Molar Control
Part 3

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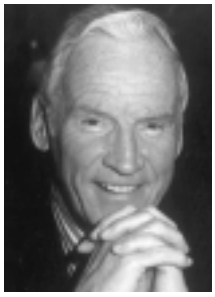
Four off-center bends have been introduced in this series for the first category of molar control. They consisted of toe-in and toe-out bends, in addition to in-bends and out-bends. The toe-in and toe-out bends were demonstrated in patient treatment in Part 2 (JCO, February 2001) to show the ease of application and clinical results.

The final two bends used in the first category, the in-bends (Fig. 3-1) and the out-bends (Fig. 3-2), will now be shown with patient treatment.

Case 6

This young man visited my office for a second opinion following the placement of a palate-splitting appliance to be used in conjunction with a surgical splint. Although I was confident treatment could be handled at the tooth-movement level, I obviously would not convey to him that surgery was not indicated. My way of handling these differences is simply to let the patient know that there are a number of ways to take care of problems, and that there are some surgical problems that can be avoided if the patient is willing to accept compromise treatment. In my opinion, the compromise in this case would have been surgery, but this was certainly not conveyed to the patient.

Looking at the buccal and occlusal views of



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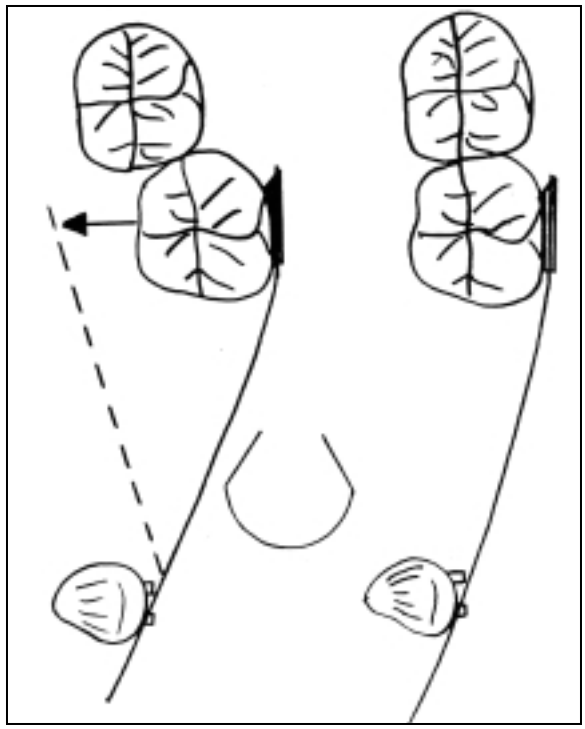

Fig. 3-1 In-bend.

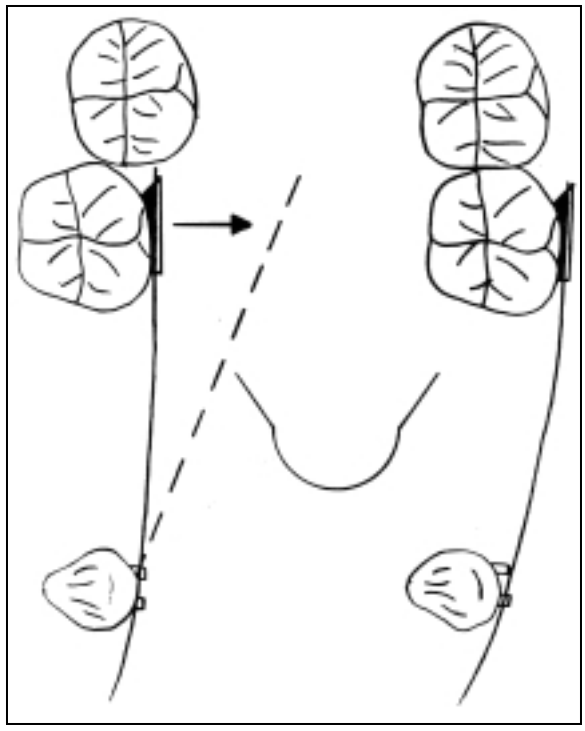

Fig. 3-2 Out-bend.

Fig. 3-3 Case 6.Patient with palate-splitting appliance in place for planned surgical procedure. Restoring lower arch to normal curve of Wilson would undoubtedly eliminate crossbite.

Fig. 3-4 Case 6. Appliance after removal of brackets in buccal segments and addition of anterior brackets. Note initial Class II molar relationship and crossbites in molar and bicuspid regions.

the patient, it seems apparent that the primary problem exists in the lower arch, where an obvious reverse curve of Wilson is present. The maxillary arch has some crowding as well as a severely rotated second bicuspid and a slight central-groove discrepancy between the first and second molars (Fig. 3-3). But looking at the lower arch from an occlusal view, it can be seen that the first molars are significantly tipped toward the buccal, while the second molars exhibit what appears to be a normal curve of Wilson.

The lateral views reveal the crossbite present in the malocclusion, so the question arises as to which arch is primarily responsible for the crossbite. There is little question in my mind that the crossbite is entirely due to the buccally displaced molars in the lower arch. If one can simply visualize tipping the molar crowns lingually until the central grooves are in alignment with those of the second molars, it can be seen that the crossbite would disappear. This would appear to be a reasonable method of determining which arch is at fault. If restoring normal inclinations to the lower molars while the upper molars were already normally inclined could not provide crossbite correction, then we would be looking at a more difficult situation. A surgical procedure or limited bodily movement might be indicated in some cases, but not in this case. Since the second molars were not going to be banded for this young man, they would make excellent references throughout treatment for the first molar movement.

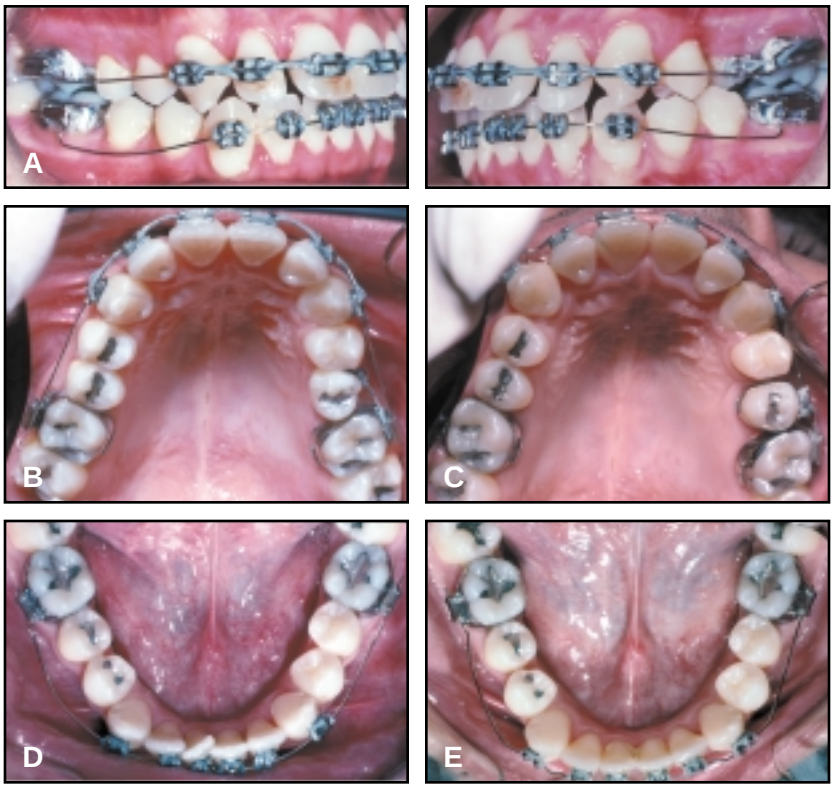

Fig. 3-5 Case 6. A. Continuation of tooth movement. B. Elastomeric tie to rotate second bicuspid. C. Rotation after correction. D. Lower incisor area undergoing arch-length increase. E. Lower incisors aligned, with step bend placed on right side and in-bend on left side.

The first step in treatment was to remove the palate-splitting appliance and all brackets in the bicuspid areas (Fig. 3-4). Maxillary incisor brackets were placed, but the mandibular incisor brackets were not replaced even though the patient had smaller slot sizes in the original appliance. Because the maxillary molar tubes were also smaller than the .022" × .028" slot size used in my practice, this meant the maximum wire size that could be used for treatment would be an .018" round archwire. For molar-control bends, it is important to avoid bracket placement in the bicuspid area, as it will prevent the placement of effective off-center bends. As mentioned earlier, brackets in the bicuspid area can be left free by avoiding ligation of the wire to the brackets, but in this case I was free to proceed with my own preference. The patient was not a transfer patient in the usual sense, so I was not faced with the problem of removing someone else's brackets and creating negative perceptions.

Following bracket alignment, in-bends were placed in the lower arch to provide the lingual forces through the molar crowns (Fig. 3-5). In the lower right quadrant, it will be seen that the in-bend is being used in conjunction with a toe-out bend. Each of these bends results in a lingual force when applied independently. When used together as seen here, they constitute a step bend, which will be discussed in the second category of molar control.

After reasonably close alignment of the central grooves between the first and second molars in both arches, the wires were removed as

Fig. 3-6 Case 6. A. Progress made in crossbite correction of molars and bicuspids and improvement of Class II malocclusion. B. Archwires removed following further improvement.

a mandatory part of treatment for a minimum period of six weeks (Fig. 3-6). Wire removal on some patients is as long as six months, but total treatment time must be considered for the patient (see Part 2).

After several appointments with no archwires present, this patient returned with a broken contact in the incisor area. Although the tooth was realigned, this was the perfect opportunity to show the patient that instability was present in this area, and that it would be his responsibility following treatment to wear retainers as indicated. Often the patient response will not indicate a great concern for what is seen at the time, and retention can be planned accordingly. Interproximal reduction was performed following appliance removal (Fig. 3-7).

Note in the serial progress pictures that in addition to correcting the molar displacements and thus the bilateral crossbite, the cuspid and molar Class II relationships were also corrected—without the use of headgear or elastics. Such Class II correction is not the subject being discussed, but rotating molars does create space distal to the second bicuspids. The point to be made now is that the use of elastics in a case that already has crowded lower incisors is an excellent approach for placing incisors outside the neutral zone. If labial root torque of the

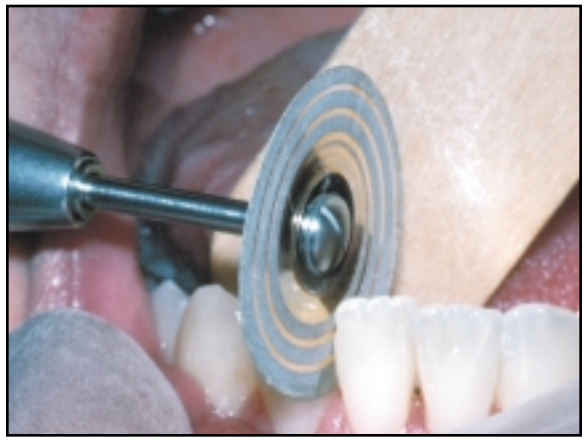

Fig. 3-7 Case 6. Interproximal reduction of lower incisor that showed rotational tendency when wires were removed.

Fig. 3-8 Case 6. A. Patient after treatment. B. One year later.

mandibular incisors with the use of rectangular wire and Class II elastics is capable of preventing anterior displacement of the incisors, then why consider headgear in the first place? There are individuals who continue to maintain that this procedure will be successful when headgear patients are uncooperative.

The corrections maintained themselves well following treatment (Fig. 3-8), despite the patient's decision not to wear retainers after approximately three months. The typical retainer policy in my practice is as follows: About half the patients do not receive an upper retainer. The majority receive a lower retainer, which is worn day and night for six weeks. After six weeks, the retainer is worn at night only for six months in most cases, and for one year in the others. Following nighttime wear, the patients are instructed never to discard their retainers, but to try them in every single night, without exception. Some will discover the retainer needs to be worn every third night. Others will discover the need to wear a retainer once a week, while others will discover it never needs to be worn. But every patient knows where the responsibility lies and is instructed to telephone the office if there is any problem whatsoever. The solution may require only a slight amount of interproximal reduction, but even this cannot be intelligently done if the orthodontist has no idea where the incisors are relative to the neutral zone.

Case 7

This young lady was attending a local college when she came in for her first examination. Her right maxillary central incisor required some cosmetic attention, but this was never done—at least as of her last post-treatment visit. The upper left buccal segment shows a lingual crown inclination (Fig. 3-9). In the lower arch, there is a buccal displacement of the bicuspids and first molar on the left side. This might be seen as a normal curve of Wilson on the right side and a reverse curve of Wilson on the left side. The chin deviation indicates mandibular displacement due to the presence of crossbite.

Step bends were applied to the upper arch for a short period of time, while an in-bend placed in the embrasure between the lower left cuspid and first bicuspid produced a lingual force at the lower left first molar tube (Fig. 3-10). This, of course, resulted in a lingual crown moment on the tooth. Although the bicuspids were not bracketed, the archwire carried these teeth in a lingual direction as a result of the first molar being tipped toward the lingual.

Again, it must be emphasized that the decision to move molars buccally or lingually can be intelligently made only if the patient is evaluated in centric relation and not centric occlusion. Such evaluation is made on the centric arc, but prior to any tooth-to-tooth contact. Only then will the

Fig. 3-9 Case 7. Patient showing crossbite primarily on left side.

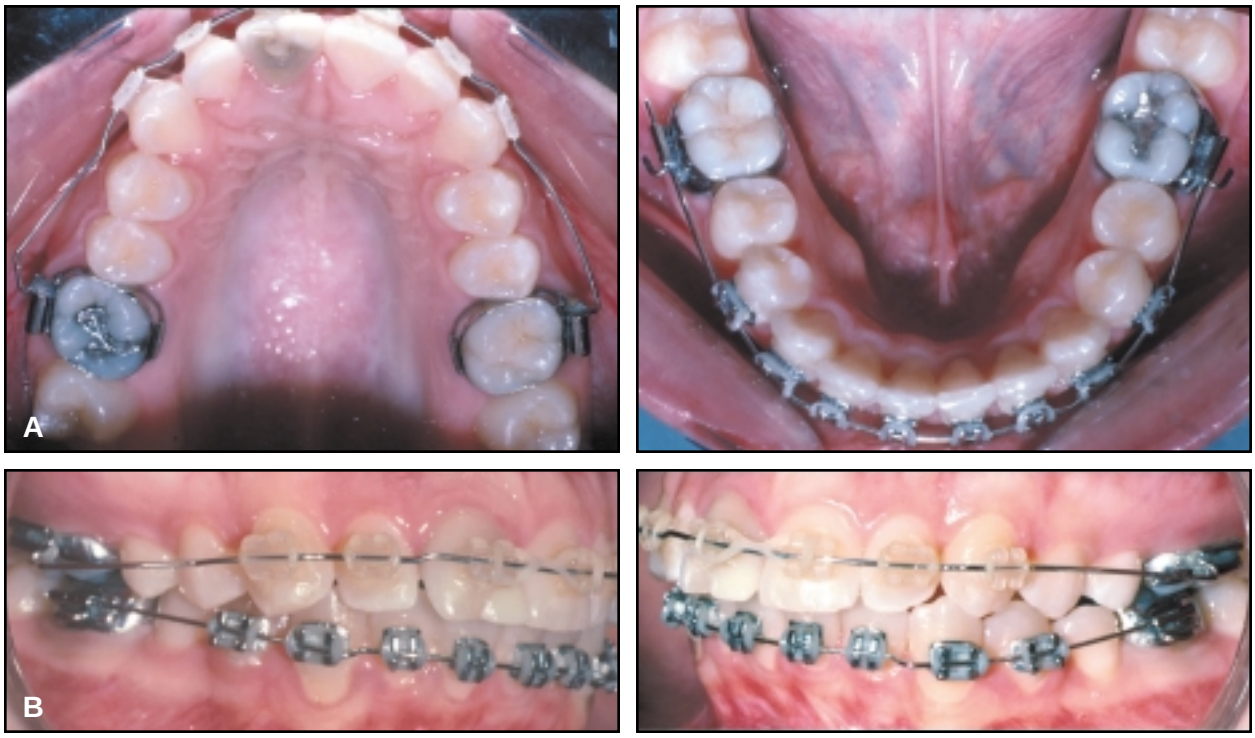

Fig. 3-10 Case 7. A. Archwires in place and activated. B. Right side almost the same as before treatment, while upper and lower left sides show considerable movement and crossbite correction.

orthodontist know what movement is required in one or both quadrants within a given arch. If both quadrants are involved in the crossbite problem, it is also necessary to know what portion of the problem exists in each quadrant.

Sometimes, what appears to be a bilateral problem is exactly that, but not necessarily in equal components. One side may be 90% involved in the crossbite, with the other side contributing only 10%. In other cases, it may be closer to equal. A bilateral crossbite should not necessarily be construed as one in which each side contributes equally. Likewise, a unilateral crossbite should not always be considered as one in which one side contributes 100% to the problem. There is usually some contribution from the opposite side. Centric relation and the centric arc provide the information at the initial clinical examination. Looking at handheld plaster models for treatment planning will not suffice. If cases are properly mounted, the problem can be resolved nicely. I will not attempt to enter the debate on mounting every case; each individual must make that determination.

As always, as the case progressed, archwires were removed for a minimum of six weeks, and the patient was evaluated for stability (Figs. 3-11,3-12). If nothing else, we at least determine the *degree* of stability or instability. If areas of instability are noticed, the patient is informed and given the responsibility for retention as instructed.

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Fig. 3-11 Case 7. A. Patient with archwires removed. B. Patient later with archwires still removed. C. After appliance removal.

Fig. 3-12 Case 7. One year following appliance removal.

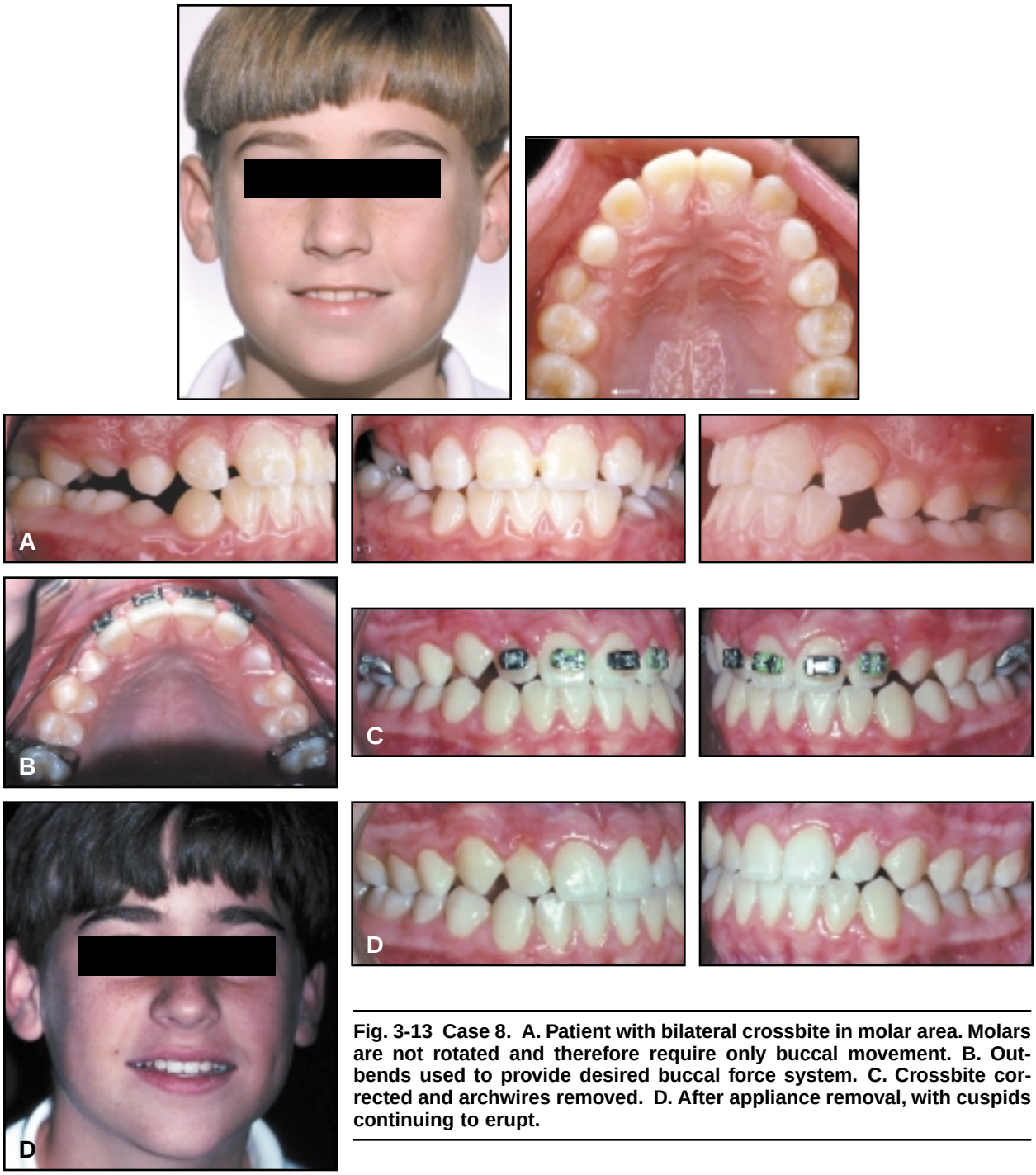

Fig. 3-13 Case 8. A. Patient with bilateral crossbite in molar area. Molars are not rotated and therefore require only buccal movement. B. Outbends used to provide desired buccal force system. C. Crossbite corrected and archwires removed. D. After appliance removal, with cuspids continuing to erupt.

Case 8

This case is rather interesting, as the lingual displacement of the maxillary molars is similar to that of Case 5 in Part 2. The only difference is that no rotations are present (Fig. 3-13). The sequence involved for determining the placement of off-center bends is exactly the same.

Because the case shown in Part 2 had severely rotated first molars, toe-in bends were automatically placed in response to the first question, which deals only with rotations. No action was taken on the second question, pertaining to displacements, because the buccal forces required were already present as a result of their association with the toe-in bends.

In this case, because no rotations are present, no action will be taken regarding the placement of toe-in or toe-out bends. When proceeding to the question of displacement, however, because of the buccal movement required, an out-bend will be chosen. As simple as this approach may seem, it works. There is nothing more to remember than "rotations first and displacements second". After the maxillary molars have been positioned properly, the archwires are

Fig. 3-14 Case 9. A. Patient with severe crowding, crossbite, and reverse curve of Wilson in lower left quadrant. Minimal rotation of maxillary molars is required. B. Placement of toe-in bends, with crossbite corrected and teeth erupting into normal occlusion.

removed and the teeth are allowed to function freely, just as they must for the remainder of the patient's life. Following appliance removal, the molars continue to maintain their positions while the cuspids are erupting into place.

Case 9

The final case involves a young lady with severe crowding and crossbite containing a reverse curve of Wilson in the lower left quadrant. Figure 3-14 reveals the steps in treatment taken to correct these problems and bring the patient to a point where normal function can take place while waiting for further eruption of teeth. Such a waiting period is not considered a prolongation of treatment time, but rather treatment itself. Since archwire removal is a standard part of all treatment, this period provides the opportunity to test the stability of the case.

Conclusion

It is of the utmost importance not to violate the sequence for placing bends, for the following reasons. If it had already been determined that rotations were not present and therefore toe-in or toe-out bends were not required, then proceeding with the action required in response to the second question (pertaining to displacements) would provide the force system needed. If we decided at this point to go back to the first question, we would be asking for trouble, because we had already decided rotations were not present. In other words, don't go back to Question No. 1 just because the buccal force might seem desirable. The choices are "all or none." This is the whole reason for creating such a relatively simple approach. We want an approach that allows us to maximize the benefits from the force system. And we want a force system that is best suited to handle the problems. There are only three general force systems that we need, and the approach to molar control will automatically and conveniently provide the best of the three for what needs to be done.

SUGGESTED READING

1. Isaacson, R.J.; Lindauer, S.J.; and Rubenstein, L.K.: Activating a 2 × 4 appliance, Angle Orthod. 63:17-24, 1993.
2. Rebellato, J.: Two-couple orthodontic appliance systems: Activations in the transverse dimension, Semin. Orthod. 1:37-43, 1995.