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Combined Orthodontic and Periodontal Management in a case of Severe Maxillary Protrusion and Generalized Aggressive Periodontitis: A Case Report

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Abstract

The study reports the case of a 24-year-old Moroccan female who presented in the dental institution with aggressive periodontitis and associated severe bimaxillary dento-alveolar protrusion. Her face was convex, with a closed naso-labial angle; the lips were protruded with an everted lower lip. A mentalis strain and a skeletal class II malocclusion were also present. Before orthodontic treatment, the gingival inflammation was treated through continuous professional debridement, including scaling, root planning, and operation flap. Based on the loss of supporting periodontal tissues, continuous supportive periodontal treatment was needed to successfully keep the periodontal tissues healthy during orthodontic treatment. After the overall treatment, not only did the patient's aesthetics improve dramatically with the decrease in the biprotrusion, but the periodontal support also got better.

Keywords: Aggressive periodontitis, Bialveolar protrusion, Orthodontic treatment, Interdisciplinary approach.

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ORIGINAL ARTICLE

Introduction

Periodontal diseases are highly prevalent and can affect up to 90% of the world population.[1] While gingivitis does not affect the underlying supporting structures of the teeth and is reversible, periodontitis, on the other hand, can result in the loss of connective tissues and bone support, which is a major cause of tooth loss in adults.[2] According to the most recent classification of the American Academy of Periodontology,[3] Aggressive Periodontitis (AP) comprises a wide group of destructive periodontal diseases that affects adolescents and young adults, mostly without clinical evidence of systemic disease. It is characterized by a very rapid loss of periodontal tissues, in otherwise clinically healthy subjects.

In patients with advanced destruction of periodontal tissue, progression of periodontal disease causes movement of the teeth, and possibly malocclusions. [4] The incisors are likely to be flared out with the loss of arch integrity because of advanced bone loss in the anterior tooth regions. In addition, severe posterior bone loss potentially leads to loss of vertical occlusal dimension, which could further worsen the problems in the incisors. Moreover, if the patients originally had dental and/or skeletal orthodontic problems, the severe loss of periodontal tissues worsens or deleteriously affects such problems.[5]

There is no contra-indication to the orthodontic treatment of patients with periodontal disease, at least, as long as the disease has been brought under control. In modern clinical practice and for such cases, it is currently well established that the judicious contribution of each discipline is essential for a successful treatment, with optimized outcomes. However, if the bone loss is significant around the affected tooth, orthodontic goals and mechanisms should be appropriately adapted .[6]

This case report presents a periodontal-orthodontic approach in an adult woman presenting with a Class II bialveolar protrusion and advanced periodontal disease, on whom 4 first maxillary premolar extractions were performed after controlling the periodontal inflammation.

Case Report
Diagnosis and Aetiology

A 24-year-old Moroccan female complaining of inaesthetic appearance because of her protruding maxillary teeth (Figs 1-3) was referred from the periodontist to the orthodontic unit at the Casablanca University Dental Hospital.

On anamnesis, she reported that she continuously experienced bleeding and gingival swelling on waking and when brushing her teeth. She had no obvious medical histories and was not taking any medications.

Periodontal examination showed that the dental plaque and inflammation were not fully controlled, and several periodontal pockets were present, with probing depths ranging from 3 to 7 mm and bleeding on probing (Table 1).

Dental Radiographs taken before periodontal treatment demonstrated generalized horizontal bone loss, predominantly in the mandibular arch, and vertical bone defects in the maxillary incisors, second premolars, and first maxillary molar (Fig 4). Based on the age, attachment loss and bone defect, the patient was diagnosed as having Aggressive Periodontitis.

On orthodontic examination, the face was symmetrical, with a convex profile, a biprotrusion, a closed naso-labial angle, a hard labial occlusion, and a contracted chin in retrusive position and an increase in the lower part of the face (Fig 1).

Dental examination objected many features, which can be reported as follows (Fig 2):

- 5mm of overjet and 5mm of overbite
- class II canine and class I molar relationships
- severe bimaxillary protrusion
- deviation of the lower dental midline on the left side
- moderate crowding in the anterior lower segment
- distal diastema of the 22 and 33
- extrusion of the 17 and 38, and a corona-mesial tipping of the 48
- missing of the 47, 18, and 28

Cephalometric analysis showed a skeletal Class II jaw-base relationship (ANB angle= 7°), a dolichofacial pattern with an increased SN-GoGn angle (37°), protruded, extruded and labially inclined maxillary and mandibular incisors (Table 2, Fig 6)

Treatment Goals

The treatment goals were to induce a favourable periodontal response by a bone remodeling in order to stabilize the periodontal lesions, to improve the occlusion by establishing better occlusal contacts, anterior guidance, and to enhance the lips relationship repositioning of the anterior sector.

Treatment Plan and Progress

Because in this case the maxillary protrusion was caused by both severe maxillary dental protrusion and mild skeletal class II relationship, only one option was considered in order to achieve the treatment objectives. This only option was to extract both maxillary and mandibular premolars. This treatment choice will allow lingual retraction of the anterior teeth to resolve crowding and biprotrusion. On the mandibular arch, concerning the space between the 46 and 48, ideally the 48 must be extracted, considering its non-functional oblique axis, together with an implant in the site of the 47.

However, because of financial reasons, the patient could not undergo the treatment so the team opted to keep the molar relationship until she was financially ready for us to place the implant.

In addition, the key element before orthodontic management in this case, with aggressive periodontitis and periodontal complications, was to eliminate or reduce plaque accumulation and gingival inflammation. So, the patient underwent a periodontal therapy consisting of bucco-dental hygiene, subgingival scaling, root planning, and a 14 days course of empirical antibiotic therapy (Amoxicillin, 500mg /3 times per day; Metronidazole, 250mg/ 3 times per day).

Six weeks after this initial treatment, a re-evaluation of the gingival pockets was done, and the plaque and gingival index demonstrated the persistence of bleeding with deep pockets at the first upper-right molar and the first lower-left molar. So the periodontist proceeded to a healthier operation flap in order to eradicate the inflammation. This surgical procedure, consisting of a modified Widman flap, was done on the sites where inflammation was persistent with heavy bleeding during probing (ie, the upper-right first molar and lower-left first molar). It is an access flap allowing debridement surgery to regulate the overflow of the restoration on the 16, which was the maintenance element of inflammation at this level.

No bone regeneration protocol was considered as we

anticipated a good result as long as a good debridement was achieved and we got a stabilized blood clot with stitches.

After this, an observation period of 2 months was observed to make sure that the inflammatory process was adequately controlled and to allow healing after the periodontal treatment (Table 3).

The orthodontic treatment was then initiated, consisting on the following actions:

- Extraction of the 4 first premolars and of the 38.
- Placing of a standard maxillary and mandibular edgewise appliance with a .022x.028 –in slot.
- The leveling started with a .016-in NiTi archwire, followed by a .016x022-in heat-activated NiTi archwire.
- The retraction phase of maxillary and mandibular canines was achieved with a .016x.022-in stainless steel (SS) archwire with an elastic chain and mechanics releasing light forces that involved the area from the canine to the second molar.
- After maxillary and mandibular canine retraction, we used a .019x25-in NiTi archwire for alignment in order to allow passive insertion of the.019x.025-in SS archwire for incisors retraction (fig 7).
- The retraction of mandibular and maxillary incisors was done with a .019x.025-in stainless steel (SS) archwire with the mechanics excluding frictions, including light forces for incisors ingression and passive anterior torque.
- During the finishing stage, we used light class II intermaxillary mechanics by the means of elastics (3/16, 6oz), weared 12 hours per day. The active treatment lasted 20 months. All along the treatment period, the patient was very compliant and strictly followed the maintenance sessions (one every 2 months) with the periodontist.
- At the debond visit, the patient received an adhesive bonding retention from 12 to 22, with a vacuum-formed maxillary retainer, routinely used at night. On the mandibulary arch, just the adhesive bonding retention was applied from 33 to 43.

Treatment Results

Comparatively to the pretreatment aspect, one could note a righting of the profile, a better labial contact with relaxation of the chin contraction and a fair improvement of the smile (Fig 8). Occlusal results exhibited a canine and molar class I relationship in both sides, a reduction in the overjet, a good overbite and a coincidence of the medial incisors (Fig 9)

On the clinical periodontal view, we observed a significant decrease of both the periodontal pockets and bleeding in the probed sites of the 16, 26, 12, 22, 13, 23 and 36 when measured by the same periodontist compared to the beginning of treatment (Table 4).

Final panoramic and dental radiographs showed an increase in the root anchorage for the upper and lower incisors and bone remodeling of the interdental septa. No obvious sign of radicular or bone resorption was present (Fig 10,11).

Post-treatment cephalometric analysis was indicative of a sound righting in the profile with a fair ingression of the incisors, an anterior rotation of the mandible and associated improvement in the projection of the chin laterally (Fig.12,13, Table 1)

Table 1: Periodontal chart at the initial examination (pocket depth in mm)

Maxillary teeth	7	6	5	4	3	2	1	1	2	3	4	5	6	7
Pocket depth (labial)	534	736	533	326	423	543	334	233	335	754	325	333	755	525
Pocket depth (lingual)	534	436	534	323	522	524	323	323	555	553	523	333	624	735
Bleeding on probing	**	**	**	*	*	**			**	**	**	*	**	*
Mandibular teeth	7	6	5	4	3	2	1	1	2	3	4	5	6	7
Pocket depth (labial)		523	526	534	543	411	212	433	322	222	323	433	463	333
Bleeding on probing		**	**	**	**	*					*	**	*	
Pocket depth (lingual)		444	533	533	522	633	222	223	222	212	212	475	454	555
Bleeding on probing		***	**	**	**	**		*	*		*	**	**	**

Bleeding observed at *mesial, **middle, and ***distal probing points during 6-point probing methods.

Table 2: Cephalometric measurements

	Normal	Pre-treatment	*Post-treatment*
SNA (°)	82 ± 2	89	82
SNB (°)	80 ± 2	82	78
ANB (°)	2	7	4
SN-GoGn (°)	32	°37	38
Upper Incisor - PP (°)	113.6	128	114
Upper incisor to NA (°)	22.9	31	22
Upper incisor to NA (mm)	25	7	5
Lower incisor to NB (°)	28	41	32
Lower incisor to NB (mm)	6	11	6
FMIA (°)	63,07	47	54
FMA (°)	21.5	30	35
IMPA (°)	95.43	103	91
Nasolabial Angle (°)	94	100	94
E line: upper (mm)	−1.23	-2	-1,5
E line: lower (mm)	−0.04	+3	0

Table 3: Periodontal chart after the flap operation and before orthodontic treatment

Maxillary Teeth 7	6	5	4	3	2	1	1	2	3	4	5	6	7	
Pocket depth (labial)	222	323	411	321	112	321	332	222	224	323	323	333	334	333
Bleeding on probing			*	*							*		*	*
Pocket depth (lingual)	433	333	334	323	422	222	323	323	433	333	323	333	334	433
Bleeding on probing				*	*							*	*	*
Mandibular Teeth	7	6	5	4	3	2	1	1	2	3	4	5	6	7
Pocket depth (labial)		423	323	423	333	311	212	323	322	222	323	433	333	333
Bleeding on probing		*	*	*	*	*					*	*	*	
Pocket depth (lingual)		423	333	333	422	333	222	223	222	212	212	333	223	334
Bleeding on probing		*	*	*		*		*	*			*	*	*

Bleeding observed at *mesial, **middle, and ***distal probing points during 6-point probing methods.

Table 4: Periodontal chart after orthodontic treatment (pocket depth in mm)

Maxillary teeth	7	6	5	3	2	1	1	2	3	5	6	7
Pocket depth (labial)	222	323	311	112	321	222	212	212	323	333	323	333
Bleeding on probing												*
Pocket depth (lingual)	221	333	333	322	222	323	323	223	333	333	333	333
Bleeding on probing												*
Mandibular teeth	7	6	5	3	2	1	1	2	3	5	6	7
Pocket depth (labial)		323	323	333	311	212	323	322	222	433	333	333
Bleeding on probing		*		*						*		
Pocket depth (lingual)		323	333	322	333	222	223	222	212	333	322	333
Bleeding on probing			*									

Bleeding observed at *mesial, **middle, and ***distal probing points during the 6-point probing methods.



Fig 1: Pre-treatment facial photographs.



Fig 2: Pre-treatment intraoral photographs.



Fig 3: Pre-treatment dental casts.

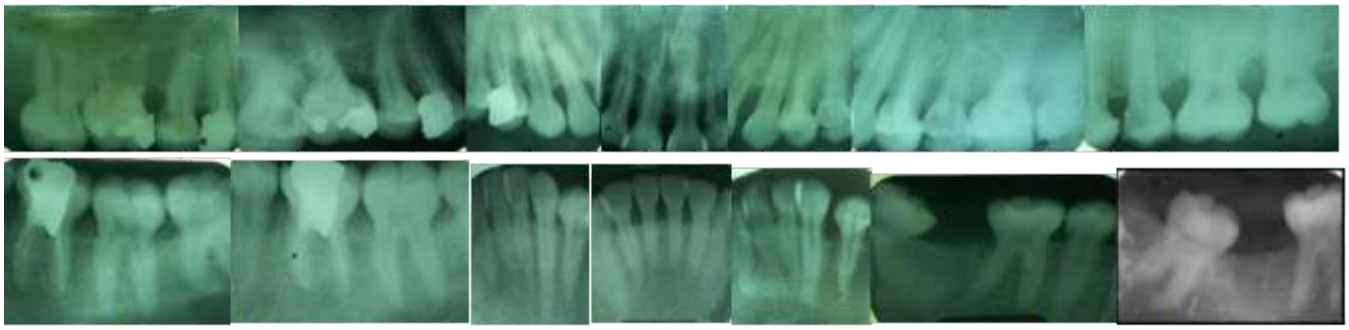


Fig 4: Pre-treatment periapical radiographs.



Fig 5: Pre-treatment panoramic radiograph.

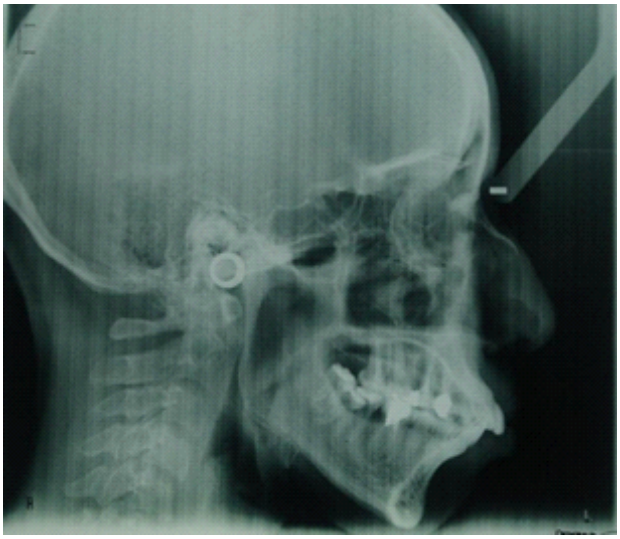


Fig 6: Pre-treatment cephalometric radiograph.

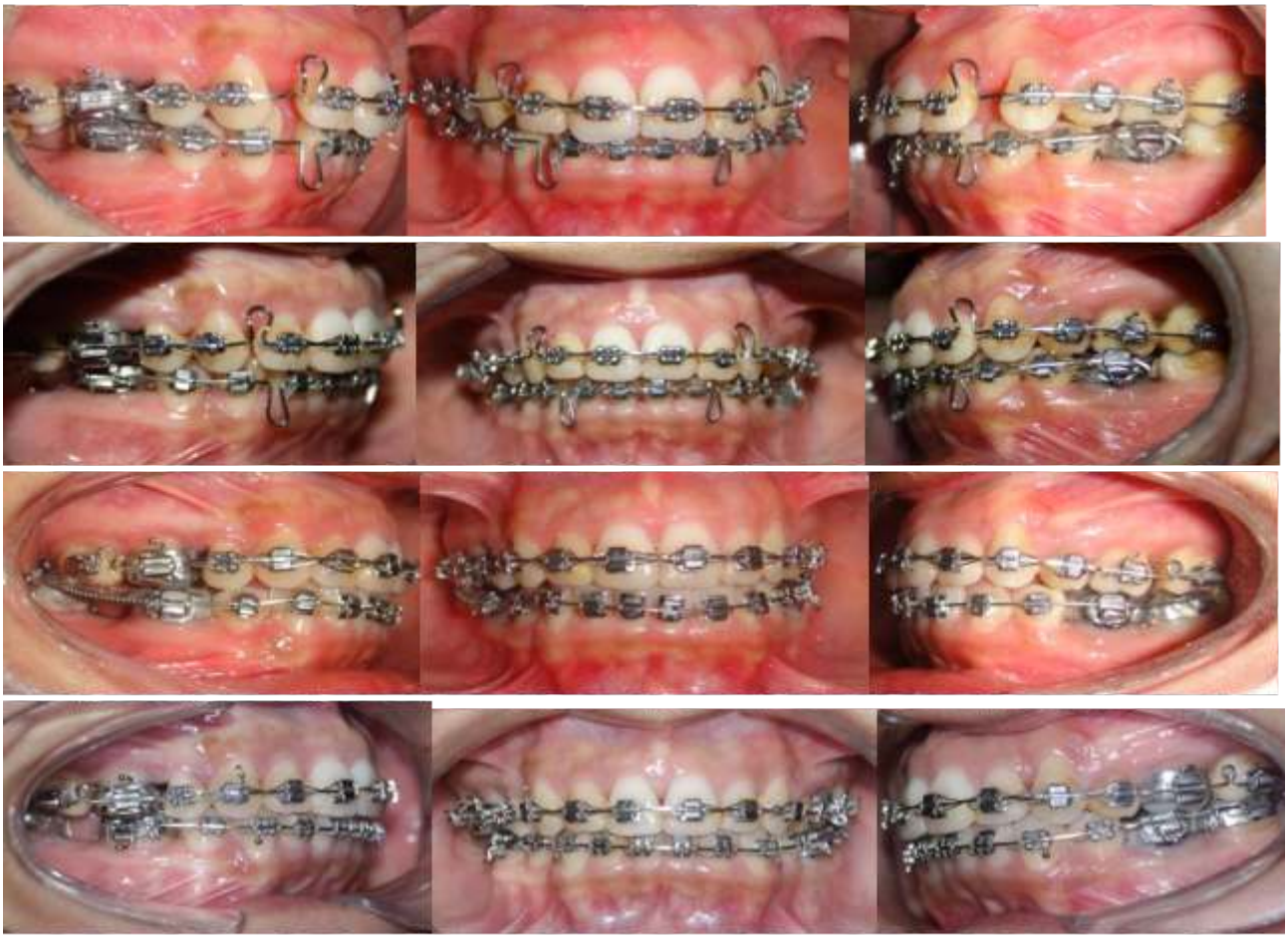


Fig 7: Intraoral photographs during treatment



Fig 8: Post-treatment facial photographs.



Fig 9: Post-treatment intraoral photographs.

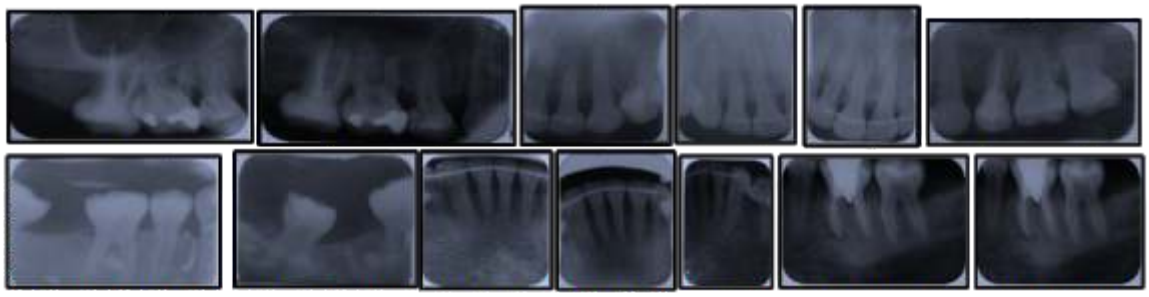


Fig 10: Post-treatment periapical radiographs.

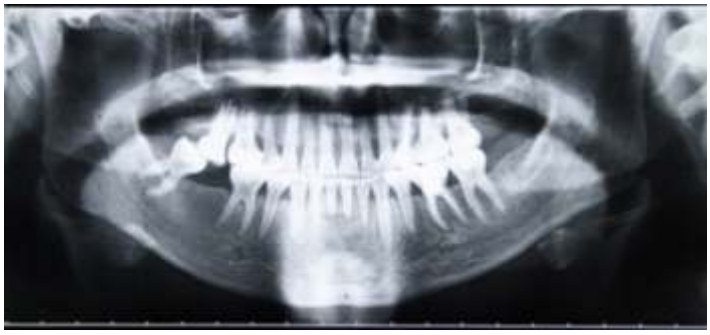


Fig 11: Post-treatment panoramic radiograph.



Fig 12: Post-treatment cephalometric radiograph.

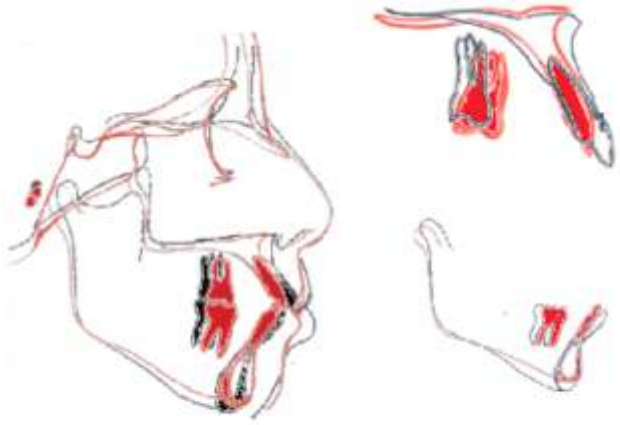


Fig 13: Pre-treatment and post treatment super-imposition.

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