

Orthodontic Decompensation in Class III Patients by means of Distalization of Upper Molars

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Introduction

Skeletal Class III malocclusion is the result of an excessive mandibular growth and/or lack of maxillary antero-posterior development, where dental compensations can be seen such as retroclination of lower incisors and proclination of upper incisors¹⁻³. With the final goal of improving both facial esthetics and occlusal function, a certain number of patients undergo orthodontic treatment and maxillofacial surgery⁴ as an alternative to orthopedic treatment in the growing ages with protocols including Frankel³ appliance⁵, RME and face mask⁶⁻⁸, chin cup⁹, or mandibular cervical headgear^{8,10-13}.

Pre-surgical orthodontic treatments have the objective of establishing harmony between the dental arches by moving the teeth to ideal positions in relation to their bony bases, in order to achieve adequate antero-posterior occlusal and transverse relationships at the moment of surgery. Among the typical requirements in terms of dental compensations presented by Class III patients that require surgery, the inclination of anterior teeth must be changed in most cases by proclination of the lower incisors and retroclination of upper incisors. To achieve the inclination of the upper incisors, many different alternatives have been proposed, such as inter-proximal reduction, extractions, or distalization of upper molars, which has not been widely reported in the literature as a means to decompensate Class III malocclusion prior to surgery. This article describes the Bone Supported Pendulum (BSP) as an efficient therapeutic option to distalize molars through the use of an appliance stabilized to the palate by mini-implants, thus avoiding extractions and providing good interdigitation and coordination of the dental arches.

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Prior to orthognathic surgery patients are treated by means of pre-surgical orthodontics, with the objective of establishing harmony in the dental arches, by moving the teeth to ideal positions in relation to their bone bases. The decompensation therapy is performed so that the dental arches will achieve adequate antero-posterior occlusal and transverse relationships at the moment of surgery.

In pre-surgical orthodontics, the occlusion must be evaluated in the sagittal, vertical, and transverse planes, as well as with regard to position and inclination of the teeth, curve of Spee, crowding, crossbites, and midline orienta-

tion, since the correction of these aspects may imply the need for space in the dental arches. Further, dental leveling and alignment can produce a change in the angulation of incisors. The relationships between the lips, and the balance between the maxillary and mandibular portions of the profile must also be evaluated before orthodontic decompensation. Error! Bookmark not defined.

Among the typical requirements in terms of dental compensations presented by Class III patients that require surgery, the inclination of anterior teeth must be changed, in most cases by proclination of the lower incisors and by retroclination of

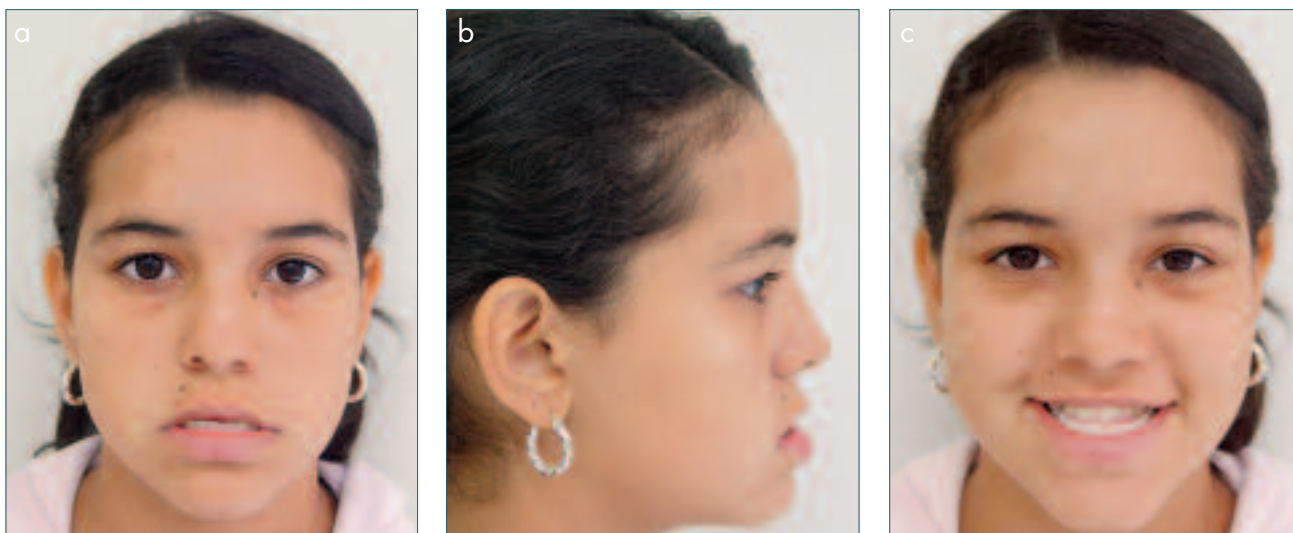
the upper incisors. To achieve this, it is necessary to create additional space in the upper dental arch. Several different types of treatment are available at this regard. For instance, Sheridan proposed a technique of interproximal dental reduction¹⁴, which he claimed can solve discrepancies of approximately 4 mm. Other techniques include the extraction of upper premolars when the required space is more than 6 mm^{1,2}, or distalization of upper molars, which has not been widely reported in the literature. The distalization of upper molars for the pre-surgical decompensation of Class III patients presents with advantages over extractions, as it allows for a conservative approach to the shape of the upper dental arch, thus resulting in a fuller smile.

Among the appliances most commonly used for distalizing molars is Hilgers pendulum¹⁵, which has been reported to produce distal movement of the molars with an adverse reaction of premolar mesial movement of 1 to 2.5mm, and proclination of upper incisors from 1.7 to 5.1°. The amount of space that can be obtained varies between 55 to 70% of the amount of molar distalization in the area of movement, and 45 to 30% of premolar mesialization and incisor proclination in the reaction area. The loss of anchorage is due to the fact that the appliance is supported by the premolars¹⁶⁻¹⁸.

The bone supported pendulum (BSP)¹⁹⁻²⁰ as others bone supported distalizer²¹ are an efficient the-

I tattamenti ortodontico prechirurgici hanno lo scopo di stabilire armonia tra le arcate per ottenere rapporti anteroposteriori e trasversali adeguati per il momento della chirurgia. In pazienti con III Classe l'inclinazione del settore incisivo vie trattata proclinando gli incisivi inferiori e ligualizzando i superiori. Tra le metodiche che comportano le modificazioni del settore incisivo superiori, la distalizzazione dei molari superiori non ha ancora ricevuto sufficiente attenzione nella Letteratura. Il presente articolo descrive il Pendulum a Supporto Osseo come una opzione terapeutica valida per distalizzare i molari per mezzo di un apparecchio ancorato al palato, che permette di evitare estrazioni dentarie e consente una buona interdigitazione tra le arcate dentali in fase prechirurgica.

Key words: Bone supported pendulum, Distalization, Presurgical Orthodontics.



therapeutic option to distalize molars through the use of an appliance stabilized to the palate by means of micro-implants. As reported by Escobar et al.²⁰, BSP has been used to distalize upper molars without anchorage loss, thus avoiding collateral reaction effects of the upper anterior teeth. This aspect is particularly critical in Class III surgical patients, whose upper incisors are already labially inclined or crowded; in some cases, canine impaction is present as well.

In the following case report, the use of upper molar distalization as a treatment option in the pre-surgical orthodontic decompensation for Class III patients is described.

Description of a Double BSP

BSP is a pendulum fixed to the palate by means of two paramedial titanium screws¹⁹⁻²⁰. As in the clinical case presented here, a double supported pendulum anchored

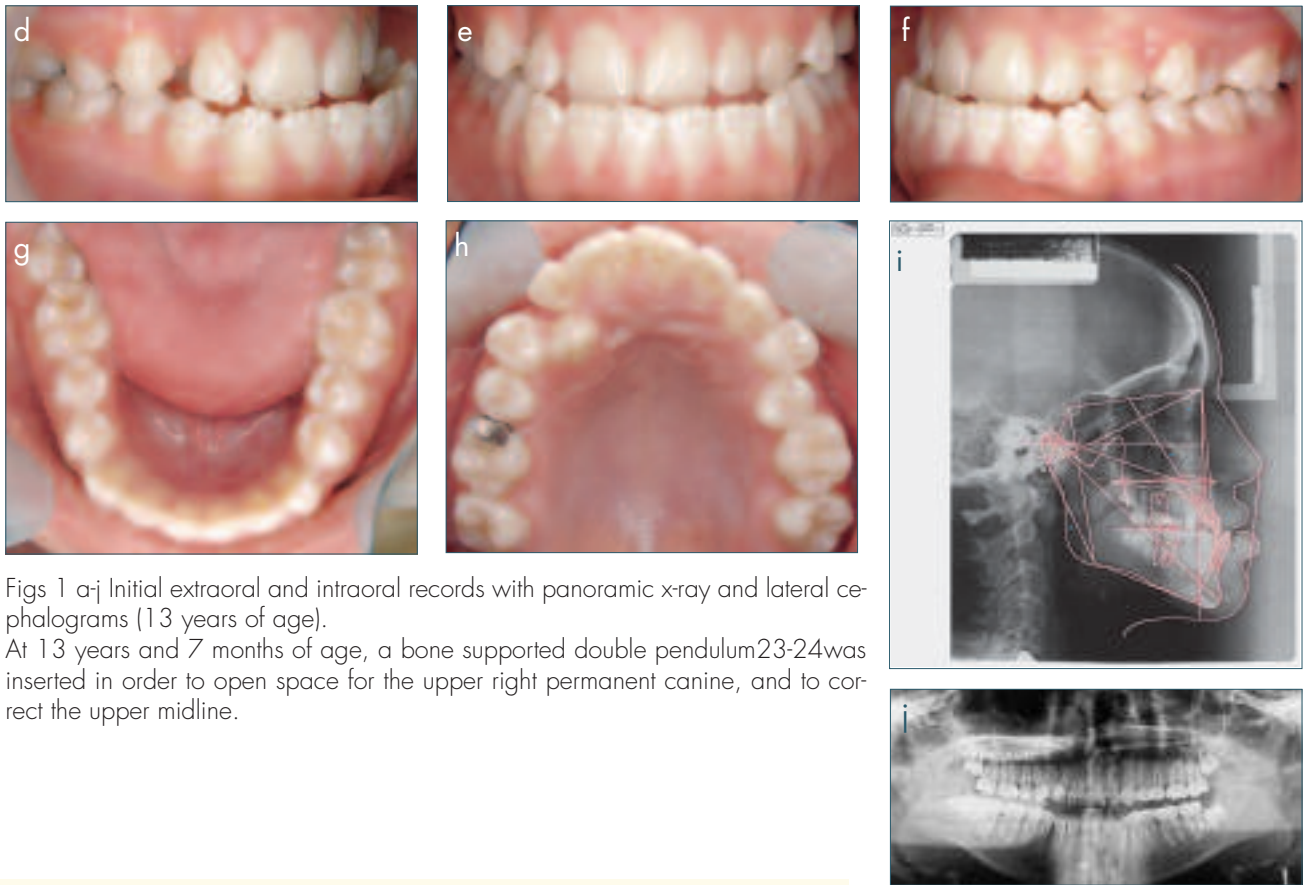
on the first and second molars can be used in order to achieve an efficient distalization of the whole upper molar segment.

The pendulum is inserted with two inter-maxillary bone screws (Mon-

deal®) placed in the paramedial region of the hard palate, measuring 2.0 mm in diameter x 11 mm in length. For its placement, the palatine region is anesthetized with lidocaine at 2% with epinephrine

Les traitements orthodontiques préchirurgicaux ont l'objectif d'établir l'harmonie entre les arcades dentaires en déplaçant les dents aux positions idéales par rapport à leurs bases osseuses, afin de réaliser des rapports occlusaux anteroposterieurs et transversaux proportionnés au moment de la chirurgie. Parmi les conditions typiques en termes de compensations dentaires présentées par les patients de Class III qui ont besoin de la chirurgie, l'inclination des dents antérieures doit être changée dans la plupart des cas avec la proclination des incisives inférieures et avec la retroclination des incisives supérieures. Pour réaliser l'inclination des incisives supérieures, on a proposé beaucoup de différentes solutions: comme la réduction inter-proximales, les extractions, ou la distalization des molaires supérieures, qui n'a pas été largement rapporté dans la littérature en tant que des moyens de decompensation de la malocclusion de la classe III avant la chirurgie. Cet article décrit le pendule soutenu par os (Bone Supported Pendulum BSP) comme option thérapeutique efficace pour la distalization des molaires par l'utilisation d'un appareil stabilisé au palais par mini-implantes, évitant des extractions et fournissant une bonne interdiction et coordination des arcades dentaires.

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Figs 1 a-j Initial extraoral and intraoral records with panoramic x-ray and lateral cephalograms (13 years of age).
At 13 years and 7 months of age, a bone supported double pendulum²³⁻²⁴ was inserted in order to open space for the upper right permanent canine, and to correct the upper midline.

Los tratamientos ortodóncicos Pre-quirúrgico tienen como objetivo el de establecer la armonía entre las arcadas dentarias moviendo los dientes a las posiciones ideales en relación con sus bases óseas, con el fin de lograr una adecuada relaciones antero posterior y transversal de la oclusión en el momento de la cirugía. Entre los requisitos típicos, en términos de compensaciones en pacientes Clase III dental que requieren cirugía; la inclinación de los dientes anteriores se debe cambiar en la mayoría de los casos por pro inclinación de los incisivos inferiores y retro inclinación de incisivos superiores. Diferentes alternativas se han propuesto para lograr la inclinación de los incisivos superiores, como la reducción inter proximal, extracciones, o distalización de molares superiores, que no ha sido ampliamente reportado en la literatura como un medio de descompensación de la maloclusión clase III antes de cirugía.

En este artículo se describe el Péndulo (BSP) como una opción terapéutica eficaz para distalizar los molares mediante el uso de un aparato anclado al paladar mediante mini-implantes, de esta forma se evita la extracción y se logra una buena interdigitation y coordinación de las arcadas dentarias.

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(1:80000). Once the area is anesthetized, the pendulum is positioned against the palate and the landmarks used to place the screws in the paramedial region are marked. The acrylic is perforated with a burr with a diameter a little larger than the screw in order for the acrylic to not present resistance to the screw at the moment of placement. Then the pendulum is placed against the palate, and the soft tissue and cortical bone are perforated with abundant irrigation with sterile saline solution. The screws are then inserted manually. Once the appliance is inserted, the screws are loaded immediately, and the TMA springs are placed in the lingual slots of the molars



Figs 2 a-g Extraoral and intraoral records with the bone supported double pendulum.



with a force of approximately 250 grams. The patient is prescribed non-steroid analgesics provided to the patient as well. The clinical advantages of the bone supported pendulum can be im-

mediately identified in the elimination of reciprocal forces on the premolars and upper anterior teeth, thus allowing for the simultaneous distalization on the premolars as the molars are distali-

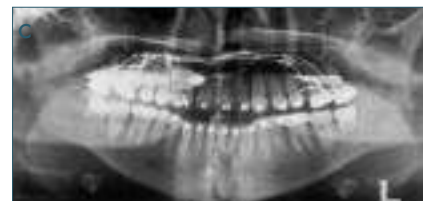
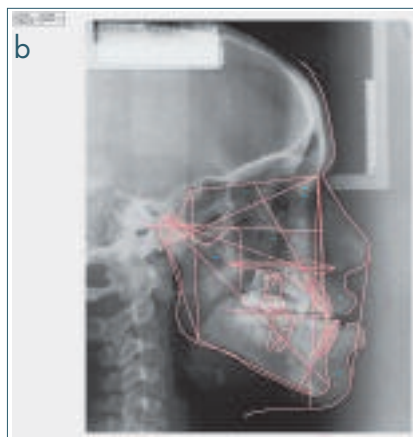
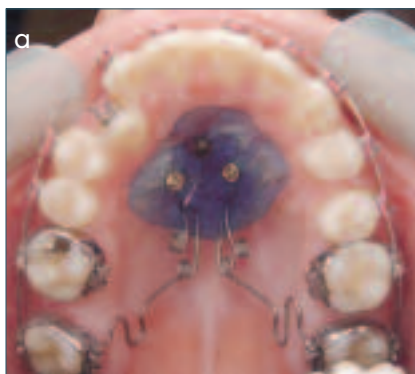
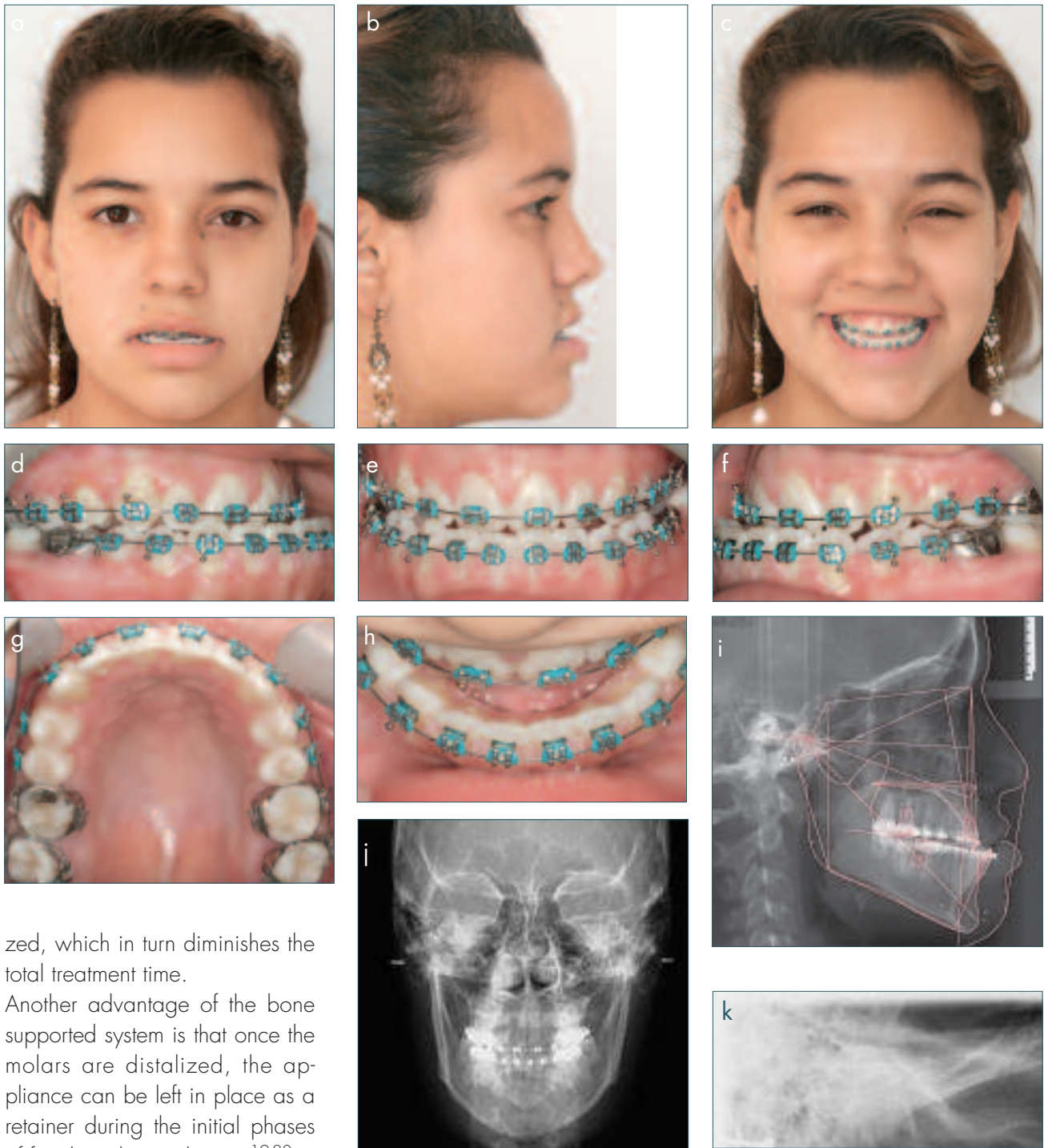


Fig 3a-c Five months later, distalization was finished, the buccal arms of the pendulum were removed, and brackets were placed in the upper and lower arches.



zed, which in turn diminishes the total treatment time. Another advantage of the bone supported system is that once the molars are distalized, the appliance can be left in place as a retainer during the initial phases of fixed appliance therapy¹⁹⁻²⁰.

Clinical case

This is a 13-year-old female patient, postpubertal (menarche at

10 years of age), stage CS 6 in cervical vertebral maturation²² who

was diagnosed with severe dentoskeletal Class III malocclusion in

Fig 4a-k. Fifteen months after initiation of treatment with the BSP (7 months after initiation of comprehensive fixed appliance therapy), the pendulum was removed and impressions were taken to coordinate pre-surgical arches.



Fig 5a-j Approximately two years after initial examination (at the age of 16 years, CS 6 achieved by at least 3 years), bi-maxilar orthognathic surgery was performed. High LeFort I osteotomy for advancing the maxilla by 3 mm and bilateral sa-gittal split ramus osteotomy for mandibular setback of 4 mm and midline correction.

the permanent dentition associated with mandibular prognathism. At the clinical examination the following features were found: a concave profile, midfacial hypoplasia, mandibular prognathism, upper midline deviation 2 mm to the right, and lower midline deviation 2.5 mm to the left, negative overjet (-4.5 mm), 1 mm overbite, impacted upper right permanent canine, and click noise on the left TMJ.

- Figs 1 a-j Initial extraoral and in-

traoral records with panoramic x-ray and lateral cephalograms (13 years of age).

At 13 years and 7 months of age, a bone supported double pendulum²³⁻²⁴ was inserted in order to open space for the upper right permanent canine, and to correct the upper midline.

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Figs 6a-g Five months after surgery, fixed appliances were removed

of 16 years, CS 6 achieved by at least 3 years), bimaxilar orthognathic surgery was performed. High LeFort I osteotomy for advancing the maxilla by 3 mm and bilateral sagittal split ramus osteotomy for mandibular setback of 4 mm and midline correction.

Five months after surgery, fixed appliances were removed (Figs 6a-g).

Conclusions

Distalization of upper molars by

means of a bone supported pendulum for dental decompensation and correction of crowding at the upper arch in a skeletal Class III patient can be regarded as an excellent treatment alternative which avoids extraction of premolars and provides a valid interdigitation and coordination of the dental arches in patients undergoing orthognathic surgery.

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To the patient, to Centro Odontológico Congregación Mariana, to the Mondeal house, and to the Centro Radiológico Imax, and to Universidad CES

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