

SURGERY FIRST APPROACH IN THE TREATMENT OF SKELETAL MALOCCLUSION - A POSITIVE PSYCHOLOGICAL IMPACT

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ABSTRACT

Background: Compared to the conventional approach to orthognathic surgery, “surgery first” approach can be advantageous in terms of shortened treatment times and immediate esthetic improvement. It indicates that orthognathic surgery precedes orthodontic treatment. In recent years the conventional method of presurgical orthodontics has been replaced with the SFA due to its many benefits over the aforementioned technique. The aim of this study is to find the frequency of SFA in a dental university hospital in Chennai, India.

Materials and Methods: A retrospective cross-sectional study was conducted using data from the Dental Information Archiving Software. Data was collected, tabulated in Microsoft Excel and exported to the Statistical Package for Social Science for statistical analysis. Chi square test was employed with the level of significance set at $p < 0.05$. Appropriate graphs, tables and charts were constructed using the same software for clear representation of the results obtained.

Results: Final data from over 86000 patients visiting the OPD of a dental university hospital in South India consisted of 72 patients. The gender distribution was found to be 52.63% male and 47.37% female. The age distribution was 50.88% below 25 year olds and 49.12% above 25 year. The arches involved were 45.61% both arches, 21.05% upper arch and 33.33% lower arch. OGS was done before orthodontic treatment in 63.16% patients and after orthodontic treatment in 36.84% patients.

Conclusion: The frequency of SFA is higher than the conventional approach in the treatment of skeletal malocclusion in the population studied.

Keywords: Orthognathic surgery, surgery first approach, skeletal malocclusion, dentoalveolar malocclusion, novel, innovative .

Introduction

Orthognathic surgery is one of the most accepted and efficient methods of correcting skeletal and dentoalveolar malocclusions. (Tseng et al., 2011) Le Fort 1 maxillary osteotomy, Bilateral sagittal split osteotomy, genioplasty and subapical osteotomy are few of the most commonly performed procedures for the correction of skeletal malocclusion. (Yu et al., 2015) There is a high success rate of surgical correction in terms of patient and clinician satisfaction. (Posnick & Wallace, 2008) There are two approaches to surgical correction of malocclusion. The first approach requires presurgical orthodontics followed by orthognathic surgery. The surgery first approach (SFA) requires surgical correction followed by orthodontic treatment. (Choi et al., 2015)

Pre-surgical orthodontics has an adverse effect on patients. The treatment time is considerably longer in this group of patients when compared to those who underwent treatment through SFA. (Jeong et al., 2017) The presurgical orthodontic approach involves worsening of facial profile initially which can impact the patients' psychologically and quality of life. (Pelo et al., 2017) It affects the self-image and interpersonal relationships of the patient. (Rivera et al., 2000) Other disadvantages of pre-surgical orthodontics include gingival recession, gingival hyperplasia, root resorption, masticatory and speech discomfort, psychological problems due to delay in treatment outcome etc. (Jacobs & Sinclair, 1983; Mahmood et al., 2018)

There are various alternatives to the presurgical orthodontics approach. Surgery early, surgery last and surgery first approaches are few of those. (Hernández-Alfaro & Guijarro-Martínez, 2014) The surgery first approach suggests that orthognathic correction precedes orthodontic treatment. This method of treatment corrects the facial aesthetics before treating the dental malocclusion. Moreover, there is accelerated tooth movement during the orthodontic treatment, post surgery which considerably shortens the treatment duration. This is because the surgery triggers a period of higher level of osteoclastic activity. (Liou et al., 2011) Higher skeletal stability is achieved in this approach of treatment. (Park et al., 2021) Also, there was better periodontal preservation observed. (B. Wang et al., 2013)

Our team has extensive knowledge and research experience that has translate into high quality publications(J et al., 2018),(Wahab et al., 2018),(Mudigonda et al., 2020),(Narayanasamy et al., 2021),(Bishir et al., 2020; Fan et al., 2021; Gan et al., 2019; Li et al., 2019; Ma et al., 2019; Saravanakumar et al., 2021; Veeraraghavan et al., 2021; H. Wang et al., 2021; Wei et al., 2021; Zhang et al., 2020) (Sathya et al., 2020),(Chandrasekar et al., 2020; Felicita & Sumathi Felicita, 2018; Ramakrishnan et al., 2019).(Su et al., 2019; Wan et al., 2020)

The aim of this study is to find the frequency of surgery first approach OGS in a dental university hospital in South India.

Materials And Methods

Study Design And Setting

This retrospective cross-sectional study was designed and conducted in a Dental University hospital in Chennai, India. Data for the study was assessed and obtained after reviewing patient records and analysing the data of 86000 patients. The data was collected from the patients reporting to the Department of Oral and Maxillofacial Surgery from June 2019- March 2021.

Data Collection

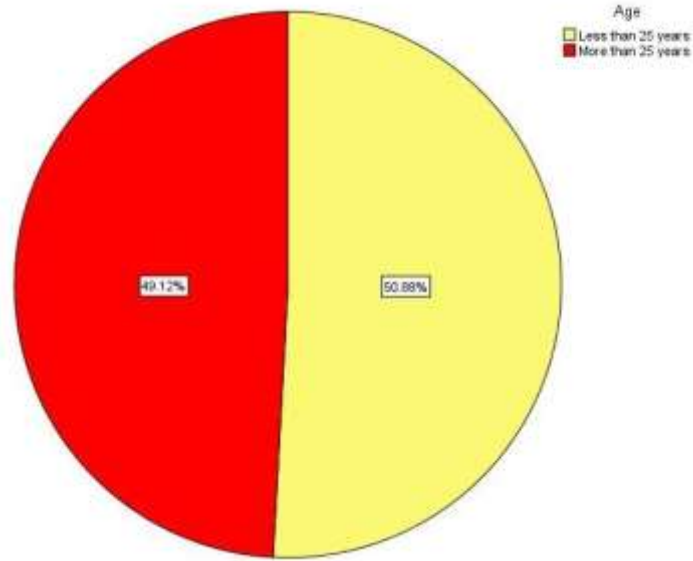
A total of 57 cases of Orthognathic surgery were identified. Other relevant demographic data such as age, gender, patient name, patient ID were recorded. Duplicate patient data and incomplete records were excluded from this study. Clinical photos and radiographs were used to verify the type of bone defect. Data was then verified by an external reviewer.

Statistical Analysis

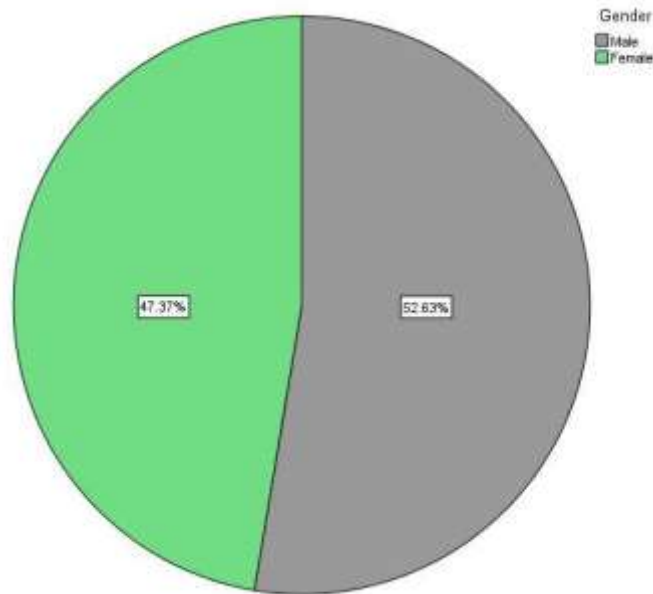
Data was recorded in Microsoft Excel® and later exported to the Statistical Package for Social Sciences after proper coding of the variables involved. These variables included were gender (1. Male, 2. Female), age group (1. Below 25 years, 2. Above 25 years), arch involved (1. Upper arch, 2. Lower arch, 3. Both arches) and Surgery first approach (1. Yes, 2. No). Thereafter, the data was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) for Mac OS (Version 28, 2021). Chi square test was employed with the level of significance set at $p < 0.05$. Appropriate graphs, tables and charts were constructed using the same software for clear representation of the results obtained.

Results

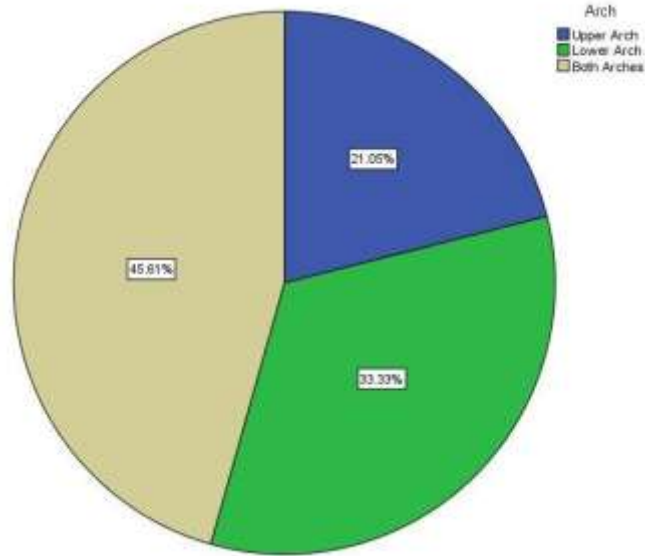
The final data consisted of 72 patients who had undergone orthognathic surgery in the Department of Oral and Maxillofacial Surgery. The age distribution was 50.88% below 25 year olds and 49.12% above 25 year. (Graph 1)



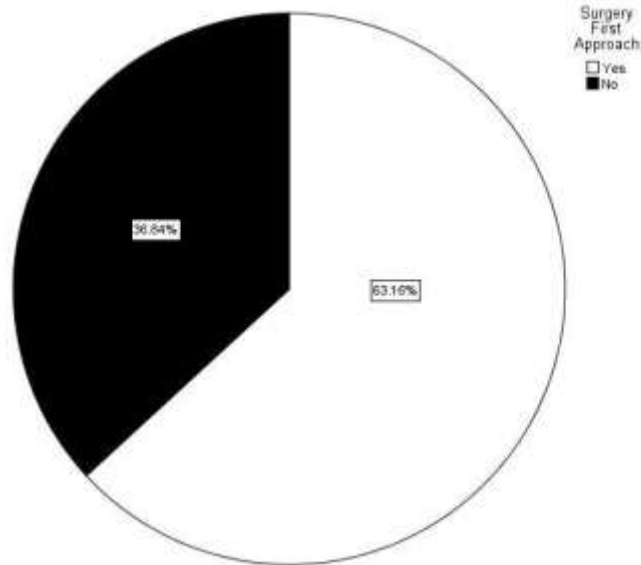
Graph 1: Age distribution among the participants. Less than 25 years- 50.88% (yellow), More than 25 years- 49.12% (orange)



Graph 2: Gender distribution among the participants. Male 52.63% (gray), Female 47.37% (mint). The gender distribution was found to be 52.63% male and 47.37% female. (Graph 2)

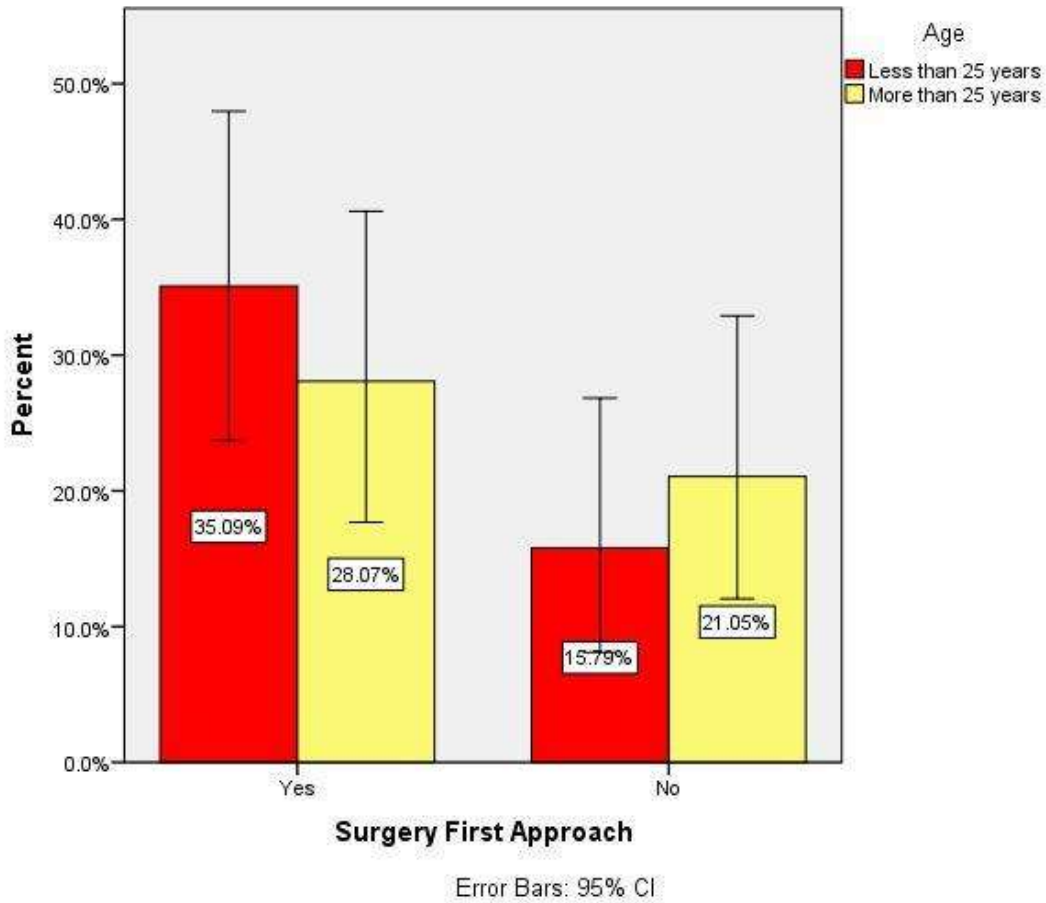


Graph 3: Gender distribution among the participants. Upper Arch 21.05% (blue), Lower Arch 33.33% (green), Both Arches 45.61% (beige).

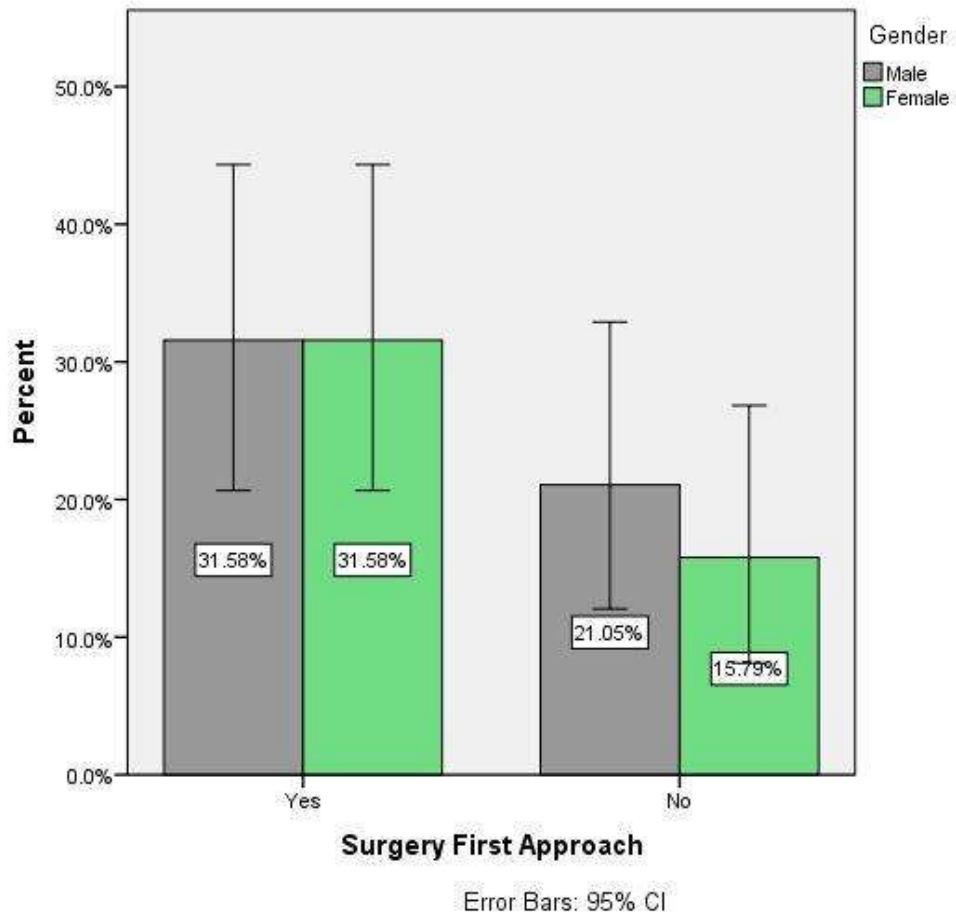


Graph 4: Distribution of Surgery first approach. Yes 63.16% (white), No 36.84% (black). OGS was done before orthodontic treatment in 63.16% patients and after orthodontic treatment in 36.84% patients. (Graph 4).

Surgery first approach was preferred in younger age group and in females (Graphs 5 & 6).

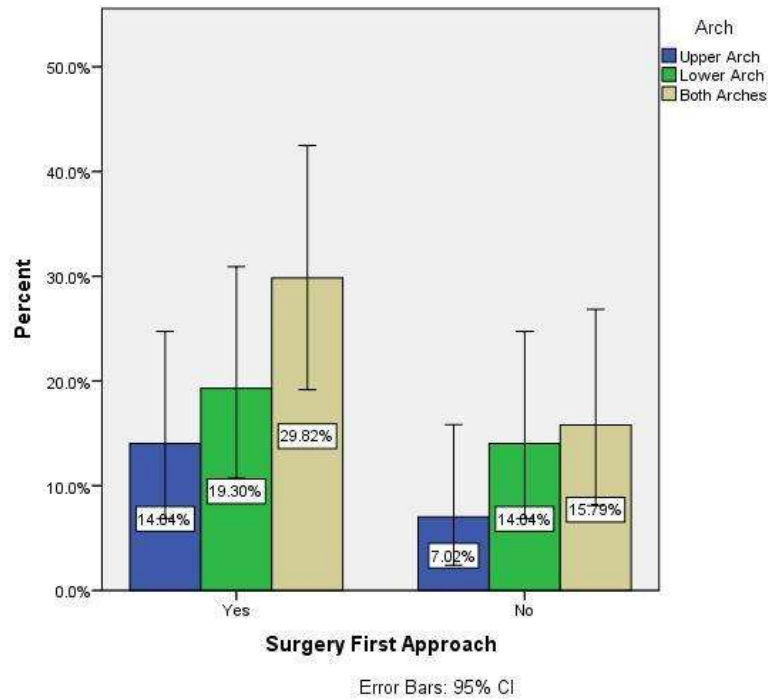


Graph 5: Bar graph showing the association between age groups and surgery first approach. The X axis represents surgery first approach and the Y axis represents the percentage of age groups. (Chi-square test; p-value=0.707; statistically not significant)



Graph 6: Bar graph showing the association between gender and surgery first approach. The X axis represents surgery first approach and the Y axis represents the percentage males and females. (Chi-square test; p-value=0.284; statistically not significant)

The type of osteotomy had no statistical significance whether surgery first or later was done (Graph 7)



Graph 7: Bar graph showing the association between arches and surgery first approach. The X axis represents surgery first approach and the Y axis represents the percentage arches involved. (Chi-square test; p-value=0.284; statistically not significant)

Discussion

The conventional way of orthognathic surgery is post orthodontic treatment. This is effective in its own way but the prolonged period of orthodontic treatment before the surgery can be extremely exhaustive for the patient. (Proffit et al., 2003) The benefit of the surgery first approach is that it allows for a shorter and faster period of orthodontic treatment and prevents worsening of facial features in the course of the treatment. (Hernández-Alfaro et al., 2011) The period of time starting 1 week post surgery and upto 3 months after the surgery grants faster turnover rate of the jaw bones which is termed as the Regional Acceleratory Phenomenon (RAP). It is in this period of time that the orthodontic treatment can be accelerated, thus shortening the total duration of therapy. (Nagasaka et al., 2009; Villegas et al., 2010) There is a high level of satisfaction among those who underwent surgery in the past. Past studies have shown that contentment with surgery increased over time as the treatment reached its termination point. (Zhou et al., 2001)

The outcome of the SFA closely resembles that of the conventional path of treatment. The cephalometric markers post treatment are similar in both approaches. (Choi et al., 2015; Yang et al., 2017) There is high acceptance for this discipline of treatment among the medical community though caution should be taken while planning as there is less data on the follow-up of the SFA. (Peiró-Guijarro et al., 2016) However, in a study comparing the stability of both the approaches it was stated that horizontal relapse was seen in 39.1% of the surgery-first group and only in 15.9% of the conventional therapy group. This suggested that the SFA is less stable than the conventional approach. (Kim et al., 2014)

Wang et al. stated that for transverse problems, the final outcome of the SFA group and Conventional (CS) approach group were the same especially considering the inclinations of the maxillary and mandibular canines and molars.

(Y.-C. Wang et al., 2010) According to Grubb J et al., in case of a transverse maxillary width discrepancy, maxillary expansion should be done before the surgery. (Grubb & Evans, 2007) Liao et al. evaluated the differences in the correction of vertical problems between the two approaches of treatment and stated that both groups had similar maxillary stability in vertical and horizontal directions, and similar mandibular stability in the horizontal direction. There was increased upward mandibular movement in the SFA group which is suggested to assist in the closure of an anterior open bite. (Liao et al., 2010) Ko EW et al. while gauging the correction of sagittal problems stated that there were no differences in the outcomes of both the approaches and that there was no need to employ lengthy orthodontic treatment pre-surgically. (Ko et al., 2011)

Conclusion

The frequency of SFA is higher than the conventional approach in the treatment of skeletal malocclusion in the population studied. Surgery first approach should be executed wherever applicable as it has positive feedback in patient compliance, motivation and faster desirable treatment outcome.

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Conflict Of Interest

The authors declare that they have no conflict of interest.

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