

Interceptive orthodontics: a headway towards normal occlusion –report of two cases

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Abstract

Guidance of eruption and development of the primary, mixed, and permanent dentition is an integral component of comprehensive oral health care for all pediatric dental patients. Such guidance should contribute to the development of a permanent dentition that is in a stable, functional and esthetically acceptable occlusion and normal subsequent dentofacial development. Early diagnosis and successful treatment of developing malocclusions can have both short-term and long-term benefits while achieving the goals of occlusal harmony and function and dentofacial esthetics. Anterior crossbite, midline closure, single tooth malocclusion, increased overbite, increased overjet, palatally or labially placed tooth, single tooth rotation are one such malocclusions that involves the use of minor orthodontic correction. Treating these cases in the late mixed dentition period provides improvement in esthetic as well as causes well alignment of the teeth. So, the purpose of this article is to present case reports of patients with different forms of malocclusion treated with simple interceptive fixed orthodontic treatment achieving satisfactory results.

Keywords: Interceptive orthodontics, Malocclusion, Crossbite, Midline diastema, Tooth rotation

Introduction

A stage of transition of dentition from primary to permanent teeth is the time which most commonly presents with malocclusion due to multiple contributing factors. Such a period has always been in controversy in regards of time of initiation of treatment and which treatment should be undertaken.¹ Evaluation and treatment of occlusal and skeletal disharmonies may be initiated at various stages of dental arch development, depending on the problems, growth, parental involvement, risks and benefits of treatment and of deferring treatment.²

Historically, orthodontic treatment was provided mainly for adolescents. Interest continues to be expressed in the concept of interceptive (early) treatment as well as in adult treatment. Treatment and timing options for the growing patient, especially in the mixed dentition and early permanent dentition, have increased and continue to be evaluated by the research community.^{3,4,5}

Greater privilege to early correction of malocclusion is given because of the fact that it will prevent further complications in malocclusions if left untreated and also correct the relationship of misaligned or malpositioned with its opposite and contralateral tooth. Anterior crossbite, midline closure, single tooth rotation, increased overbite, increased overjet and labially or palatally placed tooth are one such malocclusions that involves the use of minor orthodontic correction.³ Treating these cases in the late mixed dentition period provides improvement in esthetic as well as causes well alignment of the teeth.⁶

Following are the case reports of patients with different forms of malocclusion treated with simple orthodontic treatment.

Case 1

A 15 year old boy reported to the department of Pedodontics and Preventive Dentistry with the chief complaint of extra tooth in the upper jaw causing esthetic problem. His medical and dental history was insignificant. On extraoral examination patient had bilateral facial symmetry and convex profile. On intraoral examination patient had class I molar relation, overjet of 4 mm and overbite measured 5mm, two mesiodens teeth were present in the upper arch and 11 and 21 showed marked rotation distally Fig. 1(a). Root stump irt 36 and 46 were present in the lower arch and abrasion irt 44 was seen. In addition to it 22 was palatally placed leading to crossbite.

Occlusal view and OPG were taken to check for anymore supernumerary tooth. The treatment plan was decided to accomplish some clinical objective such as the removal of mesiodens followed by orthodontic closure of the midline diastema and also correcting the crossbite irt 22.

After consent was obtained from the parents, extraction of both the mesiodens was done. Patient was recalled after 2 weeks to check for healing of the socket Fig. 1(b). Once the socket had fully healed the orthodontic treatment started with bonding 018 slot bracket in the upper arch except 22.

Initially .016 Niti wire was used for 3 months. In the third visit of the patient rotation present irt 11 and 21 was corrected. On the subsequent visit E-chain was placed from 21 till 15 in order to close the midline space and to create space for 22 Fig. 1(c).

In the later visits the teeth showed marked alignment, midline diastema was reduced. E-chain was placed in irt 21 and 11 to further reduce the midline gap. In the next appointment the midline diastema was totally reduced and the sufficient space was present for

the alignment irt 22 Fig. 1(d). The composite block was placed in lower 6's and bracket was bonded irt 22.

Subsequently the anterior crossbite was corrected Fig. 1(e) and .016 Niti was replaced with .017''*.025'' Rectangular Niti which was used for another 2 months. The .017''*.025'' Rectangular Niti was replaced after 2 months with The .017''*.025'' Rectangular stainless steel wire. The wire was continued for another one month. After one month the teeth were well aligned. The patient was satisfied with the esthetic, the overjet, overbite was corrected, midline diastema was completely improved and with that it was decided to debond the bracket and seeing the proper levelling of the arch the brackets were debond, after that oral prophylaxis was done and the pt was given fixed retainer for 6 months. The patient is still kept on follow-up.



Fig. 1a: Preoperative photograph showing mesiodens



Fig. 1b: After the extraction of mesiodens



Fig. 1c: During the treatment



Fig. 1d: Midline diastema closure



Fig. 1e: Crossbite correction irt22



Fig. 1f: After treatment

Case 2

A 14 Year old boy reported to the department of Pedodontics and Preventive Dentistry with the chief complaint of extra tooth in the upper arch behind the left upper front tooth region. On Extraoral examination patient had bilateral facial symmetry with convex profile. On Intraoral examination the patient had class I molar relation, overjet of 2 mm and overbite 3mm. Supernumerary tooth was present palatally irt 21 which had displaced 21 labially Fig. 1(a). In addition to it distally rotated premolars were present in upper arch. The treatment planning was done which included extraction of supernumerary tooth followed by alignment of teeth in upper arch. Occlusal view and

OPG were taken to check for any other supernumerary tooth.

Following the extraction of supernumerary tooth, 018 slot MBT brackets were bonded on upper arch simultaneously proximal stripping was done mesiodistally irt 11 and 21 Fig. 3(a). Initially .016 Niti was used for 2 months. In the next visit further stripping was done. After two months the teeth showed marked alignment Fig. 3(b). Labially displaced 21 got well aligned Fig. 3(c). In the same visit .016 Niti was replaced with .017*.25” rectangular stainless steel wire and the same wire was continued for another 1 month Fig. 3(d). The teeth at the next appointment showed marked correction and was well aligned, with that the brackets were debond Fig. 3(e). After this oral prophylaxis was done, a removable retainer was given to the patient and was instructed to wear that for 6 months in order to avoid relapse of the treatment. Pt is still kept on follow up.



Fig. 3(a): Preoperative photograph showing labially



Fig. 3b: During treatment displaced 21



Fig. 3c: During treatment



Fig. 3d: Arch showing well aligned teeth



Fig. 3(e): After Treatment

Discussion

The teeth erupt into an environment of functional activity governed by the muscles of mastication, of the tongue and of the face. The muscles of the tongue, lips and cheeks are of particular importance in guiding the teeth into their final position, and variation in muscle form and function can affect the position and occlusion of the teeth.⁷ Some dental and local factors can affect the development of occlusion which include alterations in size of the dentition in relation to jaw size, crossbite, aberrant developmental position of individual teeth, presence of supernumerary teeth, developmental hypodontia, labial frenum, thumb or finger sucking. Early interference and modification of these basic etiological features can help to avoid malocclusion or

reduce the need for treatment in some cases.⁶ Consequently interceptive orthodontic treatment has been set as an important aspect of orthodontic care.

The concept and the necessity of interceptive orthodontic treatment, so called early, have been controversial. Some define it as removable or fixed appliance intervention in the deciduous, early mixed, or midmixed dentition. Others place it in the late mixed dentition stage of development (before emergence of the second premolars and the permanent maxillary canines).⁸ Some profession's leaders advocate that early treatment is always desirable because tissue tolerance and their power of adjustment are at or near their maximum, others warn that there is no assurance that the results of early treatment will be sustained, and that several-phased treatment will always lengthen overall treatment time. Early treatment not only may do some damage or prolong therapy, it may exhaust the child's spirit of cooperation and compliance.⁹

As mentioned above, the different forms of malocclusion, midline diastema is one of such malocclusion that can be corrected by interceptive fixed orthodontic treatment which we have described in the present report.

Midline diastema could be transient or created by developmental, pathological, or iatrogenic factors such as mesiodens, microdontia, hypodontia, abnormal oral habits, enlarge frenum, etc. Treatment involves correct diagnosis and an early intervention relevant to its specific etiology. Successful treatment of diastema depends on etiological factors, size and extent of the diastema, and patient's affordability in terms of treatment time and costs involved.

In the present case diastema closure was performed using treatment procedure which involved mesial bodily approximation of the incisors with simple fixed orthodontic therapy.

Different treatment modalities include removable orthodontic appliances, full arch, single arch or sectional fixed orthodontic appliances, excision of the frenum, restoration techniques, extraction of mesiodens and habit breaking appliances, etc.^{10,11,12}

Gurudutt Desai et al stated that not all orthodontic procedure should be fixed orthodontic treatment, removable can also be an option in some circumstances like lack of time, unwillingness of patient and cost in treating midline diastema.¹³

Santosh Kumar et al advocated the use of thermoplastic resin sheet to close the midline diastema and concluded that technique may be used to close a wide range of midline diastema without compromising the esthetics and stability of treated outcome but cannot be used for generalized spacing.¹⁴

Another form of malocclusion that shows high frequency is anterior cross bite like in case report 1 and 2 where there is single tooth cross bite present.

The anterior dental crossbite may be as a result of 1 or a combination of several etiologic factors which

include an injuries to the primary dentition that cause a lingual displacement of the permanent tooth bud, an over retained primary tooth, a labially situated supernumerary tooth, a sclerosed bony or fibrous tissue barrier caused by losing a primary tooth prematurely. An inadequacy of arch length causing the lingual deflection of the permanent tooth during eruption, detrimental habit patterns.^{15,16,17}

Lee outlined factors to consider before selecting a treatment approach:¹⁵

1. Adequate space in the arch to reposition the tooth
2. Sufficient overbite to hold the tooth in position following correction
3. An apical position of the tooth in crossbite that is the same as it would be in normal occlusion

There are many possible approaches to the treatment of a simple anterior dental crossbite. The following treatment approaches have been recommended for simple anterior dental crossbite, tongue blade therapy, lower inclined plane, stainless steel or composite crowns. Hawley retainer with auxiliary springs, labial and lingual arch wires.

Labial and lingual arch wires: The use of labial and/or lingual arch wires has proven successful. The disadvantage of the use of these appliances is the expense and additional training required to use them efficiently.

The present cases mentioned with anterior cross bite got corrected with fixed orthodontic treatment and showed marked alignment of teeth till date.

Weidal AP (2015) compared and evaluated the efficiency of the two different treatment strategies to correct the anterior crossbite with anterior shift in mixed dentition Anterior crossbite with functional shift in the mixed dentition can be successfully corrected by either fixed or removable appliance therapy in a short-term perspective. Treatment time for correction of anterior crossbite with functional shift was significantly shorter for fixed appliance compared with removable appliance but the difference had minor clinical relevance.¹⁸

Conclusion

Interceptive orthodontics is employed to recognize and eliminate potential irregularities and malposition in the developing dentofacial complex. These procedures are directed to lessen or to eliminate the severity of developing malocclusion. The early assessment of the child, followed by regular review, and treatment at the appropriate time if necessary, will do much to reduce malocclusion to great extent. The key to prevention of this kind is awareness. This part examines the key areas relating to interceptive orthodontics with the available evidence to support the clinical management of common problems presenting in the mixed dentition.

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