

# CASE REPORT

## Combining Skeletal Anchorage and Intermaxillary Elastics in Class II Treatment

ANTONIO MANNI, DMD  
DANIELA LUPINI, DMD  
MAURO COZZANI, DMD, MScD

**A**ppliances designed for Class II correction generate either pulling, interarch force vectors (intermaxillary elastics) or pushing, interarch force vectors (bite-jumping devices).<sup>1</sup> Intermaxillary elastics, which have the capacity to produce both sagittal and extrusive forces at the point of attachment, are the most popular mechanism for correction of sagittal problems.<sup>1-3</sup> Class II elastics should be used judiciously, however, because of their association with such adverse effects as mandibular anchorage loss, lower

molar extrusion, clockwise rotation of the occlusal plane, lower incisor proclination, and upper incisor extrusion.<sup>4-6</sup> Some authors assert that treatment results are less satisfactory in terms of skeletal relationships and facial esthetics when Class II elastics are used. The esthetic compromise results from extrusion of the lower molars and upper incisors and consequent clockwise rotation of the occlusal plane.<sup>5-7</sup> Upper incisor extrusion also increases gingival exposure and thus impairs smile esthetics.



Dr. Manni

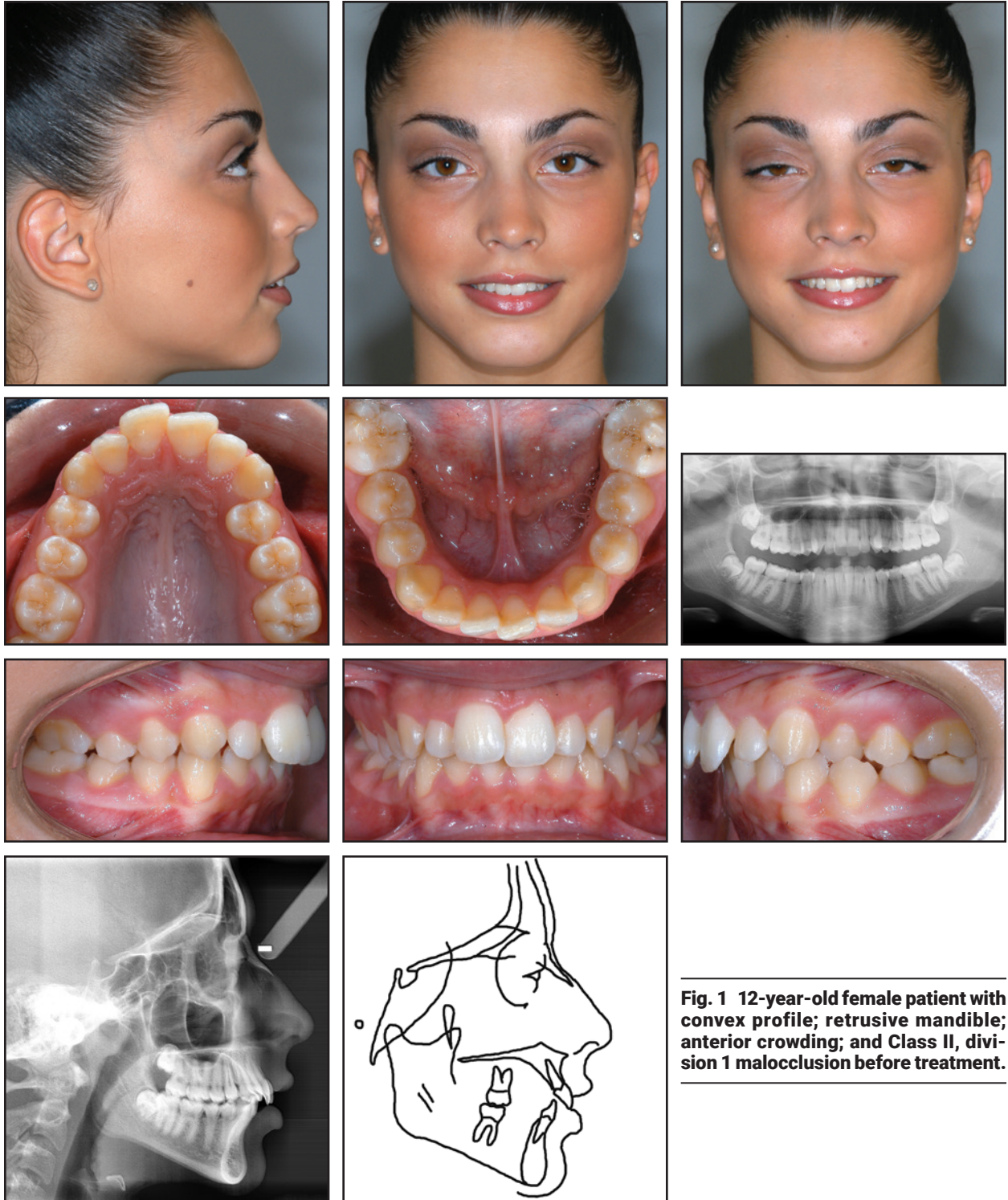


Dr. Lupini



Dr. Cozzani

Dr. Manni is the private practice of orthodontics in Racale, Italy. Dr. Lupini is a Visiting Professor of Orthodontics at the University of Trieste, Trieste, Italy, and in the private practice of orthodontics at via Monte Zebio 1A, 64021 Giulianova, Teramo, Italy; e-mail: danielalupini@gmail.com. Dr. Cozzani is Professor of Orthodontics and Director, Master's Program in Clinical Dentistry Orthodontics, UCM HEI, San Giljan, Malta, and in the private practice of orthodontics in La Spezia, Italy.



**Fig. 1** 12-year-old female patient with convex profile; retrusive mandible; anterior crowding; and Class II, division 1 malocclusion before treatment.

**TABLE 1**  
**CEPHALOMETRIC ANALYSIS**

	Norm	Pretreatment	Post-Treatment
SNA	82° ± 3.5°	81.0°	81.0°
SN-Pg	80° ± 3.5°	75.0°	77.0°
AN-Pg	2° ± 2.5°	6.0°	4.0°
SN/ANS-PNS	8° ± 3.0°	11.0°	1.0°
SN/GoGn	33° ± 2.5°	37.0°	37.0°
ANS-PNS/GoGn	25° ± 6.0°	26.0°	26.0°
SN-Occlusal plane	17° ± 4.0°	18.0°	20.0°
U1-ANS-PNS	110° ± 6.0°	111.0°	106.0°
L1-GoGn	94° ± 7.0°	94.0°	99.0°
L1-APg	2.0mm ± 2.0mm	1.0mm	0.0mm
Overjet	3.5mm ± 2.5mm	5.5mm	2.0mm
Overbite	2.5mm ± 2.5mm	5.0mm	1.0mm
Interincisal angle	132° ± 6.0°	132.0°	132.0°

At least in the short term, bite-jumping devices achieve greater skeletal changes than Class II elastics because they are fixed and therefore less dependent on patient compliance.<sup>6,8-14</sup> To overcome this advantage while improving the predictability of outcomes, orthodontists have begun to combine Class II elastics with skeletal anchorage from temporary anchorage devices (TADs). Besides avoiding the loss of anchorage associated with tooth-borne appliances and auxiliaries, TADs have the advantages of low cost and easy insertion.<sup>15,16</sup> The following case report demonstrates this innovative integration of treatment mechanics in the correction of Class II malocclusion.

### Diagnosis and Treatment Plan

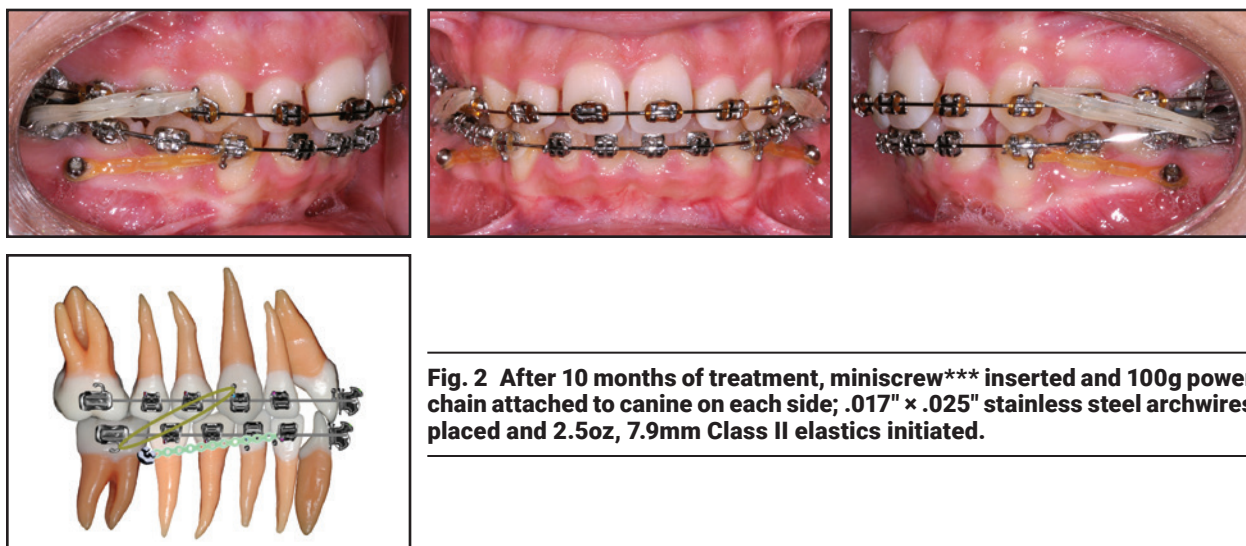
A 12-year-old female was referred by her dentist for orthodontic correction of protrusive maxillary teeth. Clinical examination showed bilateral Class II molar and canine relationships, with a 1mm discrepancy between the upper and

lower dental midlines, a convex profile, and incompetent lips (Fig. 1). The patient exhibited a cross-bite between the upper and lower left first premolars. The maxillary arch was constricted, with anterior crowding; the mandibular arch also had mild anterior crowding.

The panoramic radiograph showed the presence of all permanent teeth. Cephalometric analysis indicated a skeletal Class II malocclusion (Table 1).

Treatment goals were to improve facial esthetics while achieving Class I molar and canine positions. Additional objectives were to widen the maxillary arch and correct the dental midlines without negatively affecting facial esthetics.

An accomplished dancer, the patient requested treatment that would require minimal compliance and would not affect her appearance on stage. Although the literature suggests that patients can gradually acclimate to bite-jumping appliances, it was clear that a less cumbersome option would be preferred.<sup>17,18</sup> In addition, the treatment mechanics



**Fig. 2** After 10 months of treatment, miniscrew\*\*\* inserted and 100g power chain attached to canine on each side; .017" × .025" stainless steel archwires placed and 2.5oz, 7.9mm Class II elastics initiated.

needed to favor mandibular advancement because of the patient's retrusive mandible and normal maxillary position. Class II camouflage treatment involving the extraction of upper premolars and maxillary dental compensation was ruled out for esthetic reasons, since the nasolabial angle was within normal limits and maxillary crowding was minimal. Asymmetrical extractions followed by clear-aligner therapy with pontics in the extraction sites would have been a more esthetic alternative, but this was rejected because it required a high degree of patient compliance.

Our strategy therefore focused on improving the maxillary and mandibular archforms and enhancing mandibular advancement, using TADs to avoid excessive proclination of the lower incisors and reduce the need for patient cooperation.

## Treatment Progress

Treatment began with rapid maxillary expansion from a Hyrax\* appliance anchored to the first

molars and bonded to the palatal surfaces of the canines. After four months of expansion, the mandibular teeth were bonded with .022" × .028" pre-adjusted brackets\*\*, the maxillary teeth were bonded two months later. Leveling and alignment were achieved with two months each of .014" and .016" × .022" nickel titanium archwires.

A miniscrew\*\*\* was then inserted on each side in the mandibular buccal bone between the roots of the first molars and second premolars (Fig. 2). Elastic power chain (100g) was stretched between the miniscrew and the lower canine to reinforce anchorage and minimize flaring of the lower incisors. The power chain was replaced every 28 days. Class II correction was accomplished using progressively stronger Class II elastics coupled with rectangular stainless steel wires. During the first month, .017" × .025" stainless steel archwires and 2.5oz, 7.9mm elastics were worn 22 hours per day. This routine was followed by .021" × .028" stainless steel archwires and 4.5oz, 3.2mm elastics worn full-time for six months and then only at night for four months. Finally, 6.5oz, 3.2mm elastics were worn for three months to improve intercuspation.

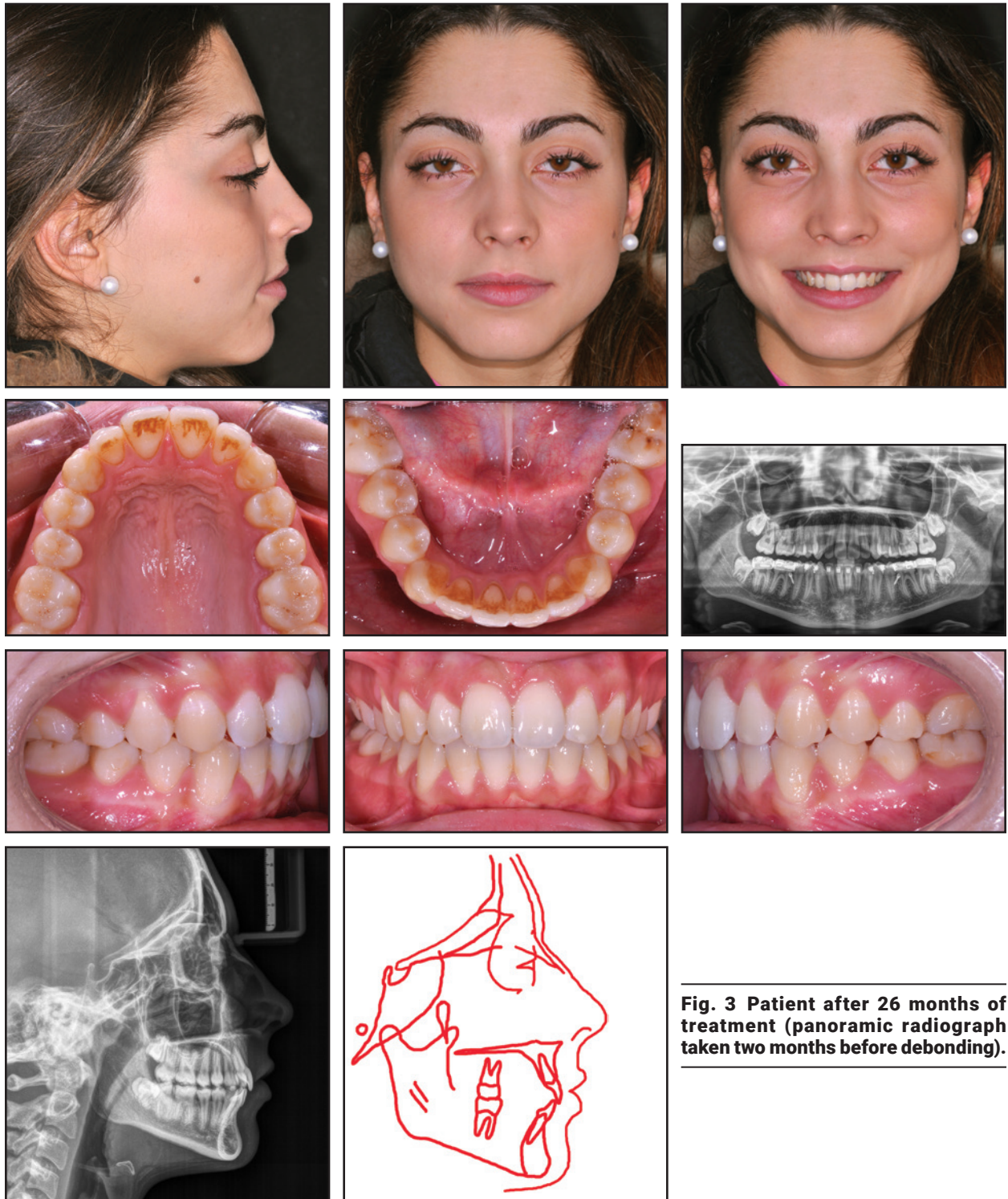
The upper arch was debonded first, and the lower arch two months later. Total treatment time was 26 months. Removable wraparound retainers were delivered for both arches.

\*Registered trademark of Dentaaurum, Inc., Newtown, PA; [www.dentaaurum.com](http://www.dentaaurum.com).

\*\*Butterfly System, Trademark of American Orthodontics, Sheboygan, WI; [www.americanortho.com](http://www.americanortho.com).

\*\*\*Micerium Anchorage System, Micerium S.p.A., Avegno, Italy; [www.micerium.it](http://www.micerium.it).





**Fig. 3 Patient after 26 months of treatment (panoramic radiograph taken two months before debonding).**

## Treatment Results

The results were a balanced profile with an esthetic and pleasing smile, harmony between the upper and lower lips, lip competence, and bilateral Class I canine and molar relationships (Fig. 3). The dental midlines were corrected, and no muscle or joint problems had developed.

A panoramic radiograph taken two months before debonding showed acceptable root angulations, no evidence of root resorption, and stable bone levels. The x-ray did reveal a lack of space for proper eruption of the lower third molars.

Post-treatment cephalometric analysis showed that the sagittal jaw relationship improved while facial height remained constant (Table 1). There was a mild increase in lower incisor inclination, but the measurement was still within normal limits. The overjet was corrected, addressing the patient's initial complaint of protrusive teeth. She was satisfied with the overall esthetics and treatment outcome.

One year after the end of treatment, the patient's facial appearance was unchanged (Fig. 4). No substantial occlusal modification had occurred, and the archforms and alignment were maintained.

## Discussion

Treatment planning involves many factors, including the patient's attitude and willingness to cooperate and the efficiency, cost, and side effects of potential appliances. Elastics remain one of the most popular and effective means of correcting Class II malocclusions. Multiple studies have reported a lack of strong evidence that the use of Class II elastics results primarily in negative side effects, as was previously suggested.<sup>4,6,19</sup> Class II elastics do require some patient compliance, but they tend to be more patient-friendly and tolerable and are less expensive than bite-jumping devices. As the present case shows, when Class II elastics are supported by skeletal anchorage, the adverse effects of elastics alone are minimized and the ability to advance the mandible is improved.

The mechanism of ligating the teeth to the miniscrews is crucial. Our decision to use power

chain instead of stainless steel ligature wire to reinforce the anterior anchorage unit was based on research showing that miniscrew implants tend to migrate in the direction of traction.<sup>20</sup> Power chain, with its inherent elasticity, produces more constant traction, but simultaneously causes a slight forward movement of the miniscrew toward the incisors and a reciprocal backward movement of the anterior segment toward the miniscrew implant. Therefore, there is no anterior anchorage loss.<sup>15,21</sup>

In our case, this dual-anchorage setup of Class II elastics reinforced with TADs produced a protrusive effect on the mandible, taking advantage of the patient's growth spurt while controlling dental side effects. Additionally, the anchorage design avoided any significant change in the vertical dimension during sagittal correction of the Class II malocclusion. The occlusal plane remained almost stable (2° increase), and no lower molar extrusion occurred. Although the lower molars were not anchored directly to the TADs, the force of the elastics on the archwire restricted anteroposterior and vertical dental movements. There was a slight proclination (5°) of the lower incisors, but this might have been attributable more to unraveling of the crowding than to unwanted flaring from the Class II correction.

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**Fig. 4 Patient one year after treatment.**

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