

Non-extraction Management of an Extraction-Indicated Case with Severe Anterior Crowding Using a Self-Ligating Fixed Appliance: A Case Report

Dr.Ceronia Christopher¹, Dr.Varadharaja M.M.², Dr.Mahalakshmi R.²,
Dr.Palaniappan C.², Dr.Nivashini², Dr. Sridevi², Dr. Madhumalar²

¹(Final Year Postgraduate, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

²(Professor And Head, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -62500, Tamil Nadu, India)

²(Reader, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

²(Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

²(Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

²(Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

²(Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, CSI College Of Dental Sciences and Research, Madurai -625001, Tamil Nadu, India)

Abstract:

Anterior crowding requires individualized assessment of arch-space discrepancy, incisor inclination, facial profile, periodontal conditions and patient preferences. This report describes the orthodontic treatment of a 21-year-old male with Angle Class I malocclusion, a Class I skeletal pattern, maxillary and mandibular anterior crowding, a pretreatment overjet of 3 mm and an overbite of 4 mm. Initial space analysis indicated an extraction-oriented treatment plan; however, treatment was completed without extractions using a 0.022-inch Damon self-ligating fixed-appliance system. Treatment included sequential archwire progression, Class II elastics, Kobayashi hooks and an auxiliary for maxillary central-incisor torque during finishing. At debonding, the recorded overjet and overbite were 2 mm each, bilateral Class I molar and canine relationships were maintained, and the dental midlines coincided with the facial midline. The lower lip was recorded as 3 mm behind the S-line before treatment and coincident with the S-line after treatment. Smile incisor exposure increased from 4 mm to 7 mm. This case documents a non-extraction treatment outcome in one patient initially considered for extraction based on space analysis; it does not establish superiority of a particular appliance or treatment approach.

Keywords: Anterior crowding, case report, non-extraction treatment, orthodontics, self-ligating brackets

Date of Submission: 06-10-2026

Date of Acceptance: 16-10-2026

I. INTRODUCTION

Anterior crowding reflects a discrepancy between tooth material and the space available within the dental arch. Treatment planning should consider the severity and distribution of crowding, incisor inclination, facial profile, skeletal pattern, periodontal status, arch form, stability and the patient's expectations. Extraction and non-extraction approaches each have indications and limitations; the choice should be individualized rather than based on a single measurement.

Self-ligating brackets use an integrated clip or door to retain the archwire. Although reduced friction and shorter treatment have been proposed as advantages, the self-ligating mechanism alone does not establish greater treatment efficiency or a predictable ability to avoid extractions. Comparative evidence has not consistently demonstrated clinically important advantages across treatment outcomes [1–4]. Accordingly, appliance type should be described as part of the treatment protocol, and outcomes should not be attributed to bracket design alone.

This report describes non-extraction treatment of a 21-year-old male with anterior crowding whose initial space analysis favored consideration of an extraction-oriented plan. Treatment was undertaken using a 0.022-inch Damon self-ligating fixed-appliance system.

II. CASE REPORT

Patient information and chief complaint

A 21-year-old male presented to the Department of Orthodontics and Dentofacial Orthopaedics, CSI College of Dental Sciences and Research, Madurai, Tamil Nadu, India, with a chief complaint of irregularly positioned upper and lower anterior teeth. The patient expressed a positive attitude toward orthodontic treatment. The medical and dental histories were reported as non-contributory.

Clinical examination

Extraoral examination documented a mesocephalic head form, mesoprosopic facial form, straight facial profile, normodivergent facial pattern, average nasolabial angle and mentolabial sulcus, and an interlabial gap of 0 mm. Functional examination recorded nasal breathing, normal deglutition, mastication and speech, normal perioral muscle activity, an unremarkable temporomandibular joint examination, and a maximum mouth opening of 45 mm. Pretreatment smile analysis documented a consonant smile arc, with 0 mm of maxillary incisor exposure at rest and 4 mm during smiling.

Intraoral examination recorded satisfactory oral hygiene, gingival pigmentation with normal stippling, normal tongue and oral mucosa, and 32 teeth present. No caries, restorations or endodontically treated teeth were recorded. Right and left molar and canine relationships were Class I. Pretreatment overjet was 3 mm and overbite was 4 mm. The maxillary and mandibular dental midlines coincided with the facial midline. The maxillary arch was described as U-shaped and symmetrical; the mandibular arch was U-shaped and asymmetrical, with crowding.

Diagnostic records and diagnosis

Pretreatment records included extraoral and intraoral photographs, an orthopantomogram, a lateral cephalogram and model analyses. Cephalometric analysis recorded an ANB angle of 2°, with SNA 78°, SNB 76° and GoGn–SN 24°; the overall interpretation was a Class I skeletal relationship with a predominantly horizontal growth tendency. Dental findings were diagnosed as Angle Class I malocclusion with maxillary and mandibular anterior crowding. Pretreatment measurements showed an increased maxillary incisor inclination (U1–NA angle, 26°) and relatively upright mandibular incisors (L1–NB angle, 15°; IMPA, 90°). Space analysis recorded a deficiency of 3 mm in the maxillary arch and 10 mm in the mandibular arch. The initial treatment plan favored consideration of an extraction-oriented approach (Figs. 1–3).

Treatment objectives and plan

The objectives were to maintain the straight facial profile and Class I molar and canine relationships, align the maxillary and mandibular anterior teeth, and improve overjet and overbite. Although the initial space analysis favored an extraction-oriented approach, treatment was carried out without extractions using a 0.022-inch Damon self-ligating fixed-appliance system. The treatment plan included leveling and alignment, non-extraction space management, finishing and detailing, followed by retention. The contribution of arch-form change and incisor inclination should be interpreted in light of the documented clinical and cephalometric findings.

Treatment progress

Treatment commenced on 11 March 2025, and debonding was recorded on 8 October 2026, corresponding to approximately 19 months of active treatment. No extractions were performed. The reported archwire sequence was 0.012-inch CuNiTi, 0.014-inch NiTi, 0.016-inch CuNiTi, 0.016 × 0.025-inch CuNiTi, 0.018 × 0.025-inch CuNiTi, 0.019 × 0.025-inch CuNiTi and 0.019 × 0.025-inch stainless steel. Kobayashi hooks were used, and Class II elastics were prescribed. An auxiliary was used to apply torque to the maxillary central incisors during finishing with a 0.019 × 0.025-inch stainless-steel archwire. The patient was reported to be cooperative. No treatment complications were documented in the clinical record.

Treatment results

Post-treatment records dated 8 October 2026 documented bilateral Class I molar and canine relationships, an overjet of 2 mm and an overbite of 2 mm. The maxillary and mandibular arches were described as aligned, and the dental midlines continued to coincide with the facial midline. Smile incisor exposure increased from 4 mm before treatment to 7 mm after treatment. The lower lip was recorded as changing from 3 mm behind the S-line before treatment to coinciding with the S-line after treatment (Figures 4–6).

Retention

The retention plan comprised a Begg removable retainer and a fixed lingual retainer.

Cephalometric assessment

Pretreatment and post-treatment cephalometric measurements, verified by repeat tracing, are summarized in Table 1. The recorded changes are presented descriptively. Cephalometric measurements should be interpreted alongside the clinical examination and treatment records; this single case does not independently establish the cause of each observed change.

Table 1. Pretreatment and post-treatment cephalometric measurements

Parameter	Reference	Pretreatment	Post-treatment	Recorded change
SNA angle	82°	78°	79°	+1°
SNB angle	80°	76°	77°	+1°
ANB angle	2°	2°	2°	0°
Wits appraisal	—	-1 mm	+2 mm	+3 mm
GoGn-SN angle	32°	24°	28°	+4°
U1-NA angle	22°	26°	35°	+9°
U1-NA linear	4 mm	5 mm	8 mm	+3 mm
U1-SN angle	102°	102°	115°	+13°
L1-NB angle	25°	15°	31°	+16°
L1-NB linear	4 mm	4 mm	10 mm	+6 mm
L1-mandibular plane angle (IMPA)	90°	90°	104°	+14°
S-line to upper lip	0 mm	2 mm behind	2 mm behind	0 mm
S-line to lower lip	0 mm	3 mm behind	Coincides	+3 mm

III. DISCUSSION

The main clinical feature of this case is the decision to proceed with non-extraction treatment despite a space analysis that initially favored consideration of extraction. At debonding, the recorded findings included bilateral Class I molar and canine relationships, a reduction in overjet from 3 mm to 2 mm and a reduction in overbite from 4 mm to 2 mm. The records also documented an increase in smile incisor exposure from 4 mm to 7 mm and a change in the recorded lower-lip position relative to the S-line.

Space analysis is an important component of orthodontic diagnosis, but it should be considered alongside facial profile, incisor position, arch dimensions, periodontal boundaries and treatment objectives. In selected patients, space may be managed through planned changes in incisor inclination, arch form and tooth position. These movements have biological limits, particularly in adults, and should be considered in relation to the periodontal phenotype and alveolar housing. The supplied case records do not provide detailed quantitative pretreatment and post-treatment periodontal measurements; therefore, periodontal safety should not be inferred solely from the final photographs or the absence of a recorded complication.

Self-ligating appliances have been proposed as a means of reducing friction and facilitating alignment. However, comparative evidence has not established that the bracket mechanism alone reliably produces greater space gain, shorter treatment or avoidance of extractions [1–4]. The outcome in this case occurred in the context of the overall treatment protocol, including archwire progression, intermaxillary elastics, finishing auxiliaries, clinician decisions and patient cooperation.

The verified cephalometric table records increases in U1-SN from 102° to 115° (+13°), L1-NB angle from 15° to 31° (+16°), L1-NB linear distance from 4 mm to 10 mm (+6 mm), and the lower-incisor-to-mandibular-plane angle from 90° to 104° (+14°). These values are reported as measured and should be interpreted in conjunction with the clinical findings. The Wits appraisal changed from -1 mm to +2 mm (+3 mm), while ANB remained 2°. ANB and Wits appraisal are different measurements and may not change in parallel; the Wits value is influenced by the functional occlusal plane and should be interpreted with the tracing and clinical context. As this is a single case without a control group, the data do not establish that these changes were caused by the bracket system alone or demonstrate that the observed incisor movements were biologically risk-free.

As a single case report, this description cannot compare extraction and non-extraction strategies or establish a causal advantage of a particular bracket system. Its contribution is to document the diagnostic considerations, treatment protocol and recorded outcome in an individual patient. Long-term follow-up would be required to assess stability.

IV. CONCLUSION

This case documents non-extraction orthodontic treatment in a 21-year-old male with Angle Class I malocclusion and maxillary and mandibular anterior crowding, despite an initial space analysis that favored consideration of extraction. At debonding, the recorded overjet and overbite were 2 mm, and bilateral Class I molar and canine relationships were maintained. The case illustrates the importance of individualized treatment planning rather than reliance on space analysis alone. Long-term follow-up is needed to evaluate stability.

V. ETHICS APPROVAL AND PATIENT CONSENT

According to the institutional policy applicable to single-patient clinical case reports, Institutional Ethics Committee approval was not required for this report; therefore, no separate ethics committee approval was obtained. Written informed consent was obtained from the patient for publication of the clinical information and clinical images, including facial photographs. The signed consent form is retained by the treating institution and is not included in the manuscript.

VI. FUNDING

No external funding was received for this case report.

VII. CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest related to this case report.

VIII. AUTHOR CONTRIBUTIONS

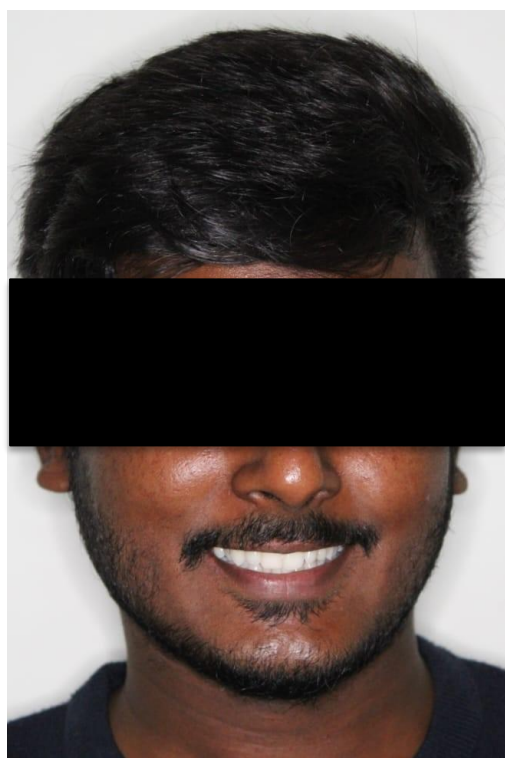
Dr. Ceronia Christopher contributed to patient management, clinical documentation and manuscript preparation. Dr. Varadharaja M. M., Dr. Mahalakshmi R., Dr. Palaniappan C., Dr. Nivashini, Dr. Sridevi and Dr. Madhumalar contributed to clinical supervision and critical review of the manuscript. All authors reviewed and approved the final manuscript.

REFERENCES

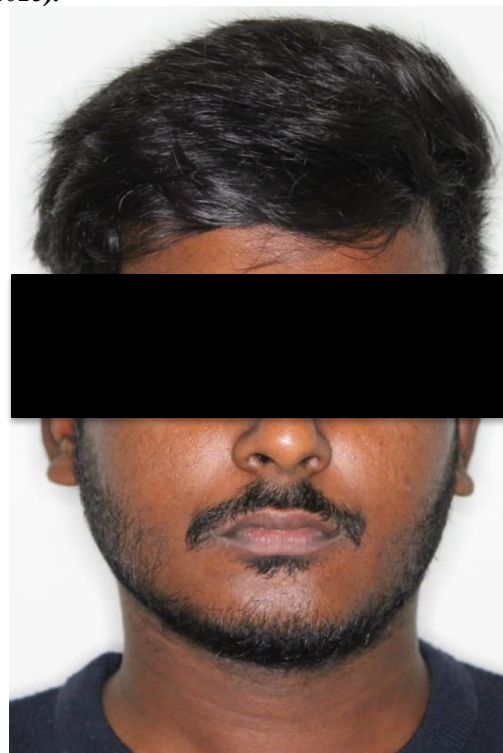
- [1]. Damon DH. The rationale, evolution and clinical application of the self-ligating bracket. Clin Orthod Res. 1998;1(1):52–61. doi:10.1111/ocr.1998.1.1.52.
- [2]. Harradine NWT. Self-ligating brackets: where are we now? J Orthod. 2003;30(3):262–273. doi:10.1093/ortho/30.3.262.
- [3]. Fleming PS, Johal A. Self-ligating brackets in orthodontics: a systematic review. Angle Orthod. 2010;80(3):575–584. doi:10.2319/081009-454.1.
- [4]. Scott P, DiBiase AT, Sherriff M, Cobourne MT. Alignment efficiency of Damon3 self-ligating and conventional orthodontic bracket systems: a randomized clinical trial. Am J Orthod Dentofacial Orthop. 2008;134(4):470.e1–470.e8. doi:10.1016/j.ajodo.2008.04.018.

CLINICAL FIGURES

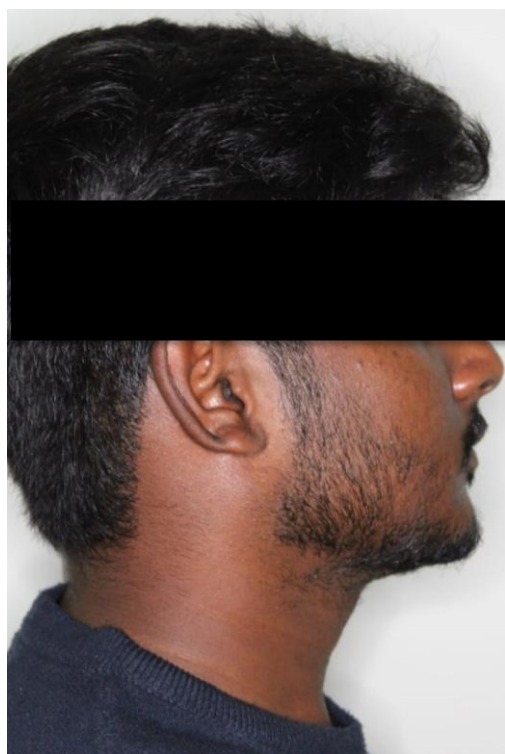
Figure 1. Pretreatment extraoral photographs (11 March 2025).



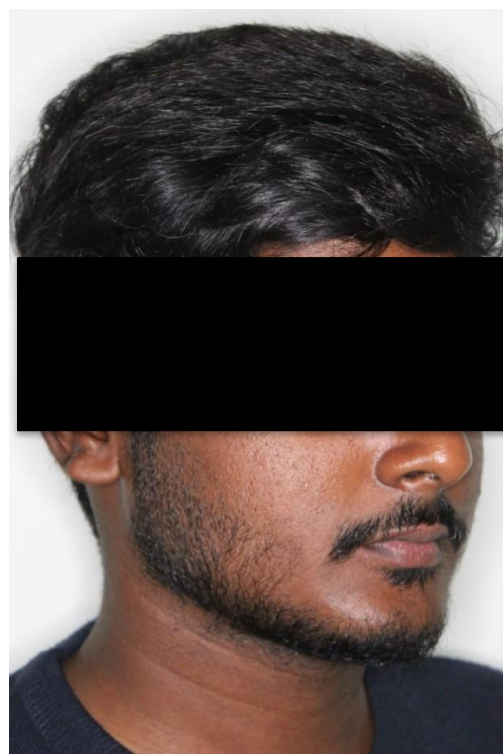
Frontal smile



Frontal at rest

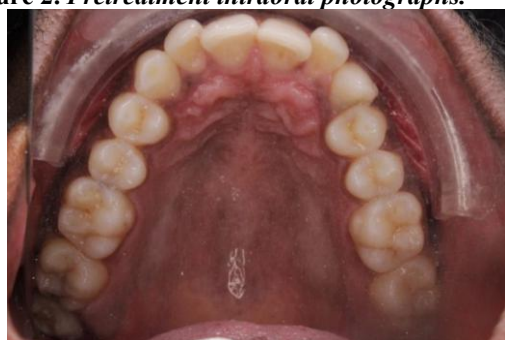


Profile



Oblique profile

Figure 2. Pretreatment intraoral photographs.



Maxillary occlusal



Mandibular occlusal



Right buccal



Left buccal



Frontal intraoral

Figure 3. Pretreatment orthopantomogram and lateral cephalogram.

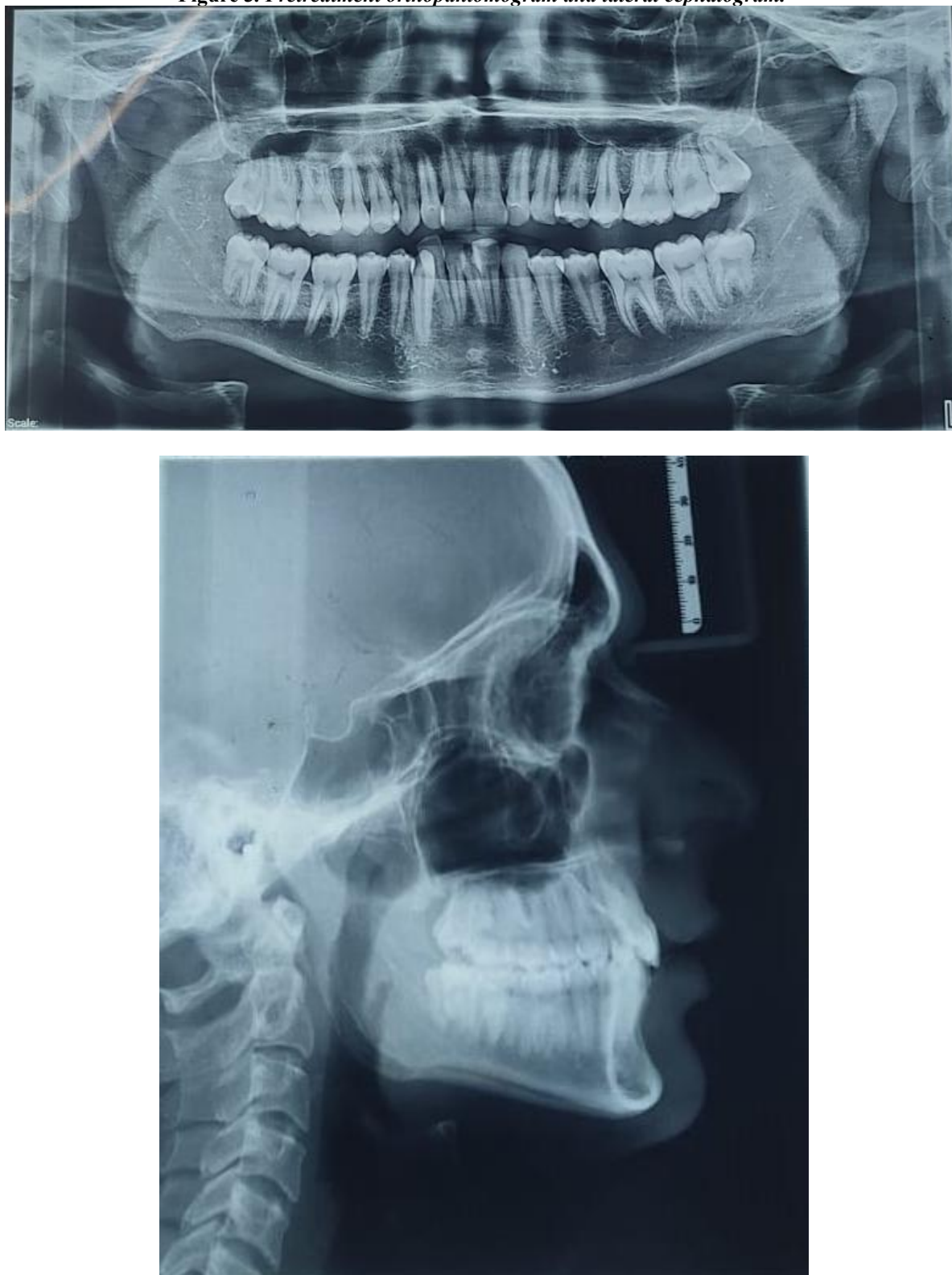
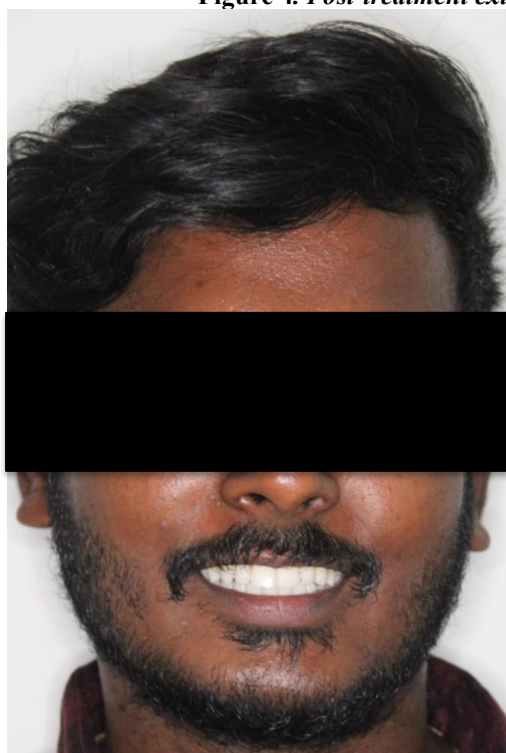
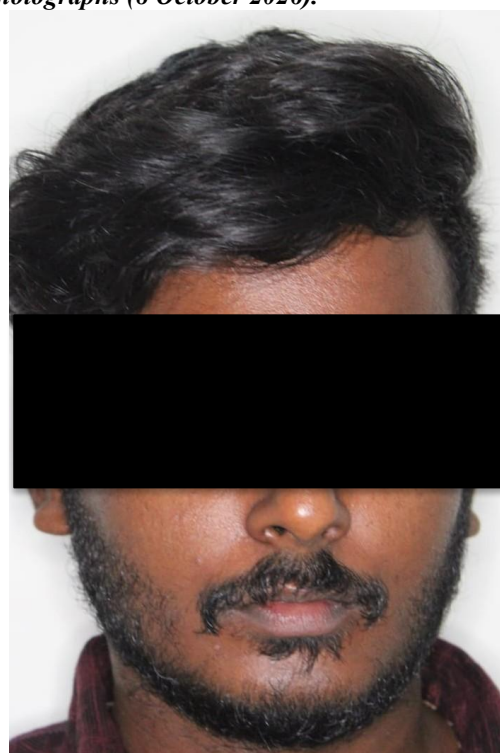


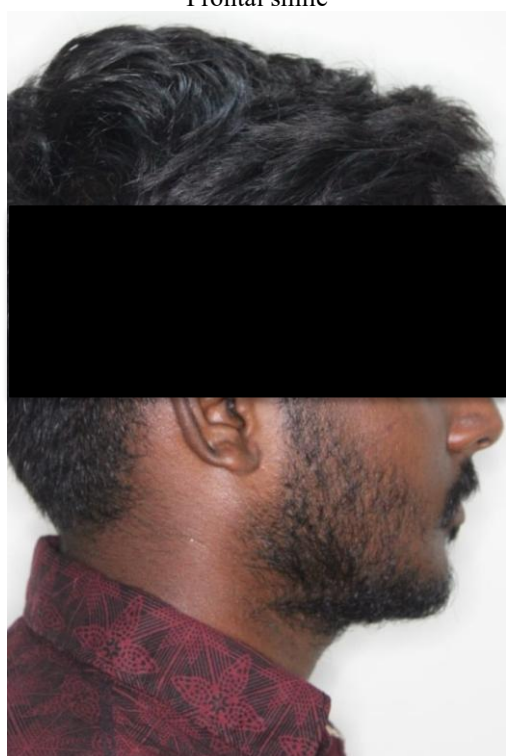
Figure 4. Post-treatment extraoral photographs (8 October 2026).



Frontal smile



Frontal at rest

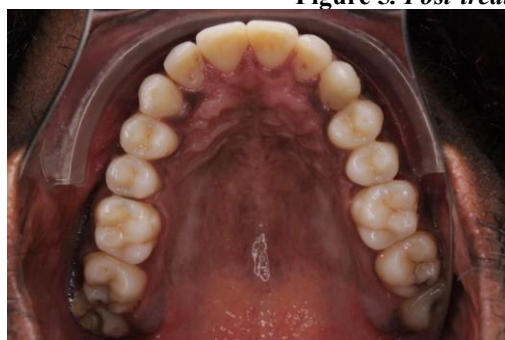


Profile



Oblique profile

Figure 5. Post-treatment intraoral photographs.



Maxillary occlusal



Mandibular occlusal



Right buccal



Left buccal



Frontal intraoral

Figure 6. Post-treatment orthopantomogram and lateral cephalogram.

