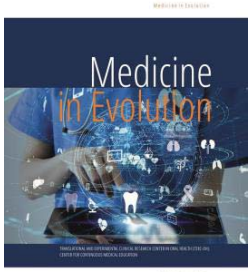
Comperison between an aesthetic metal free band-and-loop space maintainer and a metal one



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Abstract

This paper deals with the use of a device similar in design to the band-and-loop space maintainer, but with a better aesthetic component. The manufacture of this device is made of aesthetic, elastic materials, which will not compromise the ability to maintain adequate space on the dental arches and will not interfere with the eruption of permanent teeth. The ability to provide greater comfort to the patient compared to the classic maintainers was also pursued.

A case of a bilateral second temporary molar loss was chosen to apply a classic stainless steel space maintainer and the aesthetic one, obtained from a thermoplastic material (Vertex Thermosense).

The essential conditions that any space maintainer are met by the appliances: both managed over time to maintain the mesio-distal dimension of the apparent edentulous gap, to withstand in time from a structural and dimensional point of view, it also did not disturb the normal functionality of the stomatognathic system.

Keywords: thermoplastic resin, space maintainer, metal-free, aesthetic

INTRODUCTION

One of the most important factors influencing the growth and development of the stomatognathic system is the maintenance of a suitable space for the correct alignment of permanent teeth on the dental arches, or in other words the management of the space [1]. The reduction of the space on dental arches due to the early loss of the temporary teeth disrupts the eruption of the permanent teeth, contributing to the installation of dento-maxillary anomalies, which will require complex and expensive treatments [2].

The space maintainer is a relatively simple device, with the help of which we have the possibility to maintain an adequate space at the level of the dental arches until the eruption of the permanent replacement teeth, without interfering with it [3]. Preservation of this space counteracts the appearance of dento-maxillary anomalies with beneficial consequences on the dento-maxillary system.

For a long time, different types of space maintainers have been used successfully in paediatric dentistry practice. One of the most used space maintainers is the band and loop [4]. This metal device ensures optimal control of the space, without interfering with the eruption of permanent teeth. A disadvantage of this space maintainer is its aesthetic performance, which leaves much to be desired [5].

Aim and objectives

This paper deals with the use of a device similar in design to the band-and-loop space maintainer, but with a better aesthetic component. The manufacture of this device is made of aesthetic, elastic materials, which will not compromise the ability to maintain adequate space on the dental arches and will not interfere with the eruption of permanent teeth. The ability to provide greater comfort to the patient compared to the classic maintainers was also pursued.

The performance of the aesthetic space maintainer space will be correlated with that of the classic stainless steel one, made of metal alloys, following its resistance over time, keeping the space on the arch, the comfort level offered to the patient and its dimensional stability.

MATERIALS AND METHODS

To obtain the aesthetic space maintainer, a case of an 8-year-old patient was selected, that had early loss of the lower second molars. In order to be able to make a comparison between the classic band and loop made of stainless steel and the aesthetic space maintainer, it was decided to apply both, on different quadrants.

After selecting the case, an impression of the lower arch was taken, using an alginate irreversible hydrocolloid, Hydrogum 5 from Zhermack, in a standard plastic tray. After making the impression, it was sent to the dental laboratory for the laboratory steps.

A class III plaster dental cast was made based on the impression, and after, a duplicate cast was obtained to design the wax model of the future space maintainer (Fig. 1).

Figure 1. Wax-up model of the future space maintainer

After making the wax-up model, it is packed in a special metal injection sink, with plaster of class III. Wax pouring rods were installed, with a diameter of 5 mm. Because the maintainer is small, it was packaged together with other prosthetic works (Fig. 2), then, the second part of the conformer is poured.

Figure 2. Investing of the wax pattern

After the plaster setting, the sink is immersed in hot water to wash the wax inside. At the end of this stage, the packing sink is kept at a temperature of 30 - 40 °C. This is followed by insulation of the sink using Thermoflow from Vertex. After insulating the sink, the thermoplastic material is injected at a temperature of 290 °C for 17 minutes. ThermoSens from Vertex was used for injection. This is a monomer-free, polyamide-type injectable material with high elastic fracture resistance. It has a low allergenic risk and is available in several shades to facilitate the aesthetic effect of the future work.

At least 30 minutes after pouring, the space maintainer is unpacked and the processing and polishing starts. For this stage, different burs and polypants are used, specially designed for the processing of this material. After completing the technological stages, the aesthetic space maintainer is brought to the dental office for the next clincal steps (Fig. 3).

Figure 3. Aesthetic space maintainer

RESULTS

The patient was called back for the intra-oral check and the adaptation of the maintainer. The aesthetic space maintainer adapts intimately to the permanent first molar, without the need for further processing and adjustments. After that, the cementing step is performed in the patient's oral cavity.

For the cementing stage, RelyX Unicem 2 Automix from 3M ESPE was used, a dual cement based on resin, two-component, self-adhesive, with self-curing reaction, but which can also be photo-activated. The space maintainer and the tooth was cleaned and isolated with cotton rolls. The self-adhesive cement was applied to the space maintainer with the help of special cannulas, after which it was applied in the oral cavity, on the lower first permanent molar. The cement was then photopolymerized for 1-2 seconds to facilitate cleaning of excess material. The dual cement makes the final setting 6 minutes after mixing the two components.

After cementing, the occlusion was checked with articulation paper and it was observed that no adjustments were necessary for adaptation (Fig. 4).

Figure 4. Intraoral aspect of the space maintainer after cementation

Because an aesthetic comparison of a metal space maintainer and the space maintainer made by injecting a thermoplastic material was desired, the first one was also applied on the contralateral hemiarch, according to the classical technique (Fig. 5).

Figure 5. Classic space maintainer cemented on the other quadrant

The patient presented for a check-up after a period of 4 months, to check the changes over time on the aesthetic space maintainer, compared to the metal one. It was observed that the aesthetic device maintained its dimensional stability, appearance and integrity over time, without noticeable changes.

DISCUSSIONS

This paper aims to make a comparison between a classic space maintainer and a more modern and aesthetically optimal variant, but the functionality of the aesthetic space maintainer and its clinical viability were also taken into account.

The aesthetic improvement of the new space maintainer is obvious, but the use of a thermoplastic injectable material brings with it certain disadvantages: one of the main disadvantages is the cost which exceeds the cost of a classic space maintainer [6]. Another disadvantage is the process of making this device, which requires special materials and special equipment, which are expensive for the dental laboratory and for the patient and also the technique is more laborious and complicated [7].

For a space maintainer made of this thermoplastic material, processing and polishing is essential, because if they are not made perfectly, the maintainer tends to facilitate the adhesion of bacterial plaque, and the design of the maintainer makes it quite difficult to polish in certain areas. By providing enough space for the eruption of the permanent replacement tooth and not being in contact with the gingivomucosa, optimal hygiene is facilitated. Arikan V et al., 2015, studied the presence of different microorganisms like Candida and Enterococcus faecalis on both fixed and removable space maintainers in patients with high bacterial plaque index [8].

The aesthetic appearance of this device is improved, compared to a classic space maintainer, offering a satisfactory result and better compliance from the paediatric patient.

Another advantage of the aesthetic maintainer is the ease of the clinical stages performed by the dentist, limiting it to the impression stage and the cementing one. At the same time, the patient's comfort increases, the sessions being few and short [9].

The essential conditions that any space maintainer are met by the both appliances: both managed over time to maintain the mesio-distal dimension of the apparent edentulous gap, to withstand in time from a structural and dimensional point of view, it also did not disturb the normal functionality of the stomatognathic system [10].

CONCLUSIONS

Following the realization of this aesthetic space maintainer, it was concluded that it can be a viable variant of the stainless steel band-and-loop one because it meets the essential requirements of a space maintainer.

The difficulties in making this device do not influence the dental clinician in performing the clinical steps, on the contrary, they are reduced in time and number, which makes it easier for the dentist to opt for such a space maintainer.

The main disadvantage being the cost and the technical stages of realization, not interfering with the fundamental characteristics of the space maintainers, it remains that the choice between such a maintainer and the classic one, to be made by the patient.

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