ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

SURGERY FIRST ORTHOGNATHIC APPROACH: A REVIEW ARTICLE

Dr. Kishore MSV, Professor and Head, Dr. Bachuwar Ankush, post graduate, Dr. Madhukar Reddy Rachala, Associate professor, Dr. Sattu Reddy Dharmender, Reader

***Abstract*:** *Skeletal malocclusions are one of the common problem encountered in today's orthodontics. Treatment of such skeletal deformities requires combination of orthodontic and surgical treatment. Surgery first approach is an alternative method to conventional orthognathic surgery which performs surgery directly without the previous orthodontic preparation, followed by a post-surgical orthodontics which enhances the tooth movement and decreases the total treatment duration. Many other benefits of SFOA includes elimination of ugly look decompensation period, establishment of proper maxilla-mandibular relationship before orthodontic treatment and reduced post-surgical orthodontic treatment duration because of regional acceleratory phenomenon (RAP) effect. As it has several advantages, this approach has some of the disadvantages such asthe possibility of relapse is increased as it is difficult to position the mandible as planned and predicting final occlusion is the hardest challenge with surgery first approach. In Orthodontic literature, minimal attention has been dedicated to this approach. This article gives an overview of surgery first orthognathic approach.*

Key words: *Orthognathic surgery, regional acceleratory phenomenon, skeletal malocclusion, surgical orthodontics.*

1. Introduction:

Management of severe skeletal malocclusions in adults requires orthognathic surgery in combination with surgical orthodontics. The term orthognathic surgery was 1st coined by Hullihen[1] in 1849. Since the introduction of the mandibular sagittal split ramus osteotomy by Trauner and Obwegeser[2] in 1957 the modern era of orthognathic surgery has begun. Pre-surgical orthodontic preparation was uncommon for patients requiring orthognathic surgery until the 1960's[3]. However, as surgical techniques advanced and the number of patients choosing an orthognathic approach increased, the patients' and clinician's desire for optimal esthetic and occlusal results led to the most common current treatment approach. This conventional approach for correction of severe dentofacial anomalies consists of three stages, which involves pre-orthognathic orthodontic treatment to relieve the dental compensations followed by the orthognathic surgical procedure and finally post-surgical orthodontics to finish the case and settle the occlusion. Pre-surgical orthodontic procedures usually produce satisfactory results and are considered routine. However, this process is time-consuming. In addition, there is worsening of facial profile, masticatory discomfort during presurgical orthodontic treatment, and psychosocial problems associated with delay in responding to the patient's complaint and also because of the long-term orthodontic preparation, there may be complications such as dental caries, gingival recession, gingival hyperplasia and root resorption.

To overcome the disadvantages and inconveniences of presurgical orthodontics, surgery first orthognathic approach has been introduced by Behrman and Behrman[4] in 1988. They claimed that the normalized surrounding

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

soft tissues (lips, cheeks and tongue) settles the teeth into better positions after surgery, thereby facilitating remaining orthodontic tooth movement rapidly and reducing the total orthodontic treatment period. This concept of "surgery-first and orthodontics second" is called "SFOA" (Surgery-First-Orthognathic-Approach) or "SFA" (Surgery-First approach). Surgery first approach is an alternative methodology to conventional orthognathic surgery ("orthodontics– orthognathic surgery– orthodontics") which performs directly an orthognathic surgery, without the previous orthodontic preparation, followed by a post-surgical orthodontic treatment to achieve the desired final dental alignment. The concept of this technique is that no prior tooth movement or minimal tooth decompensation for shorter period of time in cases of occlusal interference, to use surgery to rapidly achieve facial esthetic improvement that is usually the patient's chief complaint at the beginning of the treatment.

The SFOA is indicated in cases like: well aligned to mildly crowed anterior teeth, normal to mild proclined/retroclined incisor inclination, flat to mild curve of spee, minimal transverse discrepancies, pronounced soft tissue imbalance in skeletal class III patients, severe skeletal class II deformities, in which decompensation is not required, patients who want immediate esthetic result or who want to improve both function and esthetic, patients with facial asymmetries, cleft lip and palate patients.In these patients the immediate post-surgical occlusion must exhibit at least three stable occlusal stops with positive overbite of six anterior teeth and existing arch coordination[3]. SFOA is contraindicated in patient who require definite decompensation, severe crowding, arch-incoordination, severe vertical or transverse discrepancy, patients with high expectations of treatment outcomes in terms of dental esthetics and stable occlusions, severe proclination of upper and lower anteriors.

The advantages of SFOA includes immediate change in the facial profile, having surgery first eliminates the unsightly pre-surgical profile and allows the chief complaint of the patient to be addressed at the beginning of treatment, improved cooperation of the patient during orthodontic treatment, reduces overall treatment period and post-op orthodontic treatment can be progressed rapidly. The main factor which is responsible for rapid tooth movement is the regional acceleratory phenomenon (RAP)[5]. The surgery first approach uses osteotomy to solve both skeletal problems and dental compensation so that the orthodontic treatment becomes less complex, orthodontists can set up treatment plan which fits to the soft tissue-centered concept, If a surgical error or skeletal relapse occurs, compensation can be made with SAS mechanics[6],whereas in conventional treatment, because the decompensation is completed before surgery, it is difficult or impossible to recover from surgical error during postsurgical orthodontic treatment. There are few drawbacks to this approach which should be taken into consideration like predicting the final occlusion is the hardest challenge with surgery first approach[7]. In many cases, the upper and lower models cannot be placed in an ideal occlusion due to multiple dental interferences. If this occlusion is not achievable or is not planned accurately, the result will be far from ideal. The occlusion cannot be used as a guide for establishing treatment goals, unlike traditional surgical-orthodontic treatment in which decompensation of the incisors and coordination of the dental arches are performed before surgery. The skeletal disharmony must be accurately assessed to establish an effective treatment plan, cases requiring extractions are especially very difficult to plan when performing surgery

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

first thus case selection is of outmost importance. When passive stainless steel wires are placed prior to surgery each wire must be bent to rest passively on the surface of each tooth, this is a challenging and time consuming procedure for the orthodontist especially when teeth are severely rotated and misaligned in SFOA procedure.

2. Protocol in SFOA:

SFOA can potentially produce semistable postsurgical occlusion compared with the conventional orthognathic surgical approach because of its sequence without presurgical orthodontic treatment. Therefore, a rigid fixation after surgery has been suggested for maintaining the occlusion stability postoperatively. However, in this new treatment concept, the need of some of the orthodontic procedures are eliminated; some are displaced by maxillary posterior impaction (MPI), occlusal plane rotation (OPR), anterior segmental osteotomy (ASO), or segmental surgery and the other procedures are performed after an orthognathic surgery. Moreover, in order to predict the degree of post-operative orthodontic treatment, a set-up model is fabricated at a dental lab. While the sequence of treatment is similar, different protocols are being used to prepare the patient for surgery, perform the surgical procedure, and initiate orthodontic treatment.

2.1 Preoperative procedures:

This includes timing of bonding in SFOA, stabilizing/ initial arch wires, splints, laboratory procedures.

2.2 Surgical procedure

2.3 Post-surgical procedure:

Intermediate transient malocclusion, immediate post-operative stability, timing of active orthodontic treatment, active orthodontic treatment. (leveling and alignment, decompensation, arch coordination, detailing of occlusion).

2.1 Preoperative procedures:

2.1.1 Timing: Timing of bonding in SFOA: Various authors recommended the timing of bonding in SFOA at different times. Sugawara[8]and Nagasaka[6] recommended that fixed orthodontic appliances should be placed just before surgery even when using a surgery first approach. But the problem is, when brackets are attached immediately before surgery the bond strength of bracket to teeth might be weak and fail to resist the force of intermaxillary fixation. Chung ChihYu[9]Villegas[10] recommended the brackets should be placed 1 week before orthognathic surgery. Ellen Wen ching[11] recommended 1 month before surgery.

2.1.2 Stabilizing/ Initial arch wires in SFOA: Contrary to conventional orthognathic surgery cases, in surgery first treatments leveling and aligning have not yet been performed which makes it very difficult to place the wire. Most authors used stabilizing wires before surgery. Some used NiTi wires and some used stainless steel wires. Liou et al[5] did not placed any orthodontic archwires before surgery. Ching et al[9] used 0.016x0.022" superelastic NiTi wire. Carlos et al[12]have opted to use 0.16"X0.16" nickel-titanium wires at time of surgery. The use of nickel-titanium wires translates into immediate tooth movement after surgery which can be an advantage. However, in doing so, the orthodontist loses the opportunity to observe the stability of the surgical correction prior to starting the tooth movement. Sugawara and Nagasaka[8,6] preferred 0.18"x0.25" SS wires

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

and 0.19"x0.26" SS wires in 0.022 slot are adapted to all teeth for preventing any tooth movement. Full slot withstands the forces resulting from intermaxillary fixation. Either brackets have hooks or brass wire (lugs) are soldered to the arch wire for wiring fixation, Kobayashi hooks can also be used[10]. Occasionally, intermaxillary screws may be required.

2.1.3 Splints in SFOA: The use of surgical splint during and after surgery also varies between different orthodontists. While some advocate the use of the splint only during surgery, other groups have advocated its use anywhere between one to four weeks after surgery. Nagasaka et al[6] have used removable Gelb–type splints post operatively. Their preference is to leave the splint in for about 4 to 6 weeks after surgery and if an open bite is observed, to use elastic between the splint and the mini-screws or to leave the splint for a longer period of time. Sugawara et al[8] modified the surgical splint into a removable maxillary occlusal splint, which was used to stabilize the jaw position and masticatory function.

2.1.4 Laboratory procedures: "Set-up models" are used to predict and simulate dental positions and arch coordination for decision on surgical jaw movement[4].Liou et al[13]suggested to set-up model surgery in proper molar relationships with a positive overbite that is opposite to the conventional approach which uses decompensated incisors as the guide to predict the final occlusion. Moreover, they suggested how to setup models in various circumstances. For example, anon-extraction case could be set-up with molar Class I relationship; in case of lower first premolar extractions, molars could be set up in Class III relationship; and setup molars Class II in cases of maxillary first premolar extractions.

2.2 Surgical procedure:

In 2011, Liou et al[13] suggested specific guidelines for using SFOA to treat cases of skeletal Class III and skeletal Class II in three dimensions; vertical, sagittal and transverse. In vertical discrepancy, deep curve of Spee can cause occlusal interference because there has not been presurgical orthodontic correction. It has been suggested to treat some cases with deep bite with subapical osteotomy, anterior segmental osteotomy or treat with post-surgical orthodontic appliance for correcting dental interferences. However, in applying the SFOA approach, the correction of the vertical discrepancy by anterior or posterior maxillary impaction can create anterior or posterior rotation of the mandible that will improve or worsen the profile of skeletal Class II or skeletal Class III. However, Baek et al[14] suggested posterior maxilla impaction can decrease occlusal interference and increase the amount of mandibular backward rotation. Nagasaka et al[6]and Sugawara et al[8] used removable surgical splints which consist of a lingual bar and ball-end clasps. Grinding of the occlusal surface of splint while using intermaxillary elastics can allow opposing teeth to be extruded and uprighted. Whether the anterior part of splint has acrylic coverage depends on the orthodontist's need to prevent extrusion of incisors or allow anterior teeth eruption. For example, the Gelbtype splint is suggested to maintain intrusion of posterior teeth because it has acrylic coverage over occlusal of posterior teeth only. This design will lead to mandibular upward and forward rotation and chin advancement.

2.3 Postoperative procedure in SFOA:

The objectives of orthodontic treatment after surgery in the SFOA technique are dental alignment, arch coordination, and allow occlusal settling,

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

that together might take another 6-12 months. This period can speed up orthodontic tooth movement especially after orthognathic surgery because there is an increased alveolar bone blood flow during the healing process with stimulation of bone turnover called the Regional Acceleratory Phenomenon[5].Leelasinjaroen et al[15] suggested postsurgical orthodontic treatment could begin as early as one week to one month postoperatively. Kim et al[16] suggested to wait four to six weeks. The surgical splint and intermaxillary fixations should be removed for the tooth movement. Nagasaka et al[6] completed postoperative orthodontic treatment within approximately 1 year. Sugawara et al[8]removed the fixed orthodontic therapy after 9 months. Villegas et al[12]removed the fixed appliances 7 months after surgery. Treatment time was approximately 6-12 months shorter using a surgery-first approach compared with using a conventional orthodontics-first approach. Only one study[15] described similar treatment times (approximately 1.5 years) for both approaches. The period for post-op inter-digitation is about 2-3 months. During this period, Orthodontists rapidly set the occlusion between upper and lower molars and adjust the width of the molar areas. Risk management: The removal of wafer, immediate after orthognathic surgery may exhibit premature contact, difference among molar width etc. that might result in an open bite. Therefore, while patient wears the wafer, Orthodontists perform the occlusal splint adjustment and elastic wearing to the patient. Orthodontic treatment begins 2 weeks after the surgery:

3. Regional Acceleratory Phenomenon (RAP):

The regional acceleratory phenomenon (RAP) was well described by Frost in 1989[17]. After an osteotomy, bone remodeling around the healing tissue facilitates the healing process. This regional acceleratory phenomenon can be utilized by the orthodontist following orthognathic surgery to accelerate tooth movement. By performing surgery first, this period of rapid metabolic activity within the tissues can be harvested for efficient orthodontic treatment. In 2001, Wilcko et al[18]suggested that rapid tooth movement in the context of corticotomy-facilitated orthodontics was the result of a demineralization–remineralization process consistent with the wound healing pattern of the regional acceleratory phenomenon. It seems that selective bone injury results in an overwhelming activating stimulus for both catabolic and anabolic responses in the peridontium. It is possible that the alveolar bone adjacent to the osteotomies performed during orthognathic surgery also undergoes increased bone turnover. This could account for the more efficient postoperative orthodontic movements and hence contribute to the total treatment time reduction in a "surgeryfirst" sequence. Serum alkaline phosphatase and C-terminal telopeptide of type I collagen are two bone markers which have been studied. The former is associated with osteoblastic activity while the latter is a by-product of osteoclastic breakdown of bone. The results of one such study show that orthognathic surgery triggers three to four months of higher osteoclastic activities and metabolic changes in the dentoalveolus[19].

4. Treatment Planning Considerations:

Careful planning is the key to the success of any orthognathic surgery case especially when the surgical procedure is to be performed prior to orthodontic treatment.

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

4.1 Treatment considerations in skeletal class II in SFOA:

Skeletal class II malocclusion typically involves proclination of mandibular incisors and upright/mild proclination of maxillary incisors[2,8]. SFOA may be particularly beneficial for a class II patient with a retrusive mandible. Immediately after surgery the Class II malocclusion becomes a super class I or Class III relationship following mandibular advancement, with an edge-to-edge incisor relationship or bimaxillary dentoalveolar protrusion. This situation therefore requires the use of class III orthodontic mechanics or it can also be corrected by extracting all first premolars followed by retraction as in class I bimaxillary protrusion cases. Thus the resulting improvement in the tone of the lower lip and tongue increases the forces acting on the incisors in both arches. In class II division 2 cases it is difficult to perform SFOA as there is a less overjet. In such cases surgery can be performed after uprighting the upper anteriors and after obtaining the sufficient overjet for the advancement of mandible or surgery can also be performed directly without presurgical orthodontics thereby getting reverse overjet, which can be corrected post-surgically. In anteroposterior and vertical decompensation for a moderate to deep curve of spee and proclined lower incisors in class II mandibular retrognathism, the anterior segment of the mandible could be leveled and intruded surgically through anterior segmental osteotomy so that the mandible could be advanced properly[13]. Alternatively, the mandible could be surgically advanced to an edge-to-edge incisor relationship and without occlusal contact in the posterior teeth and then postoperatively, the mandibular anterior teeth could be orthodontically intruded so that the mandible rotates upward and forward for posterior occlusal contact and a better chin projection.

4.2 Treatment considerations in skeletal class III in SFOA:

In these cases, the lower incisors are usually crowded and retroclined while the maxillary incisors are commonly flared out[19]. One of the goals of presurgical orthodontics is to position incisors in a proper angulation to the jaw bone, so the surgeon can set back the jawbones to their maximum. Sometimes extraction is required for retraction of the upper anterior teeth and relief of lower crowding. This also increases the time needed for pre-surgical preparation. Therefore when surgery is performed first, a class III malocclusion always become a class II relationship immediately after mandibular setback which should be maintained with surgical splint and requires class II orthodontic mechanics after surgery and adjustment of the anterior teeth can be managed postoperatively. In anteroposterior and vertical decompensation in class III cases the anteroposterior decompensation for proclined maxillary incisors could be achieved by extraction of the maxillary first premolars and anterior segmental osteotomy or by clockwise rotation of the

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

maxilla by Lefort 1 osteotomy to upright the upper incisor inclination[20]. The second approach is recommended because the first approach might have the disadvantage of the lack of an occlusal antagonist in the mandibular second molars. The anteroposterior decompensation for moderately retroclined and crowded lower incisors in a class III case could be achieved by setting up the molars in a class I relationship with an excessive incisor overjet, and then the lower incisors could be aligned postoperatively to obtain a normal overjet. The anteroposterior decompensation for severely retroclined and crowded lower incisors in a class III case could be achieved by extractions of the lower first premolars and anterior segmental osteotomy, setting up the molars in a class III molar relationship with an excessive incisor overjet, and then the lower inciosrs could be aligned postoperatively to obtain a normal overjet. A chin cap could be applied to prevent mandibular skeletal relapse in the first 3 months
postoperatively.

The stability and risk factors in SFOA includes surgical procedures like types of fixation of bone fragments, displacement and rotation of the maxillary-mandibular complex, temporomandibular joint dysfunction condylar resorption and muscular factors[16]. Dental factors includes incisor inclination, overbite, overjet, depth of the curve of spee, anterior facial height, mandibular plane angle, occlusal plane angle and palatal plane angle. Ching EW, Pin SS et al[21]compares postsurgical stability of skeletal class III malocclusion with and without presurgical orthodontic treatment based on cephalometric investigation. Surgical orthodontics performs ideal dental decompensation in presurgical orthodontic treatment to achieve greater skeletal correction and stability. Rhee CH et al[22] studied, surgery-first orthodontic treatment postoperative occlusal instability results primarily from premature contact of the extruded upper second molar. Premature cusp-to-cusp premolar contact is often associated with postoperative surgical occlusion. Additionally, premature contact induces postoperative occlusal instability, increased vertical dimension, and postoperative forward mandibular movement.

5. Conclusion:

Performing orthognathic surgery before orthodontic treatment has multiple advantages like shortened treatment time, increased patient acceptance, and the utilization of the regional acceleratory phenomenon. By utilizing the principles of surgery first technique, the pre-surgical orthodontics period can be shortened eventhough if it is not eliminated. As with any other surgical procedure, the patient's well-being and chief complaint should always be the first priority. The future of orthognathic surgery is geared toward minimizing the overall treatment time without compromising the final results.

6. References:

I. Poulton DR, Ware WH. The American academy of oral roentgenology joins our Journal. Oral Surg Oral Med Oral Pathol 1959: 12: 389-90.
II. Trauner R, Obwegeser H: The surgical correction of mandibular prognathism and retrognathia with consideration of genioplasty. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1957: 10: 677.
III. Kim JH, Mahdavie NN and Evan CA. Guidelines for "Surgery First"

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

Orthodontic treatment. Orthodontic basic aspects and clinical considerations: 2012: 265-300

IV. Behrman SJ, Behrman DA. Oral surgeons considerations in surgical orthodontic treatment. Dent Clin North Am 1988: 32: 481-507.

V. Liou EJW, Chen PH, Wang YC surgery-first accelerated orthognathic surgery: postoperative rapid orthodontic tooth movement. J Oral Maxillofac Surg 2011: 69: 781-785.

VI. Nagasaka H, Sugawara J, Kawamura H, Nanda R. surgery first skeletal class III correction using the skeletal anchorage system. J Clin Orthod 2009: 58 (2): 97-105.

VII. Jin Young Choi, Seung-Hak Baek, Yoon-Hee Kwon. New paradigm in orthognathic surgery and orthodontic treatment (surgery first orthognathic approach and minimum presurgical orthodontic approach): Vol-III.

VIII. Sugawara J, Aymach Z, Nagasaka H, Kawamura H, Nanda R, "Surgery First" Orthognathics to correct a skeletal class II malocclusion with an impinging bite. J Clin Orthod 2010: 56 (7): 429-438.

IX. Chih Yu C, Chen PH, Liou JW, Huang CS, Chen YR. A Surgery-first Approach in Surgical-orthodontic treatment of mandibular prognathism – A Case Report. Chang Gung Med J 2010: 33: 699-705.

X. Villegas C, Uribe F, Sugawara J, Nanda R. Expedited correction of significant dentofacial asymmetry using a "Surgery First" Approach. J Clin Orthod 2010: 56 (2): 97-103.

XI. Ching KO EW, Pin Hsu SS, Hsieh HY, Wang YC, Huang CS, and y Chen YR. Comparison of progressive cephalometric changes and postsurgical stability of skeletal class III correction with and without presurgical orthodontic treatment. J Oral Maxillofac Surg 2011: 69: 1469-1477.

XII. Villegas C, Janakiraman N, Uribe F, Nanda R Rotation of the maxillomandibular complex to enhance esthetics using a "Surgery First" Approach. J Clin Orthod 2012: 56 (2): 85-91.

XIII. Liou EJW, Chen PH, Wang YC, Yu CC, Chen YR. Surgery-First Accelerated Orthognathic Surgery: Orthodontic guidelines and setup for model surgery. Journal of Oral and Maxillofacial Surgery 2011: 69 (3): 771–780.

XIV. Baek SH, Ahn HW, Kwon YH, Choi JY. Surgery-first approach in skeletal Class III malocclusion treated with 2- jaw surgery: evaluation of surgical movement and postoperative orthodontic treatment. J Craniofac Surg. 2010: 21: 332–338.

XV. Leelasinjaroen P, Godfrey AM, Manosudprasit M, e Wangsrimongkol T, Surakunprapha P. Surgery First Orthognathic Approach for skeletal class III malocclusion corrections- A literature review. J Med Assoc Thai 2012: 95 (11): 172-178.

XVI. Kim JY, Junga HD, Kimb,SY, Parka HS, Junga YS Postoperative stability for surgery-first approach using intraoral vertical ramus osteotomy: 12 month follow-up. British Journal of Oral and Maxillofacial Surgery 2014: 52: 539–544.

XVII. Frost HM. The biology of fracture healing. An overviewvfor clinicians. Part I. Clin Orthop Relat Res 1989: 248: 283-93.

XVIII. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: two case reports of

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

decrowding. Int J Periodontics Restorative Dent 2001: 21: 9-19.

XIX. Aymach Z, Sugawara J, Goto S, Nagasaka H, Nanda R. Nonextraction "Surgery First" Treatment of a skeletal class iii patient with severe maxillary crowding. J Clin Orthod 2013: 57 (5): 297-304.

XX. Converse JM, Horowitz SL. The surgical orthodontic approach to the treatment of dentofacial deformities. Am J Orthod 1969: 55: 217- 43.

XXI. Ching Ko EW, Lin SC, Chen MR, and Huang CS. Skeletal and dental variables related to the stability of orthognathic surgery in skeletal class III malocclusion with a surgery-first approach. J Oral Maxillofac Surg: 2013: 71: 215-223

XXII. Rhee CH, Choi YK, Kim YL, Park SB and Son WS Correlation between skeletal and dental changes after mandibular setback surgery-first orthodontic treatment: Cone-beam computed tomography-generated half-cephalograms.Korean J Orthod 2015: 45(2): 59-65.

ISSN (online): 2250-141X
Vol. 6 Issue 1, February 2016

Author details:

1. **Author**

Dr. Kishore MSV
BDS, MDS, MOrtho RCS
Professor and Head
Department of Orthodontics
SVS institute of Dental Sciences
Mahabubnagar, Telangana
India
msvkishore@gmail.com

2. **Author**

Dr. Bachuwar Ankush
BDS, (MDS)
Department of Orthodontics
SVS institute of Dental Sciences
Mahabubnagar, Telangana
India
ankush.bachuwar@gmail.com

3. **Author**

Dr. Madhukar reddy Rachala
BDS, MDS, DIBO
Associate professor
Department of Orthodontics
SVS institute of Dental Sciences
Mahabubnagar, Telangana
India
mrachalaortho@yahoo.co.in

4. **Author**
Dr. Sattu Reddy Dharmender,
BDS, MDS

Reader
Department of Orthodontics
SVS Institute of Dental Sciences
Mahabubnagar, Telangana
India
drdharmendarreddy@hotmail.com