Integrated management of distocclusion with protrusive incisors.

Abstract:
This is a case study of a twelve-year-old male patient who had skeletal class 1 malocclusion and class II division 1 dental malocclusion.He also had a 10mm overjet and a 5mm overbite, as well as an oval maxillary and square mandibular arch, spaced upper dentition, and mild crowding in the lower arch. The treatment goal was to keep the existing profile, correct bilateral class II molar relationship, eliminate spacing, and correct the teeth's axial axis, attain a satisfactory overbite and overjet, and provide optimal balance and occlusal function. Treatment begins with myofunctional appliance that is lip bumper and fixed orthodontic appliances. With skeletal maturation ahead, Forsus appliance therapy was also included to hasten the process. The upper and lower arch were held together by a removable retainer.

Key-words: protrusive incisors, Forsus, Fixed Functional appliance, myofunctional

Introduction:

The prevalence of Class II malocclusion varies significantly across different populations.[1] The prevalence of Class II malocclusion in India varies between 1.9% in Rajasthan and 8.37% in South India.[2,3]

Class II malocclusions embrace dental, skeletal, or merged entities. Furthermore, they could have been caused by maxillary prognathism, mandibular retrognathism, or a combination of the two, besides vertical and transverse problems.[1]

The literature describes a variety of treatment options for the correction of dental and skeletal Class II malocclusion in growing patients, such as: 1) a two-stage treatment using a functional appliance in the first stage and a fixed appliance in the second; 2) a one-stage treatment combining an extraoral appliance and a fixed appliance; and 3) the implementation of a mandibular fixed protraction appliance, such as Herbst or Forsus, prior to or concurrently with a fixed appliance.[4]

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Case Description:

A 12 years old male patient indicated forward-placed upper front teeth and lip trap in the Department of Pediatric and Preventive Dentistry in Jaipur, Rajasthan.

During the initial extraoral clinical exam, he presented with a symmetrical mesofacial growth pattern characterised by a slightly convex profile, retruded lower lip, and cheek fullness (Figure1a-c).

The patient's mouth had mixed dentition with spacing in upper and lower teeth and bilateral class II molar relationship, and lip trap habit, requiring lip bumper fabrication and delivery (Figure.2a-e).

[1]**PARKHI BHATNAGAR,** [2]**APURVA GOYAL,**
[3]**SUNITA RANWA**
[1-3]Pediatric & Preventive Dentistry, Jaipur Dental College, Rajisthanl

Address for Correspondence: Dr. Apurva Goyal
Dr. Apurva's Kids & General Dentistry
Hempath, Ganesh Nagar, Beside Reliance Smart, Near Metro Pillar No. 98, New Sanganer Road,
Jaipur, Rajasthan
E-mail: drapurvakgd@gmail.com

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After ten months, the extraoral examination (Figure 4a-c) indicated that the patient showcased a symmetrical mesofacial growth pattern with relatively straight profile and retruded lower lip, along with correction of habit during intraoral examination (Figure.5a-e)he exhibited a bilateral class II molar relationship, an establishing canine class II relationship, upper anterior spacing, mild crowding in lower anterior teeth, an overjet of 10mm, an overbite of 5mm, an oval shape in the maxilla, and a square shape in the lower jaw. Periodontal tissues were found to be in good health.

Based on the examination of the cephalometric investigations, the maxillary proportions were determined to be suitable. He also exhibited dentoalveolar proclination and protrusion, skeletal class I, and neutral growth.

Treatment goals:

Achieving bilateral canine class I, rectifying bilateral molar class II, rectifying proclined upper teeth, sustaining facial harmony, and rectifying the mandibular squared arch were the goals.

Treatment sequence:

In Phase I, lip bumper, a myofunctional appliance (Figure. 3a, b) was fabricated and delivered to correct anterior teeth crowding thereby increasing arch circumference and correcting lip trap. It was worn by the patient for around 10 months.

Phase II involved fixed orthodontic therapy using.022 x.028" slot MBT appliances, leveling with round nickel titanium arch wires, and final torque and tipping with rectangular arch wires.

Phase III involved delivering a Forsus appliance (Figure.6a-d) to correct overbite and overjet, promote growth, and place a removable retainer for retention for a year.

Results:

The retruded lip was corrected while maintaining skeletal class I relationship and straight profile, as seen in the extraoral photos, and the treatment plan's goals could thus be met.(Figure.7a-c)

The last intraoral photographs (Figure.8a-e) facilitate one to gauge that, maxillary anterior teeth protrusion and proclination was corrected along with bilateral class I canine and molar relation. The spacing was also corrected, in addition to the overbite and overjet.

The patient who was referred expressed satisfaction with the outcome.

Follow Up:

At 1 year after appliance removal, the patient was re-evaluated clinically. The occlusion remained stable—no relapse of incisor alignment or occlusal cant. The patient reported comfort in function and satisfaction with the aesthetics. Periodontal health was also good.

Discussion:

Class II malocclusion can be corrected using removable or fixed appliances in adolescents. A greater percentage of individuals have Angle's class I malocclusion (57.9%) than class II div 1 malocclusion (5.5%).

The conclusions of Das et al.[5]—who noted 62% class I malocclusion and 7% class II Div 1 malocclusion—are in accordance with this. Class II Division 2 and Class III malocclusion weren't extremely prevalent, with 1.9% and 1.4%, respectively.

In their study of the distribution of malocclusion among North Indians seeking orthodontic treatment, Singh et al.[6] found that the prevalence of class II Div 2 malocclusion was 5.85% and the prevalence of class III malocclusion was 3.17%. These findings are in line with their findings.[3] Angle's class I malocclusion (57.9%) turned out to be more prevalent than Angle's class II div 1 malocclusion (5.5%) in a study performed to ascertain the prevalence of malocclusion in Jaipur, India.[2]

The literature discusses many methods for correcting Class II malocclusion during growth, including protraction appliances, functional appliances, intermaxillary elastics, extraoral appliances, fixed orthodontic equipment, and removable aligners.

For its aligners, Align Technology recently developed a technique known as "wings" that corrects Class II malocclusion by using mandibular protraction. However, there is not any scientific evidence of this method yet.[4]

Lip sucking, a harmful oral habit, disrupts lip occlusion and growth, with frequency ranging from 2.2% to 4.8% between infancy and six, affecting class II skeletal relationship development.[7]

Myofunctional therapy can help manage lip sucking habits by creating a lip seal, controlling molar anchorage, expanding lower arch space, and eliminating oral habit, especially in patients with hyperactive mentalis activity.[8]

A lip bumper was used in this case to increase the tonicity of the labialis and mentalis muscles in addition to breaking the bad habit. During the set-up of the appliance, the patient was advised that it would take eight to ten months for the habit to disappear.

Patients whose growth has either finished or is almost finished benefit greatly from the Forsus fixed functional appliance. A number of variables, including the patient's age, compliance, and other case selection criteria, affect how well this appliance treats skeletal Class II malocclusion.

Functional appliances can be characterised as orthodontic devices that accomplish skeletal and dental changes by utilising the forces produced by muscle stretching. Class II corrections using fixed appliances can be divided into three groups according to how they work, and they require little patient cooperation.[9]

1. Herbst and its modifications, a rigid fixed functional orthopaedic appliance.
2. Fixed maxillary devices, such as pendulum devices give the maxilla a class I force. Consequently, the maxillary arch experiences orthopaedic and orthodontic effects.
3. An inter-arch spring force delivery system, such as the Forsus or Jasper Jumper.

The literature has shown that fixed functional appliances do not cause long-term skeletal alterations, with majority of their impacts being dentoalveloar. Although a larger dentoalveolar effect has been reported in most of the research on fixed functional appliances, our investigation demonstrated similar results with favourable effects after six months.

The mandible can move forward and downward with the help of fixed functional appliances. Mandibular incisor proclination is the most noticeable dentoalveolar adverse effect during fixed functional therapy. This raises relapse rates, which is concerning for patients and limits skeletal and soft tissue correction. This could be prevented by cinching the mandibular archwire and laceback in the mandibular arch and by incorporating progressive lingual crown torque in the anterior portion of the mandible[10], as was done in this case, which has showed promising results.

Table 1. Cephalometric measurements before and after orthodontic treatment. Skeletal (top section) and dental (bottom section) values are presented. Angular measurements are in degrees (°) and linear values in millimetres (mm).

	PARAMETERS	Pre-Treatment values	Post-Treatment values
SKELETAL	Facial angle	87.9°	90.4°
	Angle of convexity	-5.7°	-6.0°
	Mandibular plane angle	18.6°	16.4°
	A-B Plane angle	-5.1°	-5.1°
	Y-axis angle	56.6°	54.5°
DENTAL	Cant of occlusal plane	14°	-0.3°
	Inter-incisal angle	119°	128°
	Incisor-occlusal plane angle	10°	25°
	Incisor-mandibular plane angle	0°	5°
	Upper incisor protrusion	12mm	5mm

Figure 1.

Pretreatment extraoral lateral (a)&(c) and frontal(b) views.

Facial photographs of the patient at initial presentation showing symmetrical mesofacial growth pattern characterised by a slightly convex profile, retruded lower lip with lip trap habit and cheek fullness.



Figure (1a)



Figure (1b)



Figure (1c)

Figure 2.

Pre-treatment intraoral views.

Intraoral photographs right (a) and left lateral(b), frontal (c) demonstrating Class II molar and canine relationship, significant overjet, and proclination of maxillary incisors.

Intraoral photographs maxillary(d) and mandibular occlusal (e) view showcasing mixed dentition with spacing in upper and lower teeth and bilateral class II molar relationship.



Figure (2a)



Figure (2b)



Figure (2c)



Figure (2d)



Figure (2e)

Figure 3.

Fabrication and clinical delivery of a lip bumper appliance.

Laboratory-fabricated lip bumper (a) on mandibular dental cast, incorporating bilateral Adams clasps on first permanent molars for optimal retention and stability, terminating in an acrylic shield positioned anterior to the mandibular incisors.

Clinical intraoral view (b) post-insertion demonstrating proper seating of molar clasps, passive positioning of the acrylic shield approximately 2–3 mm away from the lower incisors, and soft tissue clearance.



Figure (3a)



Figure (3b)

Figure 4.

Extraoral photographs after 10 months left lateral (a), right lateral (c) and frontal (b) views.

Facial photographs of the patient after 10 months of appliance therapy showcasing a symmetrical mesofacial growth pattern with relatively straight profile and retruded lower lip.



Figure (4a)



Figure (4b)



Figure (4c)

Figure 5.

Intraoral views

Intraoral photographs frontal (a), right (b) and left (c) lateral demonstrating bilateral class II molar relationship, an establishing canine class II relationship, an overjet of 10mm, an overbite of 5mm.

Intraoral photographs maxillary (d) and mandibular (e) occlusal view showcasing an oval shape in the maxilla, and a square shape in the lower jaw as well as upper anterior spacing and mild crowding in lower anterior teeth.



Figure (5a)



Figure (5b)



Figure (5c)



Figure (5d)



Figure (5e)

Figure 6.

Clinical photographs showing Forsus appliance in place.

Frontal intraoral view (a) with Forsus appliance in situ, demonstrating bilaterally attached telescopic push rods extending from the maxillary first molar bands to the mandibular arch-wire distal to the canine region. Right lateral intraoral view (c) showing proper activation and alignment of the Forsus spring mechanism for mandibular advancement with left lateral view (d) confirming symmetrical appliance placement and engagement. Open-mouth intraoral view (b) illustrating the functional range of the Forsus appliance, highlighting the spring action during mandibular movement.

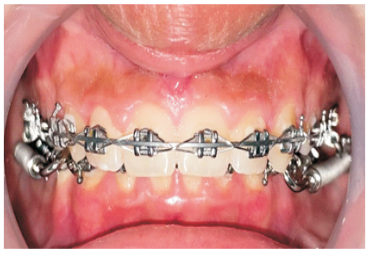
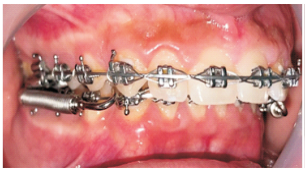


Figure (6a)



Figure (6b)


Figure (6c)

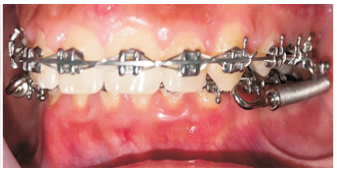

Figure (6d)

Figure 7.
Post-treatment extraoral photographs

Left (a) and right (c) lateral profile demonstrating normalized facial convexity and improved soft tissue harmony following correction of Class II dental discrepancies.

Frontal view (b) showing improved facial symmetry and relaxed lip posture, indicating resolution of retruded lip.


Figure (7a)


Figure (7b)


Figure (7c)

Figure 8.
Post-treatment intraoral photographs.

Right (a) and left (b) lateral views showing bilateral correction of molar and canine positions with optimal intercuspation.

Frontal view (c) confirming well-established Class I canine and molar relationships with ideal overjet and overbite.
Maxillary (d) and mandibular (e) occlusal views displaying well-aligned arches with coordinated arch forms and maintained arch integrity


Figure (8a)


Figure (8b)


Figure (8c)


Figure (8d)


Figure (8e)

Figure 9.
Panoramic radiograph (orthopantomogram) of the patient.

The OPG reveals the full complement of permanent teeth, with bilateral symmetry in dental development. No evidence of pathology or impactions is noted. The relationship between the maxillary and mandibular arches, as well as condylar morphology, appears within normal limits.

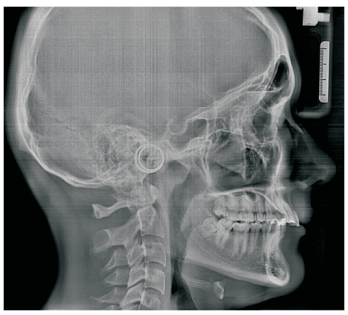

Figure (9a)

Figure 10.
Pre-treatment and post-treatment lateral cephalograms.

The cephalometric radiograph (a) demonstrates skeletal Class I jaw relationship with proclined maxillary incisors. An increased overjet and reduced lower anterior facial height are noted. Soft tissue profile analysis indicates retruded lower lip.

The cephalometric radiograph (b) demonstrates dental changes, including retroclination of maxillary incisors, and improved soft tissue profile following functional appliance therapy.


Figure (10a)


Figure (10b)

Conclusion:

Despite the current discussions about growth modulation and functional appliances, they can still be a quitehelpful tool in the management of a class II malocclusion. There are various diagnostic techniques that help generate a customized treatment plan and, in turn, accomplish the intended goals to get the desired results.

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