Non-Invasive Maxillary Anchorage for Canine Retraction in Premolar Extraction Cases

W. BONHAM MAGNESS, DDS

The current trend toward placing mini-implants for skeletal anchorage has had a pronounced impact on the orthodontic profession. Although miniscrews have proven impressive in their capacity for multidirectional control, they do require invasion of the oral soft tissue and underlying osseous tissue. As this article demonstrates, a modified Nance arch can provide predictable and non-invasive maxillary anchorage for space closure.

One of the advantages of using a pretreatment Visualized Treatment Objective (VTO) is that the amount of molar anchorage needed to position the incisors in the best relationship to the soft-tissue nose, lip, and chin becomes crystal clear. Growth of the nose as a person matures is beyond orthodontic control and highly unpredictable. Lip position is obviously influenced by incisor position; in general, however, the flat-lip profile that was a problem 30 to 40 years ago, during the "extraction phase" of orthodontics, has now been replaced by the strained-mentalis lip of the "nonextraction era".

The belief that teeth should never be extracted in orthodontic treatment is as great a misconception as was the indiscriminate premolar removal of the mid-20th century. Both facial esthetics and long-term stability can be jeopardized by an all-or-nothing approach to extractions. Whenever there is a need for space in either arch, the conscientious clinician must be aware of the limitations of lateral buccal expansion and the risks of ill-advised incisor advancement.

The Modified Nance Arch

When Hays Nance introduced the Nance arch, his primary goal was to stabilize the maxillary first molars while allowing the physiologic drift of the canines to unravel the incisors (Fig. 1). His acrylic button was about the size of a dime (18mm). The modified Nance arch uses a button roughly the size of a quarter (24mm) to minimize mesial displacement of the first molars during active retraction of the canines (Fig. 2).

Fig. 1 Traditional Nance arch allows canine drift.

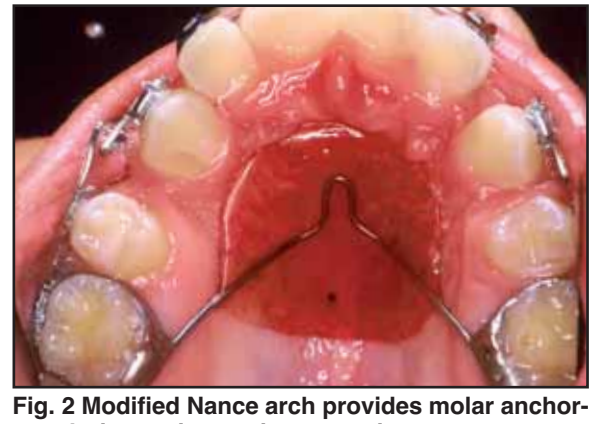
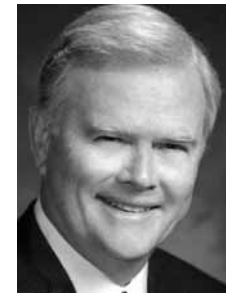


Fig. 2 Modified Nance arch provides molar anchorage during active canine retraction.



Dr. Magness is a Clinical Professor of Orthodontics, University of Texas Dental Branch, Houston, and in the private practice of orthodontics at 902 Frostwood, Suite 300, Houston, TX 77024.

Customized sectional wires, made of .016" × .022" spring steel for an .018" × .025" appliance, are used for bodily canine retraction. Right and left sectional wires can be bent ahead of time so they will be readily available. The only difference between the two sides is that the mesial end of the wire should be lingual to the buccal end, so that after activation, the curvature of the wire holds the vertical loop arms close together (Fig. 3).

Three key bends are made in the sectional wire prior to insertion (Fig. 4):

1. A 5° anti-rotation bend is incorporated in the loop area to prevent distolingual rotation of the canine.
2. A 5° anti-tip bend is made in the loop area to overcome the tendency of the canine to tip, due to its large root surface.
3. Most important, lingual root torque of approximately 10-15° is added in the canine region to reduce the resistance of the cortical plate at the canine eminence during retraction.

After the wire is cut so that about 3mm will extend distal to the molar tube, the terminal 7-8mm is heated to soften the wire for activation (Fig. 5). The loop should be activated about 1mm

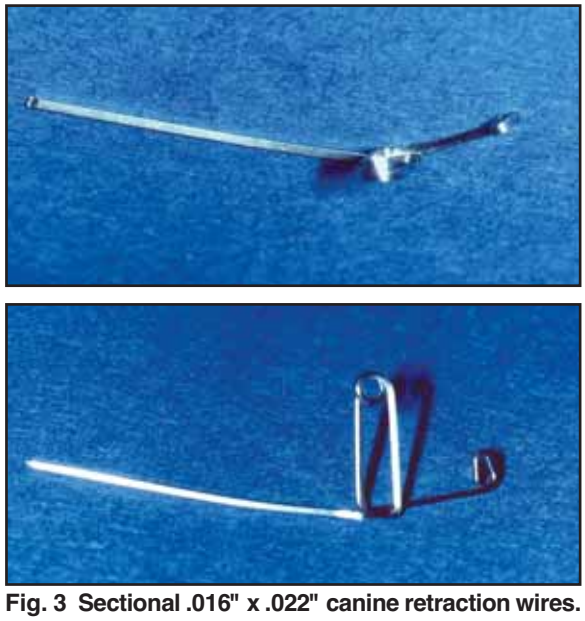


Fig. 3 Sectional .016" x .022" canine retraction wires.

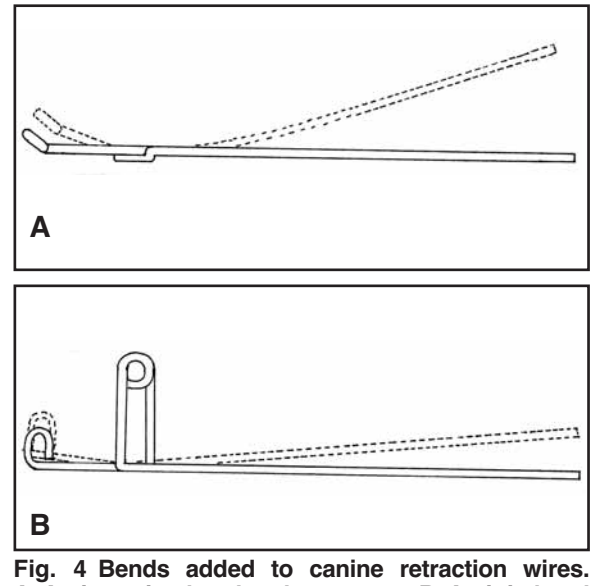


Fig. 4 Bends added to canine retraction wires. A. Anti-rotation bend and curvature. B. Anti-tip bend and lingual root torque in canine area.

Fig. 5 Heating cut end of sectional wire allows easy activation with Weingart plier.

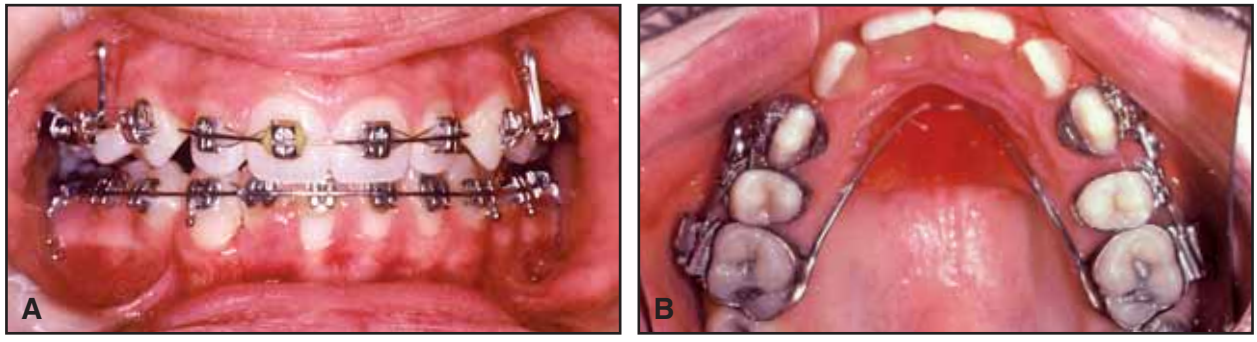


Fig. 6 A. Figure-8 ligatures added to incisors to prevent spacing. B. Without incisor brackets, unsightly anterior spaces may open.

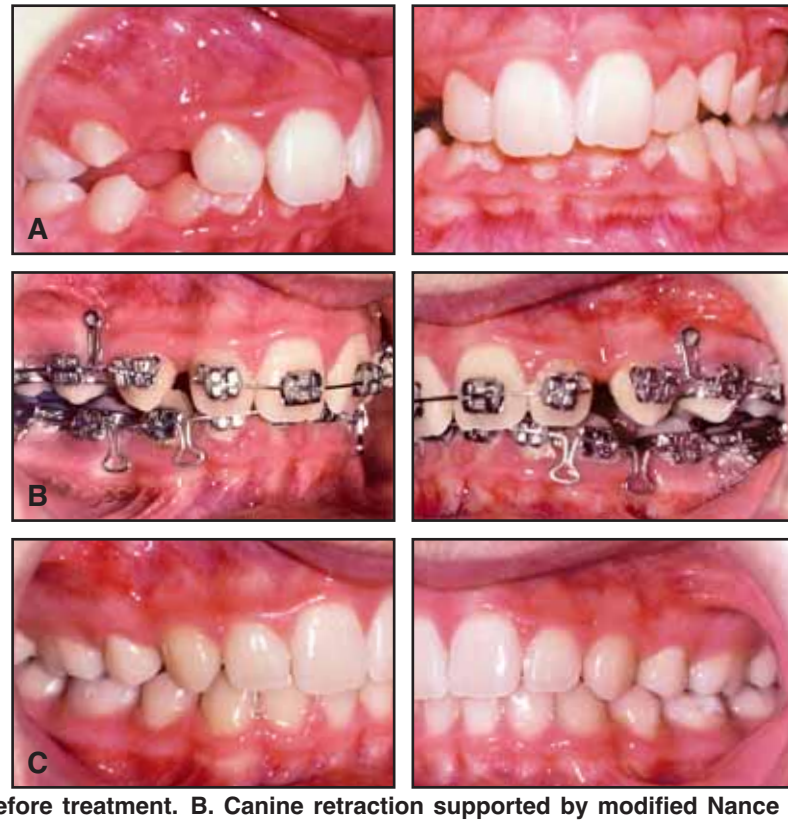


Fig. 7 A. Patient before treatment. B. Canine retraction supported by modified Nance arch, showing spontaneous incisor drift. C. Final result.

every four to five weeks. Each activation will produce 150-170g of force, which will normally close 7mm of premolar extraction space within six months. Some of the premolar space will usually close spontaneously during the initial alignment phase, however, leaving only 3-4mm to close when the sectional wires are placed.

If possible, the incisors should also be bracketed during canine retraction, with figure-8 ligatures used to hold the incisors together once they are in contact (Fig. 6). Otherwise, unsightly anterior spaces will open as the transseptal fibers are stretched. Fixed appliance treatment can proceed in the lower arch as required.

Fig. 8 A. Sectional canine retraction wires prior to engagement. B. Wires after engagement. C. Patient after two months of activation.

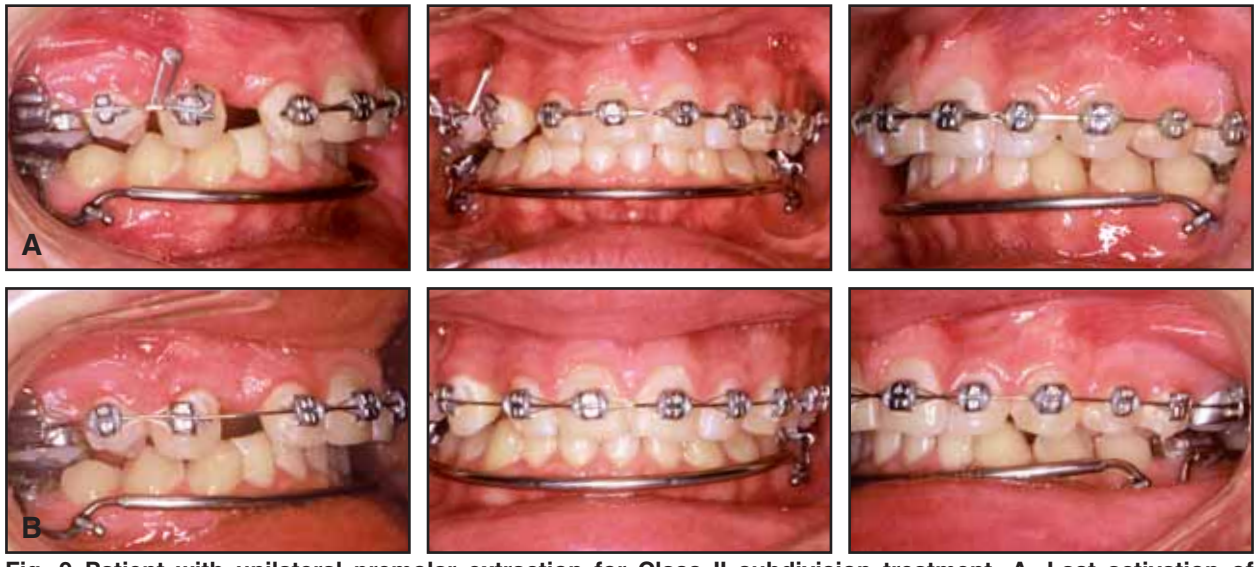


Fig. 9 Patient with unilateral premolar extraction for Class II subdivision treatment. A. Last activation of canine retraction wire for space closure. B. .016" stainless steel archwire used for alignment, with figure-8 ligature used to hold extraction space closed **(continued on next page).**

When the modified Nance arch has been placed and the entire maxillary arch is bonded, the usual archwire sequence is:

1. .014" nickel titanium for initial rotation correction and slot alignment.
2. .016" stainless steel for final rotation and alignment, with power chain added to the incisors if anterior space has opened.
3. .016" × .022" sectional retraction wires. The figure-8 ligatures are left on the incisors; the .016" stainless steel archwire is cut 2mm distal to the lateral incisor brackets and bent lingually to prevent spaces from opening as the canines are retracted. Once all the spaces have been closed on both sides, the first molars, second premolars, and canines are tied together with figure-8 ligatures.
4. .016" stainless steel with final archform, plus molar rotation if needed. The Nance arch is removed by cutting the wire at the molar bands, using a No. 330 carbide bur in a high-speed handpiece.
5. Upper .016" × .022" closing arch with closing loops just distal to the lateral incisor brackets. Curve of Spee control can be added as necessary.

By this time, the upper incisors will have drifted back to some extent, depending on the amount of canine retraction, the overjet, and the position of the lower incisors (Figs. 7-9). If further anchorage control is needed after removal of the Nance arch, extraoral traction and/or intraoral elastics may be used. The canines, with their large root surfaces, will now serve as part

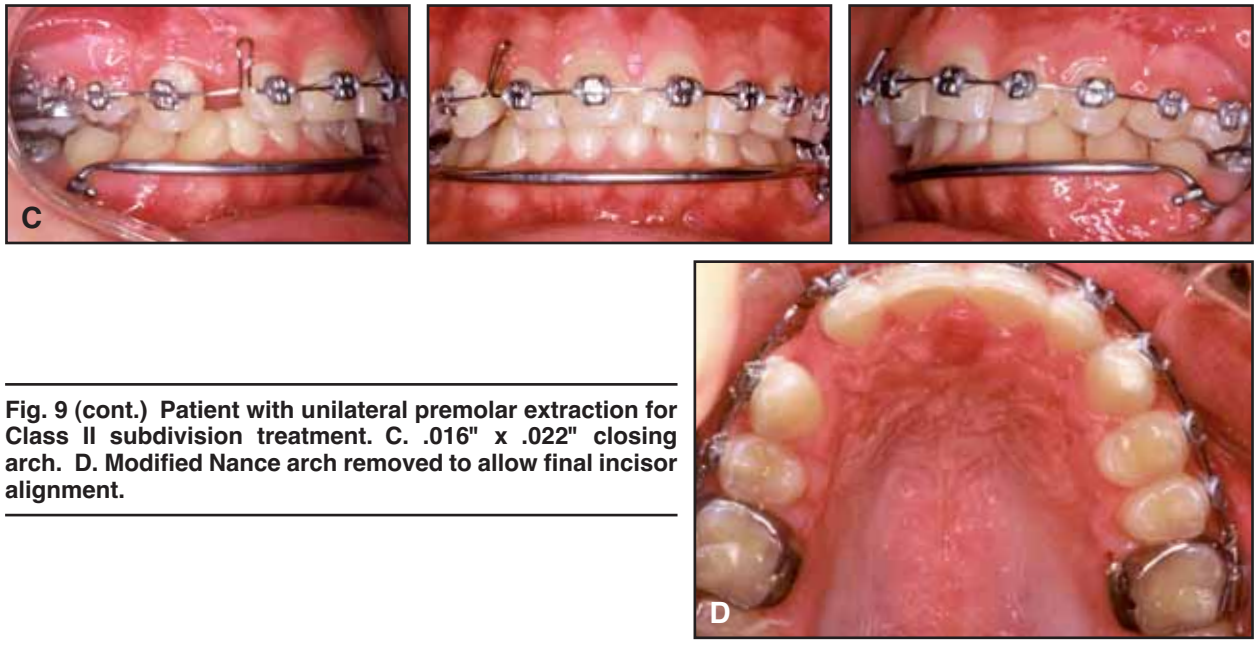


Fig. 9 (cont.) Patient with unilateral premolar extraction for Class II subdivision treatment. C. .016" x .022" closing arch. D. Modified Nance arch removed to allow final incisor alignment.

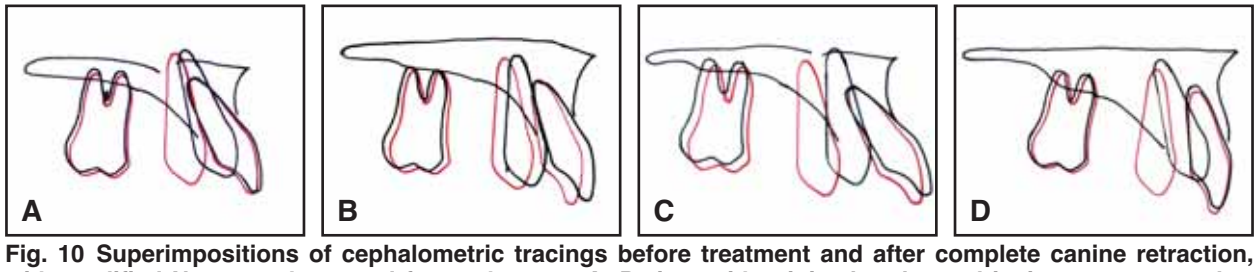


Fig. 10 Superimpositions of cephalometric tracings before treatment and after complete canine retraction, with modified Nance arches used for anchorage. A. Patient with minimal molar and incisor movement, but excellent canine control. B. Patient with slight molar movement, passive incisor tipping, and bodily canine movement. C. Patient with vertical tooth eruption, slight molar movement, passive incisor tipping, and bodily canine movement. D. Patient with minimal molar and incisor changes, but good canine retraction.

of the posterior anchorage unit, and the upper second molars can be banded for additional anchorage.

Discussion

Ricketts designed a prefabricated, multiloop canine retractor that could close extraction spaces in two to three activations, but required using a "cuspid uprighting" segment for several months afterward to parallel the roots. The retraction system shown here keeps the canine roots parallel as they are moved.

In cases where the orthodontist's intuition or, ideally, an objective VTO prediction demands maximum maxillary molar anchorage to achieve treatment objectives, the modified Nance arch provides an excellent source of non-invasive anchorage (Fig. 10). This canine retraction program is an efficient method of treating a maximum anchorage problem with minimal demands on chairtime and patient compliance. ☐