

## “Extraction Protocol for Facial Profile Correction in a Hypodivergent Case with Crowding and Severe Dental Protrusion” – A Case Report

Dr. Bhushan Jawale<sup>1</sup>, Dr. Lishoy Rodrigues<sup>2\*</sup>, Dr. KM Keluskar<sup>3</sup>, Dr. Anup Belludi<sup>4</sup>, Dr. Rohan Hattarki<sup>5</sup>, Dr. Shrinivas Ashtekar<sup>6</sup>

<sup>1</sup>Professor, Dept. of Orthodontics and Dentofacial Orthopedics, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune, Maharashtra, India

<sup>2</sup>Post Graduate Resident, Dept. of Orthodontics and Dentofacial Orthopedics, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune, Maharashtra, India

<sup>3</sup>Principal, Professor and HOD, Dept. of Orthodontics and Dentofacial Orthopedics, KLE Dental College and Hospital, Belgaum, Karnataka, India

<sup>4</sup>Professor and HOD, Dept. of Orthodontics and Dentofacial Orthopedics, KLE Dental College and Hospital, Bangalore, Karnataka, India

<sup>5</sup>Associate Professor, Dept. of Orthodontics and Dentofacial Orthopedics, KLE Dental College and Hospital, Belgaum, Karnataka, India

<sup>6</sup>Professor, Dept. of Orthodontics and Dentofacial Orthopedics, VPDC Dental College and Hospital, Sangli, Maharashtra, India

DOI: [10.36347/sjds.2021.v08i05.002](https://doi.org/10.36347/sjds.2021.v08i05.002)

| Received: 22.04.2021 | Accepted: 31.05.2021 | Published: 06.06.2021

\*Corresponding author: Dr. Lishoy Rodrigues

### Abstract

### Case Report

The aim of orthodontic treatment in a bimaxillary protrusion case is to obtain an esthetically pleasing face with harmonious soft tissue profile, stable occlusion and pleasant smile. The etiology of bimaxillary protrusion is multifactorial involving both genetic and environmental causes like mouth breathing, tongue and lip habits and tongue volume. The following case report shows management of class I bimaxillary protrusion malocclusion in a hypodivergent case with extraction of all first premolars. The effective management of space without losing anchorage is itself a big challenge. The results produced a pleasant facial profile with attainment of good occlusion. The case required extraction of 1<sup>st</sup> premolars for correction of the proclined, forwardly placed and crowded upper and lower anterior teeth. Clinical and cephalometric evaluation revealed a Class I skeletal pattern and clinical examination revealed presence of an orthognathic facial profile, a horizontal growth pattern, increased overjet and average overbite, crowding in maxillary and mandibular anterior region, potentially incompetent lips, increased lip fullness and lip strain with an unaesthetic smile arc and a decreased nasolabial angle. Following fixed orthodontic treatment by removal of all 1<sup>st</sup> premolars and with retraction of anterior segment, a marked improvement in patient's smile, facial profile and occlusion was achieved and there was a remarkable increase in the patient's confidence and quality of life. The profile changes and treatment results were demonstrated with proper case selection and good patient cooperation with fixed appliance therapy.

**Keywords:** Fixed Orthodontic Mechanotherapy, Class I malocclusion, Crowding, non-consonant smile arc, Mesoprosopic facial form, Aesthetic Improvement, 1st Premolar Extractions, Orthodontic Camouflage, Unaesthetic smile, Therapeutic Extractions, Management of Bimaxillary dento-alveolar protrusion, Hypodivergent Case.

**Copyright © 2021 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

Bimaxillary protrusion is a malocclusion characterized by proclined upper and lower incisors giving a convex facial profile. Management of bimaxillary protrusion in a hypodivergent case requires an efficient anchorage system. This anchorage system should provide effective stability of anchorage unit with minimum discomfort to the patient. This can be managed by efficient use of mechanics along with devices like transpalatal arch, nance palatal arch and

sometimes temporary anchorage devices which provides an efficient absolute anchorage in such cases [1]. The etiology of bimaxillary protrusion is multifactorial involving both genetic and environmental causes like mouth breathing, tongue and lip habits and tongue volume [2]. The goals of orthodontic treatment in a bimaxillary protrusion patient with hypodivergent growth pattern requires retraction of maxillary and mandibular incisors along with control of vertical dimension of face for esthetic soft tissue profile. This is commonly achieved by extraction of four first

**Citation:** Bhushan Jawale *et al.* “Extraction Protocol for Facial Profile Correction in a Hypodivergent Case with Crowding and Severe Dental Protrusion” – A Case Report. Sch J Dent Sci, 2021 Jun 8(5): 124-130.

premolars followed by retraction of anterior teeth using maximum anchorage mechanics. This case presents the correction of crowding with a Class I malocclusion in an adolescent female patient with proclined maxillary and mandibular anterior teeth, merely simply by executing extraction of maxillary and mandibular 1<sup>st</sup> premolars followed by fixed appliance therapy using conventional MBT fixed appliance mechanotherapy. Temporary anchorage devices were used in this case for the purpose of retraction and also to maintain an absolute anchorage. The Extraction protocol shown in this case is indicative of how an unaesthetic smile can be converted into a pleasant one by routine fixed Orthodontic treatment with extraction of 4 premolars followed by retraction and closure of spaces.

**CASE REPORT**

**Extra-Oral Examination**

A 17 year old female patient presented with the chief complaint of irregularly placed upper and lower front teeth and excessive show of upper teeth. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides, a Leptoprosopic facial form, Dolicocephalic head form and average width of nose and mouth, potentially incompetent lips with increased lip strain , an acute Nasolabial Angle with increased upper and lower labial fullness. The patient had no relevant prenatal, natal, postnatal history, history of habits, medical or a family history. On Smiling, there was presence of crowding in the maxillary anterior region and an excessive show of upper front teeth with an unaesthetic non-consonant smile arc. The patient was very dissatisfied with her smile.



**Fig-q: Pre-Treatment Extra-Oral Photographs**

**INTRA-ORAL EXAMINATION**

Intraoral examination on frontal view showed presence of crowding in the maxillary and mandibular anterior region. On lateral view the patient showed presence of Class II Division 1 incisor relationship, a Class I canine and molar relationship bilaterally with an increased overjet of 5mm and proclined and forwardly placed upper and lower anterior teeth. Occlusal view showed presence of maxillary and mandibular lower anterior crowding with multiple rotated teeth both in upper and lower arch and presence of a “U” shaped arch form.



**Fig-2: Pre-Treatment Intra-Oral Photographs**

**Table-1: Pre Treatment Cephalometric Readings**

PARAMETERS	PRE-TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	1 mm
MAX. LENGTH	92mm
MAN. LENGTH	109mm
IMPA	99°
NASOLABIAL ANGLE	88°
U1 TO NA DEGREES	34°
U1 TO NA mm	6mm
L1 TO NB DEGREES	29°
L1 TO NB mm	4mm
U1/L1 ANGLE	118°
FMA	24°
Y AXIS	66°
L1 TO A-POG	3mm
CONVEXITY AT PT. A	1 mm
LOWER LIP- E PLANE	3mm
N-PERP TO PT A	1 mm
N-PERP TO POG	-1 mm
CHIN THICKNESS	11 mm

**Model Analysis**

<p><b>Bolton ratio:-</b> Maxillar anterior excess:- 3.54 Mandibular Overall excess:3.652</p>	<p><b>Arch Perimeter Analysis :</b> Need to extract first premolar</p>
<p><b>Ashlev howe's index:-</b> Borderline case</p>	<p><b>Carevs Analysis :</b> Need to extract first premolar</p>
<p><b>Pont's Index :</b> Need of expansion</p>	<p><b>Chadda's Index :</b> Expansion Needed</p>

## Diagnosis

This 17 year old female patient was diagnosed with a Class II malocclusion on a Class I Skeletal base with a horizontal growth pattern, proclined upper and lower incisors, increased overjet, crowding in upper and lower anterior region, potentially incompetent lips with increased lip fullness, a non-consonant smile arc, reduced nasolabial angle with increased lip strain.

## List of Problems

1. Proclined maxillary and mandibular dentition.
2. Crowding in maxillary and mandibular anterior region.
3. Decreased Nasolabial angle.
4. Potentially incompetent lips.
5. Increased lip strain.
6. Non-consonant smile arc.

## Treatment Objectives

1. To correct proclined maxillary and mandibular anterior dentition.
2. To correct crowding in maxillary and mandibular anterior teeth.
3. To correct the decreased Nasolabial angle.
4. To improve the lip competency.
5. To decrease the lip strain.
6. To correct the smile arc.
7. To achieve a Class I incisor relationship.
8. To maintain a Class I canine and molar relationship.
9. To achieve a pleasing smile and a pleasing profile.

## Treatment Plan

- Extraction of 14, 24, 34 and 44 with banding [24], bonding and fabrication of trans-palatal arch in the maxilla
- Fixed appliance therapy with MBT 0.022 inch bracket slot.
- Initial leveling and alignment with 0.012", 0.014", 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT.
- Inter-radicular implants between 15 and 16, 25 and 26, 35 and 36, 45 and 46.
- Retraction and closure of spaces by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires.
- Absolute anchorage with TADs in the upper and lower arch to maintain a Class I molar relationship bilaterally and for en-masse retraction of the proclined anterior teeth.
- Final finishing and detailing with 0.014" round stainless steel wires.
- Retention by means of Hawley's retainers along with lingual bonded retainers in the upper and lower arch.

## Treatment Progress

Complete bonding & banding in both maxillary and mandibular arch was done, using MBT-0.022X0.028" slot. Initially a 0.012" NiTi wire was used

which was followed by 0.014, 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. Retraction and closure of existing spaces was then started by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires. Reverse curve of spee in the lower arch and exaggerated curve of spee in the upper arch was incorporated in the heavy archwires to prevent the excessive bite deepening during retraction process and also to correct the already existing gummy smile. Anchorage was conserved in the upper and lower arch with the help of temporary anchorage devices, thus constantly monitoring the already existing Class I molar relationship bilaterally. Retraction and closure of existing spaces was done with the help of Elastomeric chains delivering light continuous forces and replaced after every 4 weeks due to force decay and reduction in its activity. Retraction with the help of inter-radicular implants enabled getting the incisors from Class II relationship to a Class I incisor relationship. Thus an ideal overjet and overbite was achieved at the end of the treatment. Finally light settling elastics were given with rectangular steel wires in lower arch and 0.012" light NiTi wire in upper arch for settling, finishing, detailing and proper intercuspation. The upper and lower anterior proclination was corrected with an ideal occlusion at the end of the fixed appliance therapy. The Nasolabial angle improved significantly at the end of treatment, thus improving the profile even further. There was improvement in occlusion, smile arc and profile at the end of the treatment and the patient's chief complaint of crowding and excessive show of anterior teeth was addressed.

## Treatment Result

The change in the patient's facial esthetics was the most imposing part of the treatment. With extraction of the first premolars, 5 mm retraction of upper anteriors was achieved. Correction of crowding, lower incisors inclination and 5mm retraction was achieved in lower anterior. The soft tissue revealed esthetic smile, reduced lip incompetency with improvement in nasolabial angle and mentolabial sulcus. Ideal overjet and overbite was established. The molar relation and vertical dimension were maintained during orthodontic treatment. Post treatment intraoral photographs and lateral cephalogram showed that the maxillary and mandibular incisors were inclined appropriately. The soft tissue chin thickness improved as the lip strain was reduced.

## DISCUSSION

Bimaxillary proclination is characterized by severe proclination of anterior teeth of both the arches and is common among various ethnic groups, like Asians and Americans of African descent [3]. According to Drobocky and Smith the patients treated with first premolar extraction show an average reduction of 3.4 mm and 3.6 mm in upper and lower lip

procumbency in relation to Rickett's E-line [4]. With extraction of premolars, the treatment plan must account for closure of extraction space which requires adequate anchorage maintenance, since mesialization of the posterior segment may compromise retraction of anterior teeth [13-20]. It has been reported that when canine retraction is done with some adjunctive appliance for anchorage control only 0 to 2.4 of molar mesialization is observed [5]. Group A anchorage has been considered effective in such cases. Absolute anchorage may be provided by various means including headgear and implants, etc [6]. In our case, we used TADs as it is considerably economical and the most reliable method to augment anchorage. Leveling by intrusion can be skilled with continuous archwires that bypass the premolar and segmented archwire's with auxiliary depressing arch [7, 21-25] Anchor bends in Begg's technique and Rickett's utility arch are example for the continuous method [8, 9, 26-32] Burrstone three piece intrusion [26, 33-38] and mini-implant assisted intrusion are an example for the segmented method. Since the patient was hypodivergent, molar intrusion was avoided and upper anteriors were intruded with inter-radicular mini-implants. Ebru Senisik [10] and Esen Aydogdua [11] observed 0.31mm/month of intrusion by utility arch. Frank J. Weiland (1996) [12] concluded that for intrusion low forces of segmented arch technique is better than continuous arch technique. The patient's chief complaint was irregularly placed upper and lower front teeth and excessive show of upper front teeth and sought treatment for the same. The selection of orthodontic fixed appliances is

dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference/familiarity and laboratory facilities. The most important point to be highlighted here is the decision to extract the premolars. After analyzing the case thoroughly and reading all pretreatment cephalometric parameters along with evaluating the patients profile clinically, a decision was made of proceeding with the treatment by extracting all four 1<sup>st</sup> premolars as the patient presented with severe maxillary and mandibular proclination with crowding, hence the case could not be managed without extractions. The treatment after closure of extraction spaces improved the patients profile changing the Nasolabial angle from acute to average at the end of the treatment. There was a significant decrease in the lip strain and lip fullness with increased competency of lips. Crowding was unraveled, an ideal overjet and overbite was achieved, smile arc was consonant and the pre-treatment excessive show of upper front teeth was corrected. Successful results were obtained after the fixed appliance therapy within a stipulated period of time. The overall treatment time was 18 months. After this active treatment phase, the profile of this 17 year old female patient improved significantly as seen in the post treatment Extra-oral photographs. Hawley's retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch. Patient was very happy and satisfied with the results of the treatment

**Table-2:Post-Treatment Cephalometric Readings**

PARAMETERS	POST - TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	0mm
MAX. LENGTH	92mm
MAN. LENGTH	108mm
IMPA	93°
NASOLABIAL ANGLE	97°
U1 TO NA DEGREES	23°
U1 TO NA mm	1mm
L1 TO NB DEGREES	22°
L1 TO NB mm	1mm
U1/L1 ANGLE	132°
FMA	24°
Y AXIS	65°
L1 TO A-POG	1mm
CONVEXITY AT PT. A	0mm
LOWER LIP- E PLANE	0mm
N-PERP TO PT A	0mm
N-PERP TO POG	0mm
CHIN THICKNESS	12mm



**Fig-3: Post-Treatment Extra-Oral Photographs**



**Fig-4: Post Treatment Intra-Oral Photographs**

**Table-3: Comparison of Pre and Post Treatment Cephalometric Readings**

PARAMETERS	PRE- TREATMENT	POST-TREATMENT
SNA	82°	82°
SNB	80°	80°
ANB	2°	2°
WITS	1mm	0mm
MAX. LENGTH	92mm	92mm
MAN. LENGTH	109mm	108mm
IMPA	99°	93°
NASOLABIAL ANGLE	88°	97°
U1 TO NA DEGREES	34°	23°
U1 TO NA mm	6mm	1mm
L1 TO NB DEGREES	29°	22°
L1 TO NB mm	4mm	1mm
U1/L1 ANGLE	118°	132°
FMA	24°	24°
Y AXIS	66°	65°
L1 TO A-POG	3mm	1mm
CONVEXITY AT PT. A	1mm	0mm
LOWER LIP- E PLANE	3mm	0mm
N-PERP TO PT A	1mm	0mm
N-PERP TO POG	-1mm	0mm
CHIN THICKNESS	11mm	12mm

## CONCLUSION

This case report illustrates how a case with crowding and bimaxillary dentoalveolar protrusion can be managed with Extraction of 4 premolars by means of appropriate use of conventional MBT prescription along

with efficient conservation of anchorage at the same time. The planned goals set in the pre-treatment plan were successfully attained. Good intercuspation of the teeth was achieved with a Class I molar, incisor and canine relationship. Treatment of the proclined and

forwardly placed upper and lower anterior teeth included the retraction of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and facial convexity. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. Patient had an improved smile and profile. The correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

## REFERENCES

- Liu YH, Liu J, Li Q, Ding WH. (2009). An efficacy comparison between mini-screw implant and transpalatal arch on dentofacial morphology in extraction cases. *Zhonghua kou qiang yi xue za zhi= Zhonghua kouqiang yixue zazhi= Chinese journal of stomatology*, 44(8):454-9.
- Sharma JN, Kumar KH. (2010). Orthodontic treatment of bimaxillary protrusion malocclusion-clinical report and treatment results. *Health*, 7:54-8.
- Kim HK, Bae KH, Nam SE, Lim HJ, Michiko N, Park YS. (2013). The growth trends of Korean adolescents with bialveolar protrusion: a nine year longitudinal cephalometric study. *European journal of orthodontics*, 36:107-13.
- Patel P, Shanthraj R, Garg N, Anisha V, Bhagyalakshmi A. (2015). Class I bimaxillary proclination treated by sliding mechanics-A case report. *Medical Science*, 4(11).
- Anil M, KAhuja N. (2008). No anchor loss with altered force application-A case report. *Journal of Pierre Fauchard Academy (India Section)*, 22:27-30.
- Skeggs RM, Benson PE, Dyer F. (2007). Reinforcement of anchorage during orthodontic brace treatment with implants or other surgical methods. *Cochrane Database Syst Rev*, 18(3).
- Proffit WR, Fields HW, Sarver DM. (2007). *Contemporary Orthodontics*, 4th ed. St. Louis: Mosby;
- Ricketts RM. 1976). Bioprogressive therapy as an answer to orthodontic needs. PartI. *Am J Orthod*, 70:241-68.
- Ricketts RM. 1976). Bioprogressive therapy as an answer to orthodontic needs. PartII. *Am J Orthod*, 70:359-97.
- Weiland F.J., Bantleon H.P., Droschl H. (1996). Evaluation of continuous arch and segmented arch leveling techniques in adult patients a clinical study. *Am J Orthod Dentofacial Orthop.*, 110:647-652.
- Ebru Senisik N., Turkkahraman H. (2011). Treatment effects of intrusion arches and mini-implant systems in deep bite patients. *Am J Orthod Dentofacial Orthop.*, 141:723-733.
- Aydogdua E., Ozsoy O.P. (2011). Effects of mandibular incisor intrusion obtained using a conventional utility arch vs bone anchorage. *Angle Orthod.*, 81:767-775.
- Dr. Bhushan Jawale, Dr. Lishoy Rodrigues, Dr. KM Keluskar, Dr. Roopa Jatti, Dr. Anup Belludi, Dr Rohan Hattarki. (2020). Treatment of a growing male having a recessive mandible with removable myofunctional appliance therapy followed by fixed orthodontic treatment: A case report. *Int J Appl Dent Sci*, 6(3):146-154.
- Jawale B, Rodrigues L, Garde JB, Belludi A, Patil A, Palande P. (2020). Interdisciplinary collaboration of orthodontics and oral and maxillofacial surgery for the correction of severe class III skeletal pattern in an adult male with an hapsburg jaw-A case report on surgical orthodontics. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(3):149-56.
- Lishoy R, Priyal R, Jamenis SC, Jawale B, Mahajan N. (2020). A survey to assess the knowledge and attitude of adults from the age group of 18 to 35 Years towards comprehensive orthodontic treatment-A questionnaire based study on adult orthodontics. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(4):255-63.
- Bhushan Jawale D, Rodrigues L, Naik V, Kerudi V, Chaudhary A, Nehete A. (2020). Management of a non growing adult borderline extraction case of a patient having a Class II Division 1 malocclusion by non extraction protocol for aesthetic improvement: A case report on adult orthodontics. : A case report on adult orthodontics. *Int J Appl Dent Sci*, 6(3):158-162.
- Jawale B, Lishoy R, Belludi A, Pharande A, Hattarki R, Prasad L. (2020). Correction of bimaxillary dentoalveolar protrusion in a growing male with class I malocclusion by extraction of premolars and profile improvement using conventional fixed orthodontic treatment-A case report on orthodontic camouflage. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(3):157-62.
- Rodrigues L, Jawale B, Kadam A, Rajani P. (2020). Single phase correction of tongue thrust habit alongside fixed orthodontic treatment for closure of spaced dentition and midline diastema in a male patient with class I malocclusion without need for a two phase appliance therapy-A case report. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(3):163-9.
- Rodrigues L, Jamenis SC, Jawale B, Patil R, Sadhunavar T. (2020). An assessment of knowledge and application of lingual orthodontics among orthodontists in their routine clinical practice. *IP Journal of Surgery and Allied Sciences*, 2(3):89-94.
- Rodrigues L, Jamenis SC, Jawale B, Patil S, Garcha V. (2021). A questionnaire study to assess and evaluate the common gingival problems faced by patients undergoing fixed orthodontic treatment.

- IP International Journal of Maxillofacial Imaging, 6(4):101-7.
21. Jawale B, Rodrigues L, Shinde K, Kangane S, Hattarki R, Mhatre S. (2020). Rhinoplasty, septoplasty and genioplasty with fixed orthodontic mechanotherapy for non-surgical correction of a patient with “Long face syndrome” Having a class III malocclusion on a class II skeletal jaw base-A case report. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(3):170-6.
  22. Jawale B, Rodrigues L, Keluskar KM, Patil S, Belludi A, Patil A. (2020). Forsus fixed functional appliance therapy for dentoalveolar and profile correction-A case report. *IP Indian Journal of Orthodontics and Dentofacial Research*, 6(4):264-70.
  23. Lishoy R, Bhushan J, Vanessa V, Hidhaya S K, Rashi L, Priyal R, Marisca P, Aljeeta K. (2020). An assessment of common concerns of 2nd year post graduate students pursuing M.D.S In orthodontics and dentofacial orthopedics, due to the COVID-19 lockdown. *IP Indian J Orthod Dentofacial Res*, 6(3):1-7.
  24. Rodrigues L, Jawale B, Kaluskar A et.al. (2020). Molar banding or bonding? What do orthodontists prefer in routine clinical practice? *International Journal of Science & Healthcare Research*, 5(3): 251-259.
  25. Rodrigues Lishoy, Jamenis Shilpa, Kadam Aljeeta, Shaikh Almas. (2019). "Correction of Midline Diastema - A Quick and Simplified Approach", *International Journal of Science and Research (IJSR)*, Volume 8 Issue 6, 862 – 864.
  26. Jawale, D. B., Rodrigues, D. L., Patil, D. S., Patil, D. A., & Jethé, D. S. (2021). Burststone’s 3 Piece Intrusion Utility Arch In Combination With Absolute Anchorage Using Mini-Implants For Correction Of Bimaxillary Dentoalveolar Protrusion. A Case Report On Segmental Arch Mechanics, *International Journal Of Scientific Research*, 10(05).
  27. Jawale B, Rodrigues L, Patil S, Kangane S, Belludi A. (2021). Aesthetic rehabilitation and correction of crowding with collaboration of orthodontics and endodontics – A case report. *Global J Dent Specialty*, 1(1).
  28. Bhushan Jawale et al. (2021). “Fixed Orthodontic Mechanotherapy for Correction of Generalized Spacing and Severe Proclination of Anterior Teeth” – A Case Report. *Glob Acad J Dent Oral Health*, Vol-3, Iss- 3, pp-29-35.
  29. Bhushan Jawale et al. (2021). “Correction of Lateral Tongue Thrust, Midline Diastema, Flared Maxillary Anterior Dentition, Incompetent Lips and An Unaesthetic Smile Arc By Fixed Orthodontic Mechanotherapy” – A Case Report. *South Asian Res J Oral Dent Sci*, 3(3), 37-44.
  30. Bhushan Jawale et al. (2021). “Effect of Asymmetric Premolar Extractions on Smile Aesthetics in A Patient With Severe Crowding” – A Case Report, *SAR J Dent Oral Surg Med*, 2(3), 36-43.
  31. Rachana Mhetre et al. (2021). “Temporary Anchorage Devices (TADs) for Management of Class I Malocclusion” – A Case Report, *SAR J Dent Oral Surg Med*, 2(3), 44-53.
  32. Bhushan Jawale et al. (2021). “Correction of Spaced Dentition with Fixed Orthodontic Pre-adjusted Edgewise Bracket System” – A Case Report. *South Asian Res J Oral Dent Sci*, 3(3), 45-52.
  33. Bhushan Jawale et al (2021). “Adjunctive Orthodontic Treatment in an Adult Patient with Mutilated Dentition” – A Case Report On Multidisciplinary Orthodontics. *Glob Acad J Dent Oral Health*, Vol-3, Iss- 3, pp-36-41.
  34. Bhushan Jawale et al. (2021). “Treatment of Severe Crowding and Bimaxillary Dental Protrusion in a Patient with Angle’s Class I Malocclusion and a Vertical Growth Pattern”– A Case Report On Orthodontic Camouflage. *Saudi J Oral Dent Res*, 6(5): 203- 208.
  35. Bhushan Jawale et al. (2021). “Conventional MBT Mechanotherapy for Management of Bimaxillary Dentoalveolar Protrusion” – A Case Report. *EAS J Dent Oral Med*, 3(3), 65-72.
  36. Bhushan Jawale et al (2021). —Wonders of Rapid Maxillary Expansion and Lower Premolar Extractions in Correction of a Skeletal Class III Case with Maxillary Deficiency and Mandibular Excessl – A Case Report on Non- Surgical Orthodontic Camouflage. *Saudi J Oral Dent Res*, 6(5): 192-202.
  37. Bhushan Jawale et al. (2021). “Maxillary 1st Premolar Extractions For Correction of Proclined Upper Dentition” – A Case Report. *Int J Recent Sci Res*. 12(05), pp. 41740-41745.
  38. Bhushan Jawale et al. (2021). “Management of Reverse Overjet and Overbite in an Adult Patient with Angle’s Class III Malocclusion and a Horizontal Growth Pattern” – A Case Report On Non-Surgical Orthodontic Camouflage. *EAS J Dent Oral Med*, 3(3), 73-77.