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Case Report

Management of Dental Trauma using Orthodontic Appliances: A Case Report

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Abstract

We describe the use of a fixed non- rigid orthodontic splint in the management of lateral luxation in dental trauma. Orthodontic brackets and flexible nickel titanium wire were used to manage this case instead of the usual option of manual repositioning and a composite wire splint. The main advantage of using Orthodontic appliances for splinting is the slow gentle repositioning of teeth so that there is the possibility that the tooth can regenerate its vitality.

Keywords: Fixed Orthodontic Appliances; Lateral Luxation; Dental Trauma; Non- Rigid Splint

Introduction

Lateral luxation is the eccentric displacement (other than axial) of the tooth [1]. Potential complications of laterally luxated teeth include pulp necrosis, pulp canal obliteration, root resorption and marginal breakdown [1, 2].

Splinting is the principle method for treating dental trauma and is indicated for avulsed, excessively mobile and displaced teeth.

Case Report

This case is that of a 28- year old female who presented to the University of the West Indies Emergency Dental Clinic after an incident of trauma five days earlier. Her medical history was unremarkable. Clinically, there was lateral luxation of the upper left lateral incisor and soft tissue trauma to the upper lip in that region (Figure 1). The affected tooth was tender to percussion, not mobile and had a negative response to thermal stimuli.

Radiographically, there was widening of the periodontal ligament seen on an upper standard occlusal radiograph (Figure 2).

The option to manually reposition the tooth and a composite wire splint was offered. The patient did not like this option. She was then referred to the Orthodontic department. There a fixed orthodontic appliance was used as a trauma splint. It was constructed by bonding 0.018" by 0.022" pre-adjusted edgewise brackets (3M Victory Series™ Metal Braces) to the traumatized lateral incisor and adjacent teeth using Transbond™ XT (3M Unitek, Monrovia, California, USA) from FDI # 1.4 to # 2.5 and 0.014 nickel titanium wire was used. The nickel titanium wire was chosen since it is extremely flexible, easy to manipulate and allows for passive forces [3]. No wire bending was necessary. The patient was given verbal and written instructions namely to stay off hard foods and keep the area clean with brushing and flossing. She was reviewed after six weeks and then three months. The nickel titanium wire was retied at both review visits.

Figure 1: Lateral luxation of upper left lateral incisor.

Figure 2: Upper standard occusal x-ray showing widening of the periodontal ligament.

The nickel titanium wire aligned the tooth and regained the arch form. Therefore, no other wires were used. The torque was adequate, so no stainless steel wires were required. At each appointment the splint was sound and there was adequate stabilization of traumatized teeth. Vitality testing was done. Teeth had a positive response to thermal stimuli. Pictures (Figure 3) and radiographs were taken (Figure 4). Physiological mobility was regained.

Figure 3: Showing alignment of teeth after 6 weeks.

Figure 4: X-ray showing tooth healing after 6 weeks.

Discussion

Dental injuries are the most common facial injuries [1,4]. Luxation injuries occur most frequently [1,5]. A splint is defined as "an apparatus used to support, protect or immobilize teeth that have been loosened, replanted, fractured or subjected to certain endodontic surgical procedures" [6]. Trauma affecting the periodontium is usually treated with splints. Splinting is used after repositioning of a tooth to stabilize and to optimize healing for the periodontal ligament and pulp [7].

Andreasen's recommendation for an ideal splint has been modified by Kahler, Hu., *et al*, the modified list states an ideal splint should.

1. Prevent risk of swallowing a loose tooth and also allow periodontal ligament reattachment and prevent risk of further trauma
2. Be easily applied and removed without additional trauma to teeth and surrounding tissues
3. Stabilize the injured tooth and maintain adequate stabilization throughout the splinting period
4. Allow physiologic tooth mobility since this will aid periodontal healing
5. Not cause soft tissue irritation
6. Allow access for endodontic therapy and pulp sensibility testing
7. Allow adequate oral hygiene
8. Not interfere with occlusal movements
9. Be aesthetic
10. Be comfortable for the patient

Different types of splints in current use include wire composite splint, suture splints, direct resin splints, nylon-monofilament – composite splint, polyethylene fiber reinforced, orthodontic splints and titanium trauma splints [8]. Wire composite splints are the most popular because of simplicity, availability of materials and their proven track record [8,9]. Evidence for orthodontic splinting in the management of dental trauma is lacking [10]. This case showed orthodontic splinting has advantages over other techniques.

With luxation injuries potential complications include pulp necrosis, root resorption, pulp canal obliteration, internal and external root resorption marginal bone loss, [1,2]. The objective during management is to diminish these complications so the tooth can be saved. Oikarinen [2] stated that luxated teeth should be man-

aged as little as possible before repositioning and not fixed with rigid splints. The treatment objective is to reposition and splint the luxated tooth so to allow for periodontal ligament and pulp to heal. Healing without resorption is ensured by having an intact viable periodontal ligament [2]. Therefore, with luxated teeth atraumatic stabilization as quickly as possible is desired [11]. Use of orthodontic appliances allows splinting with minimal trauma to the affected teeth [11]. This negates the need for manual repositioning of traumatized teeth. In such cases orthodontic repositioning enables slow repositioning and marginal bone repair. Manual repositioning produces a secondary trauma; this will cause further damage to the neurovascular bundle and periodontal ligament thereby jeopardizing the vitality of the teeth. Gentle slow repositioning of teeth with an orthodontic splint is the atraumatic alternative that may prevent loss of vitality, encourage periodontal ligament healing and prevent ankylosis.

The international association of dental traumatology guidelines recommends splinting types that are flexible. Orthodontic splinting allows stabilization of severely malposition teeth with flexible wires. Thus, cases like this one with a severely displaced tooth can be well managed.

A general dentist, paediatric dentist or an orthodontist can provide this type of splint without special training [8,12]. This type of splint is atraumatic, simple and quick. No wire bending, or composite manipulation was required.

This type of splint allowed easy clinical evaluation as the wire can be removed to assess mobility and periodontal healing.

Orthodontic splints also maintain physiological mobility [13].

The brackets also allow for minimal disturbance to the patient's occlusion, maintenance of good oral hygiene and do not irritate gingival tissues (if this does occur wax can be provided) [11].

Conclusion

In conclusion Orthodontic splinting should be considered as a viable treatment option for treating dental trauma.

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