# Bioprogressive Simplified, Part 4: Extraction Therapy

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We have seen a definite trend toward more nonextraction therapy in the last 20 years. Orthodontists who used to be absolutely rigid about extracting permanent teeth in any case with more than 2mm of crowding are now talking about functional expansion, esthetic considerations, and the benefits of nonextraction treatment.

Whether this turn away from extraction was caused by dental peer pressure, by strong champions of nonextraction, or by orthodontic enlightenment is difficult to say. In my opinion, the introduction of Bioprogressive therapy was a major factor.

Still, it is clearly possible to go too far toward nonextraction. Indiscriminate nonextraction treatment is tantamount to saying, "If I can get all the teeth into the arch and the malocclusion corrected, I'm not going to worry too much about what the final esthetic result might be."

The truth is there should always be a balance between extraction and nonextraction in any well-managed orthodontic practice. It is certainly possible to lean toward nonextraction through careful treatment timing, clever analysis of growth and esthetics, and appropriate use of current technology.

Yet, there is no reason for an extraction case to suffer in terms of quality of result, health, function, or esthetics. Proper diagnosis and understanding of one's mechanics are still the keys. This article will outline a simplified approach to Bioprogressive extraction therapy--again using the latest techniques and materials.

## Synopsis of Extraction Treatment

Extraction therapy can be divided into five phases, each designed to achieve a specific goal. The number of archwires has been minimized, and complex loop systems have been eliminated where possible. As with nonextraction therapy, understanding when to use each archwire is the key to understanding Bioprogressive mechanics. The stages can be described as follows:

*1. Initiation*

The lower utility arch serves a slightly different purpose than it does in nonextraction cases, even though the lower arch may be the source of a deep bite in extraction cases as well. The utility arch is not used to align the lower incisors, but instead to open the bite during initial cuspid retraction and control torque in the incisor and molar regions. In critical anchorage cases, lower arch anchorage is increased by engaging the lower second molars in the arch quite early in treatment.

In the upper arch, anchorage is gained by one or more of four methods.

a. A removable Goshgarian-type transpalatal bar can be used to stabilize the molars against each other and to enhance distal movement of the upper molars. The transpalatal bar tends to counteract the anchorage loss caused by mesial tipping and rotation of the upper first molars.

b. Headgear can be added, based on facial type and growth pattern. Directional-pull headgear would be the usual choice for more mesial or dolichofacial growth patterns.

c. In cases where torque control of the upper incisors and mesial tipping of the upper molars must be avoided, an upper utility arch can enhance anchorage. The utility arch intrudes the upper incisors and provides a counteracting distal tipping of the upper molars during cuspid retraction.

d. To enhance anchorage, the upper second molars, when available, can be engaged in the upper arch with an overlay wire that ties them to the buccal anchorage segment.

*2. Cuspid Retraction and Uprighting*

a. Depending on the initial angulation of the lower cuspids, their retraction across the first one-third of the extraction sites can be started with something as simple as Class I elastics from lower molar to lower cuspid--with no archwire other than the lower utility arch. This serves to kick back the cuspid slightly and allow for better incisor alignment and initial overlay placement. If the bicuspids and cuspids are tipped toward each other, an initial overlay wire might be used to upright and level these segments before completing retraction with a simple helical loop.

The remaining two-thirds of the extraction site is closed with rigid overlay wires. This offers several distinct advantages over complete cuspid retraction with sectional arches, which I have found to be somewhat ungainly in most cuspid retraction sites.

Using overlay wires allows retraction along wires with minimal binding and without the side effects of molar tipping and incisor extrusion common with round wires. Each wire is thus used to maximum advantage. The rectangular wire is used to keep the lower molars upright and achieve torque control and intrusion of the lower incisors. The round wire is used for archform integrity, cuspid root parallelism, and patient comfort.

b. Cuspid retraction with a sectional arch is more feasible in the upper arch. If the upper incisors are in good position, I start cuspid retraction with an .016" x .016" vertical helical closing section. This kicks back the cuspid by about half the extraction site before the upper incisors need to be engaged.

When the upper incisors need to be engaged at the onset of treatment for intrusion, torque control, or anchorage, I usually place the retraction sections and add a light round section in the incisors to level them with each other. This is followed by an .016" x .022" upper utility arch, and the cuspid retraction is then completed on an .016" round overlay wire.

*3. Transition and Final Cuspid Space Closure*

When the cuspids have been almost completely retracted and the bite has been opened sufficiently (usually about halfway through active treatment), transition arches are used to complete the cuspid retraction. These flexible edgewise wires (Ni-Ti, TMA) have several distinct functions.

a. They allow for final incisor alignment and torquing.

b. They correct details of archform that are difficult to resolve with any kind of sectional cuspid retraction. Although retracting cuspids on an overlay wire improves arch integrity to some extent, better arch control must be achieved before placing more rigid consolidation and ideal arches.

c. They allow for final root paralleling, rotation, and torquing in the cuspid-bicuspid regions. When a reverse curve of Spee is incorporated, the transition wires permit a vertical seating of the buccal segments without loss of torque control in the incisor and molar segments.

d. They serve as a transition from the sectional cuspid retraction into the continuous arches used to complete the case. In a typical extraction case, the transition wires are in place about halfway through the active treatment.

*4. Consolidation*

The upper and lower incisors are retracted after the achievement of good archform and symmetry, cuspid space closure, torque control, and leveling. Lower incisor consolidation is usually started a month or two ahead of upper incisor consolidation so that there is no "jamming" of the teeth (especially when a Class I buccal relation has been achieved). Typically a heat-treated .016" x .016" helical continuous closing arch is used to retract the lower incisors. This wire has a reverse curve of Spee and is extended to and activated at the second molars. The upper incisors can be consolidated by any of the following methods, depending on the smile line and the labial inclination of these teeth.

a. If the upper incisors are proclined labially and no torque is needed during retraction, a simple .016" round wire with a vertical helical closing loop is used.

b. If the upper incisors are in good vertical and angular position (no intrusion or torque needed), an .016" x .016" or .016" x .022" helical closing loop archwire is used.

c. If additional torquing or intrusion of the upper incisors is necessary, an upper closing utility arch is used. This is a bit more cumbersome than a simple closing arch, but the added control over the vertical and angular dimensions makes it quite expedient. The buccal segments must be held against the intrusive force with stabilizing buccal sections, which will avoid tipping the upper molars distally, pitting the incisor intrusion against the buccal segment occlusion.

d. When it is advantageous to extrude the upper buccal segments at the same time the upper incisors are intruded and retracted, a combination crossed-"T" horizontal closing loop is used. Although difficult to bend, this is effective in extreme brachyfacial types where anterior bite opening has been difficult to achieve. In such cases, it is ideal to extrude posterior teeth and intrude anterior teeth.

*5. Idealization*

Orthodontists who work with edgewise mechanics are used to finishing cases with rigid edgewise arches. I prefer a simpler approach to final detailing.

After consolidation of the incisors, rigid edgewise ideal coordinated arches are placed to achieve ideal interarch symmetry, to allow the pretorqued and preangulated brackets to express themselves completely, and to complete buccal segment overcorrection.

Once this has been done and Class II elastics have been discontinued, a light round archwire is more effective for seating the buccal segments. We have been controlling the teeth in all three planes of space since the onset of treatment. Now, it is advantageous to allow natural function to express itself with round finishing wires, for several reasons.

Because the buccal segments have previously been overcorrected to a super-Class I, there is time during these final three months of treatment to find out if the patient is in centric relation. If Class II elastics are being worn, it is very difficult to determine centric relation because of TMJ compression. However, if round arches are used without Class II elastics, any relapse toward Class II centric occlusion can easily be seen.

In addition, it is somewhat ineffective to put 1st-order bends in edgewise arches to allow for bracket height discrepancies in detailing the occlusion. The archwires are simply too rigid. Light, resilient round archwires allow more effective vertical detailing. These wires can even be laced over or under certain brackets.

Finally, the teeth can "roll" around a round archwire, allowing natural inclined plane function and musculature to assist in buccolingual settling. Adding multiple vertical elastics will help the musculature lock in the buccal segments.

Many of us have been taught to "start with round, finish with edgewise", but I believe it makes more sense to do just the opposite.

I will further demonstrate the concepts, mechanics, and time increments of these five stages of extraction therapy by using a series of flow charts with three common malocclusions.

## Flow-Charts

Figure 1: Class I, Double Protrusion
Initiation, 1-3 months (Fig. 1A, Fig. 1B)
Cuspid Retraction and Uprighting, 3-6 months (Fig. 1C, Fig. 1D)
Transition and Final Cuspid Space Closure, 6-12 months (Fig. 1E, Fig. 1F)
Consolidation, 12-18 months (Fig. 1G, Fig. 1H)
Idealization, 18-24 months (Fig. 1I, Fig. 1J)

Figure 2: Class II, Division 1
Initiation, 1-3 months (Fig. 2A, Fig. 2B)
Cuspid Retraction and Uprighting, 3-6 months (Fig. 2C, Fig. 2D)
Transition and Final Cuspid Space Closure, 6-12 months (Fig. 2E, Fig. 2F)
Consolidation, 12-16 months (Fig. 2G, Fig. 2H)
Idealization, 16-24 months (Fig. 2I, Fig. 2J)

Figure 3: Class II, Differential
Initiation, 1-3 months (Fig. 3A, Fig. 3B)
Cuspid Retraction and Uprighting, 3-6 months (Fig. 3C, Fig. 3D)
Transition and Final Cuspid Space Closure, 6-14 months (Fig. 3E, Fig. 3F)
Consolidation, 14-18 months (Fig. 3G, Fig. 3H)
Idealization, 18-24 months (Fig. 3I, Fig. 3J)

## Conclusion

I have attempted to show some of the changes that technology has made in Bioprogressive orthodontics during the last 10 years. Techniques may change, but the principles remain the same. It has long been my contention that understanding the nuances of this flexible approach can bring ample rewards to clinicians in both the diagnostic and mechanical arenas of orthodontics. ÃÂÃÂ

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## Figures

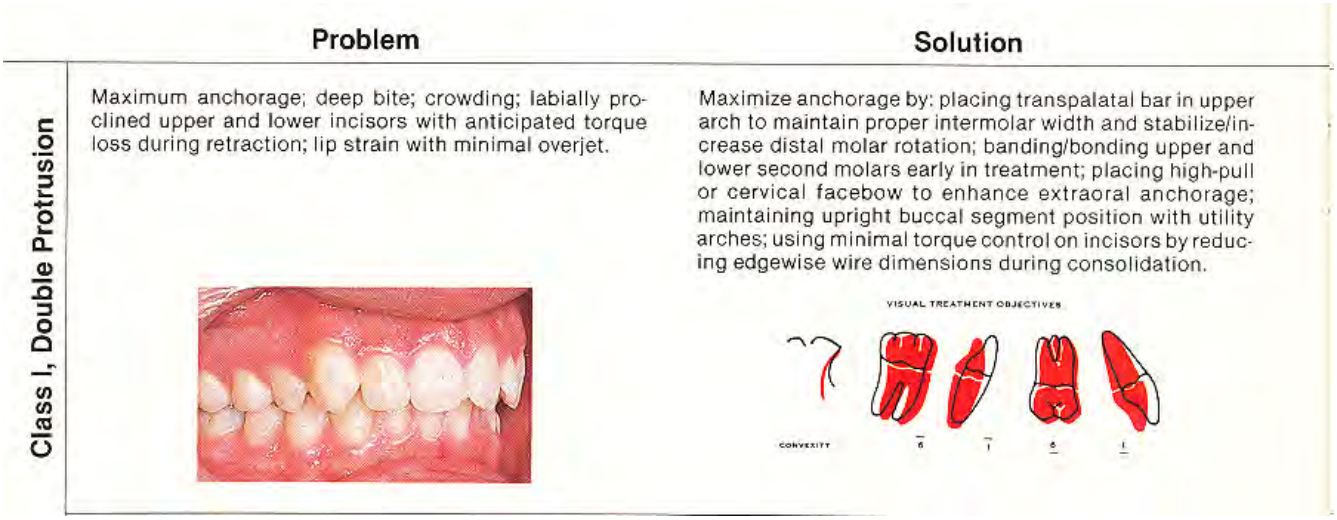



**Fig. 1A** Class I, Double Protrusion: Initiation, Problem and Solution

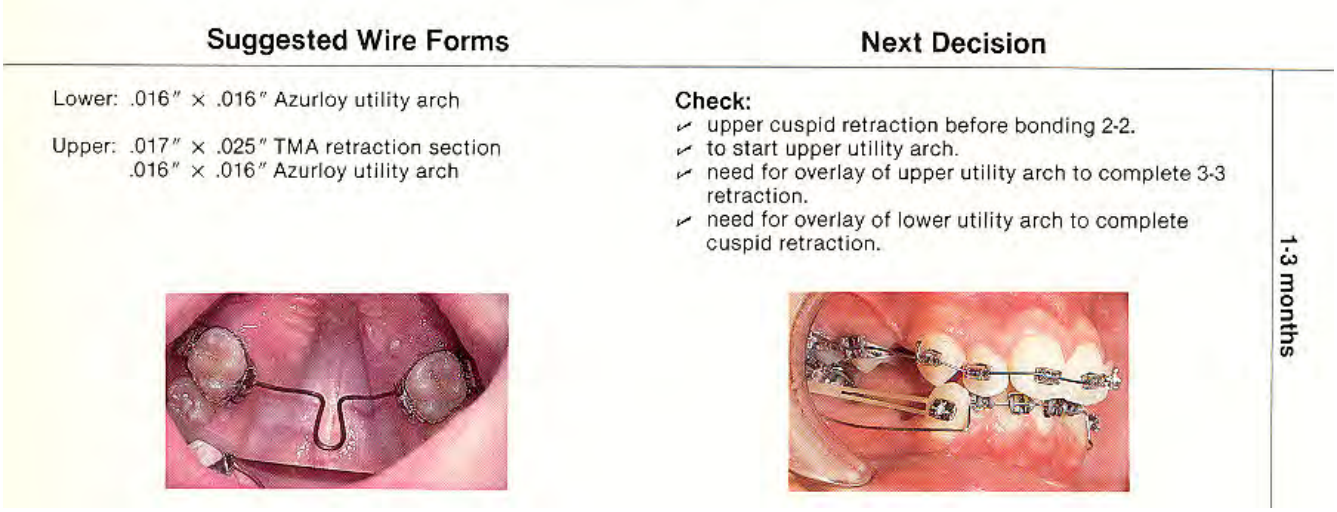



**Fig. 1B** Class I, Double Protrusion: Initiation, Suggested Wire Forms and Next Decision

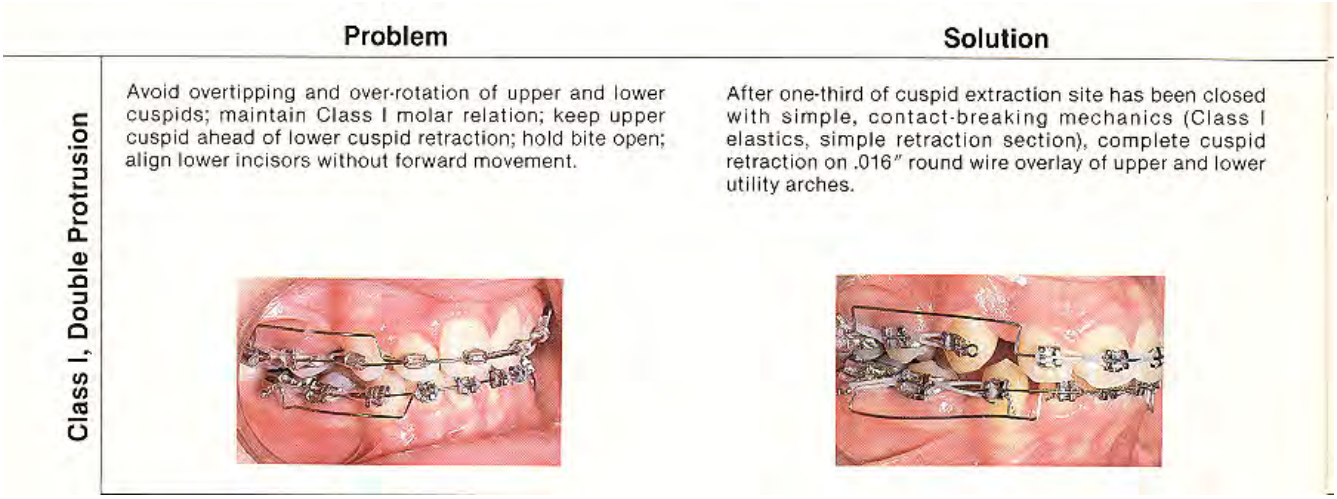



**Fig. 1C** Class I, Double Protrusion: Cuspid Retraction and Uprighting, Problem and Solution

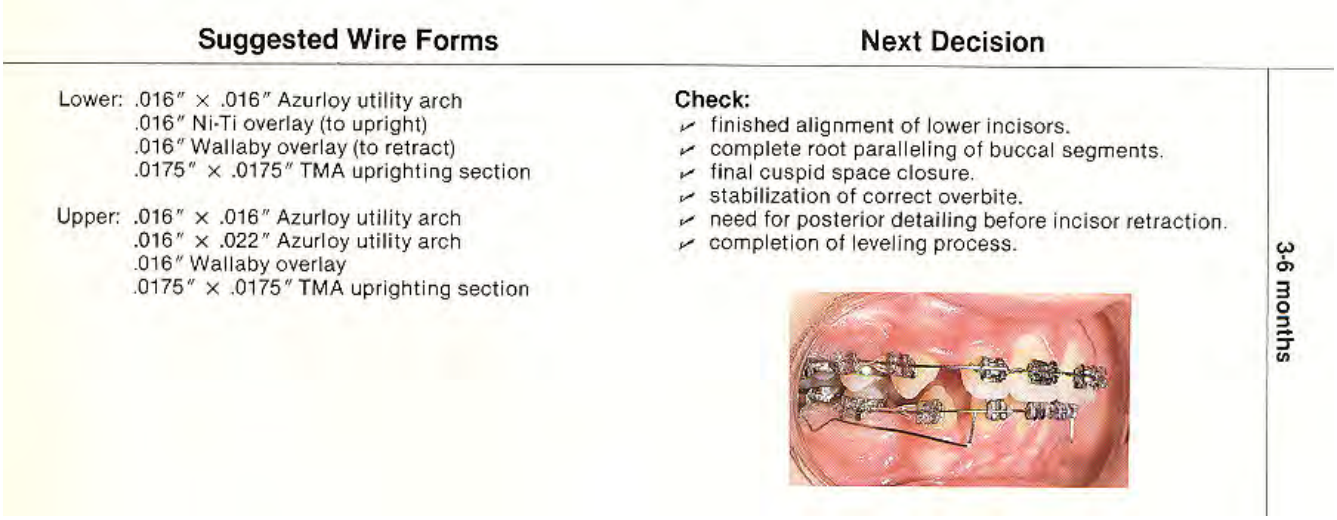



**Fig. 1D** Class I, Double Protrusion: Cuspid Retraction and Uprighting, Suggested Wire Forms and Next Decision

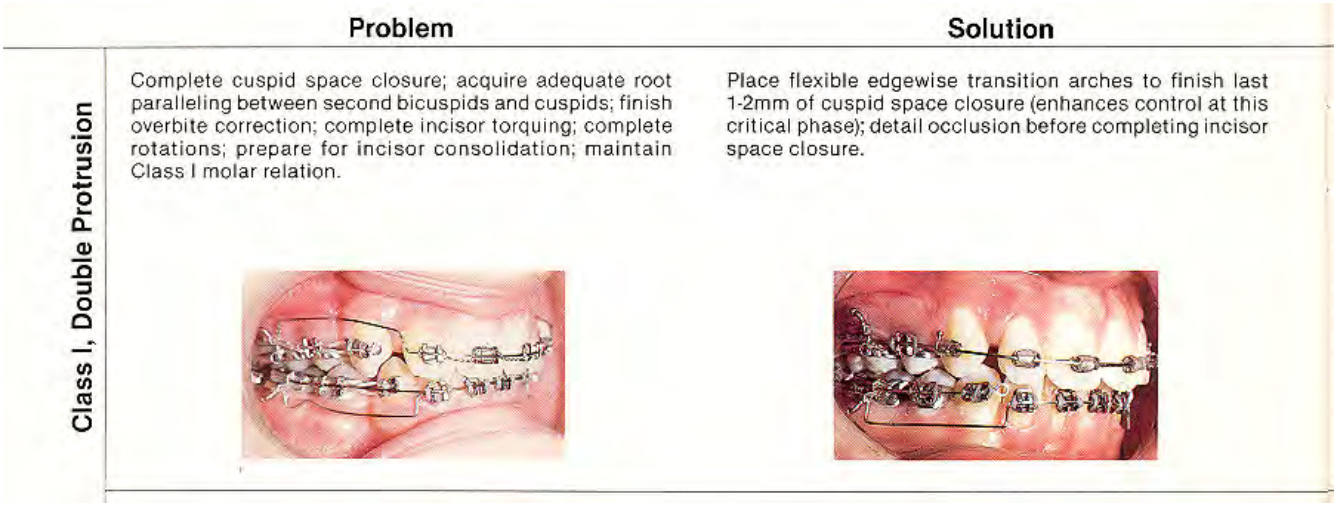



**Fig. 1E** Class I, Double Protrusion: Transition and Final Cuspid Space Closure, Problem and Solution

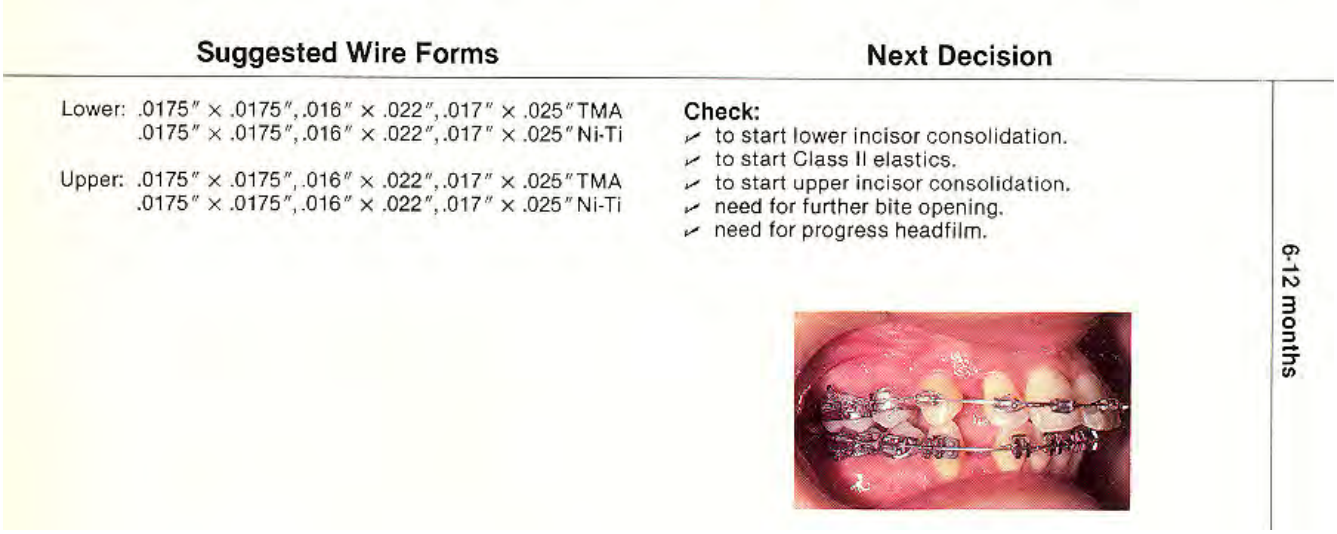



**Fig. 1F** Class I, Double Protrusion: Transition and Final Cuspid Space Closure, Suggested Wire Forms and Next Decision

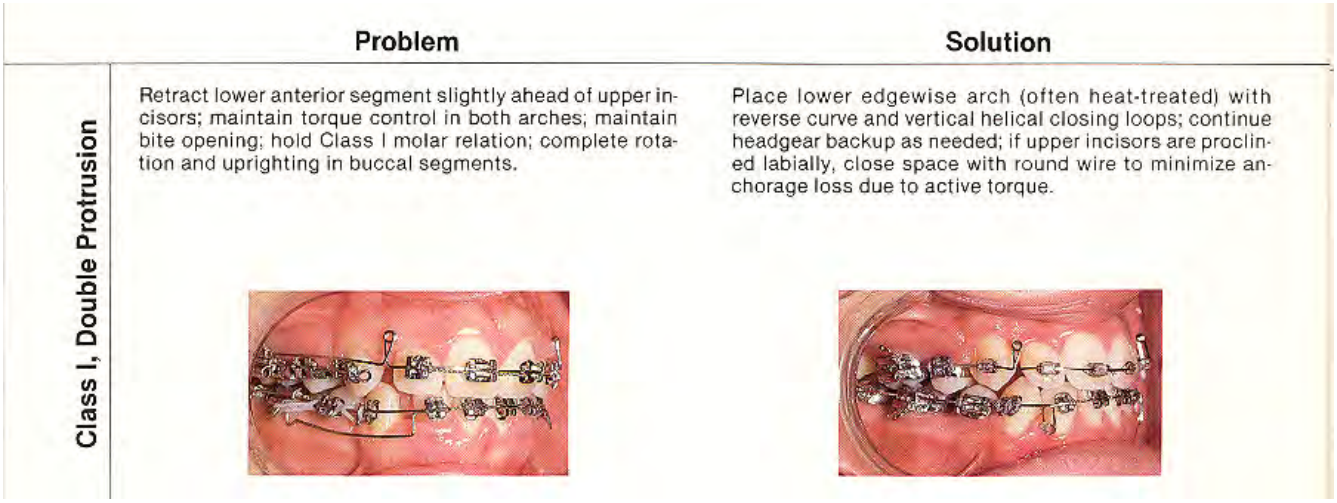



**Fig. 1G** Class I, Double Protrusion: Consolidation, Problem and Solution

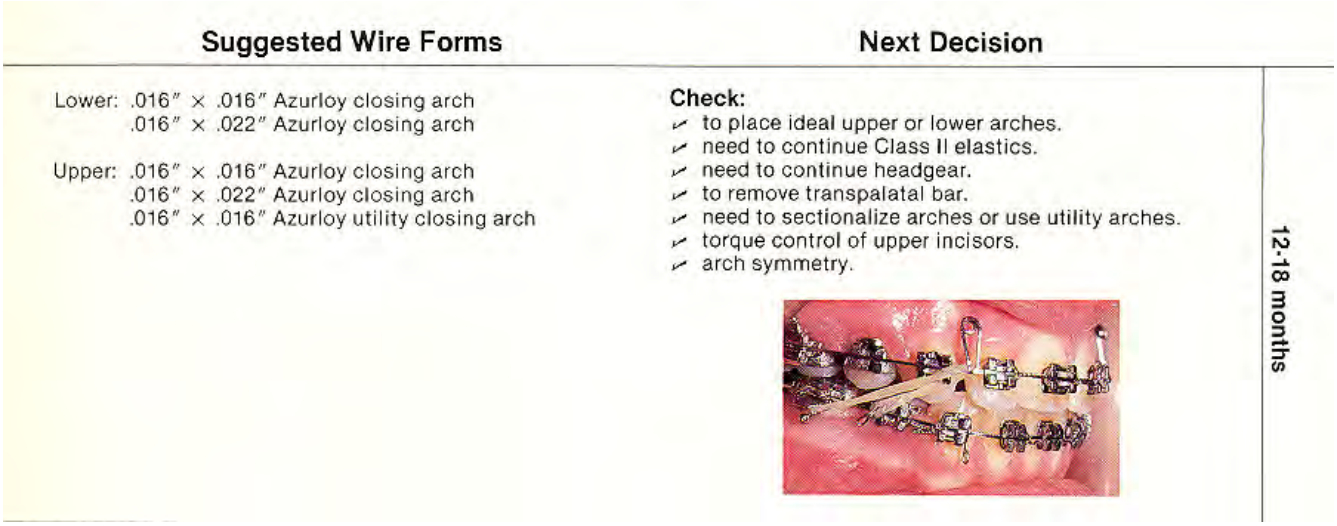



**Fig. 1H** Class I, Double Protrusion: Consolidation, Suggested Wire Forms and Next Decision

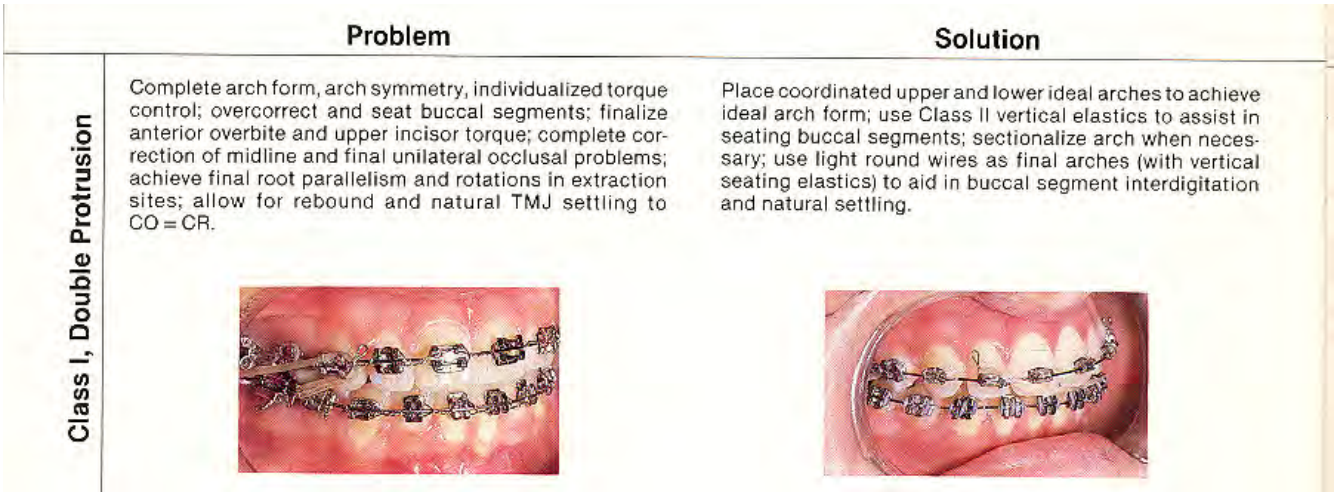



**Fig. 1I** Class I, Double Protrusion: Idealization, Problem and Solution

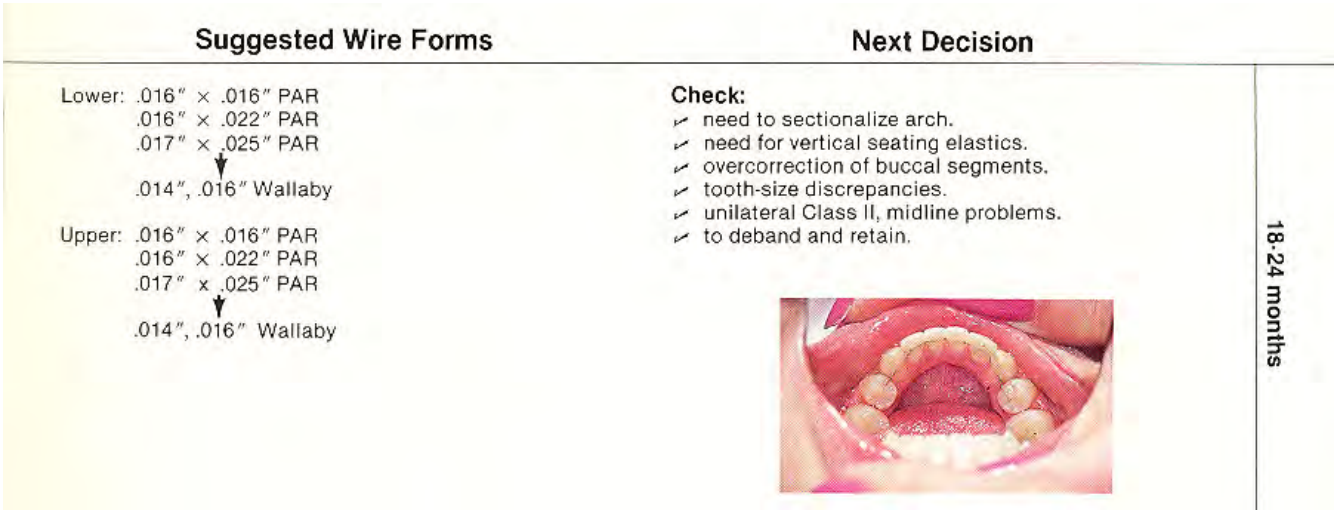



**Fig. 1J** Class I, Double Protrusion: Idealization, Suggested Wire Forms and Next Decision

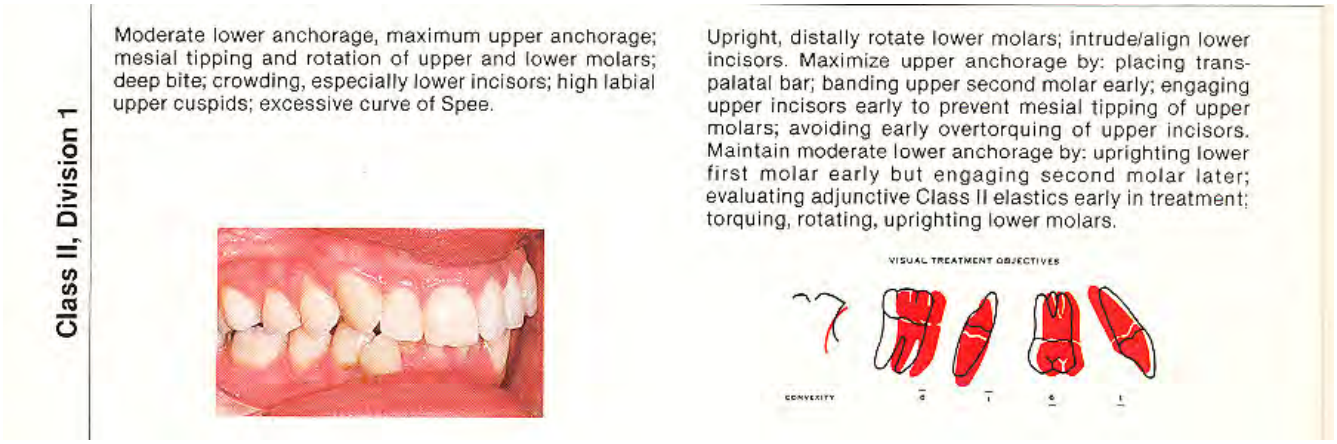



**Fig. 2A** Class II, Division 1: Initiation, Problem and Solution

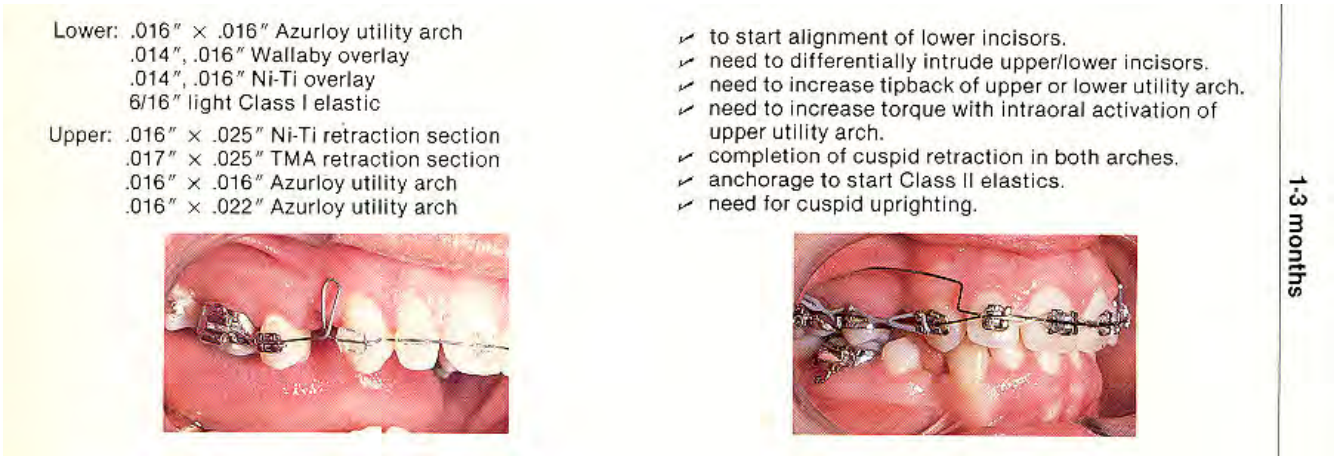



**Fig. 2B** Class II, Division 1: Initiation, Suggested Wire Forms and Next Decision

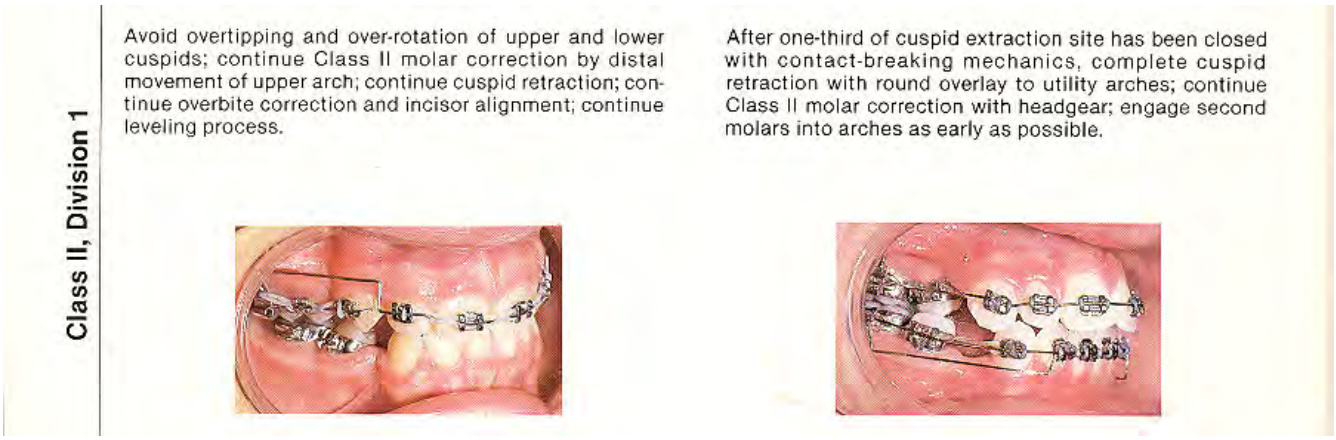



**Fig. 2C** Class II, Division 1: Cuspid Retraction and Uprighting, Problem and Solution

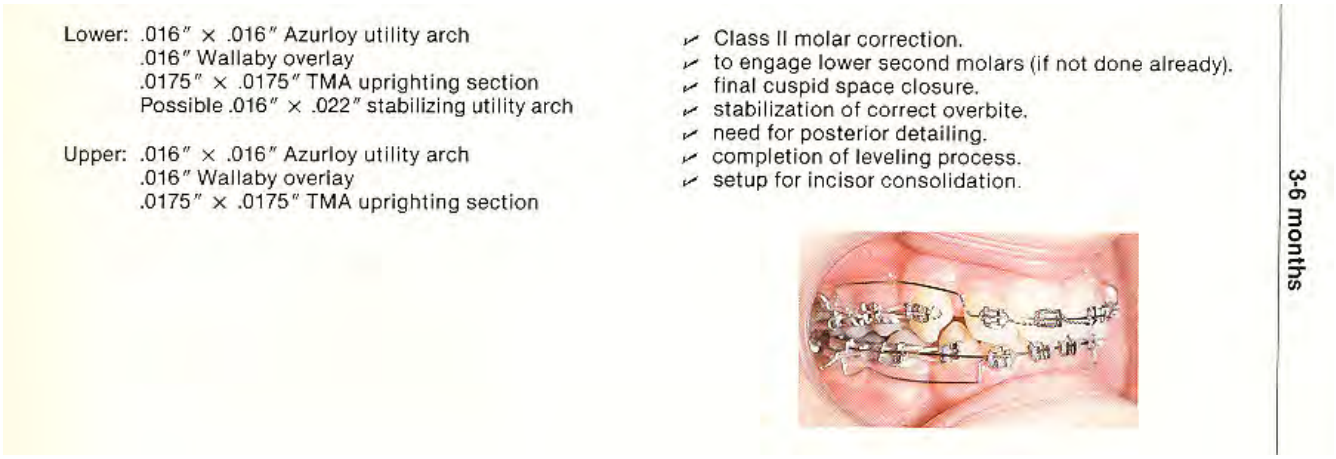



**Fig. 2D** Class II, Division 1: Cuspid Retraction and Uprighting, Suggested Wire Forms and Next Decision

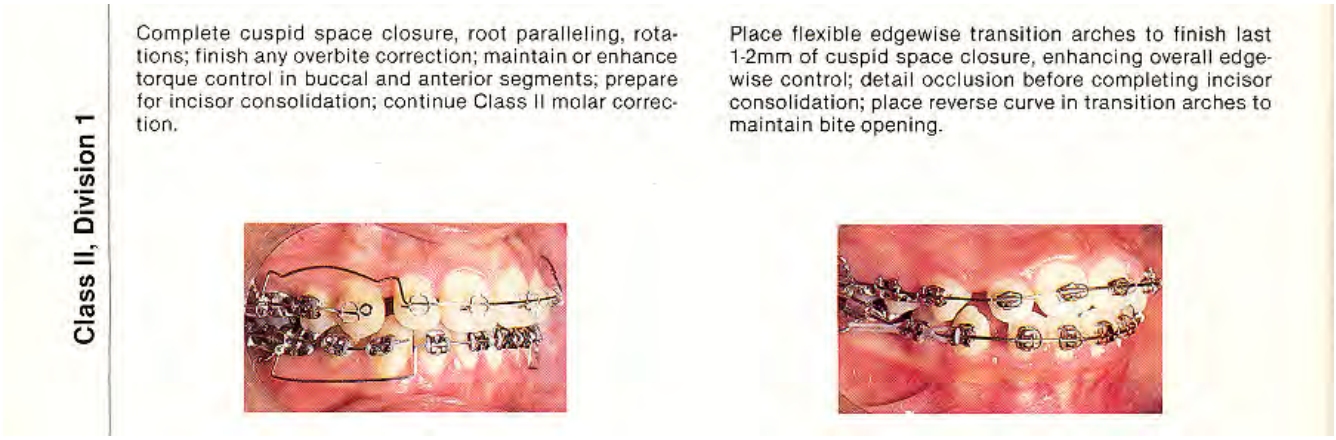
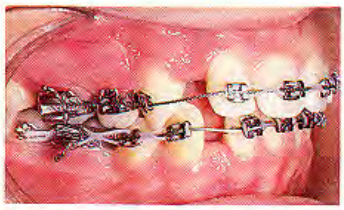



**Fig. 2E** Class II, Division 1: Transition and Final Cuspid Space Closure, Problem and Solution

Lower: .0175″ × .0175″, .016″ × .022″, .017″ × .025″ TMA
.0175″ × .0175″, .016″ × .022″, .017″ × .025″ Ni-Ti

Upper: .0175″ × .0175″, .016″ × .022″, .017″ × .025″ TMA
.0175″ × .0175″, .016″ × .022″, .017″ × .025″ Ni-Ti

- to start lower incisor consolidation.
- to start Class II elastics.
- need to continue headgear for anchorage.
- need for further torque control, bite opening.
- need for progress headfilm.



6-12 months

**Fig. 2F** Class II, Division 1: Transition and Final Cuspid Space Closure, Suggested Wire Forms and Next Decision

Class II, Division 1

Retract upper and lower incisors simultaneously with continued Class II correction; maintain bite opening; complete rotation and uprighting in buccal segments.

Place lower edgewise arch (often heat-treated) with reverse curve and vertical helical closing loops; continue headgear backup as needed; close upper space with torque-control wire to retract incisors.

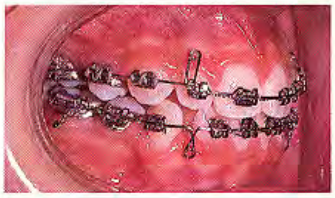


**Fig. 2G** Class II, Division 1: Consolidation, Problem and Solution

Lower: .016″ × .016″ Azurloy closing arch
.016″ × .022″ Azurloy closing arch

Upper: .016″ × .016″ Azurloy closing arch
.016″ × .022″ Azurloy closing arch

- need to start or continue Class II elastics.
- torque control of upper incisors.
- need to accentuate reverse curve in lower arch.
- need for progress headfilm.

12-16 months

**Fig. 2H** Class II, Division 1: Consolidation, Suggested Wire Forms and Next Decision

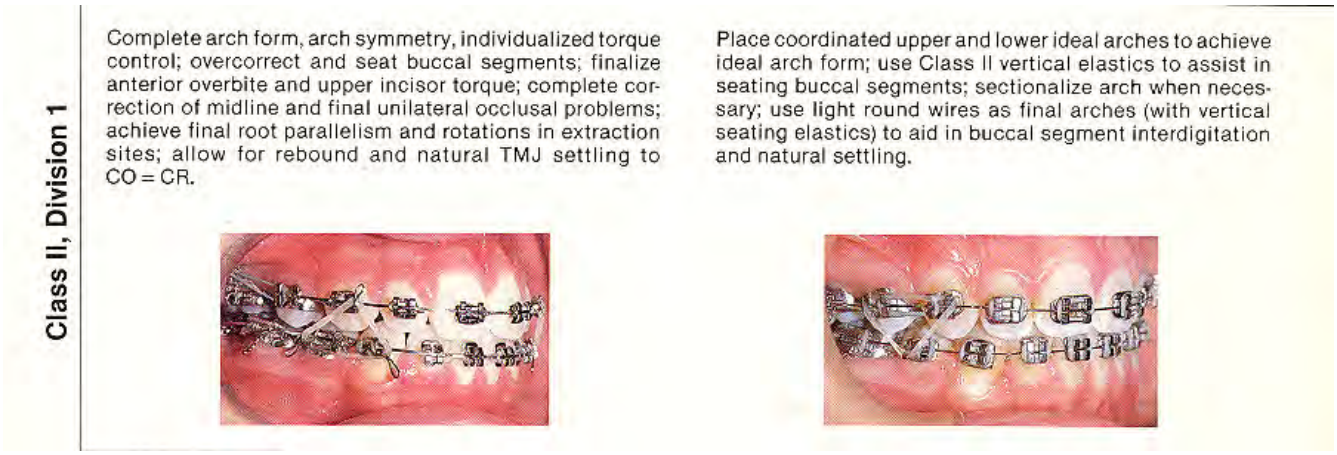



**Fig. 2I** Class II, Division 1: Idealization, Problem and Solution

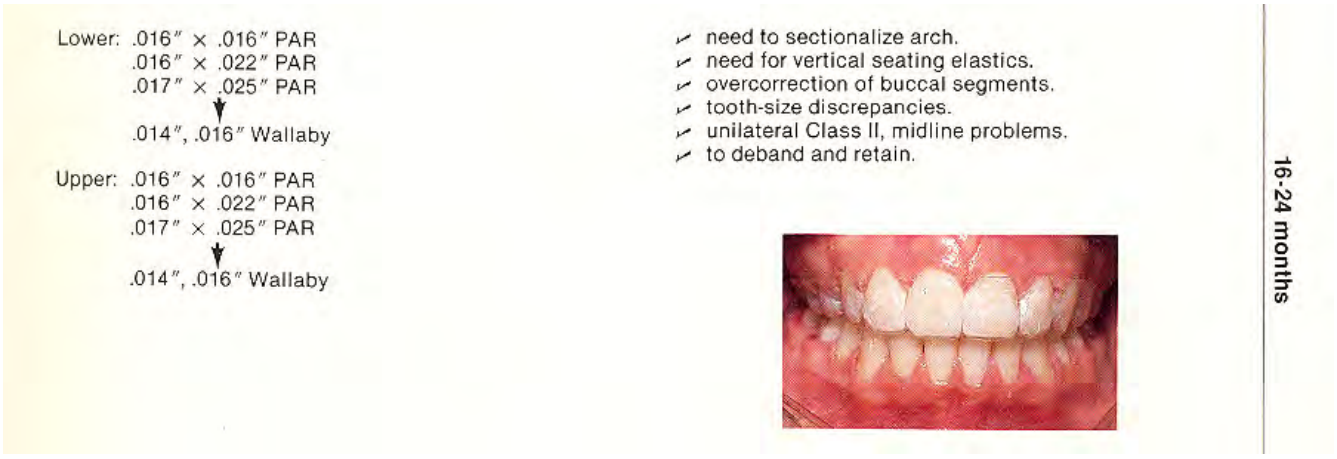



**Fig. 2J** Class II, Division 1: Idealization, Suggested Wire Forms and Next Decision

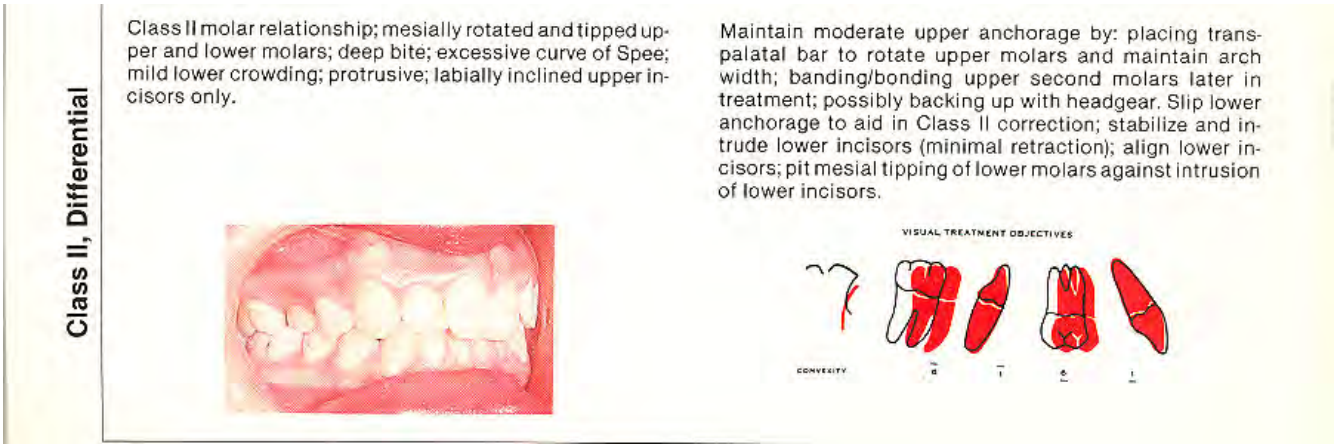



**Fig. 3A** Class II, Differential: Initiation, Problem and Solution

Lower: .016″ × .016″ Azurloy utility arch
6/16″ light Class II elastic

Upper: .017″ × .025″ Ni-Ti retraction section
.016″ × .022″ TMA retraction section
.014″, .016″ Ni-Ti anterior leveling section
↓
.016″ × .016″ Azurloy utility arch
.016″ × .022″ Azurloy utility arch

- need for overlay of lower utility arch to complete cuspid retraction.
- need to increase intrusion of lower incisors.
- need to upright lower cuspids.
- need to engage/torque upper incisors.
- mesial tipping of lower molars.
- differential anchorage loss.

1-3 months

**Fig. 3B** Class II, Differential: Initiation, Suggested Wire Forms and Next Decision

Class II, Differential

Allow lower molar to move mesially without overtipping; maintain anterior bite opening; complete lower cuspid-first bicuspid space closure; avoid overtipping of mesially drifting second molars; finish lower incisor alignment; use differential space closure to correct Class II.

Overtip lower first molars distally during bite opening process; continue simple distal movement of lower cuspid and bicuspid with Class I elastics; maintain good anchorage in upper arch; evaluate beginning Class II elastics to support bite vertically and slip lower anchorage.

**Fig. 3C** Class II, Differential: Cuspid Retraction and Uprighting, Problem and Solution

Lower: .016″ × .016″ Azurloy utility arch
.014″, .016″ Ni-Ti overlay (leveling)
.014″, .016″ Wallaby overlay (retraction)

Upper: .016″ × .016″ Azurloy utility arch
.016″ × .022″ Azurloy utility arch
.016″ Wallaby overlay

- need to move lower molars mesially.
- finished alignment of lower incisors.
- to start Class II elastics.
- posterior space closure.
- to engage second molars.

3-6 months

**Fig. 3D** Class II, Differential: Cuspid Retraction and Uprighting, Suggested Wire Forms and Next Decision

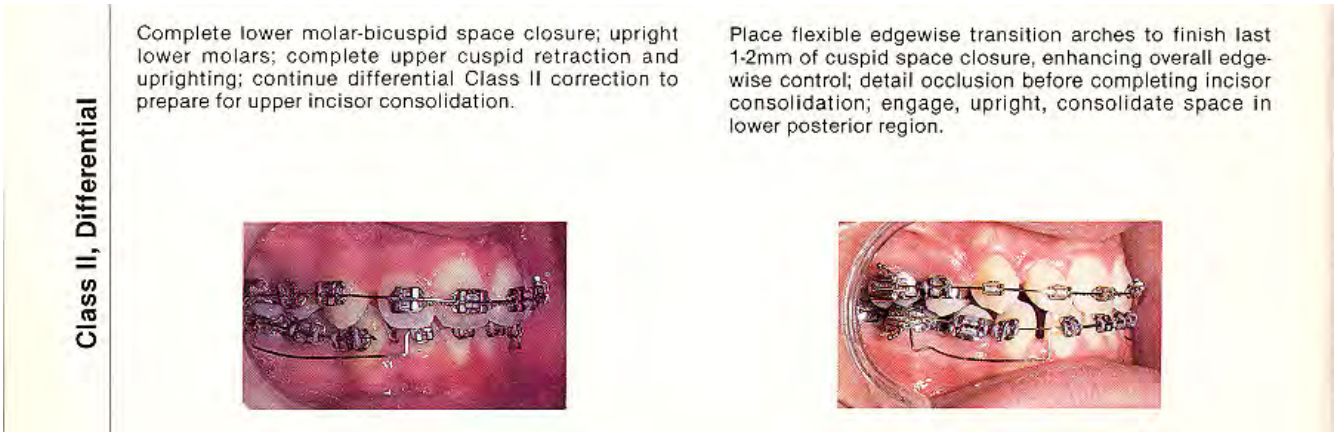



**Fig. 3E** Class II, Differential: Transition and Final Cuspid Space Closure, Problem and Solution

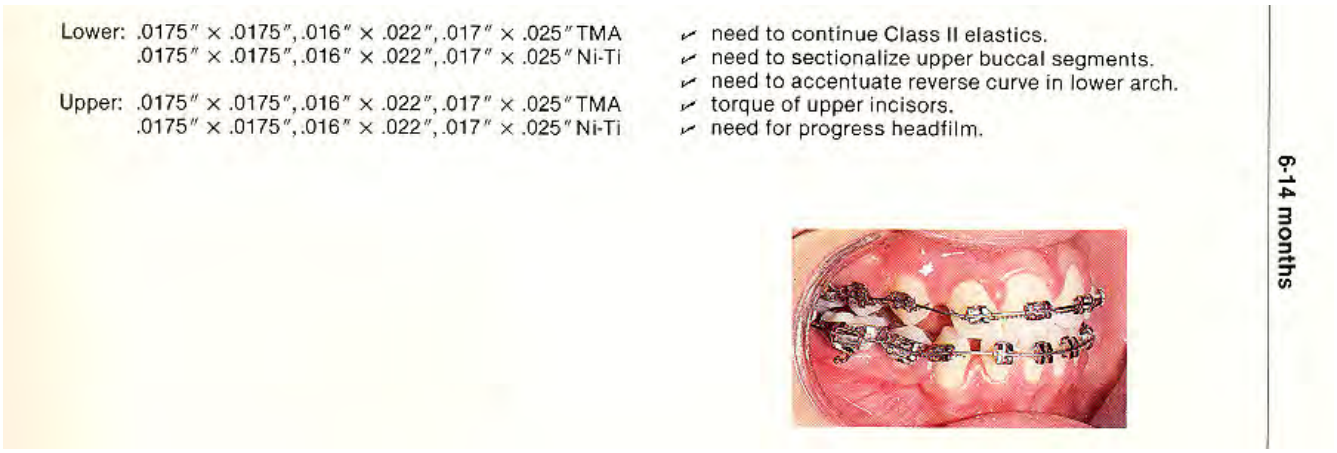



**Fig. 3F** Class II, Differential: Transition and Final Cuspid Space Closure, Suggested Wire Forms and Next Decision

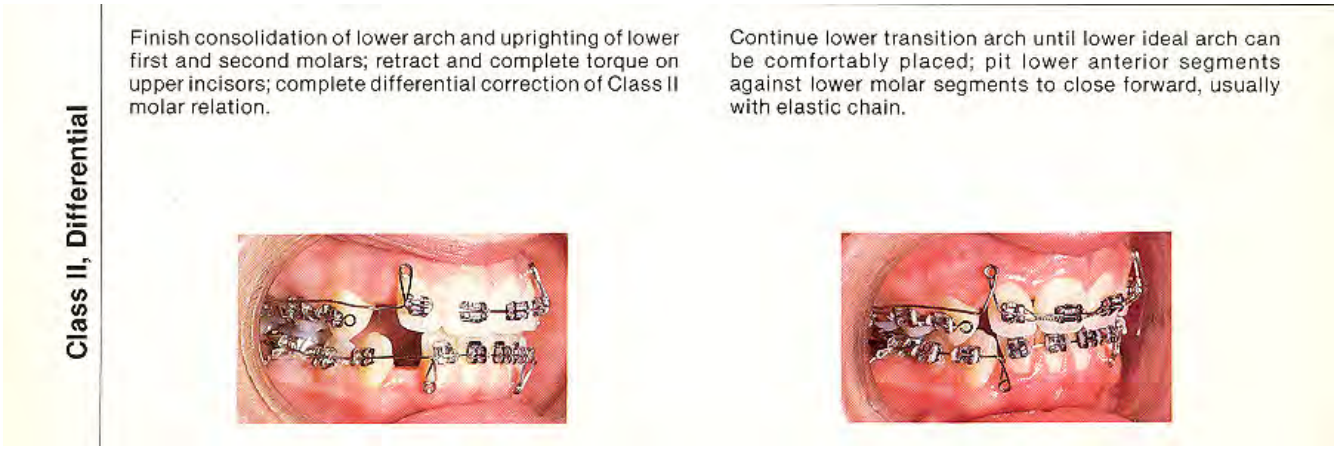



**Fig. 3G** Class II, Differential: Consolidation, Problem and Solution

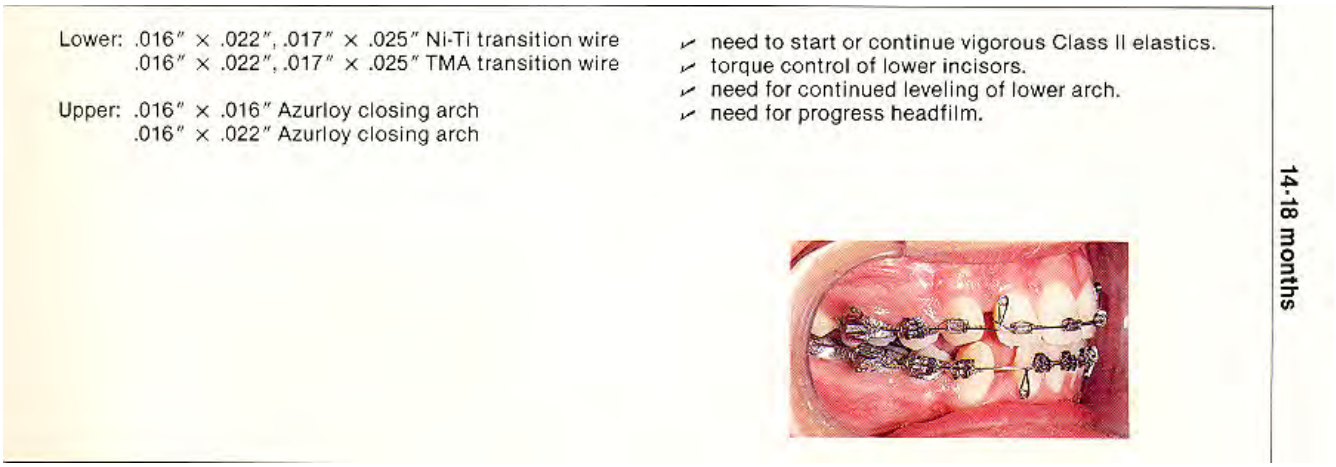



**Fig. 3H** Class II, Differential: Consolidation, Suggested Wire Forms and Next Decision

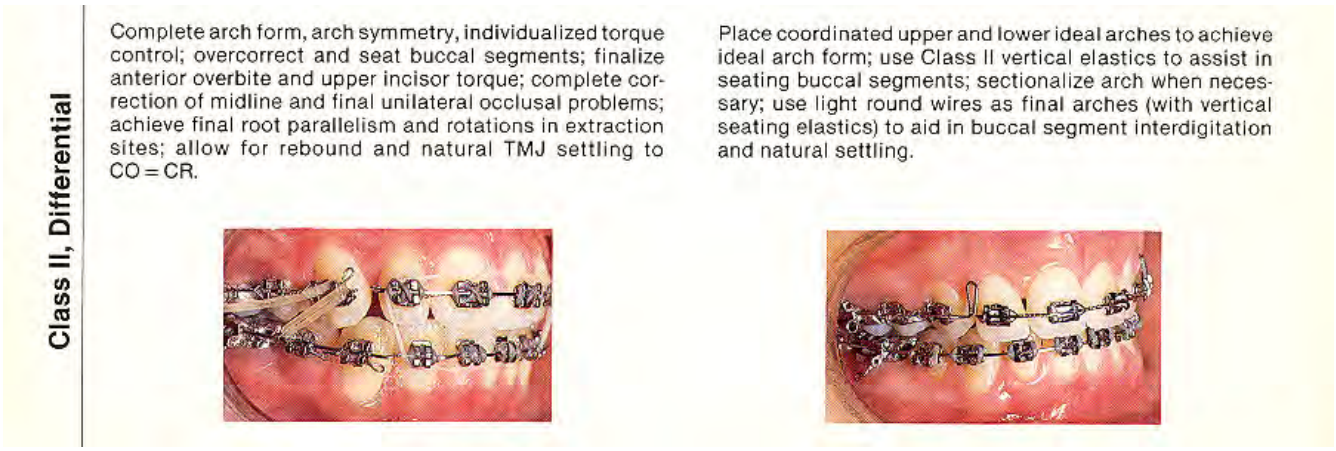



**Fig. 3I** Class II, Differential: Idealization, Problem and Solution

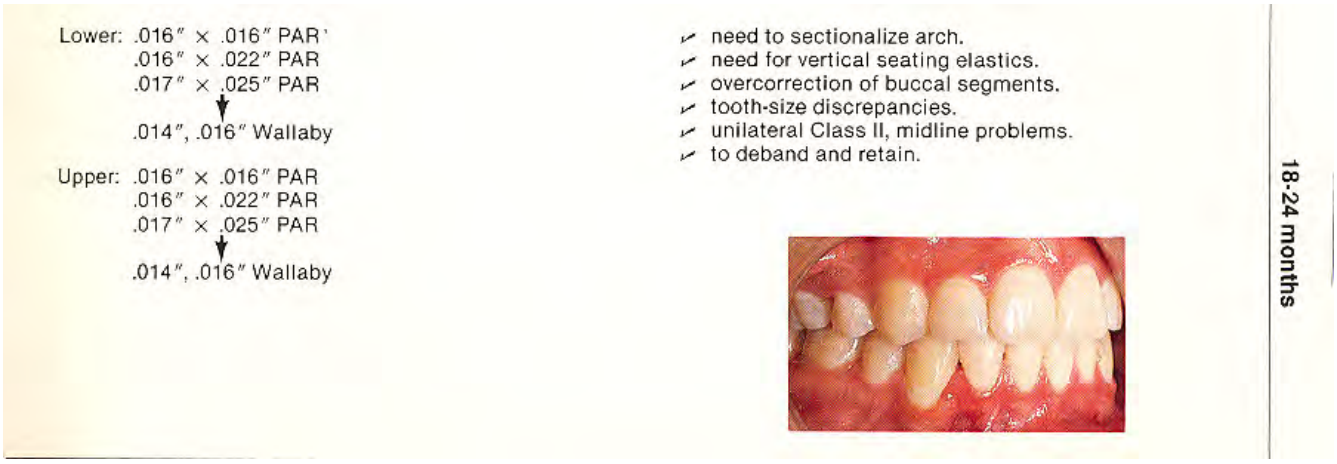



**Fig. 3J** Class II, Differential: Idealization, Suggested Wire Forms and Next Decision

**Footnotes**

**1.** Bioprogressive: Trademark of Rocky Mountain Orthodontics.

**2.** D-Rect, Force 9, Ni-Ti, PAR, TMA: Registered trademarks of Ormco Corporation.

**3.** Azurloy, Wallaby: Trademarks of Ormco Corporation.