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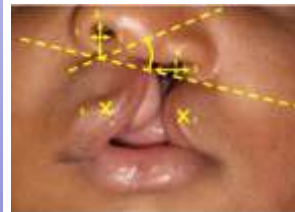
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**PAR and self reported improvement  
of malocclusion**



**Orthodontic considerations of  
children with special needs**



**Pre-surgical infant orthopedics  
experience in LUTH**



**Management of bimaxillary  
protrusion**



**Orthodontic management of  
severe crowding**

# Case Report: Management of Angles Class I Malocclusion with Severe Crowding and Midline Shift

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## Abstract

A 12-year-old male who reported to the dental unit with his mother complained of teeth not well aligned and requested expert management. Clinical examination showed he had Angles class I malocclusion, ectopic 23, severe crowding in the upper and lower anterior segment, minor rotations in the upper and lower arch, an upper midline shift to the left by 3mm and a lower midline shift to the right by about 3mm, an increased overjet of about 5mm, and a 3mm overbite.

Treatment involved the extraction of maxillary and mandibular first premolars to help relieve crowding and align ectopic canines, and to correct upper and lower midline shifts.

Treatment was workable and simple within an active period of 24 months. The patient was very compliant and received a satisfactory occlusion and an attractive smile.

**Keywords:** Angles Class I malocclusion, Severe crowding

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## Introduction

**T**ooth crowding occurs when there is disharmony in the tooth-jaw size relationship or when the teeth are larger than the available space.

Tooth crowding can pose an intellectual and technical challenge since the mesiodistal and buccolingual discrepancies must be addressed. A thorough evaluation of the patient will establish the basis for potential treatment options. Crowding leads to dental caries, periodontal diseases, improper cleaning of all surfaces of the teeth, and above all, it is aesthetically unsatisfactory.

Ectopic buccally erupted maxillary canines are one of the frequently encountered conditions in orthodontic

practice.

Orthodontic management involves the creation of space in the arch, for the alignment of teeth into their respective positions. The spaces created could be a result of the expansion or extraction of teeth.

## Presenting complaints

A 12-year-old male presented to the Komfo Anokye Teaching Hospital in Kumasi, Ghana, with the chief complaint of teeth not being well arranged.

## Medical and dental history

There was no significant medical and dental history, and no known allergies or oral habits.

## Diagnosis

### Clinical assessment

### Extraoral findings

The patient had a convex facial profile, with a Frankfort mandibular plane angle formed anterior to the occiput, which is suggestive of an increased lower anterior facial height. He had protrusive upper and lower lips. He also had a non-consonant smile arch

with 100% of the upper central and lateral incisors teeth showing and about 25% of the ectopic left upper canine.

### Intraoral findings

Patient was in the permanent dentition stage of development with all teeth present, except the third molar in all quadrants, as well as partially-erupted second molars. There was severe crowding in the lower and upper anterior segment, stains in fissures of all first molars, and hypoplastic enamel of 15, 23, and 25. Ectopically placed 23, crowded out 33 and 43, and rotation of teeth was observed.

Angles class I molar relationship with unclassifiable canine relationship and an incisor class I relationship 5mm overjet between 21 and 31, 32

3mm overbite between 11 and 41, 42 with about 50% lower incisor coverage.

Upper relative to the facial midline non-coincident with upper centerline shifted to the left by 3mm and lower centerline shifted to the right by 3mm.

### Radiographic assessment

**Panoramic findings:** This revealed the presence of all teeth with ectopically positioned 23 and the crown of all third molars almost complete. No sign of caries, root resorption, or any periapical lesion.

**Cephalometric findings:** Lateral cephalometric analysis showed a skeletal class II pattern, maxillary skeletal prognathism, maxillary dentoalveolar proclination, and an increased lower anterior facial height. The radiographic images and findings are shown below (Figure 2)

### Treatment objectives

The following treatment objectives were adopted:

Improve and reinforce oral hygiene by scaling and polishing, and oral hygiene instructions

Fluoride therapy and fissure sealants of all first molars

Correct rotations of all de-rotated teeth

Extraction of maxillary and mandibular first premolars to align the crowded out lower canines and ectopic upper canines, and to correct the upper and lower midline shifts.

Levelling and aligning the arches

Closure of the remaining spaces

Reassessment of occlusion and retaining corrected results

### Treatment progress

Orthodontic treatment began on 20<sup>th</sup> August 2019, with band cementation on all first molars and bonding of 0.022"x 0.028" inch MBT bracket prescription on teeth. This was done with an initial startup 0.014 NiTi Euroform Archwire for the upper arch and 0.012 NiTi Euroform archwire for the lower arch. Bendbacks were then incorporated to control anterior-posterior movements.

Four weeks after, the transpalatal arch was fixed and the forceps of all first premolars were extracted under local anaesthesia. Retraction of 23 started with a NiTi coil spring with open coils between 22 and 25, and canine laceback commenced in other quadrants after 5 weeks. By 19th May 2020, the correction of the midline had started with the distalisation of 11 and 12, as well as the mesialisation of 21 and 22. By October 2020, an elastomeric chain was used to close the spaces in both arches, and Class II intermaxillary elastics were used for better interdigitation of occlusion.

Settling of teeth started with metallic ligature wire undertie on 0.014" SS wire for both upper and lower arches, it continued with metallic ligature overtire after 6 weeks, with archwires maintained in both arches.

On 24<sup>th</sup> August 2021, debonding of all brackets was done with all residual composites removed. Enamel smoothing and polishing of all surfaces of the teeth was done and a fixed bonded retainer on palatal surfaces of 15 to 25 and lingual surfaces of 35 to 45 was incorporated. Fissure sealants were applied on occlusal and buccal pits and fissures of 1<sup>st</sup> and 2<sup>nd</sup>

permanent molars and fluoride therapy was done. Simple removable Hawley's appliance was delivered and instructions for its use and maintenance were given. The occlusion was checked and oral hygiene instructions were also reinforced.

### Treatment results

At the end of the treatment, all teeth in both arches were well aligned with post-treatment radiographs depicting a Class I incisor, canine, and molar relationship with normal overbite and overjet. The

upper centerline was coincident with the midfacial axis and the lower midline of about 0.5mm shift to the right.

The post-treatment cephalogram, panoramic radiograph, cephalometric analysis and superimpositions are shown below. These investigations show a massive growth of the maxilla and mandible during the period of treatment and evidence of mild root resorption within the acceptable parameters compatible with the extent of movement. The one-year follow-up is yet to be done on the patient.

**Table 1. PRE TREATMENT CEPHALOMETRIC VALUES**

| Parameter                  |                      |     |     |
|----------------------------|----------------------|-----|-----|
| <b>Skeletal (Sagittal)</b> |                      |     |     |
| SNA                        | 88.6( $\pm$ 4.02)    | 94  | 90  |
| SNB                        | 83.34 ( $\pm$ 3.83)  | 84  | 83  |
| ANB                        | 5.37 ( $\pm$ 2.24)   | 10  | 7   |
| <b>Dento-Alveolar</b>      |                      |     |     |
| UIMxP                      | 102.94( $\pm$ 7.13)  | 112 | 100 |
| LIMdP                      | 98.74( $\pm$ 7.98)   | 95  | 86  |
| <b>Dental</b>              |                      |     |     |
| I-IA                       | 112.76( $\pm$ 10.12) | 115 | 105 |
| <b>Vertical</b>            |                      |     |     |
| MMPA                       | 27.84( $\pm$ 5.78)   | 40  | 32  |



**Fig. 1. Pretreatment facial and intraoral photographs.**



**FIGURE 2 - A) Initial panoramic radiograph, (B) Initial lateral cephalometric radiograph, and (C) tracing.**



**FIGURE 2A**



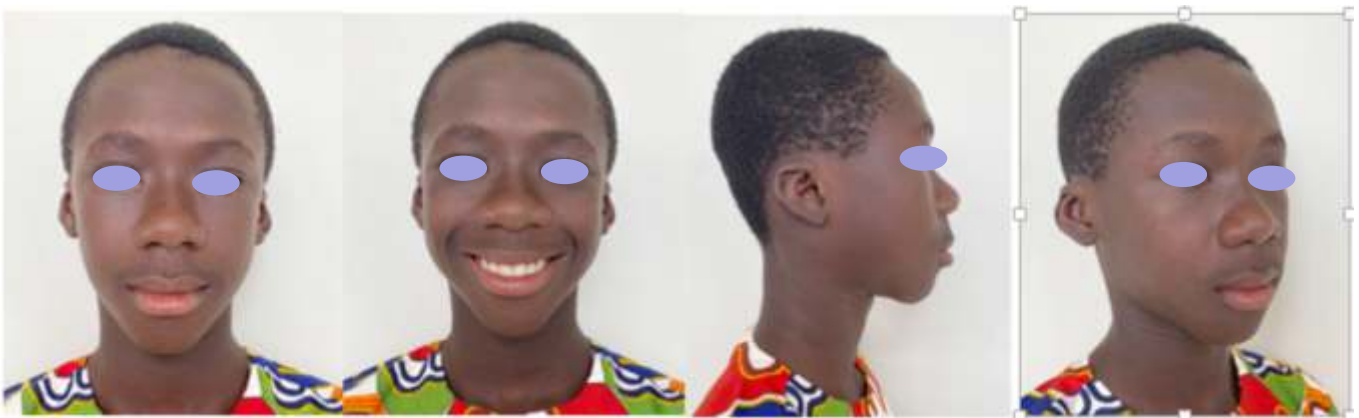
**FIGURE 2B**



**FIGURE 2C**



**FIGURE 3- Treatment progress: A, B- Initial bonding; C), D)-post-extraction and TPA insertion; E), F- Canine retraction; G), H- Midline correction; J) Remaining Space closure; K) Lateral open bite closure with elastics; I) Settling**



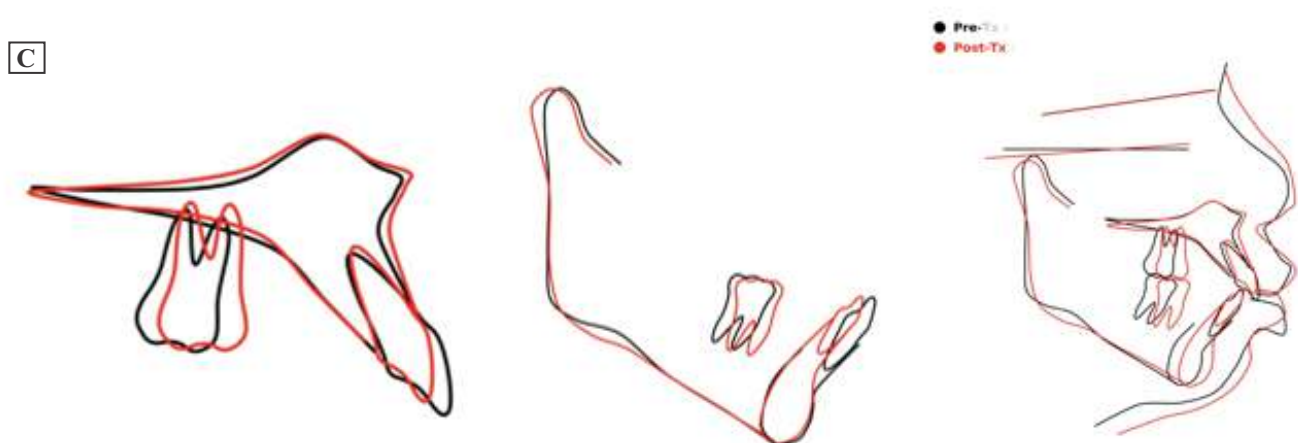
**FIGURE 4- Post-treatment facial and intraoral photographs**

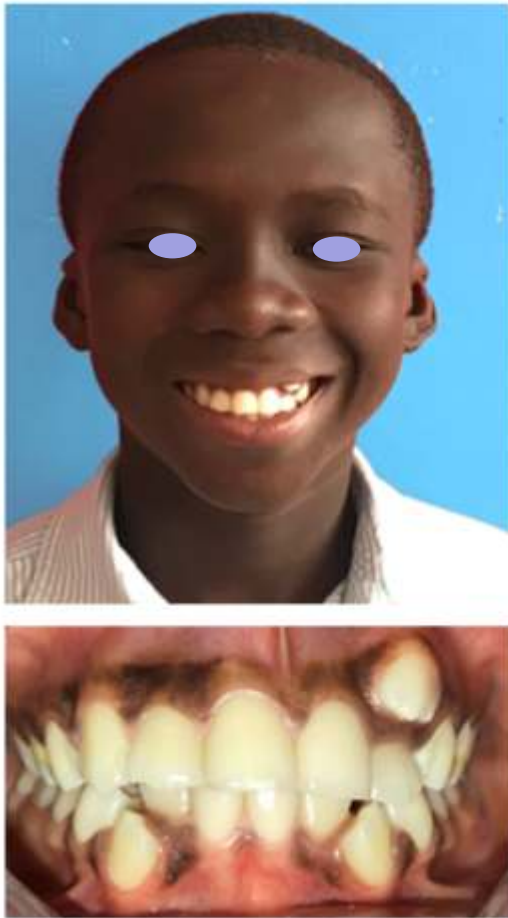
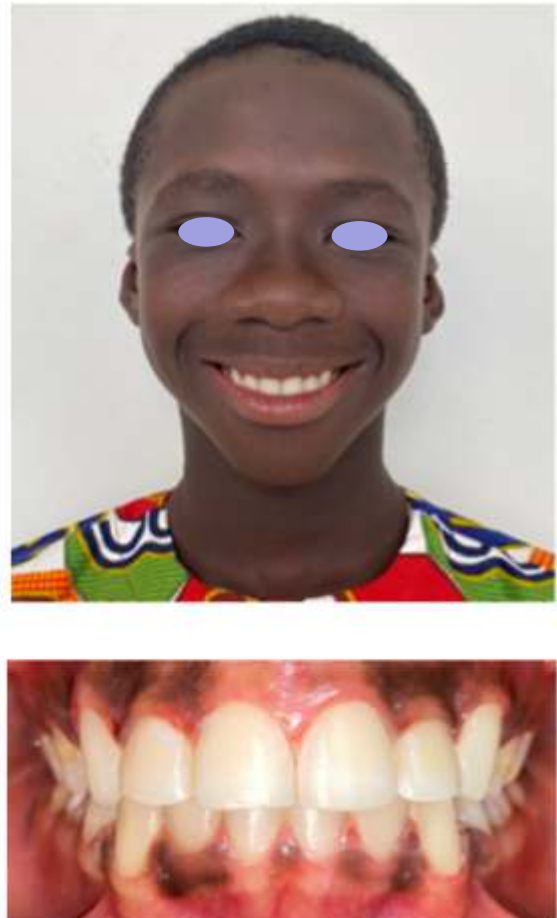


**Figure 5- A) Post-treatment panoramic radiograph; (B) cephalogram; and (C) superimposition.**



**C - Superimpositions**



**Before****After**

### Discussions

Crowding and severe overjet can interfere with social relations. Moreover, dissatisfaction with one's appearance is the main reason why people seek orthodontic treatment. The selection of an appropriate treatment approach may depend upon which factors influence the observed crowding. Extractions are routinely used to address dental crowding. The high prevalence of tooth crowding poses a constant dilemma to orthodontists: which treatment option to follow, with or without extractions? How many and which teeth should be extracted? Based on studies about different types of treatment to alleviate crowding, one of the routine procedures for Class I malocclusion and bimaxillary protrusion, is the extraction of the first premolars.

These teeth are usually chosen because of their position and size, which is compatible with most types of discrepancies in cases that require the retraction of anterior teeth. However, tooth-size discrepancies may also be found in the same case, which will require not only extractions but interproximal stripping as well.

Therefore, because of the severe crowding in the anterior region in both dental arches, the treatment plan included the extraction of the four first premolars to eliminate discrepancies and also make room for the correct positioning of the ectopic canine.

Midline discrepancies are the common problems encountered that pose both diagnostic and treatment difficulties. Midline discrepancy may be either skeletal or dental. Sometimes, the functional shift of

the mandible may contribute to the midline discrepancy. Extraction spaces created in this case were used in the correction of both the upper and lower midline shift before the final space closure in both jaws.

Several anchorage techniques are used for cases of severe crowding with associated ectopic canines. A moderate anchorage for the upper arch, by incorporating a Trans-palatal arch and a minimum anchorage during levelling and alignment, and moderate anchorage with banding of second molars during the retraction of the anterior segment for the lower arch was used.

## Conclusion

The correction of severe crowding in this case of Class I malocclusion with ectopically placed canine and a midline shift in both upper and lower arch was successful after the extraction of the four first premolars.

There was a significant improvement in dental and gingival margin aesthetics, which gave the patient a quite agreeable and harmonious smile after orthodontic treatment.

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