

Modified serial extraction treatment in a patient with congenitally missing lower second premolars

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ABSTRACT

Serial extraction is a sequential plan of premature removal of one or more deciduous teeth in order to improve the alignment of permanent teeth and then removal of permanent teeth to maintain the proper ratio between tooth size and arch size. The aim of this case report was to present a case treated successfully with a modified serial extraction protocol in the lower arch because the patient had congenitally missing lower second premolars with severe crowding. The treatment consisted of selective removal of the deciduous mandibular teeth only (C, D, and E) and no permanent premolar removal. However, the space of the missing second premolars was utilized to resolve the anterior crowding along with the spontaneous closure of the extra spaces by physiologic movement of the permanent mandibular teeth. Whereas in the upper arch conventional serial extraction was performed.

Key words: Congenitally missing second premolars, modified serial extraction, serial extractions, severe crowding

INTRODUCTION

The term serial extraction can be defined as “the correctly timed, planned removal of certain deciduous and permanent teeth in mixed dentition cases with severe crowding to allow the unerupted teeth to guide themselves into improved positions and eliminate the long period of fixed appliance therapy”.^[1]

Serial extraction cases should be diagnosed in the early mixed dentition period. It is most effective in Class I malocclusions, especially where we find marked irregularity of 10 mm or more with normal bite. In such cases, the decrease in tooth mass improves the alignment of anterior teeth and the gingival tissue, thus shortens the orthodontic fixed appliances treatment in later stages.^[2]

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Serial Extraction Pattern^[1]

- Stage I: (Extraction of all deciduous lateral incisors). This stage helps in the alignment of central incisors
- Stage II: (Extraction of all deciduous canines after 7–8 months). This stage helps in the alignment of lateral incisors by providing space for them
- Stage III: (Extraction of all deciduous first molars). This stage stimulates the eruption of all first premolars
- Stage IV: (Extraction of all first premolars after 7–8 months). This stage provides the space needed for canines and stimulates their eruption.

Stage I is performed when the patient has severe crowding in the central incisors region and the deciduous lateral incisors are not yet exfoliated, otherwise stages II to IV are usually the common pattern of serial extraction cases.^[3]

In this case report, the patient has congenitally missing lower second premolars coupled with severe crowding in both arches. Treatment of such a case is not easy and is challenging as the conventional serial extraction is performed to the upper arch,

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while a modified serial extraction treatment protocol was used on the lower arch, only one case was reported in the literature treated similar to the presented case.^[2]

A short period of fixed orthodontic appliance treatment is frequently required following serial extraction for controlled residual space closure and position the teeth into proper occlusion since permanent teeth could erupt with minor malalignment.

CASE REPORT

A 10-year-old male came to the clinic at the Faculty of Dentistry in King Abdulaziz University complaining of irregular teeth and unpleasant smile [Figures 1-4].

On examination, the patient had the following:

- Dental and skeletal Class I relationship
- Normal overbite and overjet
- Severe crowding in the upper and lower arch - more than 10 mm in each arch
- Congenitally missing lower second premolars.

Summary of the Treatment (It was Done in Two Phases) as Follows

Phase I

Serial extraction treatment in the upper arch and a modified



Figure 1: (a-c) Pretreatment extra oral photos

serial extraction in the lower arch. The time duration for this phase was 2 years.

The age of the patient was 10 years when serial extraction treatment started and finished when all his permanent teeth erupted by the age of 12 years. The extractions were done in a serially ordered manner as follows:

- In the upper and lower arches
 - Extractions of all deciduous canines were done to have better alignment of the permanent lateral incisors and to provide space for them.
 - After 5 months, the extractions of all deciduous first molars were done to stimulate eruption of all permanent first premolars.
 - 6 months later, the extraction of the upper deciduous second molars was performed to stimulate the eruption of the upper permanent second premolars in the upper arch. In addition, the extraction of the deciduous lower second molar was done, although the patient has congenitally missing second premolars; the space of the missing second premolar was utilized to resolve the anterior crowding along with the spontaneous closure of the extra spaces by the physiologic movement of permanent mandibular teeth.^[2]
- After 7 months and following the eruption of all the permanent first premolars; extractions of the upper first permanent molars were done to facilitate and allow space for the eruption of the upper permanent canines. However, no extractions of the first premolars in the lower arch were done due to the congenitally missing second premolars.
- 6 months later, all the patient permanent teeth had erupted and his age was 12 years, this is the end of Phase I.

In summary, a total of 14 teeth (12 deciduous teeth and 2 permanent teeth) were serially extracted during Phase I of the treatment as shown in Figures 5 and 6.

Phase II

Fixed appliances treatment

Following the completion of Phase I, and for a period of



Figure 2: Pretreatment intra oral photos showing the severe crowding in both arches

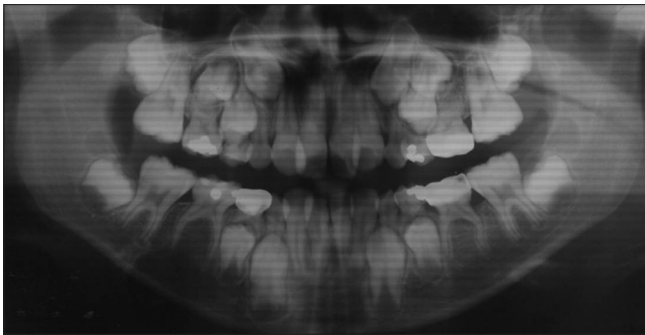


Figure 3: Pretreatment panoramic view showing congenitally missing lower second premolars

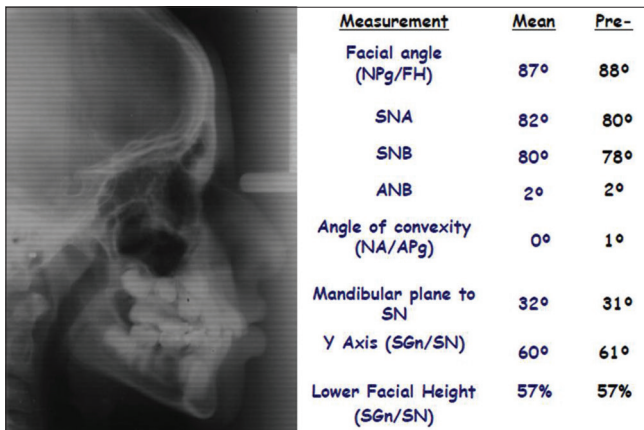


Figure 4: Pretreatment cephalometric view showing skeletal Class I relationship

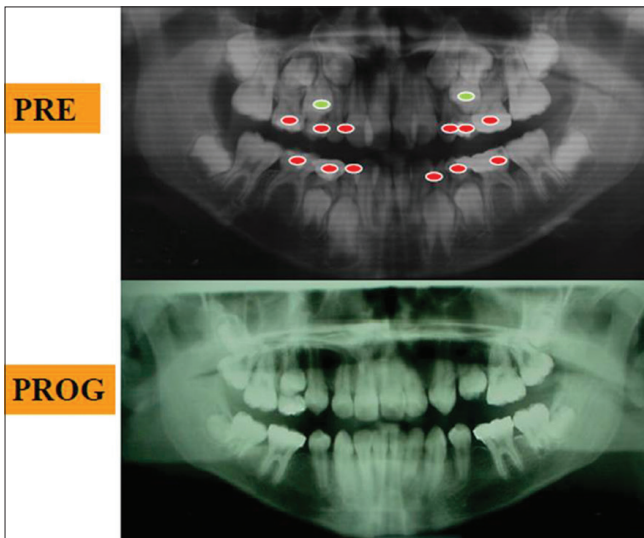


Figure 5: Panoramic radiographs before and after serial extraction (14 teeth were extracted, 12 deciduous - red circle- and 2 permanent upper first premolars - green circle)

6 months, fixed appliance treatment was performed to align the teeth and to close all the spaces as shown in Figure 7.

The treatment overall time duration of both phases was 2 years and 6 months. Following the completion of the treatment,

retainers were placed, Hawley appliance in the upper arch and fixed 3-3 in the lower arch as shown in Figures 8 and 9.

This case was treated successfully with a modified serial extraction plan in the lower arch because the patient had congenitally missing lower second premolars with severe crowding. The treatment consisted of selective removal of the deciduous mandibular teeth only (C, D, and E) and no permanent premolar removal. The space of the missing second premolar was utilized to resolve the anterior crowding along with spontaneous closure of the extra spaces by physiologic movement of the permanent mandibular teeth. Whereas in the upper arch conventional serial extraction was performed.

DISCUSSION

Second premolars are congenitally absent in 2.5–4% of the cases and are bilaterally absent in 60% of such cases.^[2] The treatment options for managing a case during the mixed dentition period with congenitally missing second premolars includes extraction of the corresponding mandibular deciduous second molars and subsequent space closure, maintain the space and then prosthetic replacement, hemisectioning or even retaining the primary second molars.^[4-6] However, if the missing premolars are coupled with severe crowding, such as this case, modified serial extraction approach can be performed by the selective removal of the deciduous mandibular teeth only with no permanent premolar removal. In this case, the space of the missing second premolar was utilized to resolve the anterior crowding along with spontaneous closure of the residual spaces by physiologic movement of permanent mandibular teeth.^[2] Fixed orthodontic appliance treatment is usually followed once permanent teeth erupt, for a short period, to align teeth and close any remaining spaces.^[7-10]

CONCLUSION

Serial extraction is a well-known treatment approach used as an interceptive orthodontic treatment protocol for patients with skeletal and dental Class I relationship and severe crowding. The presented case had congenitally missing lower second premolars. The patient was treated successfully by serial extraction protocol in the upper arch and through modified serial extraction pattern in the lower arch.

The modified serial extraction sequence was C, D, then E and no permanent premolar removal. This protocol was effective in treating severe lower anterior crowding with congenitally missing second premolar teeth.

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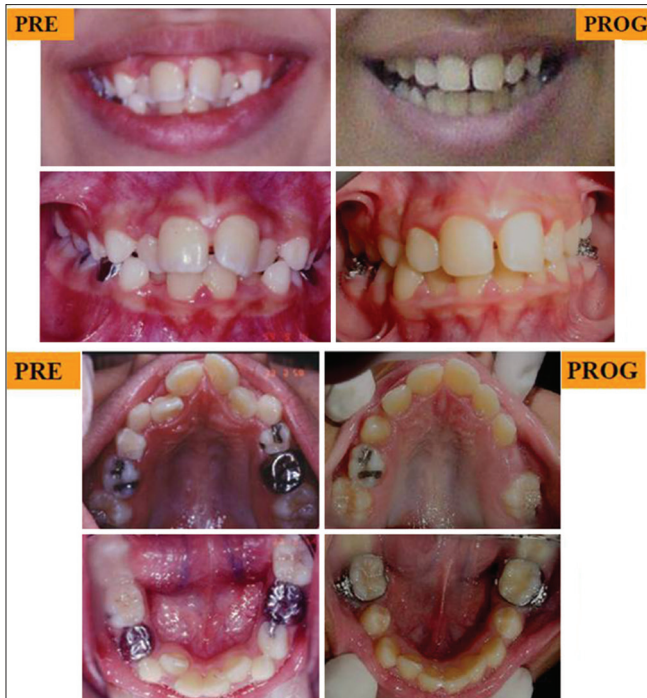


Figure 6: Smile and intra-oral photograph before and after serial extraction



Figure 8: Progress and post-treatment intra-oral photographs after phase I and phase II

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Nil.

Conflict of Interest

There are no conflict of interest.

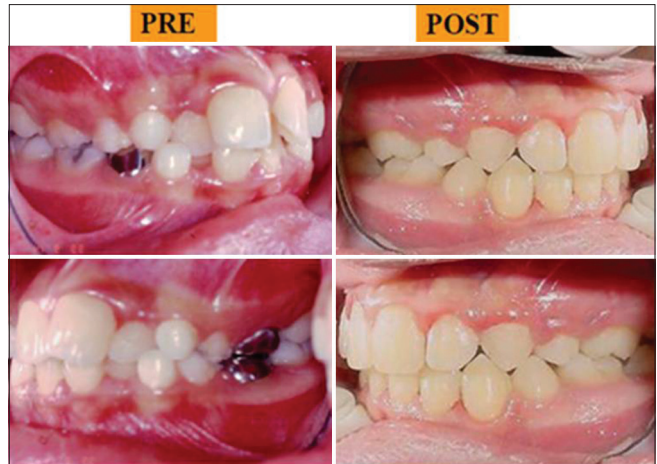


Figure 7: Pre-and post intra-oral side photograph

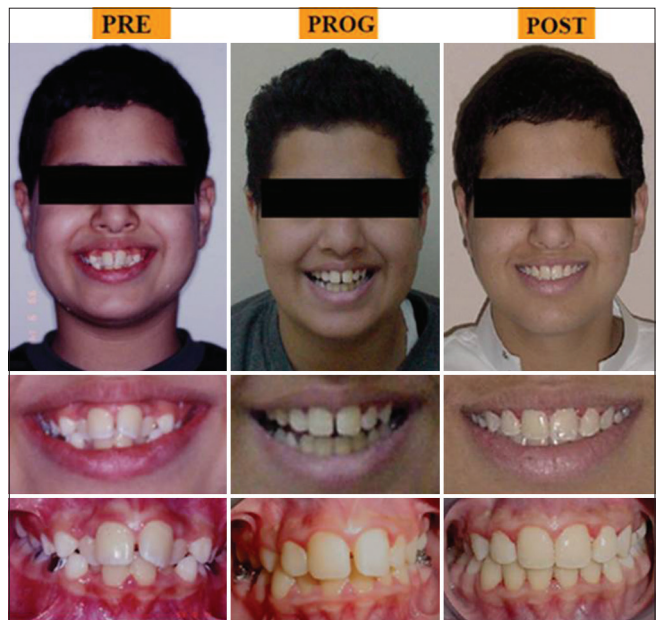


Figure 9: Pre-treatment, progress and post-treatment photograph showing patient smile

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