



FABRICATION OF MAYNE'S SPACE MAINTAINER FOR PREMATURE LOSS OF DECIDUOUS TEETH

PEMBUATAN MAYNE'S SPACE MAINTAINER UNTUK KEHILANGAN PREMATUR GIGI SULUNG

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ABSTRACT

Background: Premature loss for deciduous teeth is defined as the teeth that fall out before approaching the time of eruption of their replacement permanent teeth regardless of the reason for the loss of the teeth. The premature loss of deciduous teeth can cause the teeth next to the edentulous area to shift and lose arch space causing permanent teeth to grow abnormally. Prevention can be done by using Mayne's space maintainer so that the negative impact of premature loss does not occur. **Purpose:** Report the fabrication of Mayne's space maintainer in premature loss case. **Case analysis:** The laboratory accepted a working model with a case of premature loss in tooth 74 and was asked to make the Mayne's space maintainer. **Result:** This appliance consists of a molar band attached to tooth 75 with a 0.9 mm loop that is soldered on the buccal of the molar band. **Conclusion:** It is concluded that fabrication of Mayne's space maintainer in the case of premature loss of tooth 74 includes the preparation of a working model, adjustment of the molar band on tooth 75, making the loop, followed by soldering the loop to the molar band, finally the finishing and polishing.

ABSTRAK

Latar belakang: Premature loss adalah gigi sulung yang tanggal sebelum waktu erupsi gigi permanen penggantinya tanpa memperhatikan penyebab hilangnya gigi tersebut. Premature loss pada gigi sulung dapat menyebabkan gigi di sebelah daerah edentulous bergeser dan kehilangan ruang lengkung yang menyebabkan gigi permanen tumbuh tidak normal. Pencegahan yang dilakukan agar dampak negatif kehilangan prematur tidak terjadi dilakukan dengan menggunakan Mayne's space maintainer. **Tujuan:** Melaporkan fabrikasi Mayne's space maintainer pada kasus premature loss. **Analisis kasus:** Laboratorium menerima model kerja dengan kasus kehilangan dini pada gigi 74 dan diminta untuk membuat Mayne's space maintainer. **Hasil:** Alat ini terdiri dari pita molar yang dipasang pada gigi 75 dengan loop 0,9 mm yang disolder pada bukal pita molar. **Kesimpulan:** Fabrikasi Mayne's space maintainer pada kasus kehilangan dini gigi 74 meliputi persiapan model kerja, penyetelan pita molar pada gigi 75, pembuatan loop, dilanjutkan dengan penyolderan loop ke pita molar, terakhir finishing dan pemolesan.

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INTRODUCTION

Premature loss is a common dental problem in children (Al-Meedani *et al.*, 2020). It is meant as the loss of teeth in oral cavity before the normal expected period. Another definition are deciduous teeth that fall out before the eruption time of their replacement permanent teeth approaches (Herawati *et al.*, 2015), or a condition in which the primary teeth are lost before the permanent teeth are ready to erupt (Phulari, 2011). When this happens, it can lead to orthodontic problems.

According to Premkumar (2008) and Nayak *et al.* (2004) the main causes of premature loss of primary teeth are trauma and caries. Other causes of premature loss of primary teeth include ectopic eruption, congenital abnormalities and arch length deficiency leading to resorption of primary teeth (Tunison *et al.*, 2008). As a result of the war, in Syria, tooth extraction is often an option for dental caries and pulpal disease. The lower left primary molar was the most commonly afflicted tooth (Salim *et al.*, 2022).

Under normal conditions, if a primary tooth falls out, a permanent tooth will be replaced. If there is a disturbance due to certain pathological conditions, so that a premature loss occurs. This can cause the remaining teeth to shift and space lost is occurred, so that the permanent teeth grow abnormally. The most common conditions being crowding, supra-eruption, and impaction (Albati *et al.*, 2008).

Research conducted by Reddy *et al.* (2018) in Khammam city, Telangana State, India against 1200 respondents (aged 6-10 years), found the prevalence of premature loss of primary teeth in 162 children (13.5%). Another study conducted by Ahamed *et al.* (2012) in Chidambaram Town, India with 1121 children as respondents (aged 5-10 years) showed that 185 children (16.5%) experienced premature loss. The placement of a space maintainer is highly recommended for premature loss cases in order to prevent abnormal growth of permanent teeth, maintain adequate space for new teeth so that they can erupt naturally in an aligned position (Garg *et al.*, 2014; Pawar, 2019; Souror *et al.*, 2019; Subramaniam *et al.*, 2008).

There are several types of space maintainers, each with their own advantages and disadvantages. Space maintainers can be unilateral or bilateral, and can be fixed or removable. Fixed space maintainers are relatively easy, because the risk for damage, loss and detachment is lower compared to removable appliances. In general, band and loop types are used more often than other types, it is based on the strength of band and loop (Laing *et al.*, 2009). Retrospective study in England showed that band and loop lasted the longest of all appliances, with time lasted a median of 13 months (Ozudogru and Tosun, 2021).

Moses *et al.* (2018) reported a fixed orthodontic appliance called *Mayne's space* maintainer, which is a band and loop space maintainer with the addition of a single loop on the buccal side. This device can be used in conditions of rotational abutment teeth, near-eruption of permanent teeth or misalignment that can interfere with the growth of permanent teeth. The use of this appliance for 6 months in the case of missing tooth 74 managed to restore the position of tooth 75 which moved 1.5 mm towards the missing tooth space. The advantages of this appliance are that it is easy to produce, the patient can accept it well and has proven to be an alternative appliance for orthodontic treatment. The purpose of this paper is to find out how to make *Mayne's space* maintainer in cases of premature loss of primary teeth.

CASE STUDY

The dental laboratory received mandibular dental cast in mixed dentition period. Existing teeth were 36, 75, 73, 32, 31, 41, 42, 83, 84, 85 and 46. It was instructed to make *Mayne's space* maintainer on a lower dental cast with a premature loss 74 with the design can be seen in Figure 1.

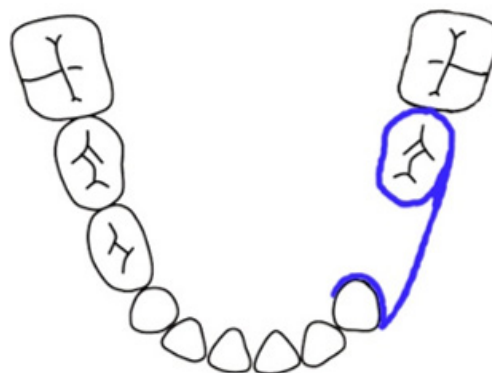


Figure 1. Appliance design

RESULT

The procedure for making *Mayne's space* maintainer includes model preparation, band adjustment, loop making, soldering and polishing can be seen in Figure 2 until Figure 5. The results of *Mayne's space* maintainer fabrication can be seen in Figures 5(b) and Figures 5(c) where the molar band is well attached to tooth 85 and the arm well adapted to the distal contour of tooth 83.

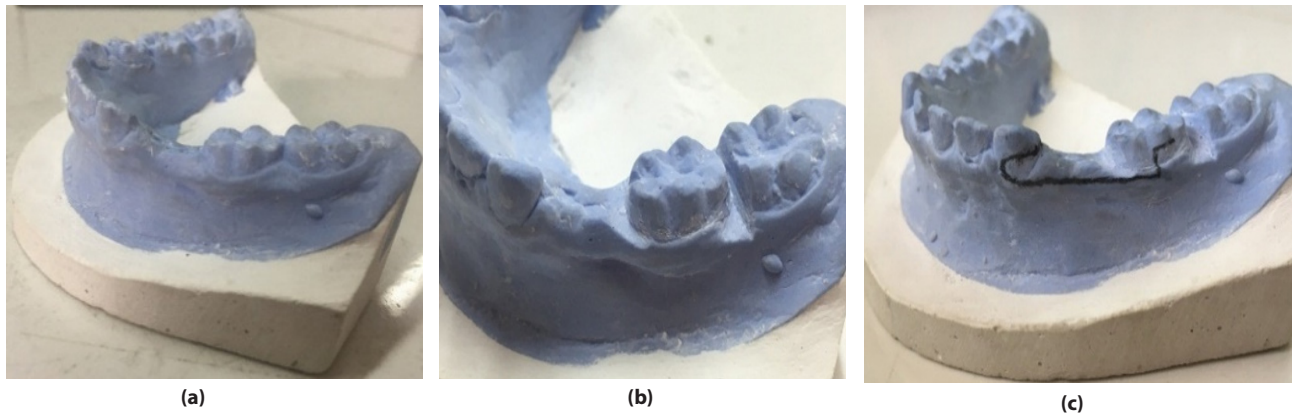


Figure 2. Model preparation: (a) Mandibular dental cast with premature loss of the left first molar; (b) Trimming the area around the abutment teeth; (c) Drawing the loop design

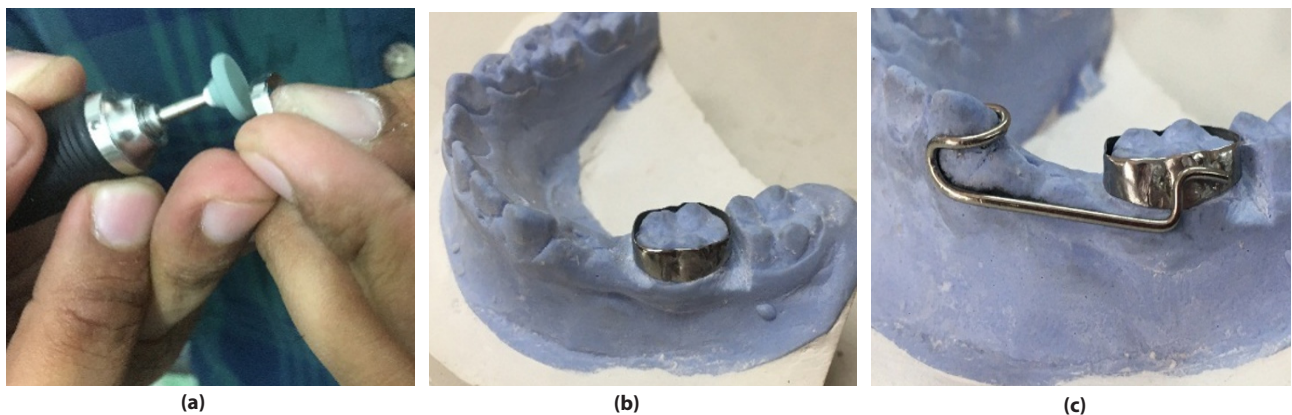


Figure 3. Band adjustment: (a) Adjusting the size of the molar band with the abutment teeth. The height of the molar band is reduced so that it matches the abutment teeth; (b) Molar band fitted to abutment teeth; (c) Making the loop according to the design

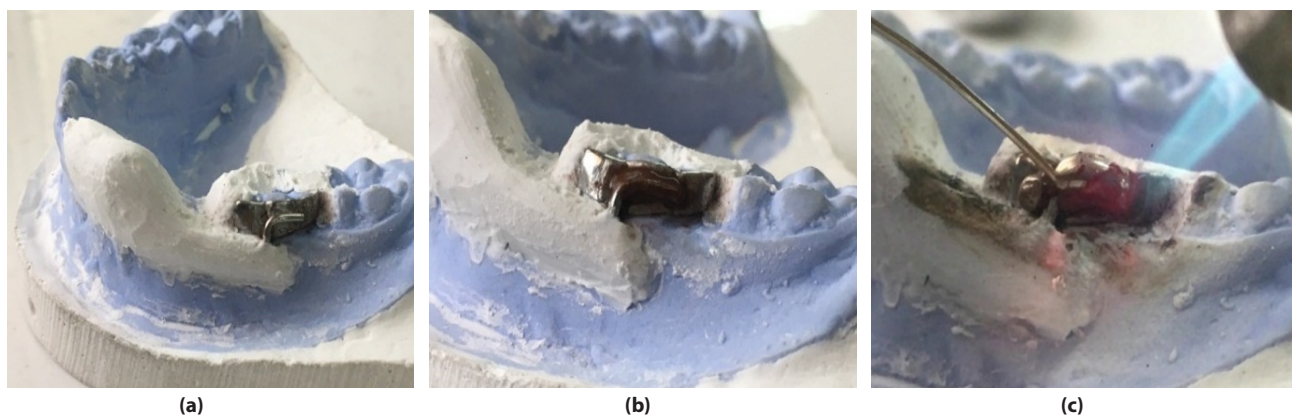


Figure 4. Soldering: (a) Fixation of the loop and molar band with dental plaster; (b) Dental flux applied to the joint of the molar band and the loop; (c) Soldering using silver alloy material.

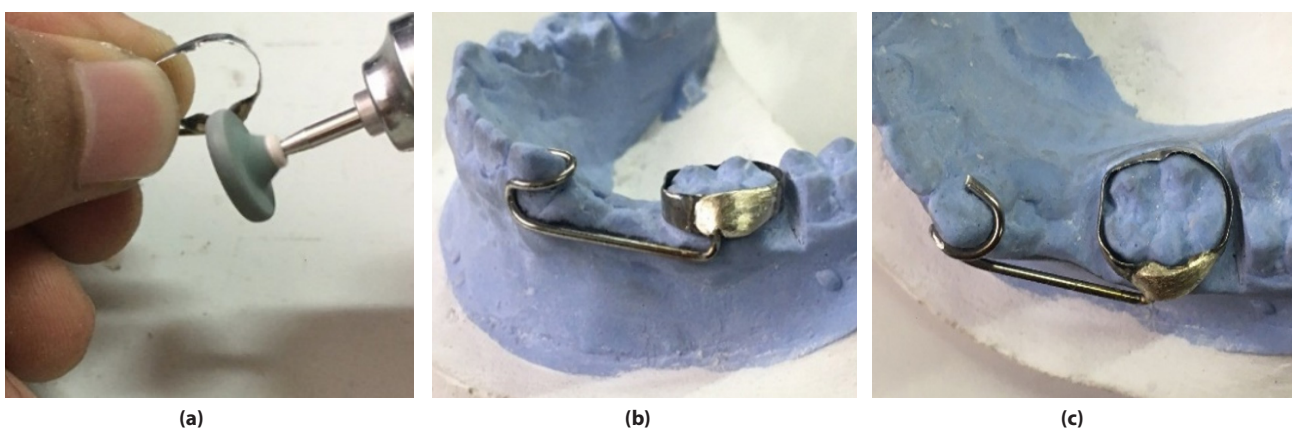


Figure 5. Finishing: (a) Finishing followed by polishing; (b) The final result (buccal aspect); (c) The final result (occlusal aspect)

DISCUSSION

Primary dentition is important in the guidance of permanent teeth eruption (Gawali *et al.*, 2020). Primary teeth that fall out long before the replacement teeth erupt without regard to the cause of the tooth loss is the definition of premature loss. Generally it is caused by trauma, ectopic eruption, congenital abnormalities and arch length deficiency that causes resorption of primary teeth, but the most common cause is caries in primary teeth (Tunison *et al.*, 2008). Premature loss causes teeth that are adjacent to the space loss their resistance to pressure, so that they can drift to the space (Negi K. S., 2010; Sjahruddin, 2015). Problems such as crowding, supra-eruption and impaction are the most common consequences in these cases (Albati *et al.*, 2008).

Prevention of abnormal permanent teeth growth caused by premature loss should be taken, to maintain adequate space for new teeth to erupt naturally in an aligned position (Acharya and Tandon, 2011). Under normal conditions, primary teeth play an important role to maintain the natural arch, but if the primary teeth have fallen out prematurely, a space maintainer is highly recommended (Albati *et al.*, 2008). Although crown and pontic space maintainer seems more durable than the common band and loop (Eshghi *et al.*, 2018), the most frequently used appliance for premature loss cases is band and loop (Laing *et al.*, 2009). Band and loop space maintainer showed better result both in terms of survival rates and success rate (Ozudogru and Tosun, 2021). However, if there are cases with rotational abutments, and permanent teeth approaching the time of eruption or if the usual loop can prevent eruption of permanent teeth, band and loop can be modified to *Mayne's space* maintainer (Savitri *et al.*, 2014).

Mayne's space maintainer uses a loop that is soldered to the buccal molar band, this appliance has the advantage of being easy to produce and relatively more comfortable when used by the patient, because it only uses one part of the loop that is soldered to the buccal part of the molar band (Moses *et al.*, 2018). This appliance does not interfere with the growth of the replacement tooth, and the only disadvantage of this space maintainer is that it is a non-functional device, although this is not a problem if used in cases where it does not require supra eruption prevention of the antagonist tooth (Savitri *et al.*, 2014).

In the fabrication of the *Mayne's space* maintainer, the first thing to do is to evaluate the working model. In this case, there is premature loss of tooth 74, but teeth 75 and 73 have not shifted to the space. The area near teeth 75 (mesial portion of tooth 36 and the cervical region of tooth 75) was trimmed using a scalpel, so that the molar band could be attached. The diameter and the height of the molar band should be fit to tooth 75.

The next step was making the loop using 0.9 mm stainless steel wire. The end of the wire being placed on the lingual part of tooth 73 just above the cingulum, and another end of the wire is bent distally in contact with the buccal surface of the molar band and this part will be soldered to the molar band. Then, all parts of the loop and the molar band were fixated using dental plaster, except for the area to be soldered. The dental plaster protected the molar band and loop from overheating during the soldering process.

Before soldering, the joint between the molar band and the loop was smeared with dental flux. Dental flux is a material that has a composition of borax and fluoride. The function of dental flux is to remove the oxide layer and protects the metal surface from oxidation during the soldering process (Anusavice *et al.*, 2012). Soldering is the process of joining metals by heating them and adding filler material, in this case using a silver alloy which has a melting point of less than 450°C (Premkumar, 2015). After soldering, finishing and polishing are carried out. Finishing is a step to level the metal surface and remove residual metal oxidation during the soldering process, using a stone. After finishing is done, the last step is polishing, which is the process of smoothing and polishing the metal surface using red rubber, followed by green rubber.

A case report proved that *Mayne's space* maintainer was clinically successful. This appliance has proven to be capable of being used in certain cases with high stability and success. The advantages of *Mayne's space* maintainer are that it is simple to produce, rigid and stable, can be used on semi-erupted teeth as well as on slanted teeth and can maintain space by preventing unwanted tooth shifts (Savitri *et al.*, 2014).

Moses *et al.* (2018) showed that there were several types of space maintainers with various modifications. In conditions where there is difficulty in fabricating a complete loop, *Mayne's space* maintainer can be an option because it has a fairly high success rate (Savitri *et al.*, 2014), so that it can be the right choice for unilateral premature loss cases. Lingual arch is also a space maintainer that can be used to maintain space in the case of premature loss, using 0.9 mm – 1.2 mm wire. The wire end can be soldered to the lingual surface of the molar band or being inserted into a buccal tube (Almuzian *et al.*, 2015). Both appliances are equally capable of preserving the space of premature loss. *Mayne's space* maintainer can be used for cases of unilateral premature loss and the lingual arch more suitable for cases with bilateral premature loss. Therefore, the role of the dentist is very important in selecting the appropriate space maintainer based on clinical conditions, oral hygiene, and the cooperative nature of the patient (Moses *et al.*, 2018).

CONCLUSION

Tooth shift in cases of premature loss can be prevented by the used of Mayne's space maintainer. The fabrication of this appliance begins with evaluating the dental cast, adjusting the molar band, making the loop, soldering the loop with the molar band, followed by finishing and polishing.

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