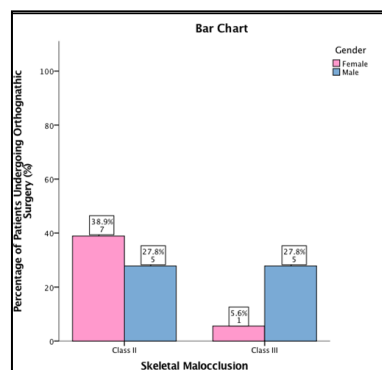


Figure 4. Bar chart represents the association between the skeletal malocclusion and the gender of patients undergoing only orthognathic surgery. X-axis represents the skeletal malocclusion and Y-axis represents the percentage of patients undergoing orthognathic surgery. Chi-square test shows that there is no significant association between the skeletal malocclusion and the gender of the patients,  $p=0.94$  ( $P>0.05$ ) which denotes not statistically significant. There was a higher prevalence of female patients (pink) with Class II skeletal malocclusion when compared to female patients (pink) with Class III skeletal malocclusion.



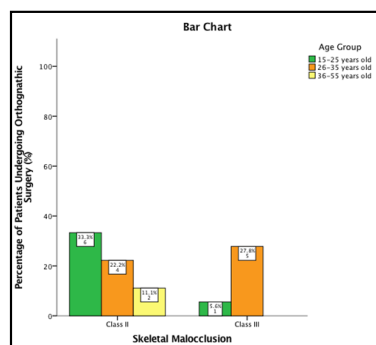
agnosed with Class II Malocclusion were the highest (33.3%) in age group ranging from 15-25 years old followed by the age group ranging from 26-35 years old (22.2%) and the least (11.1%) in the age group ranging from 36-55 years old.

In regard to Class III skeletal malocclusion patients, a majority be-

longed to the age group ranging between 26-35 years old (27.8%) while the remaining were categorized into the age group ranging between 15-25 years old (5.6%). [Figure 5]

When the correlation between the age group and skeletal malocclusion was evaluated, it also showed no statistical significance

Figure 5. Bar chart represents the association between the skeletal malocclusion and the age group of patients undergoing only orthognathic surgery. X-axis represents the skeletal malocclusion and Y-axis represents the percentage of patients undergoing orthognathic surgery. Chi-square test shows that there is no significant association between the skeletal malocclusion and the gender of the patients,  $p=0.13$  ( $P>0.05$ ) which denotes not statistically significant. Patients with Class II skeletal malocclusion is more commonly associated with an age group ranging from 15-25 years old (green) while patients with Class III skeletal malocclusion is more commonly associated with the age group ranging from 26-35 years old (orange).



( $p=0.13$ ).

Based on the skeletal malocclusion distribution of patients opting only for orthognathic surgery, the highest percentage of patients were diagnosed with Class II skeletal malocclusion. In contrast to that of the study done by Boeck EM et al, Class III Malocclusion showed the highest proportion in the Brazil population (34). Another study done by de Souza RA et al also found that the highest prevalence was seen in Class II division 1 (17.5%) and Class II Division 2 (0.7%) followed by Class III (3.7%) (34,35). The reason behind this is because patients with skeletal Class II Malocclusion seek orthodontic-surgical treatment and corrective orthodontic treatment for dental compensation in equal proportions, contrary to patients with Class III Malocclusion, who, from the data observed, much more frequently seek orthodontic-surgical treatment instead of compensatory corrective orthodontic treatment [34].

In regard to the age wise distribution, the highest percentage was seen in the age group ranging between 26-35 years old. Similar to a study done by Boeck EM et al, the highest frequency of age group undergoing orthognathic surgery had a mean age of 26.25 years old. The reason behind this being that at this age, the dentofacial region has fully developed but at the same time it has extended beyond the age where growth can be modified "" on page 2924. Thus, orthognathic surgery would ideally be the option to correct such cases [34].

Based on the gender wise distribution, a higher percentage was seen in males. A study conducted by Almasri M et al also had similar findings in which the female to male ratio was 1:3.2, showing that orthognathic surgeries are more common in males than in females [36]. However, a study done by Boeck EM et al opposes this finding, showing that females had a higher majority. This is because they are said to be more concerned about aesthetics and health, which leads them to seek a solution, and thus, have better acceptance of treatments proposed by professionals [34].

When the association between the gender and skeletal malocclusion was analyzed, it showed that females opting only for surgery are commonly diagnosed with Class II Malocclusions while in males, they are commonly diagnosed with Class III Malocclusions. A study done by Almasri M et al is able to produce the same findings in which Class II Malocclusions are more common in

females and Class III Malocclusions in males [36]. Our institution is passionate about high quality evidence based research and has excelled in various fields [37-47].

Throughout the whole study, there were some limitations encountered which includes a limited time frame of only 10 months and a study demographic that is limited to the city population. In future studies, an increase in the study duration and a bigger population would produce an even more significant study.

## Conclusion

The broad term malocclusion includes all types of dental and skeletal malocclusions. Skeletal malocclusions include maxillary and mandibular linear discrepancies, dental malalignment most frequently is also a component skeletal malocclusions. Although a majority of skeletal malocclusion in adults usually requires orthognathic surgery along with pre and post surgical orthodontics, in certain cases, orthognathic surgery alone can also correct the jaw discrepancies.

In this study, we observed that patients diagnosed with Class II Malocclusions more commonly opt for orthognathic surgery without undergoing orthodontic treatment. Within the limits of this study, we noticed that patients with skeletal malocclusion that undergo orthognathic surgery commonly belonged to the age group of 26-35 years old with a male predominance.

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