

The Use of Removable Appliances in Place of Fixed Appliance Therapy to Treat an Amateur Boxer

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Received: March 06, 2015; **Published:** April 02, 2015

Abstract

This is a case report about an amateur boxer with a Class II division 1 malocclusion with impacted upper canines. Regulations preclude the use of fixed orthodontic appliances during a contest unless the boxer has a letter from their orthodontist. This patient was treated with removable appliances to improve the alignment of the teeth and the bite. The design and construction the removable appliance are described

Keywords: Orthodontic; Fixed appliance; Removable appliance; Unerupted canine; Crowding; Appliance construction

Abbreviations: URA: Upper Removable Appliance

Introduction

Providing the best treatment possible for patients isn't always about achieving the best possible orthodontic result. It is also about accommodating the patient's wishes and needs at that particular time in their life. This case report looks at a patient with a Class II division 1 malocclusion with impacted canine whose parents stated he could not be fitted with fixed appliances as he was a promising boxer. The Amateur Boxing Association of England (ABAE) [1] regulations state in regards to fixed appliances it is the preferred option that boxers have a letter from the orthodontist confirming that they are allowed to box. Ideally a discussion should be held with whoever fitted the brace to see if boxing is possible. This is because playing contact sports increases to the risk of a dental injury and the risk is increased even further if the patient is wearing fixed orthodontic braces. Newsome PRH., *et al.* [2] state that Athletes undergoing orthodontic treatment present a particular problem as they are potentially at greater risk of injury because of increased tooth mobility and the presence of orthodontic appliances'. The patient's parents felt boxing took precedence at that time.

This case report looks at both the patient's orthodontic needs and the patient's wishes and describes the compromise reached.

Case Report

This appliance has been prescribed for a 12 year old male patient who presented with a Class II division 1 incisor relationship with moderate crowding the lower arch and severe crowding in the upper arch. The upper right canine was displaced buccally and the upper left canine was impacted palatally. The upper right second premolar had a large restoration. In occlusion the over jet was increased at 7.5 mm and the overbite was average and incomplete. The centre lines were coincident with the facial midline and each other. There were no cross bites; the molar relationship was a full unit post normal bilaterally

Radiographic examination confirmed the presence of all permanent teeth including all four third molars. The upper left canine was palatally placed.

Citation: Andrea Johnson. "The Use of Removable Appliances in Place of Fixed Appliance Therapy to Treat an Amateur Boxer". *EC Dental Science* 1.3 (2015): 134-138.

The treatment prescribed by the Consultant Orthodontist was as follows:

1. Relief of crowing with the extraction of both of the lower first premolars, the upper second premolar and the upper left canine.
2. Growth modification with modified Twin Block functional devices.
3. Upper and lower fixed appliances to detail the occlusion.
4. However; the patient was a county level competitive boxer and his parents did not consent to the fixed appliance state of treatment so the treatment plan was modified to,
5. Upper removable appliance (URA).

The patient and his parents were fully informed that this was a compromise treatment plan and that he could have fixed appliances placed at a later stage in his life if he stopped boxing competitively.

Appliance design and construction

The design of the modified Twin Block constructed for this patient by the author

Retentive components

1. Adams cribs to the upper right first molar, upper left first premolar and first molar and to the lower first molars.
2. Ball hooks between the lower central and lateral incisors.

Active components

1. Midline expansion screw in the upper appliance.
2. Acrylic Blocks with advancement screws in the upper blocks.
3. Palatal finger spring to retract the upper right first premolar.

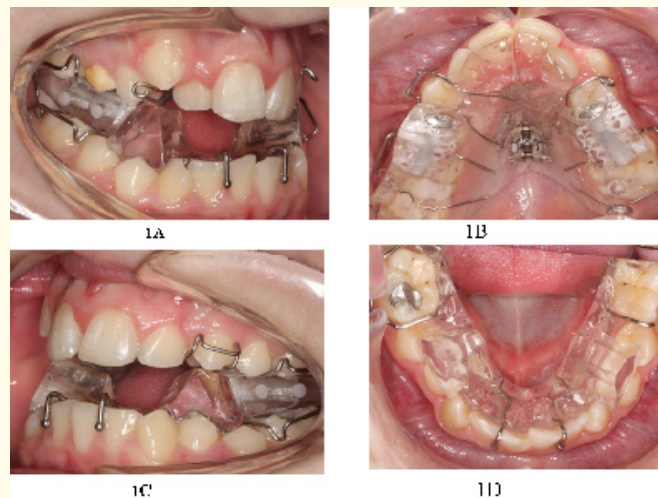


Figure 1: Photographs of appliance in situ.

- a. Right buccal view.
- b. Maxillary occlusal.
- c. Left buccal view.
- d. Lower occlusal.

Design of the URA

At the end of the growth modification stage the patient was fitted with an URA. The original prescription for this appliance was for a midline expansion screw to continue the expansion of the upper arch, a palatal finger spring to retract the upper right first premolar and a second palatal finger spring to retract the upper right canine once the upper right first premolar had been retracted, a Z spring would be used to push the upper right lateral incisor into position once the upper right canine had been retracted. However once the author had cast up the initial working model she felt that a palatal finger spring to the canine would not be ideal as it would have to cross from the palatal area over the saddle area and then up into the buccal sulcus in order to reach, this she felt could impair the function of the spring due to its length and cause irritation to the patients soft tissues through rubbing when activated, she also felt that the spring would potentially cause an obstruction to the upper right lateral incisor as the wire would be in between the lateral incisor and canine.

With these considerations in mind the author approached the prescribing consultant orthodontist to express her concerns and to offer an alternative design, which replaced the finger spring with a buccal canine retractor soldered to the bridge of the Adams crib on the upper right first molar.

The orthodontist agreed that this design would be a suitable solution and agreed to the alteration of the prescription.

This approach to designing the appliance combines the clinical knowledge and skill of the orthodontist with the technical skill and material knowledge of the technician. It demonstrates how a close working relationship between the clinician and their team can benefit the patient.

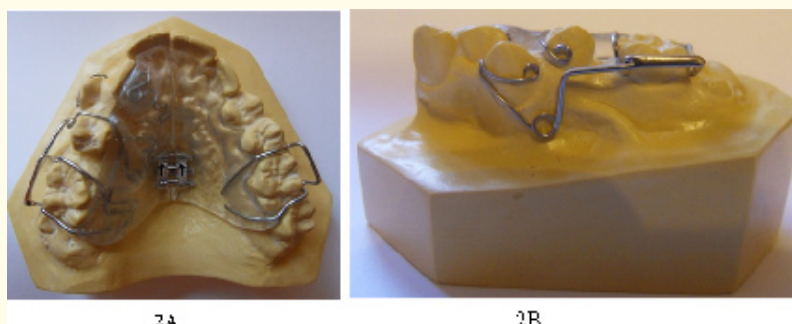


Figure 2: a. Completed URA on model - palatal view.
b. Completed URA -buccal view right hand side.

Results and Discussion

The main concern for this patient and his parents was that he be able to continue his promising boxing career whilst undergoing orthodontic treatment, however; they were aware that there was an increased risk of dental damage as described by (Newsome, Tran, & Cooke, 2001) and wished to find a suitable compromise. They discussed these requirements with their consultant orthodontist who agreed to a treatment plan using removable appliances only, however; she advised them that the best treatment outcome could not be achieved with removable only and that the patient may continue into a fixed treatment stage at a later date if they so wished.

The consultant Orthodontist prescribed a series of removable appliances and after discussion with the author agreed on the appliances described in this case study, the reasons for the design modifications are described.

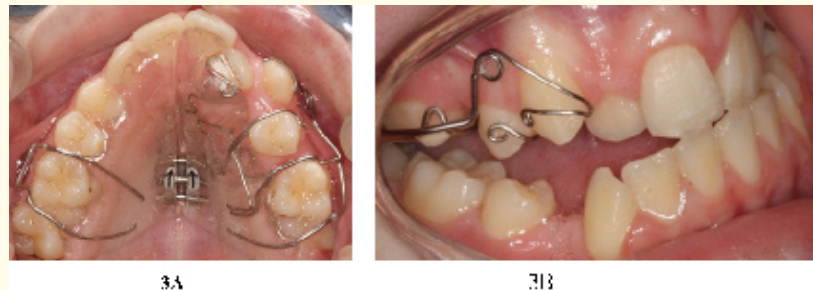


Figure 3: Photographs of appliance in situ –
 a. Palatal View.
 b. buccal view right hand side.

When constructing this upper removable appliance the author had to consider each of the required components and its operation to ensure that no one component conflicted or interfered with another, for example; the clasp arm on the mesial of the upper right first molar had to be kept high enough that it would allow the contact points of the first molar and first premolar to eventually meet without gagging the bite open.

The ideal alternative to the removable appliances which have been prescribed for this patient is a fixed appliance; these are made up of brackets that are temporarily stuck onto each tooth. A flexible wire runs through the brackets in each arch and allows the teeth to be moved into the correct position.

The patient would still have needed to have his overjet reduced with a functional appliance such as a Clark Twin Block or similar but would have then been able to move on to the fixed appliance therapy which according to his prescribing orthodontist would have been able to correct his malocclusion much more quickly, efficiently and completely. The complications of the patient being involved in a contact sport could have been minimized by the wearing of an orthodontic mouth guard as ‘...it is important for anyone with a brace to wear a mouth guard over their fixed brace to avoid a laceration to the mouth from the brace; to avoid damage to the brace; and to prevent injury to the teeth [3]. An example of an orthodontic mouth guard designed to fit over fixed braces is the OproShield which ‘act like shock absorbers by spreading the force over a larger area, and increasing the time for the force to dissipate.’ They are also designed ‘with a cross-sectional profile which means maximum protection against front and concussive blows whilst keeping the palate clear for improved breathing and speech [4].

Conclusion

The treatment for this patient has been complicated due to his sporting activities and his parent’s reluctance to allow fixed appliances to be used, however; at the end of this phase of active treatment the patient still had an improved occlusion and better aesthetics through the use of the removable appliances. He can opt for fixed appliances at a later stage if he so wishes.

The case also demonstrates how effective teamwork and communication between the clinician and technician can benefit the patient to ensure the best treatment outcome possible.

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Volume 1 Issue 3 April 2015

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