

A Review on Flexible Spiral Wire Retainer

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Abstract: *Maintaining newly moved teeth in position, long enough to aid in stabilizing their correction. Bonded retainers are type of retainers which does not require patient's compliance, invisibility and long-term retention. This type of retainers also can produce rare undesirable tooth movement and effects on periodontium which is discussed in our review.*

Keywords: *Flexible spiral wire retainers, bonded retainers, multistranded wire retainers.*

I. Introduction

Moyer's defined retention as 'maintaining newly moved teeth in position, long enough to aid in stabilizing their correction. Teeth that have been moved in or through bone by mechanical appliances have a tendency to return to their former position and the purpose of retention is to counteract this tendency. Since retention requirements are unique for every case the orthodontist has to opt for an appropriate appliance available to him.¹ The various retentive appliances available include Banded retainers, Removable retainers and bonded retainers.^{2,3} Need for long term retention to avoid relapse is widely accepted now-a-days and hence bonded orthodontic retainers have found an important role in orthodontic treatment. Bonded orthodontic retainers consist of a length of orthodontic wire bonded to the teeth with acid-etch retained composite. The major advantages of bonded retainers over removable retainers include, invisibility, no patient compliance required and long term retention. Bonded retainers used in the last decade include fixed rigid wire retainer and the Flexible spiral wire retainer.⁴ This review is focused mainly on the Flexible spiral wire retainers that are used now-a-days in orthodontics.

II. Evolution Of Flexible Spiral Wire Retainers

Since introduction of acid etch technique by Buonocore in 1955, Bonded retainers have become popular. In 1965, Newman⁵ first bonded orthodontic attachment to tooth and Kneirim⁶ published report of use of this technique to construct bonded retainers. Later multistranded wire fixed retainers were constructed by Artun and Zachrisson⁷ which were bonded from canine to canine. In 1983, Zachrisson⁸ reported use of multistranded wire bonded to all the teeth in labial segment. Many variations like different diameters, different composite, and use of mesh pads were also suggested⁹⁻¹⁰. In last 20 years Flexible spiral wire have evolved in which small diameter multistranded wire usually 0.0175 or 0.0215 inch is bonded to each tooth in the labial segment.

III. Advantages Of Flexible Spiral Wire Retainers given By Graber

1. Increase retention because of irregular surface⁸.
2. Invisible.
3. Neat and clean.
4. Can be used along with removable retainers.
5. They can be placed out of occlusion in most instances.
6. Physiological movements of teeth are allowed by these retainers¹¹.

Disadvantages Of Flexible Spiral Wire Retainers:

1. Good oral hygiene of the patient is mandatory.
2. Excessive adhesive during retainer bonding can cause gingival recession.
3. Undesirable movements can occur.
4. Not indicated in deep bite as they are under mechanical stress.

Indications Of Flexible Spiral Wire Retainers As Told By Zachrisson⁸:

1. Closed midline diastema.
2. Anterior teeth spacing.
3. Potential post orthodontic tooth migration in adults.
4. Accidental loss of maxillary incisors, requiring closure, and retention of large anterior spaces.
5. Spacing reopening, after mandibular incisors extraction.
6. Palatally impacted canines.

IV. Construction

1. Wire used:

Stainless steel wire is mostly used. Multistranded wires may be round or rectangular formed by three to six fine strands braided or arranged co-axially. Diameter of wire varies from 0.015¹³⁻¹⁴ to 0.032 inch⁷.

2. Composite resin:

Bonded fixed retainers are attached to the teeth with composite resin. **Concise** (3 M Unitekcorp., Monrovia, Calif.) a conventional restorative composite based on Bis-GMA. This is most commonly used.

Artun and Zachrisson⁷ diluted the concise restorative material using unfilled resin to improve handling properties for orthodontic bonding.

Other adhesives used are Sevriron⁶, Nuva-fil^{15,16}, Silux¹⁷, Bondmor¹⁸, Heliosit orthodontic¹⁹⁻²⁰ and Transbond²¹⁻²².

V. Techniques Of Fabrication

Direct technique:-

Russel .D suggested the Length of wire to be fabricated is verified in latest cast. Loops are not required at end of the wire. Wire is again verified in patient's mouth clinically to ensure it fits passively to the tooth to be bonded and the tooth to be bonded were pumiced and etched. Wire is then accurately located on the teeth and bonded using composite resin.⁴ Indirect technique was suggested by Hobbson²¹.

VI. Long Term Effectiveness Of FSW

According to 2 years study done by Stormann²³, no relapse was observed in patient with 0.0195 inch flexible spiral wire canine to canine retainers, whereas 20% relapse was observed in 0.0215 inch FSW. However in both FSW groups the changes in irregularity index was not significant.

In recent study by Attack, Harradin, Sandy²⁴ 0.065 mean increase in irregularity index was shown 1 year after treatment with FSW. But it is not significantly different when compared to patients who received removable retainers.

VII. Survival Rate Of FSW

According to Artun, failure rate with thick spiral wire bonded only to canine was 30.8% and thin spiral wire bonded to each tooth was 27.3%.

Artun concluded that bonded orthodontic canine to canine retainers (plain and spiral wire) effectively maintain incisor alignment following orthodontic treatment however the failure rate of approximately 20% may be expected during a period of 3 years. Occasional cases of slight incisor relapse may occur using retainers bonded only to canines.²⁵

According to study done by Lie Foeket al²⁶ who used a flexible, braided, rectangular stainless steel wire retainer (Quad cat, GAC International).

1. The total survival rate of flexible, braided lingual retainers was 63% over an observation period of 41.7 months and the highest number of failures was observed within the first 6 months after placement.

2. Failure rate of the mandible was 31.6% lower than the findings of and Renetal who reported failure rate of 35%.

3. Survival rate for mandible was 68.4%.

4. Most failure occurred during first 6 months. Gender, age of the patient and operator experience did not affect the failure rate

According to Stormann and Ehmer (2002)²³, the failure rate for 0.0195 inch multistranded wire FSW was 18% and for 0.0215 inch MS FSW was 53%

Dahl and Zachrisson²⁷ reported a failure rate of 10.3% with the use of 3 stranded spiral wire and 5.9% with the 5 stranded spiral wires. They concluded higher failure rate for maxilla compared to mandible. Excellent long-term success rate for six unit mandibular and four unit maxillary retainers was noted. Adequate plaque control by the patient is required and remaking retainers every 10 year once is recommended.

VIII. Effects Of FSW In Periodontium

N. Pandiset al did a study on the periodontal status of long term mandibular lingual fixed retention. This study suggests long term retention promotes calculus accumulation, marginal recession, increased periodontal disease but has no effect on plaque and gingival index or bone level.²⁸

But failure rates was considerably lower than those reported in other recent studies of lingual retainer over period of 20 years²⁹⁻³⁰. The results with 5 stranded penta-one wire are partially encouraging.

According to Artun spiral wire retainer do not accumulate more plaque and calculus than the plain wire retainers and formation of caries is not a problem. the presence of bonded retainer did not seem to have any negative effect on the patient's ability to achieve satisfactory oral hygiene. Gingival health is significantly better at the 3 year follow up examination.²⁵

IX. Unexpected Complications Of FSW

From the study of Renkema et al³¹; it can be concluded that FSW canine to canine retainer is effective in maintaining the intercanine distance after orthodontic treatment, but in few patients unexpected complications has been reported like, torque difference between the adjacent mandibular incisors, increased inclination and movement of mandibular canine. Katsora³² observed same post treatment changes occurred in his 21 patients. From the study made by Dahl and Zachrisson²⁷, Loosening and fracture of wire is less seen in 5 SW than 3 SW, 62% of patient has evident abrasion of composite, 11% of patient had obvious wear facets in retainer wire, Opening of small spaces (0.5 -2mm) distal to terminal ends of intact retainer, Moderate gingivitis was observed in some patient due to inadequate hygiene. Accumulation of plaque along mandibular retainer was common. No signs of dental caries was seen.

X. Conclusion

In retention of the orthodontically treated teeth, Flexible spiral wire retainers does not requires patients compliance, they are invisible, aids in long term retention. In spite of some rare complications, many orthodontists opt flexible spiral wire retainers as best.

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