ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 2, Issue – 6, November - December - 2019, Page No. : 171 - 175

Intercept Rightly To Allign Properly: Management of Reverse Articulation By 2 By 4 Appliances

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Early Mixed dentition is considered the best age to correct malocclusions and by intercepting at the right age proper growth and development of jaws and surrounding structures can be seen. 2 by 4 appliance are used to correct anterior crossbite in the mixed dentition. The aim of this article is to emphasize the importance of 2 x 4 appliance in mixed dentition period to correct dental malocclusion.

Introduction

Intercepting the malocclusion at an early mixed dentition stage not only boosts a childs self confidence but also avoids the need of undergoing cumbersome expensive orthodontic treatment in the future.[1] According to Sandler et al the use of 2 x 4 appliance at an early stage can correct the malocclusion efficiently within a couple of weeks or months compared to the long span conventional fixed appliance treatment.[2,3]

Case Discussion

Case 1: A female patient aged 9 years reported to the department of Pedodontics and Preventive Dentistry at ITS Dental College,Greater Noida with the chief complaint of decayed tooth in the lower back and upper back jaw region since 2 months and abnormally placed upper front tooth **(Figure 1 a)** .The model was taken for model analysis of the patient **(Figure 1 b).** On clinically examining the patient a unilateral cross bite on the left side was seen irt 31 , retroclination of 21 and 32 and Class III marginal gingival recession due to trauma from occlusion was seen 31. An orthopantomograph **(Figure 2)** and RVG irt 26 and 46 was advised. A diagnosis of chronic irreversible pulpitis irt 46 and 26 was seen.

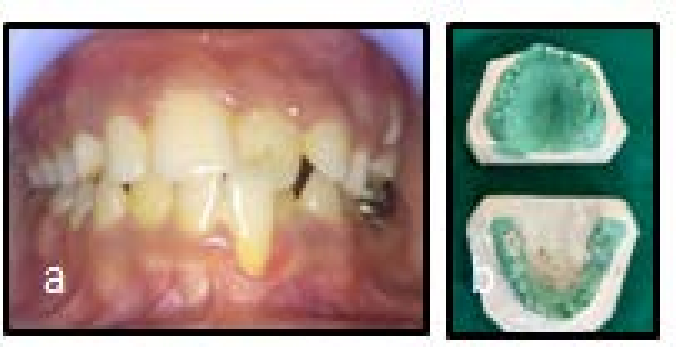

Figure 1

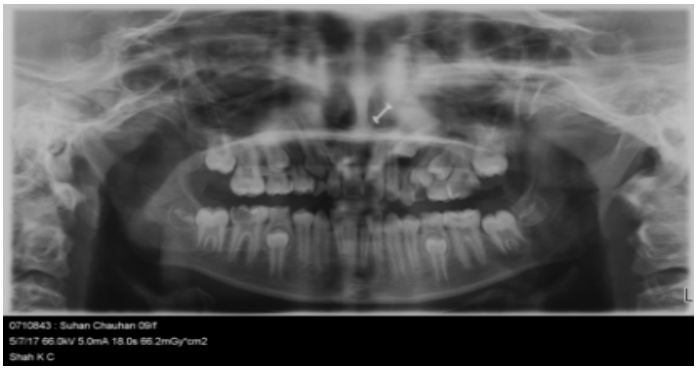

Figure 2: Orthopantamograph

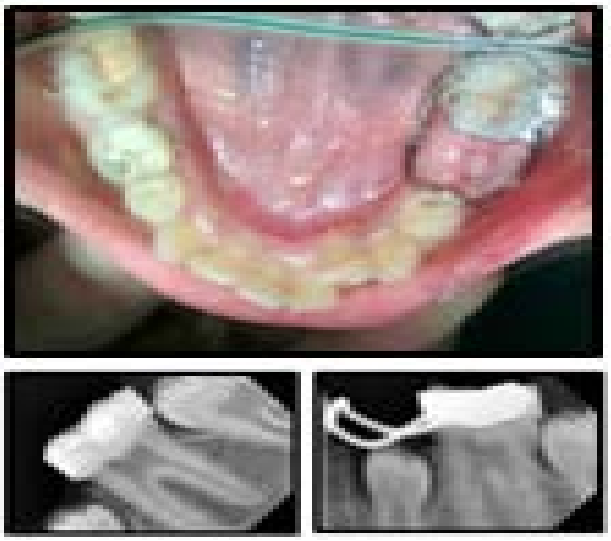

Figure 3: Short band and loop space maintainer

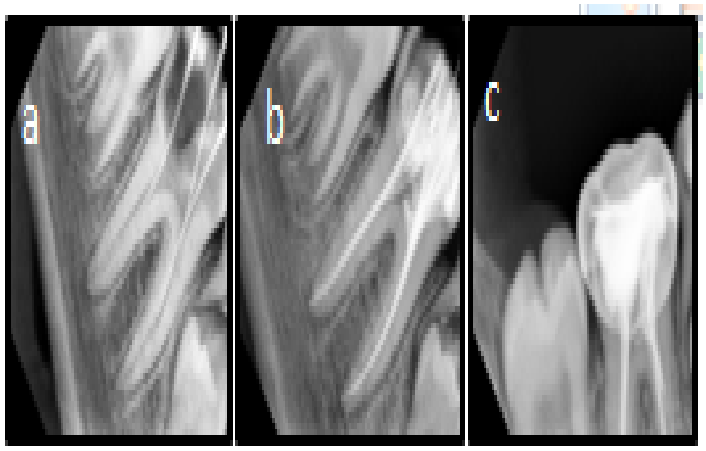

Figure 4: a) Working length irt 46 b) Obturation irt 46 placed irt 75 c) Stainless steel crown irt 46

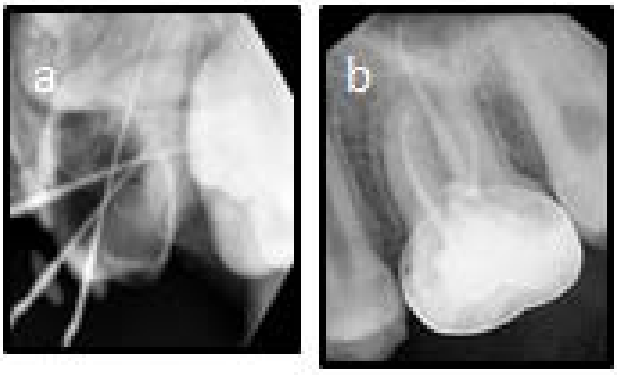

Figure 5: a)Working length irt 26 b) Obturation and Stainless steel crown irt 26

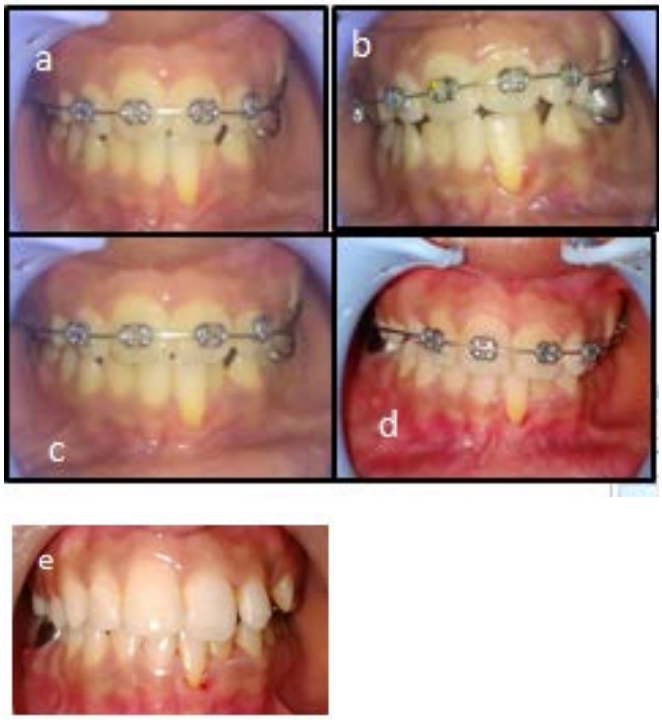

Figure 6: a) 0.012" Ni-Ti b) 0.014" Ni-Ti c) 0.016" Ni-Ti d) 0.018" e) Post debonding

Figure 7: Laser frenectomy to correct gingival recession and lip exercise

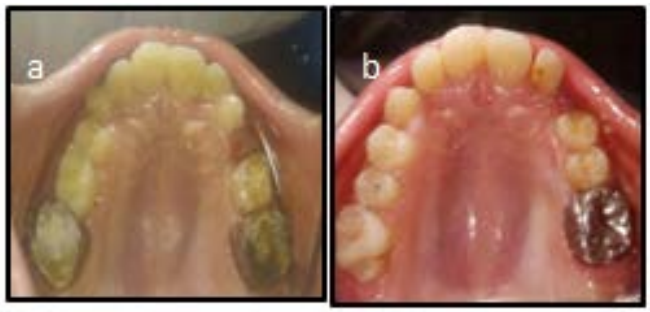

Figure 8: Pre and Post operative upper occlusal photograph

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Figure 9: Pre and Post operative lower occlusal photograph

Treatment Plan

The patient was advised oral prophylaxis and extraction of 75 followed by a short band and loop space maintainer **(Figure 3**). Root canal treatment was advised irt 26 and 46 followed by a stainless steel crown (**Figure 4 and 5**). Simultaneously brackets were placed on the upper incisors for levelling and aligning and molar tubes were placed.Orthodontic correction by 2 by 4 appliance was done by use of 0.012 inch , 0.014 inch , 0.016 inch Ni-Ti and 0.018 inch Ni-Ti archwire for stabilizing and bite block were also placed posteriorly **(Figure 6).**The round archwire was changed after 21 days. Correction of the anterior crossbite, alignment of the maxillary incisors took a period of 4 months .The brackets were debonded, and the GIC on teeth 36 and 46 was removed using an ultrasonic scaler. The trauma from occlusion irt 31 was relieved and laser frenectomy was done by a **BIOLASE** laser diode to correct the gingival recession at 1W for a pulse interval and pulse length of 1.0 ms (**Figure 7)**. The patient was also advised lip exercises. **Figure 8 and 9** showed pre and post treatment photographs of the patient . At 6-month followup the corrected teeth were still in positive overjet **(Figure 10)**.

Figure 10: Pre and Post treatment photograph

Case 2

A male patient aged 8 years reported to the Department of Pedodontics and Preventive Dentistry at ITS Dental College, Greater Noida with the chief complaint of grossly decayed tooth in the lower back region since 3 months and abnormally placed upper front tooth (Figure 11 a) .The model was taken for model analysis of the patient (Figure 1 b). On clinically examining the patient anterior frontal segmental cross bite was seen irt 11 and 21. The intraoral assessment showed that the patient was in his mixed dentition stage and the first permanent molars were in a Class I relationship on either side.

Treatment Plan

The patient was advised oral prophylaxis and extraction of 75 and a short band and loop space maintainer was advised **(Figure 15**). After discussion with the parents on the treatment options, we decided to use a short-span wire-fixed appliance with two preadjusted edgewise brackets. Orthodontic correction by 2 by 4 appliance was done by placing brackets, molar tubes and using 0.012 inch wire and then 0.014 inch , 0.016 inch Ni-Ti and 0.018 inch archwire for stabilizing, levelling and aligning the teeth and bite blocks were also placed posteriorly to correct the crossbite **(Figure 11 b,c,d and e).**The round archwire was changed after 21 days. Correction of the anterior crossbite and alignment of the maxillary incisors took a period of 9 months. The brackets were debonded, and the

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GIC on teeth 36 and 46 was removed using an ultrasonic scaler. For the correction of edge to edge bite inclined plane and advancing arch wire were placed for tipping of anteriors (**Figure 11 f and 12**). **Figure 13,14 and 15** showed pre and post treatment photographs of the patient . **Figure 16** shows change in the profile of patient from concave to orthagnathic .At 6-month followup the corrected teeth were still in positive overjet **(Figure 13)**. The patient is currently under followup for monitoring the eruption of permanent canines.

Figure 11: a) Pre treatment b) 0.012" Ni-Ti c)0.014" Ni-Ti d) 0.016" Ni-Ti e) 0.018" f) Advancing arch wire to correct edge to edge bite

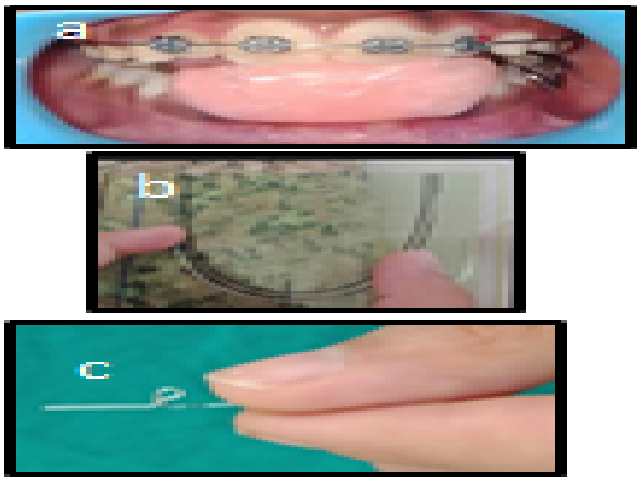

Figure 12: Inclined plane b) c) wire bending of advancing archwire

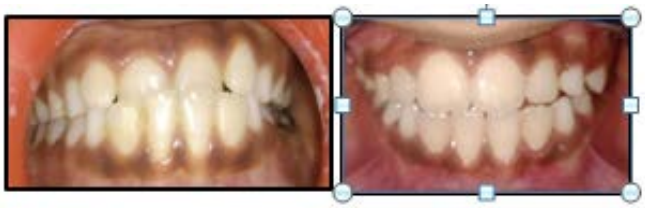

Figure 13

Figure 14

Figure 15

Figure 16: Change in profile from concave to straight (orthagnathic).

Discussion

Anterior crossbite/reverse articulation is defined as an abnormal reversed relationship of a tooth or teeth to the opposing teeth in the buccolingual or labiolingual direction.[4] An abnormal bite can also affect periodontal health leading to the gingival recession with thinning of the alveolar bone and mobility of the opposing mandibular tooth/teeth and may even cause jaw deviation and

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temporomandibular pain dysfunction.[5,6] Simple to complex removable and fixed treatments are available to correct anterior crossbite.[7,8]

The best method to treat anterior crossbite depends on the aetiology of the crossbite, the patient's age and compliance, eruption status of the teeth, space availability and treatment affordability. The etiology of dental anterior crossbite are the presence of supernumerary tooth/teeth, odontomas, trauma to the primary predecessor, ectopic position of permanent tooth germ, retained primary predecessor, anomalies in tooth shape and size, arch length inadequacy, and upper lip biting habit[7,9,10] The benefits of interceptive orthodonticsa are that it improves airway / speech problems, corrects harmful oral habits,gives a child self confidence, maintains and gains space ,relieves the trauma from occlusion and improves the gingival health, harmonizes the width of dental arches and influences jaw growth in a positive manner.[11]

Conclusion

Early identification of a malocclusion at mixed dentition stage and diagnosing it helps in lifetime stable orthodontic post treatment results. As a successful dental practioner we don't need to wait till eruption of all the permanent teeth. 2 x 4 appliance is a versatile, convenient and effective appliance which can intercept simple malocclusions at an early stage within shorter span giving better results as compared to a lengthy corrective adult orthodontic treatment.

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