Dr. Robert (Bob) Little began his teaching career at the University of Maryland shortly after graduating from the University of Washington orthodontic program in 1970. After two years, he returned to UW on a teaching fellowship where he obtained a PhD from the UW College of Education with an emphasis on curriculum design and educational administration. Along with his UW career, he practiced part-time for 17 years with Dr. David Turpin, becoming ABO certified and joining the Angle Society during that time. He later had a solo part-time practice in Federal Way, Washington, while continuing his research, and teaching / mentoring of graduate students. During those early years he worked with Dr. Richard (Dick) Riedel combing through and adding to what became the well know sample of UW post-retention cases. He had a hand in many articles and textbook chapters on the subject and lectured widely. He is now Professor Emeritus, retired, and living in Anacortes, Washington. But retirement has not dampened his interest in the subject of stability and relapse nor his travels to give a lecture or two each year.

This is the concluding portion of a two-part interview with Dr. Little addressing the often-debated topic of long-term stability. Most of the world’s experienced orthodontists consider Dr. Little and his cohorts to be the profession’s leading experts on long-term stability of orthodontic treatment results and the perils of violating long standing proven principles of dealing with tooth size arch length deficiencies (TSALD). Conclusions that might be drawn from this interview are that maintaining the patient’s original arch form and avoiding lateral expansion of lower canines might enhance both long-term stability and periodontal health. But as he makes clear, there seems to be no treatment protocol that assures long-term stability without the aid of a bonded lower canine-to-canine retainer. A fixed canine-to-canine retainer, if made and placed correctly, can maintain lower incisor alignment indefinitely, but of greater concern might be long-term periodontal health with dehiscences when teeth are expanded beyond their bony support. In these cases, a fixed retainer would likely contribute to periodontal breakdown while holding the expanded incisors and/or canines in an expanded position. Hopefully Dr. Little’s research efforts in this arena will be continued by others and provide, as did he, documented information on the dos and don’ts of treating malocclusions involving TSALD.

—Dr. Terry McDonald

TM: Let’s talk about treating with arch enlargement. Let’s start with mixed dentition treatment. What have you learned?

RL: Before discussing arch length enlargement, let’s examine whether to maintain adequate arch length in the mixed dentition. Dr. Hayes Nance taught us the concept of “leeway space.” That is, the arch length of the permanent canines and premolars in each quadrant is less than that of the deciduous predecessors. As the deciduous teeth are lost, mesial drift of the permanent posterior teeth eliminates this excess space unless a passive lingual arch is used. For mixed dentition cases where anterior crowding does not exceed leeway space, Nance reasoned that a lingual arch was appropriate to hold space and permit self-alignment of the incisors around the anterior arc of the lingual arch.\[9,10\]

Fifty years later, Dr. Art Dugoni showed that his own mixed dentition cases treated by the Nance lingual arch strategy were quite stable.\[11\] We had several cases in our UW collection treated in this same manner and they looked very nice post-retention as well (Figure 3.). None of our UW cases showed significant relapse. It seems clear from Art’s work that if overall mandibular arch length is adequate in the mixed dentition, then a passive lingual arch can be an effective tool. Apparently, “leeway space” does not have to be lost and can be used to counter incisor crowding. But what about arch enlargement in the mixed dentition? Nance called arch enlargement strategies “suicidal” except in certain cases such as thumb sucking or Class II division 2 where the lower incisors are tipped lingual pre-treatment. The term “suicidal” seems a little melodramatic, but you get the message.
Some years ago there was much interest in enlarging the mandibular mixed dentition arch in an effort to treat crowded cases non-extraction. It was reasoned that “arch development” in the mixed dentition would be more stable than either premolar extraction or non-extraction treatment of crowded cases in the permanent dentition. We did a post-retention study of early “arch development” and found that treatment was routinely unstable. In fact, those cases enlarged in the mixed dentition by active lingual arches, lip bumpers, or 2 x 4 banded treatment showed the poorest stability of any case study that we have done. Less than 10% of the cases showed post-retention stability after a minimum of six years post-retention (Figure 4).

Recently an article by Dr. Julie Vargo, et al., evaluated mixed dentition first phase lower arch enlargement with Crozat and lip bumper appliances along with upper arch expansion. Retention after first phase treatment averaged one year and was followed by another year of no retention before the start of phase two treatment. Lower arches during the one-year post-retention interval between phase one and two showed significant relapse of molar width, arch depth and arch perimeter with perimeter showing a 78% loss of treatment increase. It would be useful to follow those cases after phase two, as in our study mentioned above, to evaluate long-term post-retention quality. Also, it would be helpful to evaluate cases years later that had no phase two treatment.

TM: What about arch enlargement in the permanent dentition to treat crowded cases non-extraction? The Damon philosophy, for one, is popular today and seems to be in opposition to your findings regarding stability.

RL: in the early years of our UW Department of Orthodontics, Dr. Charles Tweed heavily influenced treatment philosophy. As a result, very few cases with crowded lower arches were treated non-extraction by the faculty in their practices or by our orthodontic residents. We do not have a sufficient post-retention sample size to comment on the strategy of non-extraction arch enlargement. We would need to obtain from other sources the post-retention records of cases treated with permanent dentition arch expansion. Recently, we did study cases treated with the Damon philosophy of arch expansion, but only from pre-treatment to end of active treatment. All of the cases received permanent retention, so we cannot learn of stability or relapse with this sample. It would be helpful to obtain cases treated with arch expansion followed by retention and then reviewed again after a 10-year post-retention period.

Our post-retention collection shows that lower arches routinely constrict in length and width with time, some more than others. In my opinion, permanent dentition treatment as per Edward Angle, Dwight Damon, or others who advocate non-extraction enlargement of the lower arch, will not be immune from the rules of normal physiology. It is clear that untreated and treated mandibular arches become smaller with time.

In my view, expansion of mandibular arches in the permanent dentition will likely relapse “in spades,” equal
to or worse than mixed dentition enlargement. Charlie Tweed and his generation of orthodontists learned this Edward Angle style non-extraction/enlargement lesson the hard way, and hoped for better success through a premolar extraction plan. Unfortunately, only about 30% of our UW crowded/premolar extracted cases had stability, so premolar extraction followed by eventual discontinuing of retention is no perfect answer either.

By the way, Dwight Damon and I were orthodontic resident classmates of the UW class of 1970. We remain good buddies even though we disagree on treatment philosophy.

Some would advocate removable retention, but this relies on continued patient cooperation. As Dick Rie- del used to say, “Removable retainers are well named. They are usually removed.” I favor fixed mandibular anterior retention. If the retainer becomes disconnect- ed, I’d suggest reattaching it ASAP.

To get back to your question regarding permanent retention, we were concerned that there might be negative consequences to long-term retention, such as various periodontal or functional iatrogenic effects. We need to study cases that had various premolar or incisor extractions as well as non-extraction cases, enlarged or not. As a first research step, we completed a study on permanent retention of non-extraction cases that had adequate initial arch length treated without arch enlargement. We found excellent long-term results without periodontal, functional, or other problems.\(^\text{15}\)

In a recent AJO-DO article, the authors studied this issue quite well and came to similar findings.\(^\text{16}\)

But what about cases that were treated with significant arch expansion? Currently, we do not know if there will be undesirable sequela and the severity of those negative problems. Obviously, flaring of upper and lower incisors to gain needed arch length could result in esthetic and/or functional problems. But I also worry about periodontal consequences of gross arch length and width enlargement.

I have seen some disturbing anecdotal evidence that lower arch enlargement can result in unanticipated problems. Occasional impaction of second and third molars should not be a surprise with arch enlargement.
I have also noted isolated and generalized gingival recession as well as areas of dehiscence in some grossly enlarged cases. Lingual relapse of individual teeth and even full quadrants posterior to lower fixed cuspid-to-cuspid retainers have been noted in some arch enlarged cases. This topic requires much more study.

**TM:** What other strategies should be considered to improve our treatment success?

**RL:** Some feel that extraction of third molars will solve the problem, but I don’t agree. We have seen many cases of relapse years after third molar removal as well as significant relapse in cases with congenital absence of third molars. The relapse issue seems multi-factorial in nature and not simply solved by removal of third molars. If there are periodontal or other reasons for third molar extraction, fine. But don’t assume that extraction of third molars will solve the relapse problem.

As advocated by Edwards, supracrestal fiberotomy offers improved results, particularly for rotations. This strategy does not solve all relapse, but is among several ways to improve our track record.

Peck and Peck advocated stripping (enamel reproximation) of lower incisors to what they felt was an ideal proportion of facio-lingual / mesio-distal dimension based on study of an untreated sample. Our post-retention study of treated cases showed no association between the Peck and Peck ratio and stability or relapse. Narrow lower incisors were just as prone to relapse as wide incisors.

Lee Boese in his practice combines supracrestal fiberotomy and lower incisor stripping without use of a retainer. However, what Lee personally indicated to me was for those cases that do begin to show relapse, he retreats them to ideal alignment and then uses permanent retention.

Further regarding extraction, Dick Riedel was a fan of lower incisor extraction in selected cases, such as those with an exaggerated Bolton mandibular anterior tooth size excess, those with one or more damaged lower incisors, those with gingival problems of one or more lower anteriors, or extremely crowded cases. We studied one and two lower incisor extraction cases and found them to have a far better success rate compared to premolar extraction cases. (Figure 5.)

One final note regarding incisor extractions, I was fortunate to have Dr. Wayne Bolton as one of my UW instructors. Wayne emphasized that his Bolton Analysis was only a crude indicator, more of a signal of potential problems. He felt that a diagnostic wax set-up is mandatory in many cases, particularly incisor extraction, to insure that one can achieve a satisfactory occlusal and esthetic result. As Wayne said, “If you can’t do it in the lab, you can’t do it in the mouth.”

**TM:** Thank you again for this summary of UW studies on this all important topic of stability and relapse. We practitioners all benefit from such work.

**RL:** I am pleased to see many more orthodontic practitioners evaluating their own cases long-term. Dick Riedel set a great example when he advocated recalling every one of his patients that he could find. He said that he learned from each one. Thanks for the opportunity to share Dick’s legacy.

**REFERENCES** Continued from Part One of Series


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