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An Unexpected Accident with Orthodontic Headgear: Do We Need Another Safety Mechanism? Case report

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Abstract

Headgear is a common method of increasing orthodontic anchorage and it is crucial that operators/patients remain informed on potential risks and how to minimise them.

Introduction

In 1988, Rygh and Moyers defined orthodontic anchorage as resistance to tooth displacement. More recently, Proffit described it as those sites, which resist the reactive forces of orthodontic appliances, to avoid unwanted tooth movement [1]. Whatever the definition, anchorage consideration when planning orthodontic treatment is fundamental.

Over the years, orthodontic clinician have developed various methods for anchorage controlling. These include headgear, trans-palatal and lingual arches, [2] lip bumpers,[3] functional appliances, [4] anchorage bends, [5] stopped arches and utility wires, [6] inter-maxillary elastics and stationary anchorage, ankylosed teeth, [7]and temporary anchorage devices (TAD) [8]. The use of headgear has remained relatively common in the United Kingdom using the contemporary design, NITOM locking facebow[9].

In general, headgear is mainly used for anchorage reinforcement, to hold molars in position whilst making maximum use of extraction space, or as an active appliance to move the teeth distally. As headgear traction uses relatively high force; the safety aspect of headgear has always been a concern for the orthodontist and patient. Additionally, several iatrogenic effects have been recorded in the literature and these include nickel allergy reaction and extra and intra-oral injuries (Table 1). Postlethwaitein and Stafford illustrated different ways to avoid such accidents (Table 2) [10,11].

The British Orthodontic Society's recommendations include at least two safety mechanisms, one to allow early safe release of the facebow under excessive strain, whilst the other should prevent spring-back of the bow (anti-recoil mechanism) towards the patient as well as thorough verbal and written instructions on how to wear the headgear and the safety mechanisms. An unreported cause of potential facial injury from headgear is presented in this paper.

Table 1: complications associated with the use of headgear in orthodontics

Teeth related	• Distal tipping of the molar teeth • Buccal flaring of the molars • Cross bite effect
Patient related	• Patient Cooperation • Social impact
Injuries	• Facial tissue injuries and eye injury with its serious consequences (impaired vision, loss of eye, sympathetic opthalmitis, and cavernous sinus thrombosis). • Intra-oral injuries as a result of disengagement or during insertion such as trauma to the gingiva or oral mucosa
General problems	• Nickel allergy • Pain

Table 2: Safety mechanisms of headgear in orthodontics

1.	Safety headgears (anti-recoil device)
2.	Locking mechanism ''Nitom'' (Samuels, 1993)
3.	Safe or blunt end
4.	Locating elastics
5.	Rigid safety neck strap (Masel)
6.	Re-curved reverse entry inner bow (Lancer Pacific)

Case presentation

A fit and healthy 14.5 years old female presented with Class II division II malocclusion on a mild Skeletal II base with reduced maxillary mandibular planes angle (MMPA) and anterior facial height. There was mild crowding in the upper and lower arches. The upper left lateral (22) was absent, upper right lateral (12) diminutive and the upper left deciduous canine was retained (Figure 1 and 2).

An orthopantomograph (OPT) confirmed the missing 22 and showed good root morphology of the 12.

Various treatment options were explained to the patient and she and her parents opted to open space for the missing 22 and to

Figure 1: Initial intra-oral photographs of the patient malocclusion (upper, lower, right, frontal and left views)

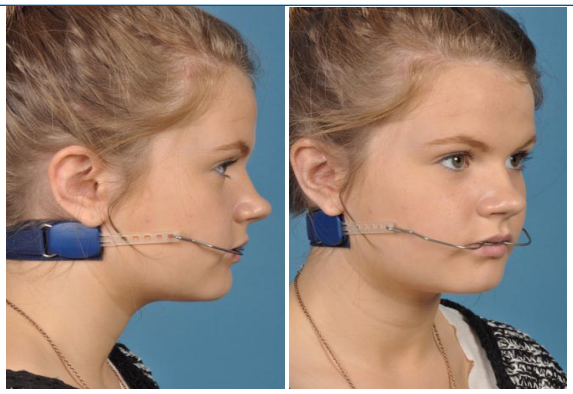

Figure 2: Patient wearing a Kloehnfacebows with low pull headgear appliance

build up the diminutive 12 to normal size.

At almost 8 months into treatment, the patient called the emergency clinic complaining that the headgear had broken. The patient was seen the same day, and the parent explained that the facebow broke two hours into the wear time whilst the patient was sitting doing her homework. There was no facial or ocular trauma associated with this accident. A close examination showed the metal fracture had occurred on the outer bow just before the soldered area of the joint between the inner and outer bow. The fracture surfaces were clean, without any obvious defect (Figure 3). A new facebow was adjusted and given to the patient.

Discussion

There are several possible reasons for the failure of the stainless steel bow.One reason may be the work hardening of the stainless steel due to the extended use (8 months).Another reasons are

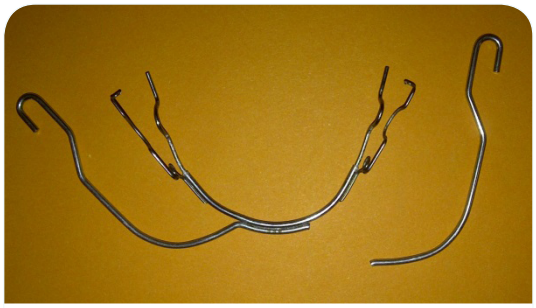

Figure 3: A broken outer bow of Kloehnfacebows

wire exhaustion during the initial adjustment, miss-use by the patient, manufacturing defect or combination.

Possible solutions to avoid such problem may include regular replacement of the facebow every 6 month to avoid steel hardening. Additionally, it is suggested that manufacturers could add a plastic sheath over facebow frame, which would keep the bow in one piece if it fails, also this maneuver could help reducing nickel allergy. Furthermore, both clinicians and patient should exercise extra care in adjusting and handling facebow respectively.

Summary

The use of the facebow with headgear to increase orthodontic anchorage should be combined with a comprehensive discussion of their risks. This paper highlights an unreported case of facebow failure and the authors suggest number of ways to prevent this type of failure.

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