

The 6 Rs of orthodontics

Research, Root Resorption, Retention, Relapse & Respiration



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Part 1 – Relapse

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The principles of orthodontic treatment have not changed since the days of Angle more than 100 years ago and these doctrines were adopted to create a specialty of dentistry. However, despite the principles remaining unchanged; the materials, techniques and mechanics associated with orthodontics have advanced substantially over the last century.

Eminent Dr James Ackerman echoed these views in a 2015 American Journal of Orthodontics and Dentofacial Orthopedics paper. "It is fair to say that orthodontics has been more technology driven than biologically or scientifically based." [1]

Research into orthodontic treatment is now comprehensive and the sheer volume of work is overwhelming the clinician by making it difficult to stay up to date on the latest findings that can further the knowledge of the orthodontist. Moreover, modern technology has made it easier for orthodontic treatment to be performed and many general dentists are taking advantage of the opportunity.

Such is the commonplace of general dentists practicing orthodontics that the Australian Society of Orthodontists has emphasised that to get the best result, the patient needs to seek treatment from a specialist orthodontist to ensure the best outcome is achieved. "An orthodontist has been specifically trained and is the most qualified person to diagnose, prevent and treat issues to do with the alignment of teeth and jaws," [2]

Furthermore, the general dentist undertakes very little training at an undergraduate level, therefore may see modern orthodontics as an easy and straightforward income producer. However, there is a drawback for the younger generation that no specialist orthodontist likes to reveal. That is the R word - Relapse.

In the past, it was assumed by every general dentist that once teeth were straightened into the optimum alignment with Class I molar relationship, the teeth would no longer move after a certain retention period once growth was completed. One would assume this would be the outcome of a referral to a specialist orthodontist who has undergone three additional years of dedicated university education and that the priority among the specialty would be good long-term results for all patients.

However, in 1988 Little et al published the first of a series of research findings based on this very concern. "Of concern to patient and practitioner at the conclusion of active orthodontic treatment is the degree of anticipated stability. At what point is it safe to discontinue retainer use? At what age will there be no further change in anterior alignment? Once growth has been completed, can we assume that alignment will be maintained?" [3]

"Orthodontists have been prone to assume that once growth has ceased, the dento-occlusal changes will be minimal to negligible and therefore retention may no longer be necessary.

It has been our subjective observation that changes in occlusion continue beyond a five and 10-year postretention period at varying rates and degrees, and these changes continue well beyond the point of growth cessation. Our goal was to assess the second decade (and beyond) of postretention follow-up." [4]

The research team concluded that; "The only way to ensure continued satisfactory alignment posttreatment is the use of fixed or removable retention for life." [5]

More alarming is the finding that up to 90% of cases researched by Little relapsed to an unacceptable level and crowding continued to worsen between the 10 to 20-year postretention period. Consequently, failure is almost guaranteed. Is the general

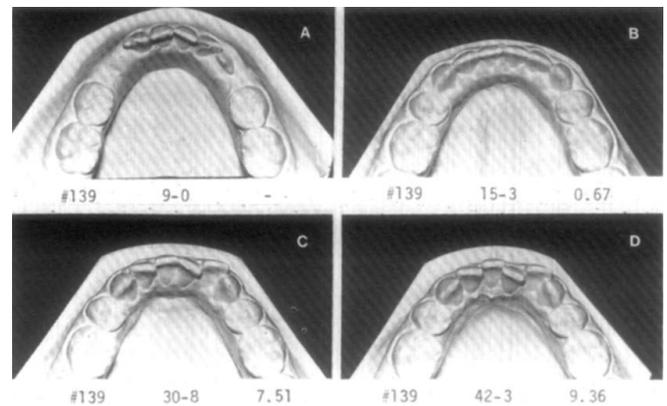


Figure 1. This case exhibited one of the larger 10-20 year post retention changes and is particularly interesting given the initial minimal irregularity. [3]

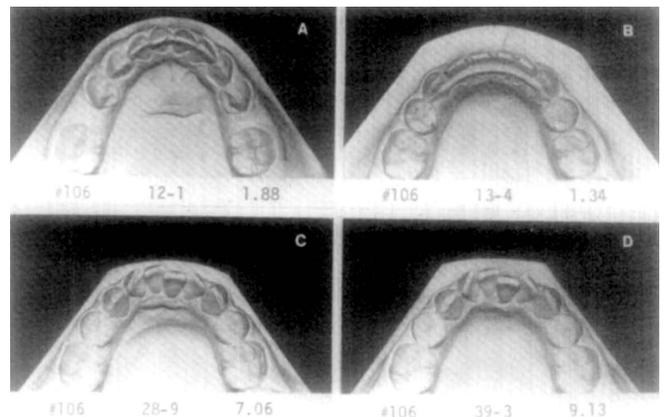


Figure 2. In spite of near perfect initial anterior alignment, this case deteriorated to a marked extent, defying our usual criterion of prediction and prognosis. [3]

dentist warned of the near guarantee of posttreatment stability failure when entering the orthodontic field?

"Patients and parents of our young patients should be apprised beforehand of the liability for posttreatment change. They must understand clearly our limitations and their roles in the maintenance of the treated results. The orthodontist should not assume that stability will occur, but should assume instability will likely be the pattern and, with such a posture, can plan against and prevent undesirable change." [6]

Dentists and orthodontists practicing orthodontics are now following a new paradigm of ensuring satisfactory long-term alignment through the use of fixed or removed retention. Logic would suggest lifelong retainers have solved the problem of retention failure and surely our patients



Figure 3. Dead soft wire with breakage between the central incisors, resulting in movement of 2 segments of teeth. Note the torque of the left canine and left central incisor in opposite directions. [8]



Figure 4. Dead soft wire, half missing, with space opening and tooth movement. It is likely that the teeth on the right side were moved by the wire segment on that side before it was ultimately lost. [8]



Figure 5. Occlusal view of a flexible spiral wire retainer with bond failure on the mandibular right canine, but with a severely lingually inclined mandibular left canine and facial attachment loss. [8]

will be content given their end goal is also long-term stability.

Observe the results of the cases in Figures 1 and 2. These cases had post-treatment crowding worse than the original crowding despite extracting four premolar teeth. Has Orthodontic treatment introduced a factor to make the problem worse? Questions are being asked as to whether we have made the airway and tongue position worse.

"The nonsignificant findings between extraction and non-extraction orthodontic treatments on airway changes apply to anatomic findings alone and not necessarily to airway function, particularly to the complex neuromuscular functional deficits associated with obstructive sleep apnoea. To truly assess the implications of orthodontic treatment with extractions on airway function, future studies with larger samples are required." [7]

Some may argue gluing the end result forever will allow stability of the anteriors and satisfy the patient, but where is the science in that approach? Surely after 100 years of orthodontics we should have come to the conclusion that moving teeth without a high retention rate is an unacceptable way of treating patients. However, the norm is considered adequate.

Three years ago, the Australian Society of Orthodontics informed patients and general dentists of the possibility that teeth may have a tendency to move after orthodontic treatment. "Teeth may have a tendency to change their positions after treatment." In 2017, this warning has vanished, along with the caution relating to root resorption.

So, the status quo is maintained for orthodontic excellence provided the lifelong use of permanent retention. Very little research focused on the detrimental effects of these orthodontic standards has been published. That is, until now.

Proffit, one of the most prolific orthodontic researchers with thousands of articles and text books to his name, has been outspoken in his critical appraisal of the relapse of orthognathic surgery and published an alarming report on permanent retainer outcomes. "Orthodontists, general dentists, and patients should be aware of possible problems with fixed retainers, especially those with all teeth bonded, because the patient might not notice partial debonding. Regular observations of patients wearing fixed retainers by orthodontists in the short term and family dentists in the long term are needed." [8]

Proffit concluded that; "A patient with a fixed retainer should be seen regularly by the general dentist if not by

the orthodontist, and the orthodontist should accept responsibility for dealing with problems if they arise." [9]

Relapse has been affirmed in recent 2017 research papers as well. "Maintaining the stability of orthodontic treatment outcome in the long term is a challenge. Studies have shown that even when a good well-functioning occlusion is achieved, there is a tendency towards relapse." [10]

"Unexpectedly, the amount of relapse did not differ between participants with or without retainers in place at T2, indicating that long-term use of a fixed retainer did not prevent the orthodontic treatment from relapsing. Our results do not support the previously reported finding that a fixed retainer has a positive effect on the PAR score in long term." [11]

"Conclusion: Our results suggest that occlusal relapse can be expected after active orthodontic treatment irrespective of long-term use of fixed retainers. Fixed canine-to-canine retainers seem effective to maintain mandibular incisor alignment, whereas in the maxilla a fixed retainer may not make any difference in the long term." [12]

The increased awareness of Myofunctional Orthodontics and its emphasis on establishing nasal breathing as well as correct oral muscular function before attempting to align the dentition, may give rise to Dentists and Orthodontists alike to achieve more stable results and potentially a healthier future for patients without the fear of developing SRBD. Also, lighter and intermittent forces can be used to align teeth and prevent root resorption, which is now present in close to 100% of treated orthodontic cases despite the best knowledge and training of the specialist orthodontist. This will be the topic of part 2 RRRRRR. ♦

References

1. Ackerman, J. Was the destiny of orthodontics written in the stars? *Am J of Orthod and Dentofac Orthop* 2015;147:290-292
2. Why see an orthodontist? [<https://www.aso.org.au/why-see-orthodontist>] Australian Society of Orthodontics website, accessed 15 November 2017.
- 3, 4, 5, 6. Little, R et al. An evaluation of changes in mandibular anterior alignment from 10 to 20 years postretention. *Am J Orthod and Dentofac Orthop*, 1988;93:423-428
7. Pliska, B et al. Effect of orthodontic treatment on the upper airway volume in adults. *Am J Orthod Dentofac Orthop* 2016;150:937-944
- 8, 9. Proffit, W et al. Inadvertent tooth movement with fixed lingual retainers. *Am J Orthod Dentofac Orthop* 2016;149:277-286
- 10, 11, 12. Steinnes J et al. Stability of orthodontic treatment outcome in relation to retention status: An 8-year follow-up. *Am J Orthod Dentofac Orthop*, 2017;151:1027-1033