

The Combined Orthodontic-Prosthetic Treatment of Mandibular Progeny and Maxillary Alveolar Ridge Atrophy: Case Presentation

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Abstract

It is a presentation of anomalies of mandibular progeny, and maxillary frontal alveolar ridge atrophy in a thirty-six years old patient with profound esthetic and functional problems. Due to the absence of maxillary frontal teeth, the orthodontic therapy was applied only in the mandible, with frontal teeth retrusion and intrusion followed by pre-prosthetic preparation. A fixed prosthetic appliance was constructed for the maxillary frontal region with the reconstruction of the atrophied alveolar ridge using pink ceramic.

The analysis of the telerradiographs showed an overjet reduction. At the end of the treatment an optimal occlusion is achieved (overbite 1 mm) and the esthetics has been significantly improved and stable even seven years after the treatment.

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Introduction

Mandibular progeny is a multifactorial polygenetic disease with emphasis to inheritance profile, and rarely being as a monogamous inherited.^{1,2} It is relatively prevalent disease ranging from 0% to 26,7% differing between nations and geographic regions. This anomaly is mostly present in East Asia (17.99%) and Middle East (10.31%), and less in Europe (4.84%), Africa (4.66%) and South Asia (1.21%).³

This anomaly is accompanied with negative overjet, mesial occlusion, cross-bite of the posterior regions, opened vertical occlusion and the inability for incisive contacts. The telerradiography (TELE) shows an increase of the mandibular body and base, and increase in the ANB, and SNB angles. The profile indicates the prominence of the chin, positive rate of the lips

and extension of the lower part of the face that occurs at the vertical growth.^{1,4}

The mid-face is underdeveloped and can be used as a differential diagnosis for maxillary hypoplasia (narrow SNA, normal SNB). Patients with mandibular progeny have esthetic problems, psychological and psychosomatic burden, functional impairment, inability to chew, occurrence of periodontitis due to the absence of occlusal forces and temporomandibular joint dysfunction.⁵ The most common treatment options are head-gear in the primary and mixed dentitions, all Fränkel plates of type III after first molars' eruption and modifications of activators (mobile orthodontic appliances), and later in the permanent dentition also the fixed device combined with class III elastic bands.⁶

Case Report

In this paper is presented the orthodontic-prosthetic treatment of a 36 years old patient with profound esthetic and functional difficulties, due to the absence of maxillary frontal teeth and alveolar ridge atrophy of the same region. Also, there were missing mandibular frontal teeth, migration and malposition of these teeth due to extractions and periodontitis.

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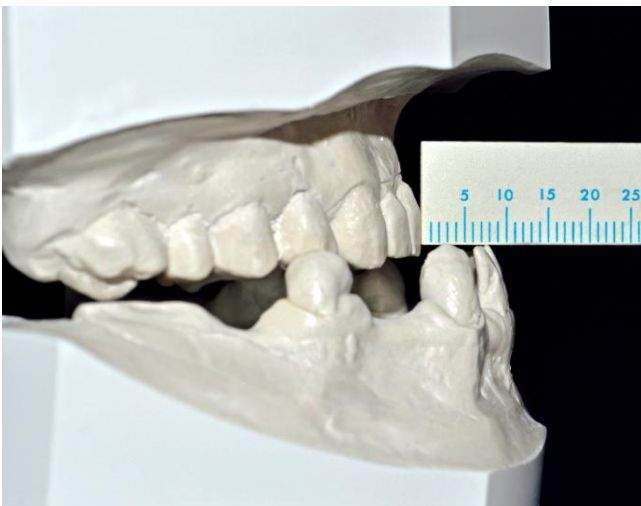
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According to the patient's history, maxillary frontal teeth (12, 11, 21, 22) were extracted due to caries complications and a fixed bridge was placed. At the same time, the patient was advised to undergo a surgical treatment of the mandible, but it was refused it. The functional difficulties were: cutting and chewing inability, and speech problems, due to lack of contact of the maxillary fixed appliance (Picture 1). After clinical intra- and extra-oral examination, radiological analysis (orthopantomography-OPT, TELE) and working casts' analysis, mandibular progeny and alveolar ridge atrophy with negative overjet -7.5 mm was recorded (Picture 2).⁷



Picture 1. Before the treatment.



Picture 2. Negative overjet (-7,5 mm) before the treatment-cast view.

In the OPT (Picture 3) the absence of maxillary teeth (18, 16, 14, 12, 11, 21, 22, 24, 27, 28) was observed, and with a semi-circular bridge spanning from 16 to 24 in place. The

missing mandibular teeth were - 38, 37, 48, 47, 46, 44, 43, 42. The patient also had carious mandibular front teeth, with second-grade periodontitis and a diastema between 33 and 34. After the TELE analysis (Picture 4) a horizontal type anomaly with mandibular progeny ($SNB=82,10^\circ$) was diagnosed, as well as alveolar ridge atrophy of the maxillary frontal region, even though there was no significant reduction of SNA angle ($SNA=79,46^\circ$ and $ANB=-2,46^\circ$) (Table 1).



Picture 3. OPT before the treatment.



Picture 4. Tele-radiography before the treatment.

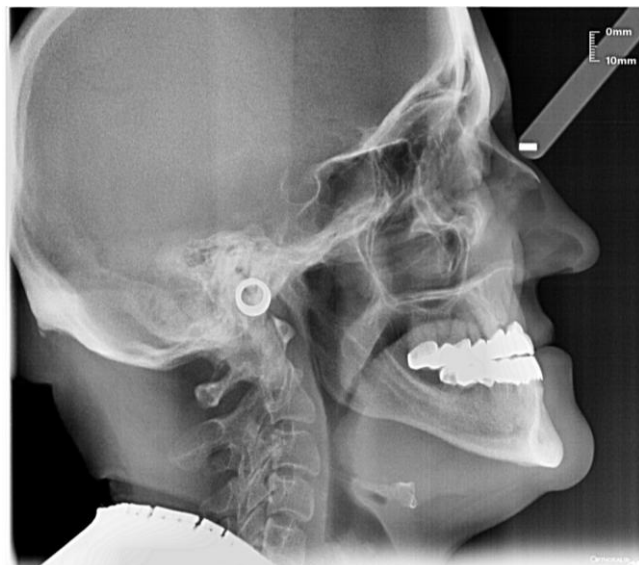
Based on this analysis, this case was indicated for surgical treatment in the mandible.⁸

Thus, we planned to maximally retrude the mandibular front teeth, to close the existing mandibular diastema, and to apply prosthetic

rehabilitation. To correct this anomaly, we proceeded with axis adjustment of the mandibular frontal teeth, their retrusion, diastema closure, and preparations for the prosthetic rehabilitation. Fixed orthodontic appliance using Edgewise technique was placed in the mandible.⁹



Picture 5. OPT seven years after the treatment.



Picture 6. Tele-radiography after seven years following the treatment.



Picture 7. The bridge prepared for cementation.



Picture 8. The cemented bridge.



Picture 9. Nasolabial profile before the treatment.

The treatment period was 1,5 years. Seven months after the baseline, we achieved reduction of overjet from -7.5 mm to -2.5 mm, and after nine months to -1.5 mm. Besides the retrusion of frontal mandibular teeth, the intrusion of elongated teeth due to periodontitis was also done.¹⁰ Due to this therapy, teeth became more stable, and their lifespan was extended, which can be observed in the OPG and TELE seven years after the treatment (Pictures 5 and 6). Due to extractions of the mandibular teeth, their displacement occurred, thus fixed orthodontic appliance was used to move them into a position suitable for the prosthetic appliance. Mesialisation of 43 and 34 teeth was done to adjust their axis and to have more stable and long-term bridge. After tooth 43

mesialisation, the diastema between 43 and 42 is closed, to make room for teeth 44 and 45, and one crown was appended (Picture 5). After mandibular teeth alignment, a new bridge with combined pink ceramic was done to camouflage anterior maxillary ridge atrophy (Pictures 7,8).^{11,12}



Picture 10. Nasolabial profile after the treatment.



Picture 11. Occlusion and gingival reconstruction seven years after the treatment.

In picture 8 the cemented maxillary bridge is shown, where the normal occlusion of the frontal antagonist teeth can be observed. One month after maxillary bridge placement, the fixed orthodontic appliance in the mandible was removed, and a semi-circular metal-ceramic bridge spanning from teeth 46 to 36 was constructed. To increase the stability of the

bridge, and to symmetrically distribute masticatory forces, tooth 46 has been appended to the bridge.

	Norm	Pre-Treatment	Post-Treatment
SNA	82°	79,46°	79,40°
SNB	80°	82,10°	80,77°
SN-Pg	78°	83,16°	82,77°
ANB	0°	-2,64°	-1,37°
ind.ANB	0°	3,91°	3,67°
Wits	2,00 mm	-6,08 mm	-3,10 mm
NLNSL	8,5°	6,41°	5,24°
MLNSL	32°	36,43°	35,38°
MLNL	24°	30,04°	30,12°
Ant.UGH Index	79,00 %	70,42 %	72,35 %
ArGoMe	130°	130,96°	130,42°
NS-Ba	130°	128,98°	128,92°
U1-NA-linear	4,00 mm	-1,80 mm	1,58 mm
L1-NB-angle	25°	17,48°	11,38 °
L1-NB-linear	4,00 mm	0 mm	-1,22 mm
Pg-NB	1,30 mm	2,14 mm	3,92 mm
Overjet	3,00 mm	-6,08 mm	0,81mm
Overbite	0,00 mm	1,40 mm	0 mm

Table 1. Tele-radiography analysis before and after treatment.

Conclusions

Based on the results obtained from this treatment it can be concluded that aesthetic and functional improvement if the orofacial system is achieved. With retrusion and intrusion of the mandibular frontal teeth, the SNB angle has been improved (Table 1). By placing the teeth's axis parallel to axial masticatory forces, and with the prosthetic rehabilitation of the missing teeth, the results are satisfactory. It can be proved using OPG and teleradiography seven years after the treatment with the stable result (Pictures 5 and 6). After photographs' comparison, a significant improvement of the nasolabial profile can be observed (Pictures 9 and 10). Based on the TELE analysis before and after treatment (Table 1), changes can be seen that show esthetics improvement, (the SNB angle from

82.10⁰ changed to 80.77⁰, Wits from -6,08 mm reduced to -3.10 mm, the negative overjet reduced from -6.08 mm to 0.81 mm, and overbite 1 mm). The patient is very satisfied with the results and seven years after the treatment (Picture 11), no significant disorder, except a slight masticatory abrasion, can be observed. All authors have made substantive contribution to this study and manuscript, and all have reviewed the final paper prior to its submission.

Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.

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