

Removable Orthodontic Appliances: The Mechanical Efficiency

Zafarmand, A Hamid

Department of Orthodontics, Shahid Beheshti University of Medical Sciences, School of Dentistry, Evin, Tehran, IR Iran

Abstract

Removable appliance should be considered as a method of interceptive orthodontic treatment and is mostly used in the mix dentition period. It basically either resolves the imminent dental problem or diminishes its severity. This is undoubtedly beneficial to the patient, in either way. However, since it is a patient-dependent, stability of the appliance in the place is very imperative. The stability is fulfilled by retentive clasps located on the appliance. This fulfillment has a substantial mechanical concept for designing. This article is a scrutiny on the retentive perspective of the appliance based upon principles of mechanics.

Keywords: Orthodontic removable appliance; Appliance clasp; Mechanics

Introduction

Removable appliances take a considerable share in contemporary orthodontic treatments. The appliance was the innovation of George Crozat, in the early 1900s. It was later more developed in European countries, but had fewer roles in the mainstream of the United States orthodontics. Instead, American orthodontists tended to use almost exclusively fix appliances. In fact, Europeans pioneered the “functional” application of removable appliances for growth modification, at large [1]. These appliances would resolve minor to mild dental problems or can reduce the length of fix treatment, at least. However, the key success of treatment is the patient compliance with the appliance [2]. The looseness and soft tissue irritation of the gadget would definitely reduce the success rate of treatment.

One the most important factor for wearing an appliance is its retention. This is fulfilled with the parts so called Clasps. Clasps and springs should be designed in a way that functions properly and efficiently. Bulky clasps can diminish the desire of wearing the gadget by youngsters, resulting in frustration of patient and disruption of the process of treatment, as well.

A number of clasps are recommended for retention in removable appliances. Among all, “Adams Clasp” (Figure 1) is the one that is used frequently. The other choices to be considered are “C” (Figure 2), “Ball” (Figure 3), and “Wraparound” (Figure 4) clasps. Each of these clasps can provide different levels of mechanical retention for appliance in the mouth. Obviously, the best one is the one that work the most efficient [3]. However, there are benefits yet some defined indications with application of “Ball” and “Wraparound” clasps. There should be two in-contact teeth for application of “Ball”; and the design of “Wraparound” would be suitable mostly for retainer appliance. Finally,



Figure 1: A fabricated “Adams” clasp.

this article intends to discuss the priority of “C” clasp over “Adams”, from mechanical perspective.

Discussion

Quite frankly, there are 8 reasons that prove this superiority, although “C” is used much less and neglected in current orthodontic practice and literature. These are the followings:

1. Extensive tooth contact

While Adams has a two-point contact, “C” clasp establishes a line-contact with the tooth.

2. Better undercut rest

“C” clasp lies completely down under height of contour of the tooth but Adams does not. In fact, lab technicians must take off a part of plaster when fabricating Adams for better fitness. This becomes more critical when applying on primary tooth. This is due to the fact that the height of contour of permanent tooth is on the middle third, but it is on the gingival third for the primary tooth.

3. No gingival impingement

The “C” clasp is very gentle to the anchor tooth. Once again,



Figure 2: A fabricated “C” clasp.

***Corresponding author:** Zafarmand AH, Associate Professor, Department of Orthodontics, Shahid Beheshti University of Medical Sciences, School of Dentistry, Evin, Tehran IR, Iran, Tel: +98 (21) 22 4218 13; E-mail: zafarmand@alum.bu.edu

Received November 08, 2016; **Accepted** December 10, 2016; **Published** December 18, 2016

Citation: Zafarmand AH (2016) Removable Orthodontic Appliances: The Mechanical Efficiency. *Pediatr Dent Care* 1: 124. doi: [10.4172/2573-444X.1000124](https://doi.org/10.4172/2573-444X.1000124)

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Figure 3: A fabricated "Ball" clasp.



Figure 4: A fabricated "Wraparound" clasp.

trimming the plaster for placement of Adams clasp means the absolute pressure on the gingival papilla and inconvenience for patient.

4. Easier fabrication

The simplicity of the "C" clasp makes its fabrication much easier than of Adams clasp. Thus, it requires much less time for preparation.

5. Easier adjustment

Even a not fully formed "C" clasp can be adjusted chair side at the appliance delivery appointment. The clasps of removable appliances will usually need readjustments in recall visits, for various reasons. For example, even proper wearing and taking off the appliance may weaken the fitness of appliance. Some kids may abuse the appliance when wearing. Unfortunately, there are children that may over activate the active auxiliaries for expediting the tooth movement. Finally, in a compliant patient, springs need readjustment in each recall visit.

As is shown in Figures 1 and 2, it is remarkable that only one end of a "C" clasp is restricted in acryl, while Adams has both ends embedded in acryl. Obviously, adjustment of one free-end clasp is much easier than a both-end restricted clasp.

6. Less occlusal interference

The Adams occupies over two interdental contacts, while "C" only passes over only one contact. Mostly, the occlusal extension of the Adams causes a bother for patient when closing jaws, even with a well-fabricated one.

7. More clasps

A clasp that occupies only one contact (C) permits placement of more clasps on other present teeth. Moreover, in mixed dentition cases where some primary teeth are already exfoliated or ready to exfoliate, it makes some restrictions for technician and clinician for prescribing a clasp, due to limited number of anchor teeth.

8. Less cost

The wire length used for a "C" is at least one half of the length of wire used for an Adams clasp. After all, this is a saving for frequent removable appliance fabricators.

Conclusion

Retention of a removable appliance is the least expectation for persuading the patient to wearing. According to the above reasons the "C" clasp is much recommendable for better retention of the removable appliances.

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Citation: Zafarmand AH (2016) Removable Orthodontic Appliances: The Mechanical Efficiency. *Pediatr Dent Care* 1: 124. doi: [10.4172/2573-444X.1000124](https://doi.org/10.4172/2573-444X.1000124)

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