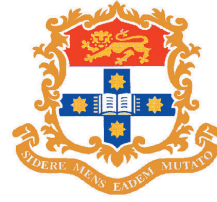


Australian Society
of Orthodontists



University of Sydney



Retention

*Creating **Brighter** Futures*

Retention

Orthodontic retention is the procedure of maintaining recently moved teeth in position for an extended period to help stabilise the corrections achieved (Reidel, 1994). Orthodontists accept the fact that teeth that have been moved in or through bone, regardless of the mechanical appliance used, have a tendency to return to their former positions.

Retention aims to eliminate or minimise this tendency.

Why do we need to retain?

The reasons for retention following orthodontic and/or orthopaedic treatment are varied and can be classified into skeletal and dental factors.

Skeletal factors:

1. **Post-treatment mandibular growth:** Mandibular growth, which continues after completion of maxillary growth, must co-ordinate with the surrounding dentofacial complex or else malocclusion will result. Lande (1952) showed that forward mandibular alveolar growth is less than the forward growth of the underlying skeletal basal bone, while Bjork, in 1954, demonstrated an increase in mandibular prognathism relative to the maxilla. Humerfelt (1972) demonstrated an increased interincisal angle of 4.5° following completion of orthodontic treatment. Thus the mandible is growing forward more than the maxilla and mandibular basal bone more than alveolar bone, resulting in retroclination and crowding of the lower incisors under the restraining influence of the upper arch.

2. **Mandibular growth rotations:** Bjork (1951) described both forward and backward mandibular growth rotations with excessive rotation resulting in an increase in mandibular incisor crowding. Forward rotation of the mandible leads to a forward displacement of the posterior teeth as they continue to erupt. Proffit described this as 'packing' and leading to lower incisor crowding. Backward rotation of the mandible results in crowding due to retroclination of the lower incisors.

Dental factors:

1. **Third molars:** There is conflicting evidence in the literature regarding the role of third molars in the aetiology of lower incisor crowding. However, the contemporary view is that the forces produced by the developing wisdom teeth play little or no role in lower incisor crowding (Richardson, 1996)

2. **Periodontal fibres:** The periodontium includes the principal fibres of the periodontal ligament and gingival ligament fibres whose functions are to maintain the structural integrity of the tissues supporting the teeth and withstand the forces of mastication. During orthodontic treatment these fibres are distorted and stretched. Sufficient time is required for these fibres to re-organise, otherwise teeth have a tendency to move back to their original positions (Reitan, 1969)

Therefore the aetiology of post-treatment changes is multifactorial and consists of both skeletal and dental factors which must be taken into account during the treatment planning process. Retention is required to minimise the effect of these and other factors producing post-treatment movement.

Commonly used retainers

Bonded Lingual Retainers

Fixed lingual retainers are becoming increasingly popular as both patients and clinicians seek to limit even minor post-treatment tooth movements. These retainers can be constructed from various materials, e.g. .0175" or .0195" multistrand stainless steel, nickel titanium wire, rigid wire with loops between teeth and/or at the terminal ends, preformed cast retainers, chain or fibre materials. They can be applied to just two teeth or whole segments both anteriorly and posteriorly, and in both arches. Most commonly they are placed on the anterior 6 or 8 teeth. The lighter or smaller dimension wires are bonded to all the teeth while the heavy wires are usually bonded at the terminal ends. They can be adapted and placed directly at the deband appointment, but often moulds are taken prior to deband for the wire to be adapted to the model then bonded to the anterior teeth at the deband appointment. The retainer is attached to the lingual surface of the teeth, positioned using dental floss or a moulded flexible jig, and then bonded in position using a light-cured composite resin. When maxillary lingual retainers are placed, care should be taken to clear the lower anterior occlusion.

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At the beginning of another new year I hope that you are feeling reinvigorated and refreshed. I would like to take the opportunity to wish you happiness and prosperity in the months ahead.

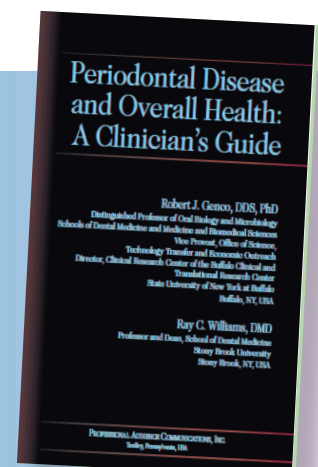
I would also like to introduce to you a text book which has been produced with support from Colgate- Palmolive titled "Periodontal Disease and Oral Health: A Clinician's Guide".

This book is a comprehensive account of current research linking periodontal disease with systemic health concerns such as diabetes, atherosclerosis, pregnancy complications, respiratory tract disease, cancer, osteoporosis, and rheumatoid arthritis. The book has been edited by Robert Genco DDS, PhD and Ray Williams DMD, and includes chapters co-authored by local expert Mark Bartold amongst other world renowned researchers. The book can be accessed as a PDF file and downloaded from

<http://www.colgateprofessional.com/professionaleducation/Periodontal-Disease-and-Overall-Health-A-Clinicians-Guide/article>

I hope this will be of interest to you regarding patients you may have who suffer from periodontal disease susceptibility or as a general interest text concerned with common diseases interactions.

Dr Susan Cartwright





Excess resin on the lingual surface and at the gingival margin should be carefully removed, and the area polished leaving smooth even surfaces which are easy to clean. The multistrand archwire is inherently flexible which allows for physiologic tooth movement and minimises bond fracture due to masticatory forces. Where less flexible wire is used, vertical loops can be added to give this flexibility, while also making it easier to floss (Cerny, 2001). Periodontal ligament stability is also enhanced using non-rigid retention (Artun, 1984). Disadvantages of bonded lingual retention include oral hygiene difficulties and localised relapse where there is a partial debond of the retainer. Furthermore, undetected debonds carry the risk of decalcification and caries. Therefore the patient must be reviewed regularly to assess the integrity of the retainer and compliance with oral hygiene.

Fig 1: Bonded lingual retainers.



Removable acrylic retainers:

Hawley Retainer:

Hawley retainers were designed in the 1920s and are still commonly used. Palatal coverage and lingual flanges are fabricated in acrylic and should be extended to the second molars especially where the maxilla has been expanded. A labial bow of stainless steel wire 0.020" to 0.036" diameter is constructed to contact the labial surface of the anterior teeth. Retention usually involves Adams clasps fitted to the first molars. Care is taken to avoid passing clasp wire across closed extraction sites as poor positioning can cause the space to reopen.



Fig 2: Hawley retainer

Begg retainer:

A Begg retainer is a variation of the Hawley retainer without Adams clasps so there is no occlusal interference. The labial wire extends along the buccal segment to usually the second molars, providing retention of the appliance, allowing settling and further adjustment of posterior teeth if necessary.

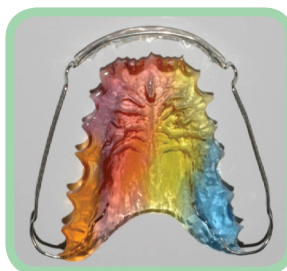


Fig 3: Begg retainer with labial acrylic added.

Both the Hawley and Begg retainers can have acrylic added to the labial bow to provide additional retention for the anterior teeth.

Thermoplastic Retainer:

These clear or semi-clear thin thermoformed appliances have become increasingly popular for orthodontic retention, as anticipated by Sheridan (1993). Advantages include low cost and ease of fabrication, good esthetics, comfort and compliance. The recommended retention regimen is the same as for removable acrylic retainers. However, due to their inherent flexibility, unless material thicker than 1mm is used, they cannot be used to retain cases where the dental arches have been significantly expanded during orthodontic treatment. Furthermore, these appliances do not allow for settling of posterior teeth, and they tend to wear through or break more easily than acrylic appliances, especially if the patient is a bruxer.

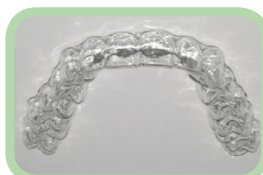


Fig 4: Thermoplastic retainer

Spring Aligner Retainer:

The spring aligner retainer is more commonly used to retain the alignment of the lower anterior teeth, whereas the removable retainers mentioned above are used in both arches. This retainer can have acrylic contact across either four or six anterior teeth. It can also be used to realign teeth where very minor malalignments are present.



Fig 5: Spring Aligner retainer

Pontics can be easily included in removable retainers for aesthetics and to maintain edentulous space prior to prosthodontic replacement.

Duration of retention

During the initial treatment plan a retention protocol should be developed for each patient, customised according to the treatment provided and operator and patient preferences. Retention demands can be categorised as: no retention; short term; medium term; permanent.

1. **No retention:** This may be appropriate for cases such as anterior crossbites that when corrected, the overbite is sufficient to maintain the correction.
2. **Short term retention:** This ranges from 3 to 9 months while the supporting tissues reorganise following minor orthodontic treatment. Removable appliances are suitable as wear can be progressively reduced towards the end of the retention period. A typical regimen would be full time use for 3 months, followed by night only for a similar period, then a gradual reduction.

Brighter Futures is published by the Australian Society of Orthodontists (NSW Branch) Inc. in conjunction with the Orthodontic Discipline at the University of Sydney.

The newsletter is intended to help keep the dental profession updated about contemporary orthodontics, and also to help foster co-operation within the dental team.

Without the generous support of Henry Schein Halas and Colgate, who are an integral part of the dental team, this publication would not be possible.

The statements made and opinions expressed in this publication are those of the authors and are not official policy of, and do not imply endorsement by, the ASO (NSW Branch) Inc or the Sponsors.

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3. **Medium term retention:** This is necessary following comprehensive orthodontic treatment where the supporting tissues will take longer to reorganise, or when it is necessary to stabilise the occlusion during the latter stages of facial growth so that dentoalveolar adaptation does not result in crowding, particularly of the lower anterior teeth. Medium term retention extends from 1 to 5 years using either fixed or removable retainers.
4. **Permanent retention:** This has traditionally been used in selected cases, usually for adult patients with moderate to severe periodontal problems where there is no alternative but to stabilise the teeth permanently. For removable retainers Parker (1989) recommended a protocol of 6 months full time wear, followed by night only. If the retainers feel excessively tight or uncomfortable, another extended period of full time wear is required (3-6 months) before reverting to night only. The patient is encouraged to gradually reduce the wearing to one or two nights a week provided the teeth do not feel sore in the morning following night wear. The patient is never told to discard the retainers and they are responsible for making the decision to cease retention and how long they wish to maintain the treatment result. A disadvantage of removable retainers is that patients get tired of wearing them and most inevitably stop wearing them prematurely, resulting in unwanted tooth movement. Fixed retainers are becoming an increasingly popular method of retaining orthodontic corrections. Following the work of Reidel and others there is increasing recognition that teeth will continue to move throughout life. Those who have undertaken orthodontic treatment in their teens do not want to undergo similar treatment a decade or two later. Placement of fixed retainers, as advocated by Cerny and Chapman (Fig 1, c and e), provides long term stability while allowing for adequate oral hygiene.

Where long term retention is used, it may be more practical for review and maintenance of retainers to be carried out by the patient's general dentist as part of the yearly 'check-up'.

Conclusion

Retention following orthodontic treatment must be considered an integral part of the treatment planning and explained to the patient in detail prior to commencement of treatment. Due to the increasing desire of both clinicians and patients to limit normal post-treatment changes there is an increasing use of long term fixed retention.

The issue of retention is best summed up in a quote by Normal Kingsley in 1908:

"It is not so difficult to straighten crooked teeth, to get the dental system into a position acceptable to your patients and yourself, but to hold it there until it becomes permanently settled, is a much more serious problem. It is the one important consideration in your entire prognosis and the success of orthodontia as a science and as art lies in the [retainer] . . . Do not discharge the case or abandon retainers until there is a reasonable expectation of permanence. You may rightfully ask of that experience, how long will that be? Your patient will pester you with the same query. Out of the same observation and experience I can only answer, I am agnostic, I don't know, in each and every individual case I do not know."

References available on request

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