



## Case Report

# Early Intervention of Skeletal Class III Malocclusion in Growing Patients Using RPHG. Case Report

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### Abstract

Skeletal class III malocclusion which could result from maxillary retrognathia and/or mandibular prognathism necessitates multidisciplinary intervention. The impact of such skeletal discrepancies on esthetic and function was reported. Early recognition and correction is crucial as it may alleviate the need for surgical intervention. This case report describes the management of a skeletal class III malocclusion of 9 years old male child with deficient maxilla and both anterior and posterior crossbite, through modifying the growth to achieve correct transverse relationship, using bonded RPE and reverse pull headgear to advance the maxilla. The results were satisfying. Thus, orthopedic corrections of skeletal Class III malocclusion with the help of a reverse pull headgear have shown their reliability in growing patients.

**Keywords:** Class III malocclusion; Growth modification; Reverse pull headgear; Constricted maxilla

### Introduction

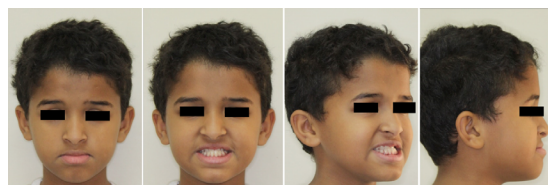
Skeletal class III malocclusion which could result from maxillary retrognathia and/or mandibular prognathism necessitates multidisciplinary intervention. Moreover, such discrepancy often results in bilateral anterior and posterior cross-bites. Lifting it untreated during the mixed dentition stage due to lack of patient cooperation makes it one of the most difficult problems to deal with. Subsequently, skeletal class III malocclusions are the most

prevalent type of discrepancies requiring orthognathic surgery. Early recognition and intervention is of paramount importance as the need for surgery can be minimized or even be avoided at a later stage [1]. Proper case selection, prolonged treatment duration, patient compliance and long-term follow-up and stabilization is necessary for orthopedic growth modification to be deemed successful [2]. Recently, many studies have documented that reverse pull headgear (RPHG) therapy is the gold standard for correcting maxillary deficiency and achieving maxillary protraction [3]. Additionally, this orthopedic effect on maxilla before adolescence is often accompanied by a downward-backward rotation of the mandible and dental changes that are favorable to the correction

of reverse overjet and Class III malocclusion [4] This case report presents the use of the reverse pull headgear (RPHG) and Bonded Rapid maxillary expansion for the successful management of Class III malocclusion with maxillary deficiency in a 9-year-old male child.

## Case report

A 9-years old male child reported to the orthodontic clinic with his parents complaining of “the extreme advancement of the lower jaw of their son”, without any other dental complaint. Patient is medically fit and has no hospitalization history nor medication use, no abnormal syndromes/malformation detected. Patient has no allergy to any medication, no habits history but with a history of class III malocclusion among the family. Patient was cooperative with external motivation to improve his dental esthetics and function. Extra oral examination revealed that the patient has a mesofacial form of the face with concave profile, symmetrical face, and normal lower anterior facial height. no incisal show at rest with low smile line, no gingival show upon smiling, short upper and lower lips with poor balance and harmony of the lips, no occlusal cant, upper dental midline is coincided to the facial midline, competent lips with protrusive lower lip related to E line, normal position of chin, acute naso-labial angle and normal mento-labial sulcus, chin throat angle within normal, non-consonant smile arc and wide buccal corridor (Figure 1).

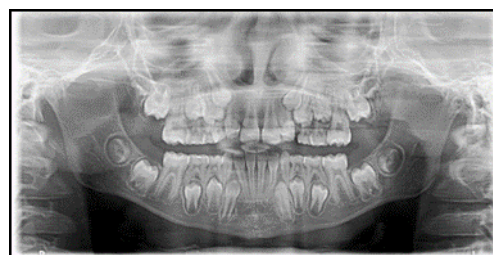


**Figure 1:** Extra-oral pretreatment photographs.

Intraoral examination showed that the patient is in a mixed dentition stage, with good oral hygiene, healthy gingiva, and noted racial pigmentation. No clinically detectable caries, restoration on #85, dens evaginatus in teeth #16 & #26, all teeth presented except #63 with history of extraction. Class III molar relation is shown with anterior and posterior bilateral crossbite, reverse overjet of 4mm, lower midline is shifted to the right in relation to the upper midline. Maxillary arch showed an asymmetric dental arch with symmetrical arch form and 6mm crowding. Mandibular arch showed a rotation in the lower left lateral incisor #32 with 3mm spacing. No other significant abnormalities were observed during intraoral examination (Figure 2).

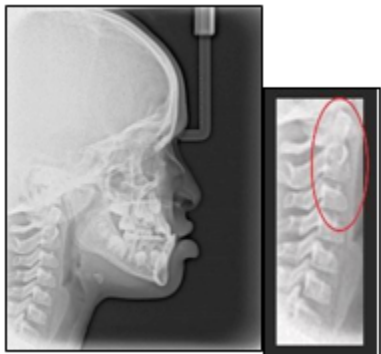


**Figure 2:** Intra-oral pretreatment photographs.



**Figure 3:** Orthopantomogram (OPG).

Radiographically orthopantomogram (OPG) and lateral cephalogram radiographs were taken for further investigation. The orthopantomogram confirmed the presence of deciduous teeth and their permanent successors. all teeth are present, with normal roots' shapes and morphology except dilaceration root related to #32 (Figure 3). Cephalometric interpretation confirmed CVM stage 2, Class III skeletal relationship due to retrognathic maxilla and normally positioned chin, normal vertical relationship, posterior inclined maxilla, normal inclined mandible, more vertical growth, normal lower facial proportion. With ANB of  $-4^\circ$ , SNA of  $73^\circ$ , SNB of  $77^\circ$  and Wit's appraisal -4mm which indicates class III skeletal malocclusion due to retrognathic maxilla. Upper incisors are proclined and protruded, lower incisors are in normal position and inclination. The upper lip was in normal position, and the lower lip was positioned forward with respect to Rickett's E line with poor balance and harmony (UL - E line = -2mm, LL - E line = 2mm). acute nasiolabial angle NLA ( $80^\circ$ ) (Figure 4).



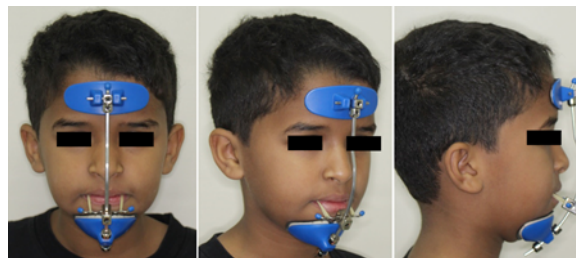
**Figure 4:** lateral cephalogram & Cervical vertebral maturation (CVM) stage.

Based on the clinical findings and the radiographic investigations carried out, a comprehensive and detailed treatment plan was made. The treatment will be carried out in two phases: phase I (growth modification), which aim to correct anterior-posterior and transverse discrepancy. Phase II (Comprehensive orthodontic treatment) aim to correct the dental issues like severe crowding and create space for unerupted teeth. After reinforcement of oral hygiene, a fixed orthodontic appliance (bonded R.P.E) is cemented (Figure 5). Activated twice/day (0.5mm) for 2 weeks. After 2 weeks Petit Facemask (RPHG) protraction is attached to the two hooks that attached to the bonded R.P.E for 6-8 months until positive overjet achieved with progressive sequence of elastics at force 350-500 gm on each side, 12-16 hrs of wear per day, and at angulation 25°- 45° (Figure 6). A noticeable change from the first appointment, and this indicates the patient's commitment. Due to the positive clinical result for the treatment, it was decided to continue RPHG until favorable anterior overlap was achieved and

the patient was treated with 6 weeks of review. In Post-treatment results, a positive overjet was achieved with improvement in the overall aesthetic appearance of the patient. Cephalometric analysis after the treatment reveals an improvement in SNA 80° (was 73°), ANB 3° (was -4°) and Wit's appraisal 1.3mm (was -4mm) which indicate that the maxilla is protruded, and the occlusion is overcorrected from class III malocclusion to class II occlusion. The nasolabial angle also shows an improvement from 80° to 85° (Figure 7,8 & Table 1). At the end of the treatment, we achieved class I skeletal and class II occlusion relation. Nance appliance used at the retentive phase (Figure 9) until phase II therapy (Comprehensive orthodontic treatment) is accomplished (Figure 10,11).



**Figure 5:** bonded R.P.E right after cementation.



**Figure 6:** Petit Facemask (RPHG).

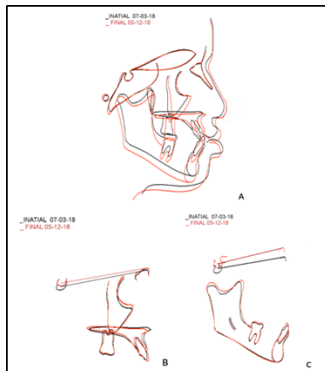
			Normal range	Pre-Tx	Post-Tx
Skeletal	Ant-Post	SNA	$82^{\circ} \pm 2^{\circ}$	$73^{\circ}$	$80^{\circ}$
		SNB	$78^{\circ} \pm 2^{\circ}$	$77^{\circ}$	$77^{\circ}$
		ANB	$2^{\circ} \pm 2^{\circ}$	$-4^{\circ}$	$3^{\circ}$
		Wit's appraisal	-1mm/ 0mm	-4mm	1.3mm
		SN-Pog	$80^{\circ} \pm 3^{\circ}$	$78^{\circ}$	$78^{\circ}$
		NA- A Pog	$0^{\circ} \pm 5^{\circ}$	$-8^{\circ}$	$5^{\circ}$
	Vertical	SN-MP	$32^{\circ} \pm 5^{\circ}$	$36.5^{\circ}$	$37.2^{\circ}$
		SN-PP	$8^{\circ} \pm 3^{\circ}$	$11^{\circ}$	$9.3^{\circ}$
		PP-MP	$25^{\circ} \pm 3^{\circ}$	$23^{\circ}$	$27.9^{\circ}$
		Me-tgo-Ar	$126^{\circ} \pm 10^{\circ}$	$126^{\circ}$	$130^{\circ}$
		Y axis	$59.4^{\circ} \pm 3.8^{\circ}$	$63^{\circ}$	$64^{\circ}$
Dental		ANS-Me/N-Me	$55 \pm 3\%$	56%	58%
		UI-L1	$131^{\circ} \pm 5^{\circ}$	$132^{\circ}$	$126^{\circ}$
		UI-SN	$104^{\circ} \pm 2^{\circ}$	$101^{\circ}$	$106^{\circ}$
		UI-PP	$110^{\circ} \pm 6^{\circ}$	$111^{\circ}$	$116^{\circ}$
		UI-NA	$22^{\circ}$ (4mm)	$22^{\circ}$ (6mm)	$27^{\circ}$ (6mm)
		LI-NB	$25^{\circ}$ (4mm)	$22^{\circ}$ (4mm)	$22^{\circ}$ (4mm)
		LI-Apog	$1\text{mm} \pm 2\text{mm}$	6.6mm	1.6mm
Soft tissue		L1-MP	$93^{\circ} \pm 6^{\circ}$	$88.9^{\circ}$	$87^{\circ}$
		UL-EL	$-4\text{ mm} \pm 2\text{mm}$	-2mm	0mm
		LL-EL	$-2\text{ mm} \pm 2\text{mm}$	2mm	2mm
		Nasolabial Angle	$90^{\circ}$ - $110^{\circ}$	$80^{\circ}$	$85^{\circ}$

**Table 1:** Pre- and post-treatment cephalometric values.



**Figure 7:** Lateral cephalogram after the treatment.





**Figure 8:** Bjork and Skieller structural superimposition method: A. Overall superimposition. B. Maxillary superimposition. C. Mandibular superimposition.



**Figure 9:** Nance appliance for space maintaining.



**Figure 10:** Intra-oral posttreatment photographs.



**Figure 11:** Extra-oral posttreatment photographs.

## Discussion

Maxillary protraction better to delayed until permanent first molars and incisors have erupted. The molars can be included in anchorage unit and the inclination of the incisors can be controlled to affect the overjet. This case report supports the fact that skeletal III malocclusion can be managed effectively with maxillary protraction via RPHG and bonded R.P.E. Moreover, desired orthopedic effects can be achieved through releasing the circumaxillary sutures of the maxillary complex to enhance class III treatment [3]. Furthermore, positive changes in the maxilla were reported in the literature with the help of RPHG therapy, as it encourages downward and forward growth of the maxilla to mimic the natural growth pattern of the human face, especially when used in growing children during their mixed dentition period [5]. However, correction of Class III malocclusion is believed to be more effective in early-mixed dentition as compared to late-mixed dentition [6,7]. In such skeletal discrepancies treated patients who had a maxillary deficiency, but normal mandibular dimensions generally showed good stability [8]. The correction achieved is just as stable as correction with Le Fort I advancement [9]. Use of the reverse pull headgear also results in positive long-term profile changes [10]. Prospective clinical trials have shown that maxilla remained stable for two years following facemask treatment [11]. However, Long term studies revealed that the treatment was successful in 67%-75% of the patients [12].

## Conclusion

Orthopedic corrections of skeletal Class III malocclusion with the help of a reverse pull headgear have shown their reliability in growing patients. Treatment results are mainly influenced by case selection, patient's compliance, and long-term stabilization. Growth modification in mixed dentition period then stabilizing the results is believed to minimize the need for future surgical intervention.

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