

One phase prosthetic and orthodontic treatment in children: Case study

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Abstract

Background: Dental trauma in children is reported about 25–33%. Besides dental trauma, children are also at high risk for malocclusion. The prevalence of malocclusion in children was reported as 39% in children and 93% in adolescents. If the patient has malocclusion and a history of tooth loss due to trauma at the same time, there is often a dilemma as to which treatment should be prioritized. This case report will combine the Prosthetic phase and the orthodontic phase at the same time. Case reports regarding denture-modified removable orthodontic appliances in children have so far not been found. Case Report: An 11-year-old boy came with his mother to pediatric dentistry department at Universitas Airlangga with the chief complaint of missing teeth due to extraction at the dentist two years ago due to trauma. On intraoral clinical examination, it was found missing 11, crossbite 21 with 31 and 32. Case Management: Patients were planned treatment of malocclusion with removable orthodontic appliances added with riding pontic 11. Discussion: Tooth loss in children will affect speech, eating, and self-confidence. Several authors have reported appliance modifications and reported satisfactory results. During malocclusion treatment, dentures may not provide optimal aesthetic results. However, the advantages provided by the presence of dentures during the treatment of malocclusion are considered to be greater. Conclusion: Modification of removable orthodontic appliances combined with dentures can be a solution to both prosthodontic treatment needs and malocclusion.

Keywords: Dentures; Malocclusion; Children; Good health; well-being

1. Introduction

Cases of trauma to the teeth are reported to occur mostly in preschool, school-aged, and adolescent children. A study that summarized reports of dental trauma for 12 years reported that: 25% of school-age children experienced dental trauma and 33% of adolescents aged less than 19 years had experienced dental trauma [1]. Various options for treating trauma to young permanent teeth start from the simplest: observation, filling, smoothing, repositioning, replanting, fixation, root canal treatment, and extraction. Permanent tooth extraction due to trauma causes premature loss of permanent teeth and leaves an edentulous area [2]. Losing teeth will have an impact on confidence, speech, and eating patterns [3].

Malocclusion is defined as the condition of irregular teeth or false relationships in the dental arch beyond normal limits [4]. According to the WHO, malocclusion is the main oral health problem after caries and periodontal problems. The prevalence of malocclusion is reported at around 39% in children and 93% in young adults [5]. Malocclusion is reported to reduce the quality of life of individuals and have a negative impact on emotional and social behavior [6]. Several treatment plans can be carried out, starting from preventive, interceptive, and corrective [7].

Most of the time, patients who experience tooth loss also require malocclusion treatment at the same time. This raises a dilemma where the period of treatment for malocclusion is generally relatively long, but at the same time, the patient

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still needs an aesthetic appearance during the treatment of malocclusion. As a solution, this case report will discuss the treatment of malocclusion combined with denture treatment.

2. Material and methods

2.1. Patient and observation

2.1.1. Patient Information

An 11-year-old boy came with his mother to the pediatric dentistry department at Universitas Airlangga with a complaint that his upper front teeth were falling apart and missing due to the extraction of tooth 11 at the dentist 2 years ago due to a fall. The patient's mother said that all this time her son was not confident when he smiled. During the initial meeting, the child does not talk much. The report showed good general health, no history of allergies, and no medical history of case management.

2.1.2. Clinical Findings

On extraoral examination, there were no abnormalities; the face was symmetrically balanced; the patient's profile was straight (figure 1).

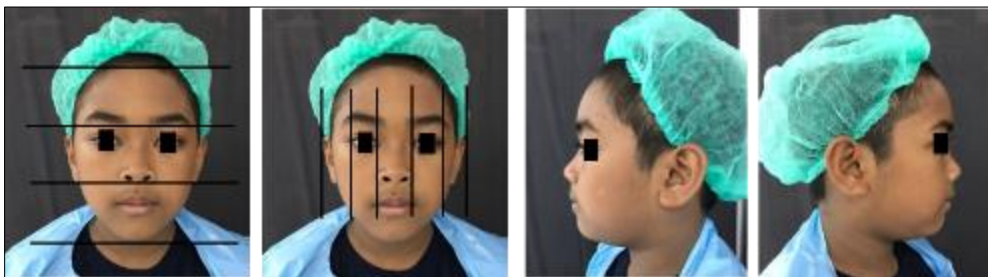


Figure 1 Extraoral examination

Intraoral clinical examination and odontogram revealed a missing 11, crossbite 21 with 31 and 21, edge to edge 22 with 32 and 33. 12 caries media, 85 caries media, 18,17,13,23,27,28,38,37,45,47,48 unerupted (figure 2),

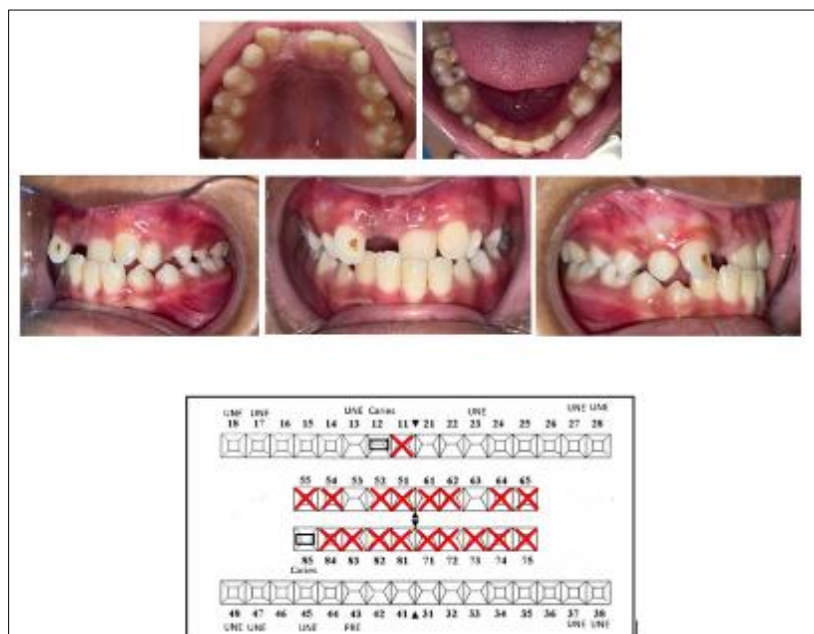


Figure 2 Intraoral examination

Plaque and calculus all over the region. The etiology of crossbite 21 with 31 and 21 is the persistence of the primary teeth according to the history given by the patient's mother. The patient's permanent molar relationship is Class I Angle, overjet -1mm and overbite +2mm.

2.1.3. Diagnostic assessment

Radiological investigations using a panoramic photo technique (figure 3) showed 11 missing, 53 resorption of the middle 1/3 of the root without a layer of bone, 63 resorption of the apical 1/3 of the root, and 85 resorption of the cervical 1/3 of the root without a layer of bone. No fracture lines were found in the dentoalveolar, mandible, or maxilla. The patient's condyle is normal with a round shape. Radiological investigations using photo cephalometric techniques showed cervical maturation stage III (figure 3).



Figure 3 Radiographic examination

Cephalometric analysis showed SNA 84°, SNB 81°, ANB 3° and concluded that the patient had skeletal class I. The space analysis showed an estimated maxillary space shortage of -1mm, and a mandibular excess of +2mm.

2.1.4. Diagnosis

The diagnosis made in this case was Angle class I dentoskeletal malocclusion with missing 11, anterior crossbite 21 with 31, 32, edge to edge 22 with 32 and 33.

2.1.5. Dental interventions

The preliminary treatment carried out on the patient was scaling, 12 filling, 53 extraction, and observation of 63 and 85. Malocclusion treatment of the patient will be corrected using removable orthodontic appliances with a posterior bite riser and screw in 21. The removable orthodontic appliance will be modified by adding a riding pontic 11 (figure 4).



Figure 4 Modification of appliance

So that during the treatment of malocclusion space 11 can be maintained and the patient can already benefit from the use of dentures. Riding pontic 11 is positioned more buccally, in accordance with ideal conditions, so that when 21 jumping, it is expected that riding pontic 11 and 21 are on the same curve.

2.1.6. Follow-up and outcome of interventions

Patients and parents are instructed to have regular check-ups, but because of the pandemic, sometimes patients can't. During control, subjective and objective examinations were carried out. Each control device will be activated to correct the patient's malocclusion. Patients were also instructed to remove the appliance while eating and to clean the appliance regularly at night. After using the device for 3 months, the patient's crossbite was corrected (figure 5).



Figure 5 Anterior crossbite was corrected

Subjective examination during control shows that children are more daring to smile and show more cheerful attitude.

2.1.7. Patient Perspective

The patient feels satisfied with the treatment result. Patient now have confidence to smile and talk to people.

2.2. Informed Consent

The informed consent is provided by the Dental and Oral Hospital of Airlangga University and given to the patient's parent. The patient's parent agreed to the informed consent, including their children picture posted.

3. Discussion

Loss of anterior teeth is a non-ideal condition that causes the most discomfort to the patient. Schuurs reported that the loss of anterior teeth is more of a concern than the loss of posterior teeth. This is due to the position of the exposed teeth when talking, eating and laughing. There are many alternatives that can be done to treat missing teeth, both fixed and removable dentures.

Prosthetic treatment is generally the final treatment of a treatment plan. When all the conditions of the oral teeth are in ideal condition, dentures can be made. However, in some cases, Prosthetic treatment can be done together with malocclusion treatment. Case reports regarding denture-modified removable orthodontic appliances have so far not been found. However, several journals have reported device modifications during the treatment of malocclusion. The article written by O'Rourke [8] states that temporary pontics, also called riding pontic can be an alternative to losing teeth during malocclusion treatment. Riding pontic provides instant gain, increases patient confidence and motivation during malocclusion treatment. In addition, riding Pontic is considered fast and inexpensive. Riding pontic can be applied to a removable device, attached to a bracket, attached to an archwire, attached to a transpalatal arch or attached to a retainer, either a Hawley retainer or a clear retainer. Riding pontic materials can be made from the patient's natural teeth or artificial teeth.

A case report on Angle class II dentoskeletal malocclusion in a 13-year-old boy patient with missing teeth 21 with appliance modification [9]. This case report reports the use of riding pontic 21 during the treatment of two-phase malocclusion. The first phase uses a riding pontic 21 on a twin block, the second phase uses a riding pontic attached to a bracket. The treatment is reported to give satisfactory results. Another case report shows the use of riding pontic 15, 25, 26 attached to a removable transpalatal archbar (TPA) [10]. TPA modification with riding pontic was used during the treatment of malocclusion and gave satisfactory results. In addition to maintaining space, riding pontic on the posterior teeth can help the chewing process. The riding pontic attached to the bracket was reported in the treatment of malocclusion in a 12-year-old female patient [11]. During the treatment of malocclusion, a riding pontic is used to maintain space, improve esthetics and increase patient motivation. The treatment is reported to give satisfactory results.

According to Sharma's case report, during the treatment of malocclusion, riding pontic provides the following advantages: improved esthetics during treatment, prevention of bad habits (tongue thrusting), space can be maintained with the right size for dentures, improved psychosocial status of the patient. According to the case report, the difficulties experienced while using the riding pontic were difficulty controlling inclination when using a round wire, easier with rectangular wire and attachment of the pontic to the bracket may fail during treatment.

The results of treatment with modified appliance in this case report are in line with other case reports reported above. In this case report, the appliance used is a removable orthodontic appliance with a riding pontic 11. The pontic position from which the appliance was inserted has followed the correct curve. Difficulties encountered during the treatment of malocclusion, among others, the riding pontic sometimes becomes unfit due to the change in position of the teeth due to device activation. In addition, the position of the incisal pontic 11 may become misaligned with the position of tooth 21 whose cross-bite has been corrected so adjustments are needed. In this case report, the main complaint of the patient has been corrected but there are still some teeth that are still rotate so that further appliance is needed. Later, after the malocclusion treatment is complete, a new, more fit denture is needed. Often this is considered inefficient. However, this is commensurate with the benefits obtained by patients during the treatment process, including aesthetic improvement, increased self-confidence, prevention of bad habits and motivation to continue treatment.

4. Conclusion

Modification of removable orthodontic appliances combined with dentures can be a solution to both prosthodontic and malocclusion treatment needs.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest

Statement of ethical approval

The informed consent is provided by the Dental and Oral Hospital of Airlangga University and given to the patient's parent. The patient's parent agreed to the informed consent, including their children picture posted.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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