

Case Report

Management of Adult Orthodontic Patient with Genetic Predisposition for Class III Malocclusion: A Case Series

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ABSTRACT:

Successful treatment of Class III malocclusion is not an easy assignment. It requires comprehensive planning and accurate implication of suitable methodologies. Class III malocclusion usually involves several components like cranial base, maxillary and mandibular skeletal and dental components. Many of the pioneer studies have emphasized on the evidence of the role of genetics in the development of malocclusion. Researchers have shown that malocclusion has a hereditary component, and genetic factors can contribute to the development of different forms of malocclusion. Therefore, a comprehensive understanding of these baseline concepts will enable researchers to develop more effective treatment options that target the underlying genetic causes of malocclusion. The study of genetics in malocclusion is still in its early stages, and much more research is needed to properly understand the dynamic interplay of genetics. This case series demonstrates the orthodontic mechanotherapy employed to treat a case of an adult with genetic predisposition for class III malocclusion through this example of a mother and son.

Keywords: Class III Malocclusion, Orthodontics, Genetics, Braces, NiTi Wires

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INTRODUCTION

Class III malocclusion, also known as "underbite," is a type of malocclusion where the lower teeth protrude past the upper teeth when the jaws are closed. Studies have suggested that there may be a genetic predisposition to developing Class III malocclusion, with certain gene variations increasing the likelihood of this condition.¹For example, one study found that variations in the BMP3 gene were associated with an increased risk of Class III malocclusion. BMP3 is involved in the growth and development, which is important for the proper alignment of the teeth and jaws.²⁻⁴ Other studies have identified variations in genes such as FGFR2, ARHGAP21, and ADAMTS1 that may also contribute to the development of Class

III malocclusion. By understanding the genetic basis of malocclusion, researchers may be able to develop more targeted and effective treatments for this condition in the future. The following cases of a mother and son also confirm the genetic predisposition of Class III malocclusion.²⁻⁴ Adult orthodontics is a rapidly growing field that has gained popularity in recent years due to the development of new technologies and techniques that make treatment more efficient and less noticeable to others. In fact, according to the American Association of Orthodontists, the number of adults seeking orthodontic treatment has increased by 40% over the past two decades.³One reason for this trend is that there is a greater awareness of the benefits of having

straight teeth, not only for aesthetic reasons but also for oral health. Misaligned teeth can cause a variety of problems, including difficulty in cleaning teeth, increased risk of tooth decay and gum disease, and even jaw pain.⁶ Fortunately, modern orthodontic treatments offer a range of options for adults, including clear aligners, ceramic braces, and lingual braces that are placed on the back of the teeth. These options are often more comfortable and less noticeable than traditional metal braces.⁷ Other significant studies in the literature also highlighted the role of genetics in class III malocclusion.⁸⁻¹¹ This case series highlights the adult orthodontics therapies along with genetic predisposition for class III malocclusion.

Angle's Class III Type III malocclusion on Class III skeletal base with 90% deep bite with retrognathic maxilla and prognathic mandible having horizontal growth pattern with retroclined upper incisors and prominent chin with concave profile and anterior divergence having competent lips. The treatment modality included moderate anchorage consideration, alignment and levelling of arch by NiTi and stainless steel wires, fixed posterior bite plane was given followed by extraction of bilateral mandibular second premolar and space closure and correction of occlusal discrepancies with settling elastics. In model analysis Ashley Howe's Analysis indicated no need for extraction in maxillary arch, Bolton Analysis showed anterior mandibular tooth material excess by 3.58mm and overall mandibular tooth material excess by 2.63 mm. Carey's Analysis suggested need for extraction of second premolar.

CASE REPORT 1

A 40 year old female patient reported to the department with the chief complaint of forward position of lower front teeth. She was diagnosed with

Figure 1: Pre-treatment intraoral view



Figure 2: Pre-treatment intraoral view



Figure 3: Pre-treatment Frontal view



Figure 4: Pre-treatment Side Profile view



Figure 5: Post-treatment Frontal view



Figure 6: Post-treatment Side Profile view



Figure 7: Post-treatment intraoral view with braces in place



Table 1: Composite Cephalometric Analysis (Pre, Dental)

Dental			
Interincisal angle	131	148°	Proclined upper and lower incisors
Upper incisor to Pt A vertical	5.3 mm	5mm	Normal
Upper incisor to NA (angle)	22	30°	Proclined upper incisors
Upper incisor to NA (mm)	4mm	4mm	Normal
Upper incisor to SN	102	93°	Proclined upper incisors
IMPA	90	83°	Uprighting of lower incisors needed
Lower incisor to A-Pog	2.3mm	3mm	Protruded lower incisor
Lower incisor to NB (angle)	25	20°	Retroclined lower incisor
Lower incisor to NB (mm)	4mm	1mm	Protruded lower incisor

Table 2: Composite Cephalometric Analysis (Pre, Soft Tissue)

Soft Tissue			
S Line	0mm	-1mm	Concave profile
Nose to H line	12mm	12mm	Normal prominence
Upper lip curvature	2.5mm	4mm	Increased
Upper sulcus depth	5mm	5mm	Normal
Upper lip strain	12mm	11mm	Normal
Lower lip to H line	-1to +2mm	4mm	Increased
Soft tissue chin thickness	10 to 12mm	9mm	Normal
Nasolabial angle	102±8	95°	Acute
Lower lip to E line	-2±2mm	1mm	Normal

Table 3: Composite Cephalometric Analysis (Post, Dental)

Dental			
Interincisal angle	131	129°	Upright Incisors
Upper incisor to Pt A vertical	5.3 mm	5.2mm	Normal
Upper incisor to NA (angle)	22	23°	Normal
Upper incisor to NA (mm)	4mm	4mm	Normal
Upper incisor to SN	102	99°	Upright upper incisor
IMPA	90	87°	Slightly retroclined
Lower incisor to A-Pog	2.3mm	2.1mm	Normal
Lower incisor to NB (angle)	25	24°	Normal
Lower incisor to NB (mm)	4mm	4mm	Normal

Table 4: Composite Cephalometric Analysis (Post, Soft Tissue)

Soft Tissue			
S Line	0mm	1mm	Straight Profile
Nose to H line	12mm	12mm	Normal
Upper lip curvature	2.5mm	3mm	Normal
Upper sulcus depth	5mm	5mm	Normal
Upper lip strain	12mm	11mm	Normal
Lower lip to H line	-1to +2mm	0mm	Normal
Soft tissue chin thickness	10 to 12mm	10mm	Normal
Nasolabial angle	102±8	99°	Normal
Lower lip to E line	-2±2mm	1mm	Normal

CASE REPORT 2

A 22 year old male patient reported to the department with the chief complaint of forward position of lower teeth in lower front tooth region. He was diagnosed with Angle's Class III Type 3 malocclusion on skeletal class III base with SNA 85°, SNB 90°, ANB 5°, having horizontal growth pattern with prominent chin, concave profile, anterior divergence, having anterior crossbite, with competent lips, buccally placed upper second molars with missing 16 and rotated 18,28. In

view of all of these factors following treatment steps were undertaken; 28 extraction, delivery of posterior bite plane, second molar banding, alignment and levelling of upper and lower arches and bite settling with Class III elastics. In model analysis Ashley Howe's Analysis suggested it is a borderline case, Bolton Analysis suggested anterior mandibular tooth material excess by 0.472 mm and overall mandibular tooth material excess by 1.23 mm. Carey's analysis suggested it to be a non extraction case.

Figure 8: Pre-treatment intraoral view



Figure 9: Pre-treatment intraoral view



Figure 10: Pre-treatment Frontal view



Figure 11: Pre-treatment Side Profile view



Figure 12: Post-treatment Frontal view



Figure 13: Post-treatment Side Profile view

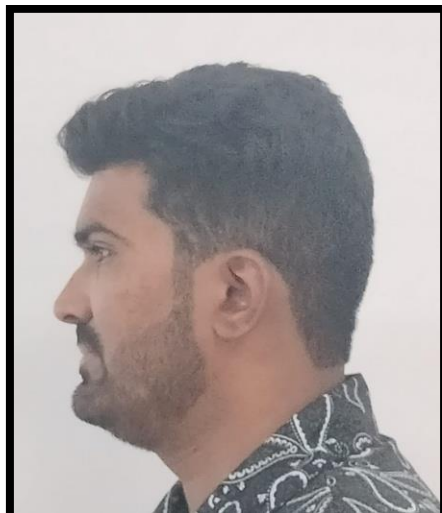


Figure 14: Post-treatment intraoral view with braces in place



Table 5: Composite Cephalometric Analysis (Pre, Dental)

DENTAL			
Interincisal angle	131	137	Require uprighting
Upper incisor to Pt A vertical	5.3 mm	0mm	
Upper incisor to NA (angle)	22	31	Proclined upper incisors
Upper incisor to NA (mm)	4mm	5 mm	Protrusive upper incisors
Upper incisor to SN	102		
IMPA	90	137	Proclined upper and retroclined lower incisors
Lower incisor to A-Pog	2.3mm	2	Retruded lower incisors
Lower incisor to NB (angle)	25	15	Retroclined lower incisor
Lower incisor to NB (mm)	4mm	3 mm	Retruded lower incisors

Table 6: Composite Cephalometric Analysis (Pre, Soft Tissue)

Soft Tissue			
S Line	0mm	mm	Concave profile
Nose to H line	12mm	17 mm	Increased
Upper lip curvature	2.5mm	2 mm	Decreased
Upper sulcus depth	5mm	3 mm	Increased
Upper lip strain		7 mm	Increased
Lower lip to H line	-1to +2mm	-2 mm	Normal
Soft tissue chin thickness	10 to 12mm	16 mm	Increased
Nasolabial angle	102±8		Normal
Lower lip to E line	-2±2mm	6 mm	Increased

Table 7: Composite Cephalometric Analysis (Post, Dental)

DENTAL			
Interincisal angle	131	125	Require uprighting
Upper incisor to Pt A vertical	.3 mm	5 mm	
Upper incisor to NA (angle)	22	30	Proclined upper incisors
Upper incisor to NA (mm)	4mm	5 mm	Protrusive upper incisors
Upper incisor to SN	102		
IMPA	90	125	Proclined upper and retroclined lower incisors
Lower incisor to A-Pog	2.3mm	2	Retrusive lower incisors
Lower incisor to NB (angle)	5	20	Retroclined lower incisor
Lower incisor to NB (mm)	4mm	3 mm	Retrusive lower incisors

Table 8: Composite Cephalometric Analysis (Post, Soft Tissue)

SOFT TISSUE			
S Line	0mm	0 mm	Straight profile
Nose to H line	12mm	11 mm	Normal
Upper lip curvature	2.5mm	2 mm	Normal
Upper sulcus depth	5mm	6 mm	Normal
Upper lip strain	11mm	7 mm	Normal
Lower lip to H line	-1to +2mm	2 mm	Normal

Soft tissue chin thickness	10 to 12mm	10 mm	Normal
Nasolabial angle	102±8	104°	Normal
Lower lip to E line	-2±2mm	2 mm	Normal

CONCLUSION

The above case series of the mother and son, both presenting with Class III malocclusion were treated successfully without surgery by camouflage treatment including extraction of the teeth indicated for the same based on cephalometric and model analysis. The mother was in her middle age, so excessive emphasis was laid on to maintain her already compromised periodontal health till the achievement of the desired tooth position. Low force values were applied compared to younger patients and the health of her temporomandibular joint was also maintained throughout the treatment.

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