Tutorial

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Orthodontic Procedures

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The specialty of oral myology is served by professionals from many disciplines, and it would befit each group to know more about the functions and skills of the others. To help speech clinicians gain a greater understanding of the dental facets of orofacial problems, Barrett and Hanson offered two chapters in the second edition of their book, *Oral Myofunctional Disorders*: Chapter 3, "Some Fundamentals of Dentistry" and Chapter 4, "Orthodontic Concepts and Procedures."

The following excerpt consists of pp. 44-51 in Chapter 4. "... (T)his glimpse through the eyes of a lay observer into the world of the orthodontist" is, in the words of Barrett and Hanson (p. 37), "... offered for the reader who is without dental background, especially of an orthodontic nature, in an effort to supply some rudimentary acquaintance with this setting."

It may also prove to be helpful material for orthodontists to give to parents and to older clients on their first visit as an overview of the course of treatment.

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A surprising number of people phone an orthodontist, brush their teeth well, and keep their appointment with the expectation that they will walk out with a full-banded appliance in their mouth. Actually, it will be a few weeks to a few years before the bands make their appearance. It might be helpful to "walk through" a hypothetical case and examine what transpires between that first phone call and the removal of the last appliance some years later.

The first appointment in many cases is merely a matter of getting acquainted, during which the orthodontist makes a gross evaluation of the problem, compiles some case history data, observes the general oral status and function of the patient, and, if myofunctional anomalies are found, may refer the patient forthwith for correction of deglutition, a sucking habit, incompetent lips, or other obstacle in the orthodontic path. The dentist may then wish to delay further action for a few months, waiting for molars to complete eruption, for noxious habits to be eliminated, or for other reasons...

Records and cephalometrics

The orthodontist usually does not want specific measurements of the patient until treatment is imminent. Accordingly, a later appointment is made for this purpose, generally called a record session or "taking records." At this time the dentist acquires the raw

material for a detailed evaluation of the patient. Profile and full-face photographs are taken, impressions are made of both dental arches for construction of study models (record casts), and intraoral radiographs are taken of each segment of the arches...

Often a second set of models is made, called working models: the teeth from this set can be cut off and remounted in a malleable plastic, making it possible for the dentist to manipulate them as he simulates the effect of the treatment he is planning. An oriented roentgenographic lateral headplate is made, and such other information as the dentist may desire is obtained.

The oriented x-ray film of the full head provides the dentist with invaluable information, but it is knowledge that must be teased out. The film is traced onto paper, and certain fixed points, or landmarks, are located and noted. By analyzing these points, by connecting some of them with others and measuring the angles of the lines thus formed, by noting relationships of teeth, jaws, and cranium, and by combining dimensional and angular criteria, the dentist is able to identify abnormalities of both form and function, project growth and development, and thus diagnose and plan treatment. Later x-ray films can be superimposed to check progress.

Depending on the amount of research which the myotherapist intends to do,

some awareness should be gained in the areas of cephalometrics. Cephalometric analysis is a tedious, painstaking process and will not be even abstracted here. The inquisitive reader should take a formal course on the subject or ask a friendly orthodontist to supply long-term tutelage. If nothing else, one should appreciate the laborious hours an orthodontist usually devotes to studying a case before he begins or even discusses actual treatment.

COMPUTER ANALYSIS. A diagnosis can be made only by a qualified clinician evaluating a live patient. Nevertheless, some of the tedium can be removed from the process described above. Some orthodontists are now utilizing a "Fundamental Computerized Cephalometric Analysis" offered by Rocky Mountain Data Systems. The dentist submits a data sheet accompanied by both lateral and frontal x-rays; these data are examined, the films are analyzed by technicians, and over 50 points of measurement are located and translated into "computer talk." All of this material is fed into the computer, where it is compared to stored data from over 20,000 previous patients. The resulting print-out contains complete details of both diagnosis and treatment planning, including projected growth and development expectations both with and without treatment. Another set of x-rays is analyzed at the end of

treatment to evaluate results. A number of other services are available in this program; the most important for the oral myologist is the consideration that all of this system is made available for research under proper conditions.

Temporomandibular joint analysis

As the orthodontist analyzes his records and begins to plan his treatment and establish goals for a particular patient, he finds almost invariably that certain compromises must be made. Some physical characteristics do not square with others; correcting one problem may preclude the repair of another—it may be absolutely essential to gain 4 millimeters of space whereas the only tooth that can safely be extracted is 7 millimeters in width, etc.

While making these decisions, he must have in mind the ultimate facial appearance of his patient, some ideal which he will approach as nearly as conditions permit. Angle chose Apollo Belvedere as the epitome of facial symmetry, and attempted to build this profile into each patient. In the early days, esthetics was almost the only goal of orthodontic treatment, along with the effort to place the occlusal surface of each tooth in static contact with its natural antagonist. Given the fixed nature of the maxillary arch, this often resulted in a mandibular placement far from harmonious with other cranial structures, rendering serious insult to the temporomandibular joint (TMJ).

It is difficult to forsake established principles. Only in very recent years have orthodontists begun to study the effects of their treatment on the requirements of the TMJ. It is now apparent that quite serious health problems, of a seemingly unrelated nature, may readily supervene when even moderate stress proves intolerable to the temporomandibular joint over a period of years. The conscientious orthodontist takes this into account as he studies and plans . . .

A new breed is beginning to emerge, the gnathologist, a specialist within a specialty, whose primary interest is protection of the TMJ.

Conference Appointment

Some time after records are taken, often two or three weeks, the orthodontist has made a full analysis and is ready to discuss his plan of treatment with the patient or the

patient's parents. A discussion period is arranged, during which the dentist explains what he will do, how he plans to accomplish it, makes an estimate as to how long it will take, what it will cost, and how he expects payment; usually a contract is signed containing many of these provisions. The dentist will request that any cavities be repaired before treatment can begin, and outline the cooperation that he will expect of patient and parents. This may be the last chance that parents have to ask questions directly of the dentist, but unfortunately they seldom know which questions to ask; future information will be exchanged via the child, who often forgets or gets it wrong.

Extractions

During the above conference, the dentist will also reveal his decision as to extractions. He will have measured the total length of the bone in each arch, and added up the combined width of the teeth within each arch. When the arch perimeter is inadequate in which to place each tooth in a healthy position, when permanent teeth are ankylosed, or when one or two other conditions prevail, he may refer the patient to an oral surgeon for extractions, and will send an "extraction letter" specifying exactly which teeth are to be lost, usually the first or second bicuspid.

It is not sound orthodontics to extract only one or two teeth as a means of gaining space; if one bicuspid goes, four should go, one from each quadrant, since the symmetry of the arch must be maintained and the teeth in the two arches must be capable of intercuspation in a reasonably normal manner at the conclusion of treatment. Nonextraction treatment is invariably to be preferred, when it is possible; the sacrifice of permanent teeth is not a step taken lightly, although a few dentists treat almost every patient as an extraction case, robbing the tongue of essential space and sometimes creating a "dish face," in which the midportion of the face has a concave appearance.

In any event, extraction sites must heal before an appliance is installed. With careful timing, it is often possible to initiate myofunctional therapy at this juncture, as long as it can be completed before the appliance is scheduled.

Expansion devices

Some patients, particularly those displaying certain types of oral muscle dysfunction, exhibit what has been called a "collapsed upper arch," a palatal vault where the lateral segments of the basal bone itself have developed so little lateral dimension as to be incapable of containing the tongue or of supporting the teeth in any sort of

Figure 1: Palatal expansion devices. Each of those pictured incorporates an acrylic body, but others are made entirely of metal. A, Expansion screw has been turned to its fullest extent. B, Labial wire rather than bands. C, Hinged at posterior extremity, this expands anterior palate. D, Cut from its original bands, this has second expansion screw designed to move anterior segment forward, while expanding buccal segments laterally. From Barrett, Richard H., and Hanson, Marvin L.: *Oral myofunctional disorders*, ed. 2, St. Louis, 1978, The C.V. Mosby Co.

Figure 2: Expansion device in place. (Courtesy Rocky Mountain / Orthodontics.)

normal alignment. In these cases, some orthodontists turn to a procedure called "splitting the palate," or R.P.E. (rapid palatal expansion). Devices for expanding the arch vary somewhat, from a pair of turnbuckles embedded between two blocks of acrylic, to the somewhat lighter wire arrangement shown in Figs. 1 and 2. The patient is supplied with a key with which to rotate the expansion screw a prescribed number of turns each day, breaking open the midline suture of the palate and thus creating a greater horizontal dimension. This can usually be achieved in only two to three weeks, after which a retaining appliance is installed, or the expansion device simply left in place, until the suture area has recalcified as it is filled in by the deposition of new bone.

Again, this is not a procedure that can be used indiscriminately, for there are at least two conditions in which it is contraindicated. One occurs when the upper molars still occlude in a normal lateral relationship with the lowers. Unless the molars are in bilateral crossbite, expansion may set the maxillary teeth so far buccally as to make any normal relationship with mandibular molars impossible; it would be necessary to tip the lower teeth at a most unphysiological angle to accomplish any kind of interdigitation.

The other inadvisable condition results from the abnormal muscle function itself that so frequently accompanies these cases. We . . . stress . . . the fact that any untreated malocclusion is in a state of dynamic muscular balance. When maxillary teeth are suddenly thrust against the musculature of the buccal wall, with no provision for compensatory alteration of the environmental forces, there is

risk of relapse or even greater damage to the teeth.

Should the patient be scheduled for R.P.E., the oral myologist might safely carry out some preliminary lip and cheek procedures, but should never attempt to complete therapy for abnormal deglutition until the expansion device is removed. When therapy is extended prematurely, the realization comes rather quickly that the appliance itself forces the tongue into an abnormally low posture. This prevents any semblance of normal function in swallowing, and thus assures a return to tongue thrusting, even in the relatively brief time that the appliance is in situ.

It has seemed more logical to wait until the expansion device is replaced by a retainer or full bands. The retainer can be removed for practice sessions, interferes little with routine function, and once the tongue begins to exert palatal pressure it makes an excellent substitute for the retainer. The tongue is nature's expansion device.

Separation of teeth

The patient might reasonably expect, after submitting to all of the foregoing preliminaries, that he is finally ready to acquire bands, but it is not to be. He has yet to make the acquaintance of one of the less pleasant aspects of treatment, the separator wire.

Even in severe malocclusion, most of the teeth are pressed tightly together at the contact point. Still, the orthodontist must have the thickness of two bands and two layers of cement, one over each contact point, between each tooth and its neighbor on either side in order to place the bands. The answer lies in separation of the teeth.

There are several methods by which to accomplish this. Probably the most common is to place small loops of brass or stainless steel wire around each contact point, then twist the ends together, drawing the loop tightly around the contact, and tucking the "pigtail" into the gingival embrasure. Another common procedure is to use a commercially available product, a tiny molded, bone-shaped piece of elastic material; when grasped at each end and stretched, it can be drawn between the contacts and released, wedging them apart as it returns to original thickness. Other dentists employ elastic thread or very small elastic bands for this purpose. The teeth are usually separated within two or three days, and the separator devices begin to fall out, frequently to be ingested. They stop hurting after the first day.

Banding the teeth

The separator session is frequently combined with a fitting session, during which bands are selected for each tooth and grossly fitted; they are adapted precisely at this, the banding appointment, after which the brackets are welded in place and the band cemented to the tooth.

Great variation occurs at this point. Some dentists prefer to band all teeth in one marathon session, others band one arch and wait a week or more for the other, while some install one segment at a time over several weeks or months: upper molars, lower molars, upper anteriors, lower anteriors, etc. Some place and activate the arch wire as soon as bands are in place, others attach it only loosely at this time, still others wait a week or so before installing the arch wire.

A few factors in addition to personal preference enter in, but most orthodontists follow a customary routine that the oral myoclinician does well to learn: when active therapy has been completed before banding, it is advisable to recheck the status within two weeks after the sudden dramatic change in the orofacial environment occasioned by a full-banded appliance.

There is an inclination to live life without dental occlusion for a few days after banding, in the fear that biting will increase the discomfort. In fact, those who choose hamburgers over soup for their first postappliance meal seem to fare much better; the sooner the jaws are closed with some force, the quicker the bands are forgotten. Danger lies in the proclivity of some patients to place the tongue interdentally as a cushion, a precaution against unexpected closure; newly acquired swallowing and resting patterns can deteriorate rather quickly under this influence.

Once banded, the patient begins the routine of returning every two to four weeks for adjustment of the arch wire as the teeth are slowly moved into alignment. (The mechanics of how this is accomplished is afforded a special section below.) For now, we may note that by bending the arch wire into various configurations, and combining its force with elastics, headgear, or other supplemental pressures, the desired changes are effected.

Recent innovations

One promising development has been the appearance of the "arch wire with a memory." This is an alloy called Nitinol made of nickel and titanium; it is drawn into a fine wire, .019 inch in diameter, which is quite flexible and easy to

manipulate. It is formed into the desired curve, heated briefly to 800° C., then quenched in cold water.

It can thereafter be bent to conform to the present shape of the patient's arch and ligatured in place. Body heat is sufficient to trigger the efforts of the wire to return to the shape built into its memory, exerting desirable force not found in conventional alloys or stainless steel arch wire.

Claims for Nitinol include the ability to reduce treatment time by 50% for the patient while increasing comfort, since it is not necessary to tighten it so much or to replace it every month or two. The orthodontist saves valuable chair time otherwise spent in arch wire changes.

Nitinol was developed by researchers in the space program, where it has several applications. It was brought into orthodontics by Dr. George F. Andreasen, chairman of the Department of Orthodontics at the University of Iowa. Considering the long history of the Andresen appliance, Andreasen may prove a trip-word for the unwary.

The cosmetic affliction that some patients feel as a result of wearing bands, and the revulsion that comes with time when they are repetitiously labelled "metal mouth," "railroad track," "brace face," or "tin grin," has spurred some orthodontists to develop less unsightly appliances (Fig. 3,A). One or two will be described in case the clinician is suddenly faced with something unfamiliar.

Direct bonding is a concept that reappears at intervals and is now in a resurgent phase because of improved techniques and materials. This involves etching the tooth by washing the surface with an acid solution, thereby clearing the microscopic crevices in the enamel of all foreign matter, then bonding the

bracket directly to the tooth without benefit of any type of band (Fig. 3,B). This results in some loss of control in moving roots, but can be effective when both patient and dentist are careful. The brackets pop off when the patient chews hard or coarse food, and sometimes when he does not.

The effect can be made more "invisible" by using clear plastic brackets bonded to the tooth with a clear adhesive that leaves only the arch wire a metal feature. This demands some additional compromise, since the arch wire can distort and cut the bracket, and excessive force can fracture brackets. Nevertheless, there are a number of advantages to direct bonding, whether with metal or plastic brackets; tooth separation is unnecessary, as is closing spaces after band removal, the uncomfortable force-fitting of tight bands, etc.

Indirect bonding has been tried using several methods. The effort grew out of some dissatisfaction with direct bonding, in which human limitations often influence the method. That is, when the bracket is placed against the tooth in direct bonding, it may be turned or moved just slightly from its optimal position; this throws awry the action of the arch wire. Accordingly, dentists have experimented with placing the brackets in ideal alignment on the working models but only lightly attached so that errors of placement can be corrected. The brackets can then be embedded superficially in a matrix of some sort and transferred in toto to the real teeth of the patient. Given an orthodontist who is part magician, it works.

Straight wire appliances are beginning to appear in some quarters.

Using conventional methods, the orthodontist spends an appreciable amount of his time in bending arch wire in and out, up and down, in order to achieve the desired movement of the teeth. The straight-wire concept is that most of this bending can be eliminated by using a system of brackets which has the necessary angulation "built in." That is, these brackets are made in varying thicknesses to stand out from the band to whatever degree required by the individual tooth, and are precisely tipped to accomplish torquing, angulation, and other details of tooth positioning. Most of the shaping and forming of the arch wire is then unnecessary, a relatively straight wire can be ligatured in place, and the treatment is built into the bracket. These brackets are also being produced for use with direct bonding techniques.

Tooth movement

TYPES OF MOVEMENT. There are five general types of tooth movement used in treatment: tipping movement, bodily movement, rotation, extrusion, and intrusion. It should be borne in mind that the orthodontist is not merely uprighting teeth into a previously prepared slot, as if moving a gearshift lever. He is literally moving the entire tooth, complete with alveolus, through bone. This maneuver is accomplished through the physiological processes of *resorption* and *deposition*, shown in Fig. 4. Bone is vital, living tissue undergoing constant revision and is more responsive to force than is often appreciated. Pressure against the bone causes resorption of existing bone until the pressure is eased; tension or pulling on the surface results in the deposition of new bone until a balance of forces is restored.

Orthodontists usually refer to this process as "physiological tooth movement." A different appreciation of their work may be gained through the realization that to benefit the patient, the orthodontist is actually injuring the tissue, inflicting a deliberate but controlled pathology. The periodontal membrane governs the consequences. Pressure against the crown of the tooth is transmitted through the root, reducing circulation in the periodontal membrane in areas where the membrane is compressed while straining its attachments in other

Figure 3: Direct bonding. A, Patient wearing "almost invisible" appliance. B, Plastic brackets bonded directly to teeth. (Courtesy Rocky Mountain/Orthodontics.)

Figure 4. Types of tooth movement. Results of pressure applied lingually to crown of central incisor (periodontal membrane greatly enlarged). A, Tipping movement: periodontal membrane is crushed at alveolar crest lingually and at apex labially; fibers are stretched at opposite diagonal. Scalloped lines show bone resorption, and concentric lines indicate bone deposition. B, Bodily movement; entire membrane is compressed lingually and stretched on labial side. From Barrett, Richard H., and Hanson, Marvin L.: *Oral myofunctional disorders*, ed. 2, St. Louis, 1978, The C.V. Mosby Co.

places. The reaction of tissue to such insult effects tooth movement.

Tipping movements are relatively fast even with moderate pressures, for the periodontal membrane recovers quickly; bodily movement, compressing a much greater portion of the membrane, requires a longer recovery time. It is thus common for the patient wearing an appliance effecting bodily movement to see the orthodontist only at three-week intervals for adjustment.

Total time during which the appliance is worn may vary from a few months up to two years or slightly longer, but long treatment periods of three to eight years often indicate an untreated tongue thrust or some other etiological agent.

MESIAL DRIFT. Mesial drift is nature's orthodontic procedure, not the dentist's, but it is a condition that the dentist must control at times. It is the tendency of the teeth to shift toward the midline of the dental arch until contact is established with another tooth. The forces at work in the normal mouth militate to this end, so that if a tooth is extracted, the teeth distal to the resulting space "drift" mesially through the bone by the natural occurrence of resorption and deposition, as described above. As neighboring teeth rub together in function, the proximal surfaces wear away and flatten; mesial drift keeps them in contact, nevertheless. When a deciduous tooth is lost prematurely, we have noted that a "space maintainer" is frequently employed to combat mesial drift and to hold a place in line for the future arrival

of the permanent tooth destined for that space. Mesial drift can be a beneficial force when permanent teeth must be extracted. Abnormal tongue pressures can prevent mesial drift in extraction cases, causing an undesirable spacing of the teeth.

FORCE. The optimum force that should be applied in order to move teeth has not yet been established; it will be a difficult formula to devise, for many unknown factors remain. One proposal has been 20 to 26 grams (less than 1 ounce) per square centimeter of root surface, the capillary pulse pressure of the body through which teeth erupt and drift naturally. In actual practice a greater force is often used, but it must be kept under rigid control to avoid such unpleasant sequelae as root resorption, sheared alveolar crests, and poor gingival health.

AGE. The age factor is of vital concern to the dentist, for he must utilize growth processes to achieve some of the necessary changes. The growth spurt that usually occurs when a child enters puberty is often prime time to the orthodontist. The apices are fully formed and closed, so that major tooth movements are possible without danger of root impairment. Prior periods of rapid body growth are also precious, but the puberty cycle is the "last chance" timing for some aspects of Class II and Class III treatment. That is, this cycle essentially completes the growth of the basal bone forming the jaws. Thereafter, the orthodontist is not able to take advantage of growth by restraining development in one arch

while the bone of the opposing arch "catches up" as it continues normal growth and development. Such restraint or encouragement of growth is the purpose behind some uses of the headgear appliances discussed earlier.

By no means does this indicate that there is no help for the adult patient; remarkable changes have been effected in patients over 40 years of age when orthodontic treatment followed correction of the swallowing pattern. Individual teeth have been moved for 70-year-old patients in order to place a prosthesis.

ANCHORAGE. "For every action, there is an equal and opposite reaction." This law of physics will concern the therapist more directly in matters of deglutition, but it is basic to the dentist in tooth movement. To apply force to a tooth, there must be a point of resistance to that force, a "skyhook" by which to lift. In the past, it was usual to wait until the permanent molars were present in the mouth and to use their more securely affixed root structure to effect movement of anterior teeth. However, some seven or eight types of anchorage have now been devised, including the extraoral resistance inherent in the headgear in which the neck or occiput supplies anchorage.

Retention period

Joy is unrestrained on the day bands are scheduled to be stripped from the teeth. Lips that have been drawn together, concealing the appliance, are now rehearsing broad smiles, to exhibit beautiful unencumbered teeth. Still, one important phase remains to be completed: the retention period.

Once the bands are stripped off, the teeth are usually buffed and polished, and some occlusal equilibration is often done to encourage healthful intercuspation and make other fine adjustments. Typically, at this same appointment, "finish models" are taken, sometimes for a later comparison with the original study models but also as a guide for constructing retention appliances. The patient will return two or more days later to receive retainers, as it requires a few hours to fabricate them.

Extensive changes have been wrought in the tissues of the mouth as a result of orthodontic pressures. We referred earlier to orthodontic

treatment as "controlled pathology." Just as the orthopedic surgeon must splint and brace his handiwork until bones have knit and tissues healed, so too the orthodontist must immobilize the reorganized mouth until it is able to withstand environmental forces unassisted. Additionally, spaces between the teeth required for the bands must now be closed.

We have pointed out the great diversity of orthodontic approaches and appliances. The dentist understands quite well the physiology of tooth straightening, and so is able to arrive at the desired result along many different routes. However, the actual body of scientifically proven data concerning retention is discouragingly small, with the result that there is remarkable uniformity in retention procedures; a cuspid-to-cuspid fixed bar behind lower incisors and a Hawley-type removable on the upper arch. It has been done this way for many years, and few dentists challenge the system.

The lower appliance is made by rebanding the long-rooted lower cuspids and connecting the two bands with a light bar of stainless steel adapted closely to the lingual surface, thus preventing any sort of distal movement of the lower incisors. If an anterior crossbite has been corrected, the upper teeth themselves act as the retainer.

The upper retainer varies somewhat in design, depending upon whether or not there have been extractions. With acrylic fitted precisely to the lingual surfaces and a static wire around the labial surface, the upper teeth are effectively locked in place.

Occasionally an orthodontist will remove the bands earlier than he would otherwise do, and use a positioner as both a "finisher" and a retainer. The teeth from the finish models are cut off and mounted in wax as described earlier, so that the impression of each tooth within the positioner reflects ideal position; the patient bites into this guidance system four or five or more hours per day while awake and continues through the night. Positioners are frequently less acceptable to the patient, and in most cases must still be followed by the conventional retainers described above.

The length of time during which retainers are worn depends on two factors in addition to the preference of the dentist. One consideration is the type of tooth movement that has been carried out; teeth that have been rotated require much more time than those that have been shifted or tipped. The second factor is the age of the patient. When treatment has been concluded during body growth, much of the necessary reorganization of tissue has occurred spontaneously as a part of the growth process, reducing the time required for retention. Adult patients must be retained over a longer period in order to be secure.

The duration of the retention period may thus vary from a few months to several years. Patients have been seen who have been in retention for 20 years or more; we might add that the authors have not seen such a case who displayed a healthy mouth or even reasonably normal occlusion. Long retention is demanded only when teeth are placed in

a posture which is inharmonious with their environment. The antagonistic stress generated even by normal surrounding tissues can result in thickening of the periodontal membrane and other ills leading to dental breakdown.

Whatever the continuance of retainers, when the last appliance is removed the patient's musculature resumes command of tooth posture. Given normal function, a beautiful, healthy, permanent result emerges; it has been the conviction of some orthodontists that retention devices should not even be required in the thoroughly treated mouth.

In contrast, an untreated tongue thrust makes its presence known rather quickly at this juncture. No amount of retention is adequate when the dentition is subjected to abnormal environmental forces. Some dentists maintain quite a vocabulary of euphemisms for use in these cases: "settling," "post-treatment adjustment," "God's will," and "preeminence of the morphologic pattern"—any of these sounds less offensive than the term *orthodontic relapse*.

We should make one final point concerning retainers. These appliances are designed to resist force only on a horizontal plane, but exert no vertical pressure and are thus incapable of counteracting the effect of a tongue placed interdentally. Open bite cases may begin to reopen with dramatic suddenness even with retainers in place, once relieved of the interarch elastics used to close the bite.