

# The Implant Distal Jet

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**M**olar distalization for the treatment of Class II malocclusions has historically depended on patient compliance with intra- and extraoral auxiliaries.<sup>1-5</sup> In recent years, “non-compliance” devices such as the Distal Jet,<sup>\*6,7</sup> Jones Jig,<sup>\*\*8</sup> Pendulum,<sup>\*\*9</sup> and repelling magnets<sup>10</sup> have been developed. The problem of anchorage loss during molar distalization with these appliances has not been solved, however, by using Nance palatal buttons or premolar anchorage arms.

Bussick and McNamara found that the Pendulum produced an average 10.6° of distal molar tipping, and that the upper first premolars or deciduous first molars moved 1.8mm anteriorly, were extruded 1mm, and tipped 1.5° mesially.<sup>11</sup> Ghosh and Nanda noted 2.6mm of upper first premolar mesial movement and 1.7mm of extrusion.<sup>12</sup> Bolla and colleagues reported anchorage loss of 16-43% with the Pendulum, 26-55% with the Jones Jig, and 15-62% with the Distal Jet.<sup>13</sup> On average, the movement produced by the most common intraoral distalizing appliances was 71% molar distalization and 29% reciprocal anchorage loss.<sup>13</sup> Ngantung and colleagues confirmed that the anchorage support of the standard Distal Jet cannot completely resist the mesial reciprocal forces of molar distalization.<sup>14</sup>

This article introduces an Implant Distal Jet (IDJ) that uses miniscrews to reduce or eliminate the loss of anchorage in Class II treatment.

\*American Orthodontics, Inc., 1714 Cambridge Ave., Sheboygan, WI 53082; www.americanortho.com.



**Fig. 1** Miniscrew Anchorage System (MAS) screw (1.5mm neck diameter, 1.3mm tip diameter, 11mm length, asymmetrical thread).

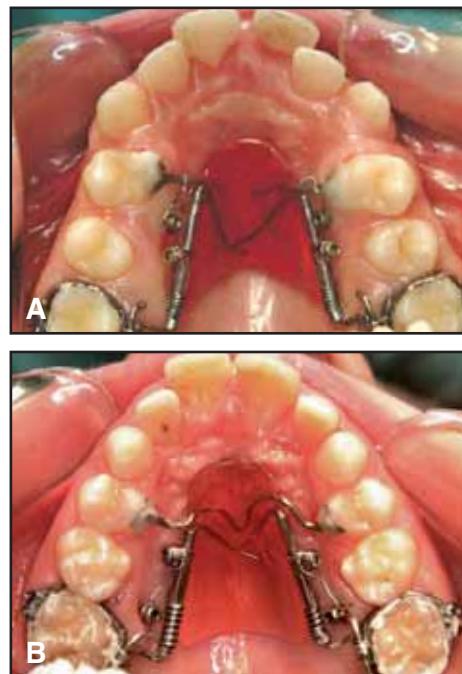
## Appliance Design

The IDJ is made with bilateral tubes embedded in a modified Nance acrylic palatal button, which is attached through supporting wires to the first premolars. If bilateral distalization is not needed, a unilateral tube can be used. A 240g nickel titanium open-coil spring is placed on each tube to generate a distal force against the first molars.<sup>6,7</sup>

Skeletal anchorage is obtained by inserting Miniscrew Anchorage System<sup>\*\*\*</sup> (MAS) titanium miniscrews (Fig. 1) in the palatal interradicular

\*\*Ormco/“A” Company, 1717 W. Collins Ave., Orange, CA 92867; www.ormco.com.

\*\*\*Micerium S.p.a., via Marconi 83, 16030 Avegno, Genova, Italy; www.micerium.it



**Fig. 2** A. With miniscrews inserted between first and second premolars, screws are tied to Distal Jet's premolar support wires. B. With miniscrews inserted between second deciduous molars and first molars, screws are tied to Distal Jet locks.

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spaces between the first and second premolars or between the second premolars and first molars, according to the surgical protocol recommended in a previous article.<sup>15,16</sup> These areas of insertion were chosen according to the “safe zone” concept described by Carano and colleagues.<sup>15-17</sup>

At the same visit when the Distal Jet is delivered, the MAS miniscrews are inserted, and their primary mechanical stability is verified. The miniscrews are tied with .012" stainless steel ligature



**Fig. 4** IDJ anchored to miniscrew between upper left first and second premolars, after four months of molar distalization.



**Fig. 5** IDJ converted to passive Nance button, with first miniscrew removed.

wires to the maxillary first premolar support wires, if the screws have been inserted between the first and second premolars, or to the Distal Jet locks, if inserted between the second premolars (or deciduous molars) and first molars (Fig. 2).

The IDJ treatment protocol can work successfully with conventional multibracketed labial appliances as well as in lingual therapy, as the following case demonstrates.

### Case Report

A 26-year-old female presented with a Class II, division 2 skeletal pattern and a deep bite (Fig. 3). She had a Class I dental relationship on the right side, but the maxillary right deciduous canine was still present between the permanent right lateral incisor and canine.

A Distal Jet was fabricated as described above. An MAS miniscrew was inserted in the palatal interradicular space between the upper left first and second premolars and tied to the premolar support wire. The IDJ was then activated in the mouth with a coil spring.

Lingual Stealth\* brackets were bonded only to the upper anterior teeth. A sectional .016"

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**Fig. 6** Premolar retraction, using second miniscrew for anchorage.

stainless steel wire was placed to produce a biteplane effect, which would avoid posterior frictional forces during upper molar distalization while allowing the lower arch to be bonded with labial brackets.

After two months of treatment, the IDJ was reactivated; because of the reduced distance from the IDJ lock to the miniscrew, light-cured composite was added between the screw and the lock (Fig. 4). This procedure was repeated until the upper left first molar was in a Class I position.

The coil spring was then removed, and the IDJ lock was blocked with composite. The first premolar support wire was cut off, transforming the IDJ to a passive Nance button, and the miniscrew was taken out (Fig. 5).

After the entire upper arch was bonded with lingual brackets, a new miniscrew was inserted between the left second premolar and first molar on the palatal side. Elastic traction was attached between the screw and the premolar to help maintain the molar position. Once the second premolar was in contact with the first molar, the passive Distal Jet was removed (Fig. 6).

En masse space closure was obtained on the left side using sliding mechanics and an .016" × .022" stainless steel archwire. An alternative method would have been to distalize the premolars completely with the second miniscrew, then to retract the anterior teeth using either sliding or closing-loop mechanics.

The miniscrew was removed for finishing, and the brackets were debonded after 15 months of treatment (Fig. 7). Cephalometric superimpositions confirmed the successful use of miniscrew anchorage for the IDJ.

## Discussion

Placing the miniscrews between the first and second premolars seems preferable to inserting them between the second premolars and first molars, because the former position can take advantage of the second premolar distal drift that is commonly seen in Distal Jet treatment.<sup>6,7,13</sup>

We have selected the palatal alveolar ridge, as opposed to the paramedian or midpalatal loca-

tions recommended by other authors,<sup>18</sup> based on clinical experience and anatomical observations.<sup>15,17</sup> The bone in the paramedian and midpalatal areas may not be dense enough to ensure primary stability of the miniscrews, and the palatal suture is not an acceptable location in a younger patient if the suture has not yet calcified.<sup>18,19</sup>

Placing the miniscrews between the roots makes them independent of the Distal Jet's premolar support wires, to which they may need to be tied. This allows the Distal Jet to be fabricated by the laboratory without precise instructions from the orthodontist on the positions of the support wires and palatal button, based on the cephalometric radiograph.

On the buccal side, where the interradicular space is smaller, the screw would have to be inserted more apically, in the free gingiva. Such placement has been associated with inflammation leading to miniscrew failure,<sup>20</sup> and can cause patient discomfort. Conversely, on the palatal side, where the gingiva is attached, the screw can be placed as high as necessary without complications.

## Conclusion

The IDJ system described above can distalize upper first molars in Class II cases with maximum anchorage control. We have seen no complications from the simple and relatively non-invasive surgical procedure, and the MAS screws have shown excellent stability. Miniscrew removal is fast and easy. Moreover, the miniscrew anchorage does not change the shape or structure of the Distal Jet, thus ensuring patient comfort while avoiding the need for compliance with auxiliary devices.

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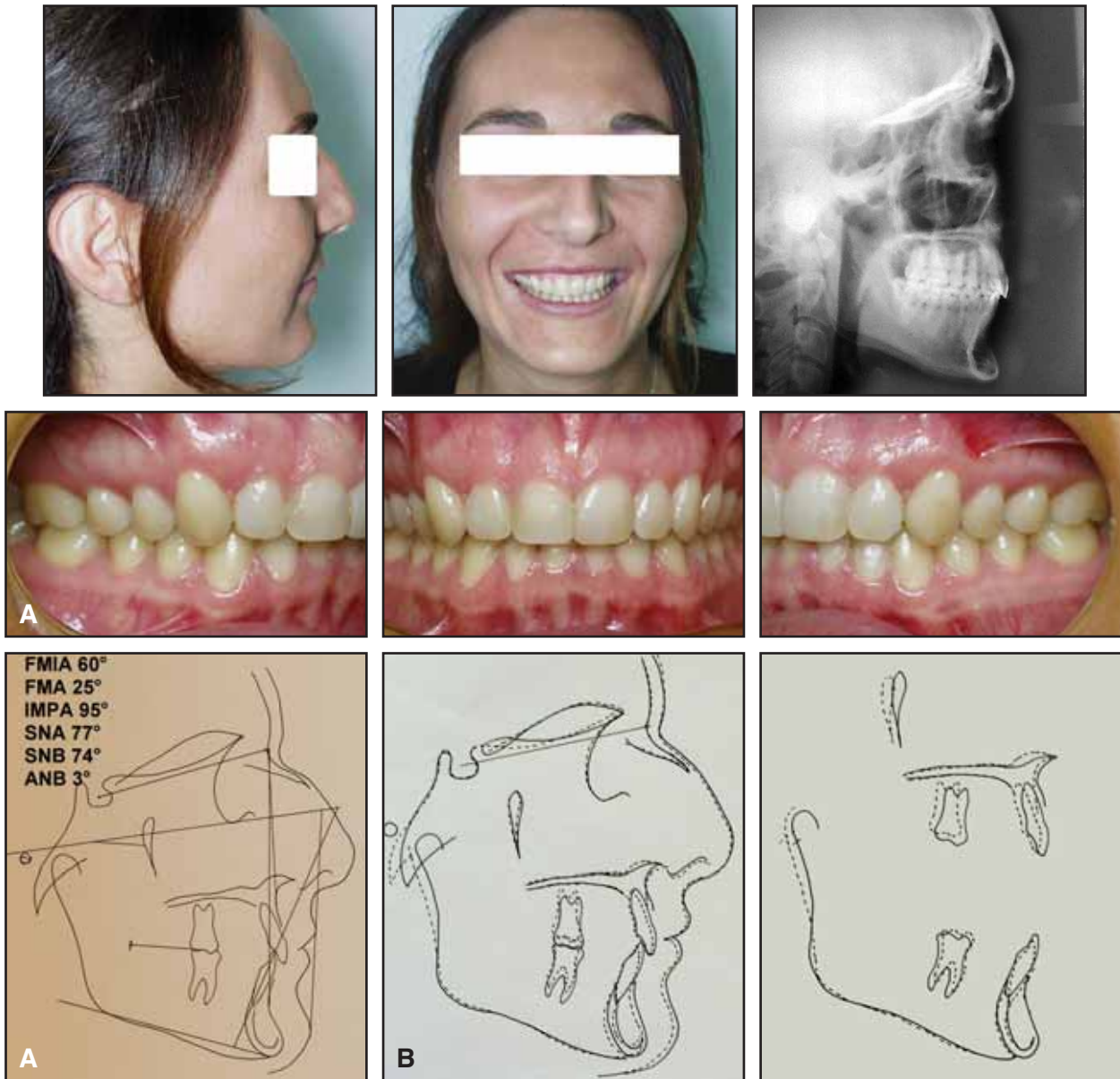


Fig. 7 A. Patient after 15 months of treatment. B. Superimposition of cephalometric tracings before and after treatment.

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