MANAGEMENT OF A COMPLEX PRESENTATION OF ANGLE'S CLASS II SUBDIVISION LEFT MALOCCLUSION WITH CROWDED-OUT UPPER LEFT CANINE

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ABSTRACT

BACKGROUND: Angle's Class II subdivision, which often leaves malocclusion, especially when combined with a buccally displaced canine, an edge-to-edge incisor relationship, and a midline diastema, presents both aesthetic and functional challenges. This case report highlights the clinical decision-making process, treatment strategies, and successful outcomes associated with managing such a complex presentation using a fixed appliance therapy with extractions.

CASE PRESENTATION: A 14-year-old female presented with a buccally displaced upper left canine, midline diastema, low maxillary labial frenal attachment, and Angle's Class II subdivision left molar relationship with an edge-to-edge incisor relationship. Treatment involved extraction of all first premolars, followed by fixed appliance therapy, canine traction, en-masse incisor retraction, and frenectomy. Active treatment lasted 20 months. Post-treatment results showed well-aligned arches, Class I molar and canine relationships, and corrected midlines.

CONCLUSION: This case demonstrates that extraction-based fixed appliance therapy can effectively address severe crowding, dental midline deviation, and edge-to-edge incisor relationships without compromising facial aesthetics. Careful treatment planning and anchorage management were key to achieving optimal results. The case underscores the importance of individualized orthodontic approaches for complex Class II subdivision malocclusions.

KEYWORDS: Angle's Class II malocclusion, edge-to-edge incisor relationship, buccally displaced canine, midline diastema, crowding.

INTRODUCTION

Dental crowding is one of the most common malocclusions observed in orthodontic practice. It refers to a discrepancy between the available space in the dental arch and the size of the teeth, resulting in misalignment due to lack of accommodation within the alveolar bone[1]. Crowding may be localized or generalized and can occur in both the maxillary and mandibular arches. It is often multifactorial, with contributing elements including tooth size-arch length discrepancy, premature loss of primary teeth, delayed eruption patterns, prolonged retention of deciduous teeth, and genetic predispositions[2]. Maxillary anterior crowding, particularly involving the canine region, is a frequent clinical concern. The maxillary canine has one of the longest eruption paths in the dentition and often erupts later than adjacent teeth. This delay, combined with inadequate arch space due to early mesial shift of posterior teeth or prolonged retention of primary canines, can cause the canine to erupt buccally or become transposed[3]. Such cases are classified as crowded-out or ectopically erupting canines, which should be distinguished from true impactions[4]. Although not impacted, buccally displaced maxillary canines can still pose aesthetic and functional challenges[5]. They may contribute to midline deviation, compromised occlusion, gingival recession, or abnormal incisor relationships such as an edge-to-edge bite[6]. Orthodontic management of such cases necessitates careful space analysis, treatment planning, and sometimes strategic extraction of premolars to achieve proper alignment, maintain a favorable facial profile, and ensure long-term occlusal stability[5].

Angle's Class II subdivision left malocclusion, is a specific type of asymmetric occlusal relationship where the molar and canine relationships differ on the left and right sides of the dental arch. Typically, the molar relationship is Class I on one side and Class II on the other, indicating a discrepancy in the anteroposterior alignment of the jaws or dental segments. This asymmetry may result from several factors, including early unilateral tooth loss, habitual mastication on one side, or uneven growth of the maxillary and mandibular arches[7]. When this malocclusion is compounded by a buccally displaced canine, the complexity of the case increases significantly. Buccal displacement occurs when the erupting canine deviates from its intended path and erupts outside the dental arch, usually due to space deficiency, premature exfoliation of deciduous teeth, or delayed eruption sequence. The maxillary canine, due to its long eruption path and late emergence, is particularly prone to such deviations[7]. Buccally displaced canines not only compromise aesthetics but also pose risks to periodontal health due to thin labial bone and gingival recession. The presence of an edge-to-edge incisor relationship further complicates the occlusal scenario[8]. This refers to a situation where the upper and lower incisors meet directly on their incisal edges when the jaws are closed, without the typical vertical overlap (overbite). While this may appear as a minor irregularity, it is often associated with underlying skeletal discrepancies, particularly a tendency toward Class III growth patterns, or may develop from anterior dental compensations due to crowding or premature loss of posterior support[9] . Edge-to-edge occlusion increases the risk of incisal wear, enamel chipping, and can hinder normal protrusive movements of the mandible, contributing to temporomandibular joint strain in the long term. Treatment strategies must be tailored to address both the asymmetry and the arch length discrepancy, often necessitating extraction protocols, space management, and anchorage control to achieve an ideal occlusion, facial aesthetics, and long-term stability[10].

CASE PRESENTATION

A 14-year-old female with no significant medical and dental history presented to Komfo Anokye Teaching Hospital in Kumasi, Ghana, with the chief complaint of an upper left tooth displaced buccally. Extra-orally, the patient presented with a symmetrical face, a near-straight facial profile, competent lips, and a non-consonant smile arch (Figure 3). Intraoral examination revealed that the patient was in the permanent dentition stage of development, with all teeth present except the third molars in all quadrants. There was a midline diastema with a low upper frenal attachment and arrested caries in the fissures of all second permanent molars. Crowded out 23, edge-to-edge relationship between upper lateral incisors with the lower lateral incisors. Angle's Class I molar relationship on the right and Class II on the left. Cusp-to-cusp bite relationship between upper and lower premolars on the left. Canine Class I relationship on the right with an unclassifiable canine relationship on the left and BSI Class III incisor relationship with 1.5mm overjet between 21 and 31, 32; 0.7mm overbite between 11 and 41, 42.
. The upper dental midline shifted to the left by 0.5mm (figure 3). A diagnosis of Angle's class II subdivision left malocclusion with crowded-out upper left canine, edge-to-edge incisor relationship, low maxillary labial frenal attachment, and midline diastema was made.

Radiographic Assessment

Panoramic findings revealed the presence of all teeth, including tooth number 23, which is crowded and not in line with the occlusal plane. The crown of all third molars is almost complete (Nolla stage 6). There were no signs of root resorption or any periapical lesion (See Figure 1 below).

Figure 1: Initial panoramic radiograph

Cephalometric findings: Lateral cephalometric analysis showed a skeletal class I pattern, mandibular dentoalveolar proclination, and bi-incisal proclination. The radiographic images and findings are presented below in Figure 2 and Table 1.

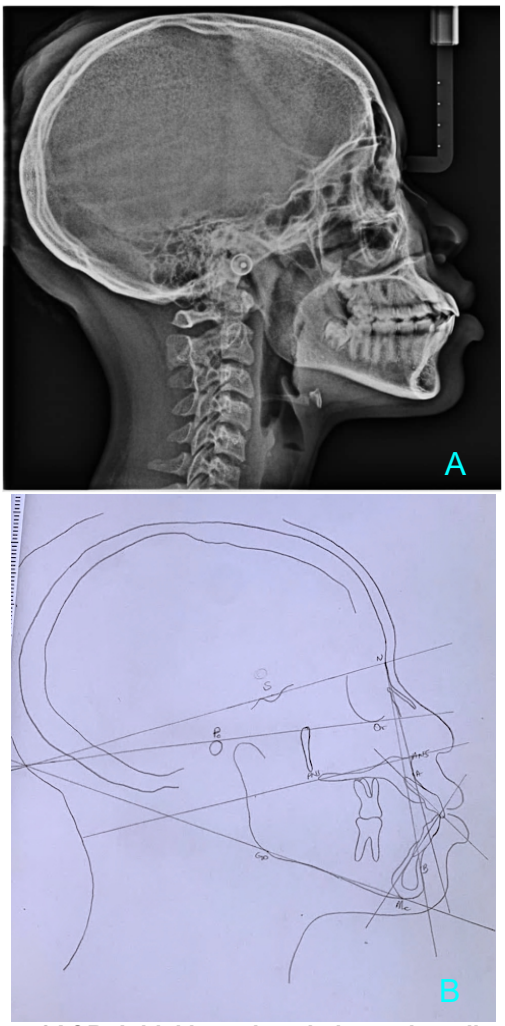


Figure 2A&B: Initial lateral cephalometric radiograph and tracing

Table 1: Pre-Treatment Cephalometric Values

Parameter	Client's Values	Remarks	Ghana (Fadeju et Al, Dec 2012)	Downs Analysis
SKELETAL (SAGITTAL)				
SNA	88º	Normal	88.60º ± 4.02º	
SNB	83º	Normal	83.34º ± 3.38º	
ANB	5 º	Normal	5.37º ± 2.24º	53º-66º
Y-axis	61º	Normal		
Facial Angle	92º	Normal		82º-95º
DENTO-ALVEOLAR				
UI-MxPl	120º	Normal	120.94º ± 7.13º	
LI-MnPl	104º	Increased	98.74º ± 7.98º	
DENTAL				
I-I angle	101º	Decreased (-11.76)	112.76º ± 10.12º	
SKELETAL (VERTICAL)				
MxP-MnP angle	32º	Normal (4.16)	27.84º ± 5.78º	
SN-MnP angle	35º	Normal (1.24)	33.76º ± 5.77º	
FMPA	28º	Normal		*17°– 28°*

Treatment Objectives

The treatment objectives were to improve and reinforce oral hygiene by scaling and polishing and to provide oral hygiene instructions. To do fluoride therapy and fissure sealants of all second molars. Correct rotations of all de-rotated teeth. To align the crowded-out upper left canine, improve on the overjet and overbite, and correct the upper dental midline shift—correction of the low upper labial frenal attachment.

Treatment Progress

Orthodontic treatment began with band cementation on all first molars and bonding of standard-sized MBT bracket with prescription, 0.022"x 0.028" slot, hooks on canine brackets. Tooth number 23 is not bonded at the initial stage.

Leveling and alignment were initiated on 0.014 NiTi Euroform Archwires for both upper and lower arches, incorporating bendbacks to control anterior-posterior movements. A month later, all first premolars were extracted under local anaesthesia in two visits. Leveling and alignment continued for 10 weeks using round NiTi 0.018", followed by NiTi rectangular 0.017 x 0.025" in both arches, incorporating lacebacks and bendbacks.

Two months later, canine traction of 23 was started using rectangular stainless steel 0.017 x 0.025" engaged in the upper arch, sectioned at the region of the upper left canine. Piggyback was done with NiTi 0.014" round wire to engage 23. Unterties were done from 12 to 22 and for 15 and 16 (compound anchor units) for orthodontic traction of 23. Three months later, canine retractions began using closed coil springs on stainless steel 0.019" x 0.025" wire after arch coordination was completed. Two months later, canine retractions were completed. A month later, a frenectomy was done.

En-masse retraction of incisors started a month later in both arches using closed coil springs of diameter 0.010 and length of 9mm. It was completed within 3 months. This was continued by the closure of residual spaces using a continuous power chain in both arches. Finishing, detailing, and settling were completed 3 months later.

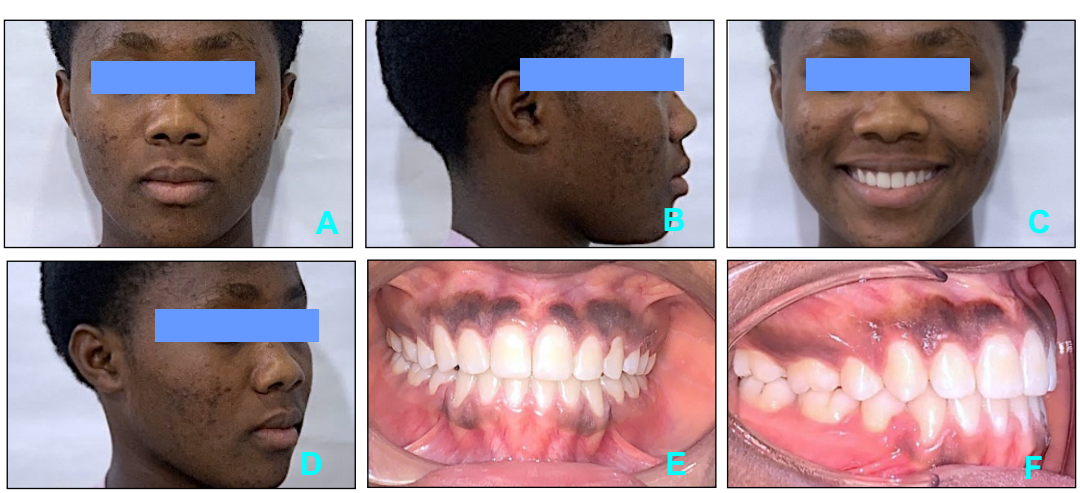
Four months later, the debonding of all brackets was done with all residual composites removed. Enamel smoothing and polishing of all tooth surfaces were performed, and fixed bonded retainers were incorporated on the palatal surfaces of 15 to 25 and the lingual surfaces of 35 to 45. Pits and fissure sealants were applied on the occlusal surfaces of all second permanent molars. Fluoride therapy was also done. The patient was provided with a simple, removable Hawley's appliance and instructions for its use and maintenance were given. The occlusion was checked, and oral hygiene instructions were also reinforced.

Treatment Results

The total treatment time was 20 months, with satisfactory results. At the end of the treatment, all teeth in both arches were well aligned, as post-treatment photographs depicted a Class I incisor, canine, and molar relationship with normal overbite and overjet (Figure 5). The upper centerline was coincident with the midfacial axis, and the lower midline was also coincident with the upper dental midline (Figure 5). The post-treatment cephalogram, panoramic radiograph, cephalometric analysis, and superimpositions are shown below (Figure 6). These investigations reveal a slight growth of the maxilla and mandible during the treatment period.

Figure 3A,B,C,D,E,F,G,H,I. Pre-treatment facial and intraoral photographs.

Figure 4- Treatment progress: A, B, C- Initial bonding; **D, E-** Post-extraction; **F-** Orthodontic traction of Canine **G, H-** Canine retraction; **I-** Frenectomy; **J, K-** En masse retraction of incisors **L-** Remaining Space closure; **M-** Good interdigitation with elastics; **–** Settling



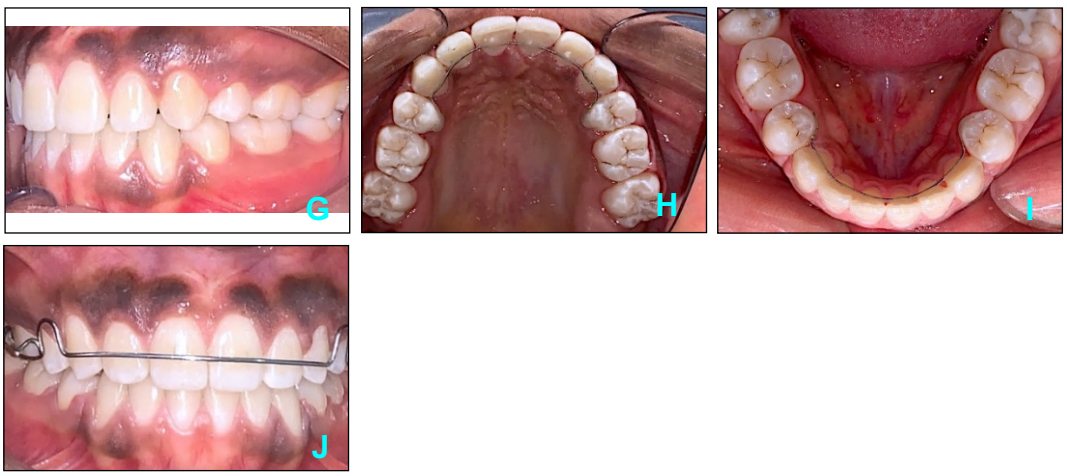


Figure 5A,B,C,D,E,F,G,H,I. Post-treatment facial and intraoral photographs.

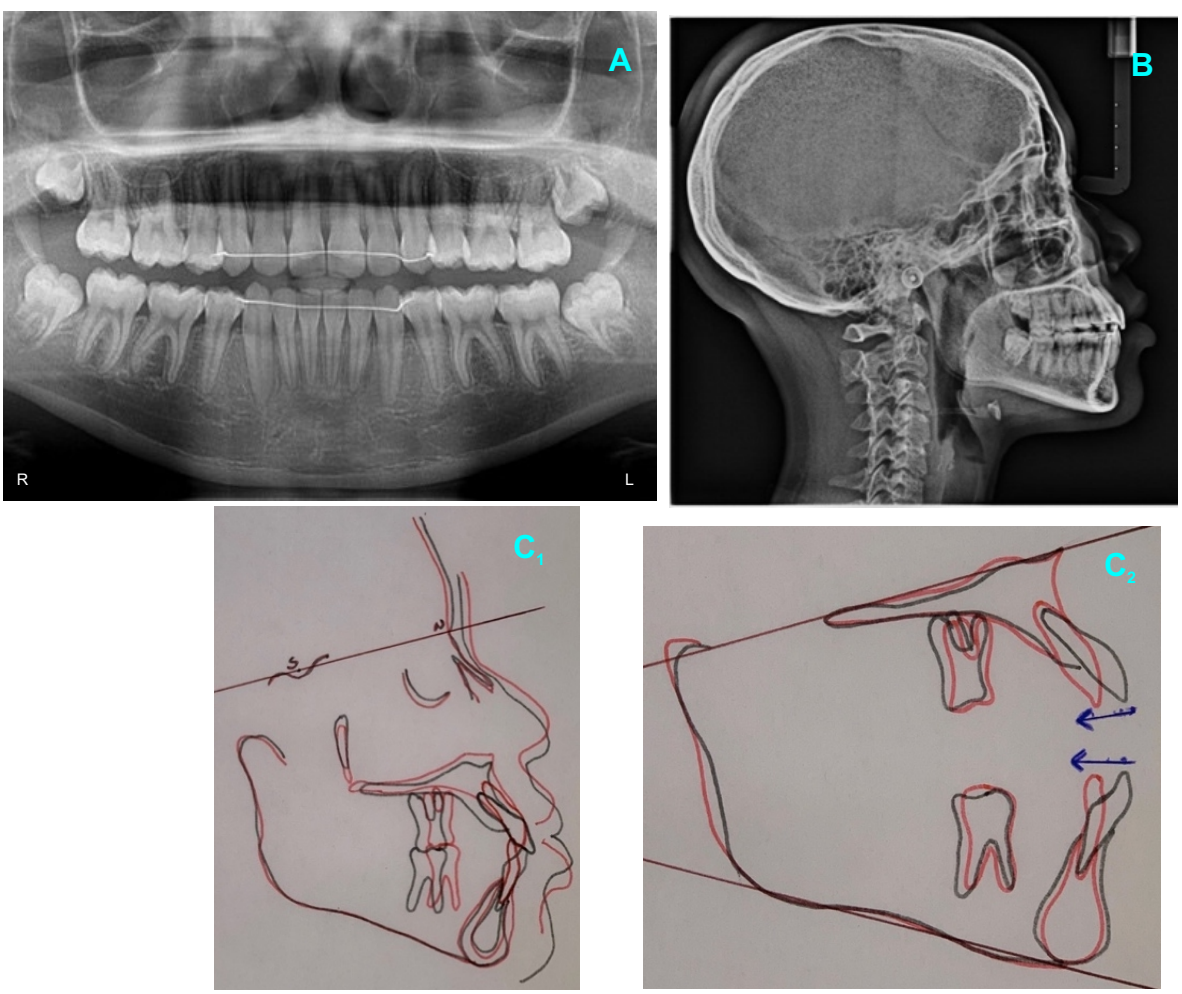


Figure 6- A - Post-Treatment Panoramic Radiograph; B - Cephalogram; and C- Superimposition

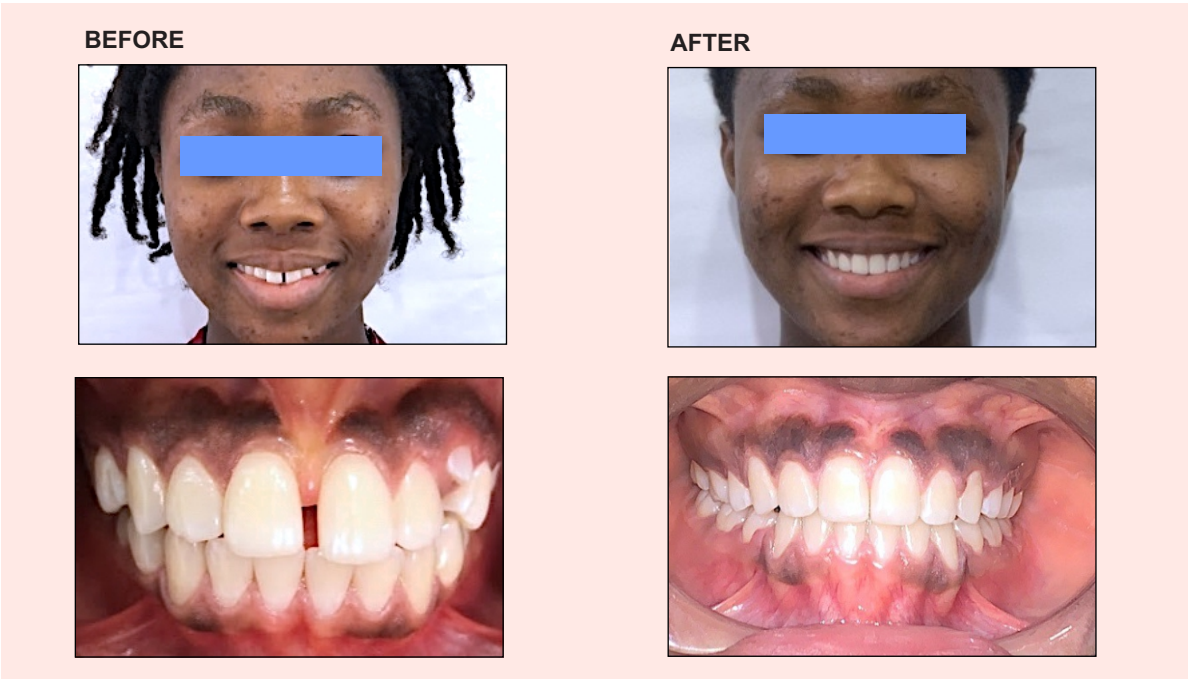
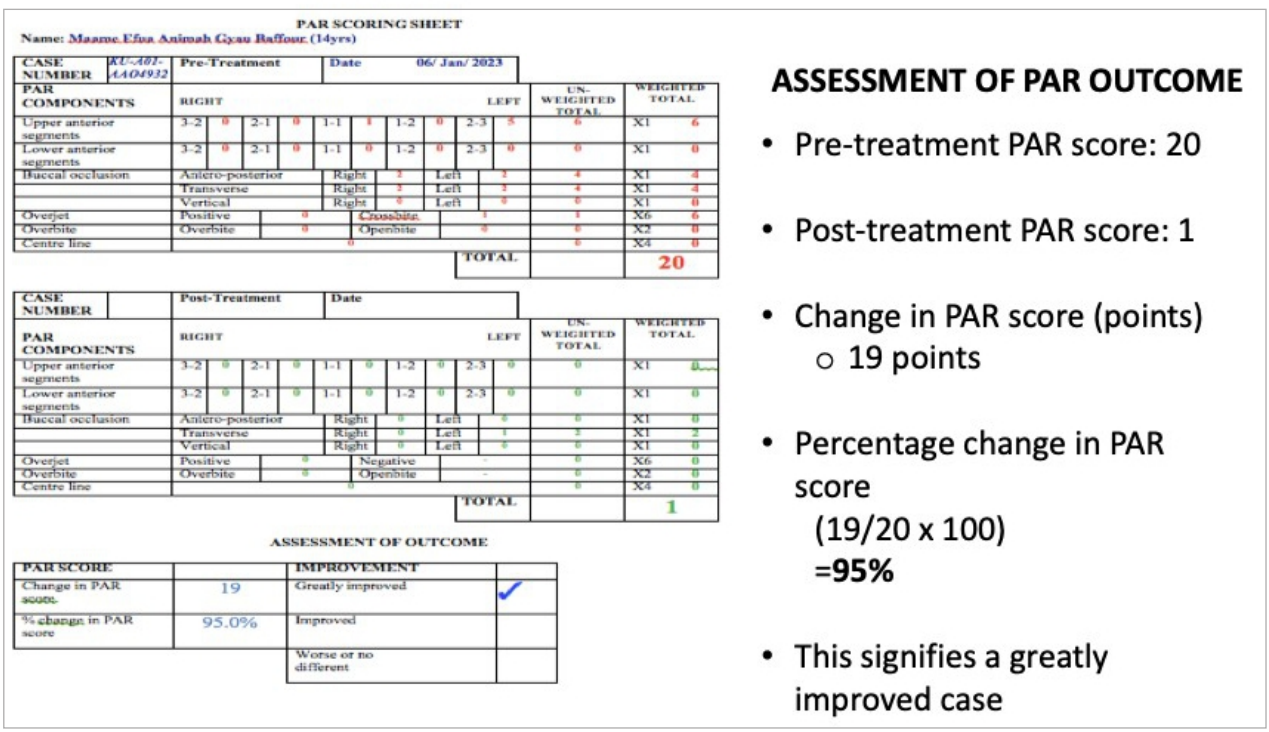


Figure 7- Before and After Treatment Photographs



PAR SCORING SHEET

Name: Maame Efua Animah Gyau Baffour (14yrs)

CASE NUMBER	KU-A01-AA04932	Pre-Treatment								Date	06/ Jan/ 2023		
PAR COMPONENTS	RIGHT								LEFT		UN-WEIGHTED TOTAL		WEIGHTED TOTAL
Upper anterior segments	3-2	0	2-1	0	1-1	1	1-2	0	2-3	5	6	X1	6
Lower anterior segments	3-2	0	2-1	0	1-1	0	1-2	0	2-3	0	0	X1	0
Buccal occlusion	Antero-posterior				Right	2			Left	2	4	X1	4
	Transverse				Right	2			Left	2	4	X1	4
	Vertical				Right	0			Left	0	0	X1	0
Overjet	Positive		0		Crossbite					1	1	X6	6
Overbite	Overbite		0		Openbite					0	0	X2	0
Centre line					0						0	X4	0
										TOTAL			20

CASE NUMBER		Post-Treatment								Date			
PAR COMPONENTS	RIGHT								LEFT		UN-WEIGHTED TOTAL		WEIGHTED TOTAL
Upper anterior segments	3-2	0	2-1	0	1-1	0	1-2	0	2-3	0	0	X1	0
Lower anterior segments	3-2	0	2-1	0	1-1	0	1-2	0	2-3	0	0	X1	0
Buccal occlusion	Antero-posterior				Right	0			Left	0	0	X1	0
	Transverse				Right	0			Left	1	1	X1	1
	Vertical				Right	0			Left	0	0	X1	0
Overjet	Positive		0		Negative					-	0	X6	0
Overbite	Overbite		0		Openbite					-	0	X2	0
Centre line					0						0	X4	0
										TOTAL			1

ASSESSMENT OF OUTCOME

PAR SCORE		IMPROVEMENT	
Change in PAR score	19	Greatly improved	✓
% change in PAR score	95.0%	Improved	
		Worse or no different	

ASSESSMENT OF PAR OUTCOME

- Pre-treatment PAR score: 20
- Post-treatment PAR score: 1
- Change in PAR score (points)
  - 19 points
- Percentage change in PAR score
  (19/20 x 100)
  =95%
- This signifies a greatly improved case

Figure 8-PAR assessment outcome

DISCUSSION

The determination of appropriate space-gaining strategies is fundamental to the management of maxillary crowding, particularly when a canine is displaced buccally due to arch length deficiency. Accurate space analysis using comprehensive orthodontic records enables clinicians to assess potential treatment paths. In the present case, space for the crowded-out upper canine could theoretically have been achieved via maxillary arch expansion, controlled proclination of the maxillary incisors, distalization of the molars, or extraction of the permanent premolars[1-3]. Among these, distalization of the posterior segment to achieve a Class I molar relationship may have served as an alternative to extractions. However, this approach would likely be accompanied by a risk of excessive incisor proclination and difficulty in establishing a positive overjet, particularly in the presence of anterior crowding. Such proclination may compromise facial esthetics and lip competence, especially in patients with borderline soft tissue profiles[4].

Previous studies have demonstrated that non-extraction treatment modalities in cases of moderate to severe crowding

frequently result in labial displacement of anterior teeth, increased risk of gingival recession, and long-term instability, particularly in the mandibular anterior region[11]. In addition, a non-extraction approach would adversely affect the profile by causing further forward flaring of the lower lip and flattening of the mentolabial sulcus[12]. In contrast, the extraction of four first premolars provided a more predictable and controlled means to resolve crowding, properly align the canine, and correct the occlusal relationships. This approach enabled the retraction of the anterior segment without labial flaring, thereby contributing to improved incisor inclination and maintaining soft tissue harmony[5]. Moreover, it enabled the achievement of Class I molar and canine relationships with satisfactory overjet and overbite, eliminating the need for interproximal enamel reduction, which might have yielded limited space and further compromised tooth structure.

Extraction-based mechanics, when applied judiciously, facilitate bodily retraction and torque control, thereby preserving periodontal health and supporting facial aesthetics[4,6]. In this case, the extraction protocol resulted in effective alignment and occlusal stability, as evidenced by a reduction in the Peer Assessment Rating (PAR) index from 20 to 1, indicating a significantly improved outcome. The success of this case underscores the importance of individualized treatment planning that balances dentoalveolar correction with facial esthetic preservation.

CONCLUSION

The successful treatment of a patient with a crowded-out canine, edge-to-edge incisor relationship, Angle's Class II subdivision left malocclusion, and cusp-to-cusp relationship of premolars can be a challenging task for an orthodontist[8]. Management of Class II subdivision malocclusion can be generally challenging due to the need for asymmetric force and anchorage systems, which may include skeletal anchorage[7,8]. Successful treatment of the above case scenario requires careful treatment planning by the orthodontist. The decision to extract the first premolars was made to achieve good aesthetics, function, and more stable occlusal results. There was a significant improvement in dental and gingival margin aesthetics, resulting in a patient with an agreeable and harmonious smile after orthodontic treatment.

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