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Case Report

Midline Diastema Correction with Fixed Orthodontic Treatment Followed by Frenectomy- A Case Report

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ABSTRACT

Background: Maxillary midline diastema is one of the most frequently encountered esthetic problems in mixed and permanent dentition. Several causes have been attributed to the midline diastema, including developmental, pathologic or iatrogenic. It can also be seen as a transient malocclusion in which case any intervention is contraindicated. A wide range of possible treatments like restorative procedures, composite build up, surgeries (frenectomies) can be done, based on etiology. Thus, correct diagnosis of etiology and specific early intervention plays a major role in deciding the treatment plan.

Case report: This case report evaluates the management of Class I malocclusion with spaced anterior dentition in a 31 year old female patient with presence of peg shaped lateral incisors and maxillary midline diastema. She showed spacing in the upper anterior region and mild crowding in the lower anterior region. The upper arch spacing can be attributed to presence of a thick band of fibrous tissue between the upper central incisors and also due to the presence of small lateral incisors. The case was treated with routine fixed orthodontic therapy and frenectomy was performed at the end of the treatment just before closure of midline diastema space to prevent scar tissue formation. After orthodontic treatment, the patient was referred to an aesthetic dentist for maxillary lateral incisors build-up with composite.

Conclusion: Maxillary anterior arch spaces were closed down and mandibular anterior arch crowding was unraveled. Spaces were maintained deliberately distal to the upper lateral incisors for esthetic composite build-up after orthodontic treatment. The dental changes and treatment results were demonstrated. This case report illustrates the interdisciplinary collaboration of an Orthodontist, Periodontist and Endodontist for treatment of such a case. With proper case selection, planning and good patient cooperation, we could obtain significant results.

INTRODUCTION

A space between adjacent teeth is called a "diastema". Midline diastema (or diastemas) occur in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12–18 year olds.[1] The midline is very often seen to be a routine part of the developing occlusion, due to the natural position of teeth in their bony crypts, the eruption path of the cuspids, and increase in the size of premaxilla at the time of eruption of the maxillary permanent central incisors. In Today's times, Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Class I malocclusion is the second most prevalent occlusion after Class II malocclusion.[1-2]Over the last few decades,

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there has been an increase in the awareness about orthodontic treatment which has led to more and more adults demanding high quality treatment in the shortest possible time with increased efficiency and reduced costs.[3]There are many ways to treat Class I malocclusions, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance.[4- 5] This case report evaluates the management of Class I malocclusion with spaced anterior dentition in a 31 year old female patient with presence of peg shaped lateral incisors and maxillary midline diastema. She showed spacing in the upper anterior region and mild crowding in the lower anterior region. The upper arch spacing can be attributed to presence of a thick band of fibrous tissue between the upper central incisors and also due to the presence of small lateral incisors. The case was treated with routine fixed orthodontic therapy and frenectomy was performed at the end of the treatment just before closure of midline diastema space to prevent scar tissue formation. After orthodontic treatment, the patient was referred to an aesthetic dentist for maxillary lateral incisors build-up with composite.

CASE REPORT

EXTRA-ORAL EXAMINATION

A young female patient, aged 31 years 4 months, sought an orthodontic evaluation with a chief complaint of spaced upper and crowded lower front teeth. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides with competent lips and an average Nasolabial Angle , a Leptoprosopic facial form, Dolicocephalic head form, Average width of nose and mouth, minimal buccal corridor space, a consonant smile arc and orthogonal divergence of face .The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, she showed presence of an unaesthetic smile with spaced upper dentition. The patient was very unhappy with her smile and dental appearance; however the patient wanted to preserve her pretreatment facial profile and seeked only dental correction.

PRE TREATMENT EXTRAORAL PHOTOGRAPHS

INTRA-ORAL EXAMINATION

Intraoral examination on frontal view showed presence of spacing in upper anterior region with presence of a maxillary midline diastema between the central incisors. The patient also showed the presence of localized microdontia with "Peg shaped" maxillary lateral incisors. Incisors, canines and molars were in a Class I Molar relationship and patient showed presence of a normal overjet and overbite. Peg shaped lateral incisors were rotated and mesially inclined. Maxillary and mandibular midline coincidence could not be assessed due to the presence of midline diastema.

PRE TREATMENT INTRAORAL PHOTOGRAPHS

PRE TREATMENT CEPHALOMETRIC READINGS

Parameters	Pre- Treatment
SNA	82°
SNB	80°
ANB	2°
WITS	1MM
Max. Length	75MM
Man. Length	98MM
IMPA	96°

Nasolabial Angle	103°
U1 TO NA Degrees	26°
U1 TO NA MM	3MM
L1 TO NB Degrees	23°
L1 TO NB MM	2MM
U1/L1 Angle	132°
Saddle Angle	127°
Articular Angle	144°
Gonial Angle	129°
FMA	27°
Y Axis	64°

CEPHALOMETRIC EVALUATION

1) Steiners analysis shows an average maxilla and mandible, Class I Skeletal pattern, an Average to Vertical growth pattern, averagely inclined maxillary and mandibular anterior teeth, averagely placed maxillary and mandibular anterior teeth and average position of upper and lower lips

2) Tweeds analysis shows an Average to Vertical growth pattern and averagely inclined mandibular incisors

3) Wits appraisal shows AO ahead of BO by 1 mm indicating Skeletal Class I pattern

4) McNamara analysis shows an average maxilla and mandible, an average to vertical growth pattern, increased lower anterior facial height and averagely inclined mandibular incisors

5) Rakosi Jaraback analysis shows a Vertical growth pattern and average inclination of maxillary and mandibular incisors

6) Holdaway soft tissue analysis shows average maxillary and mandibular sulcus depth and no strain of lips

DIAGNOSIS

This 31 year 4 months old female patient was diagnosed with Angle's Class I malocclusion with an average maxilla and mandible and an average to vertical growth pattern, spaces in upper anterior region and crowding in lower anterior region, maxillary midline diastema and peg shaped and rotated lateral incisors with and unaesthetic smile.

LIST OF PROBLEMS

1. Maxillary midline diastema
2. Spacing in upper anterior region
3. Crowding in lower anterior region
4. Peg shaped and rotated lateral incisors

TREATMENT OBJECTIVES

1. To correct the maxillary midline diastema
2. To correct spacing in upper anterior region
3. To correct crowding in lower anterior region
4. To correct the rotated lateral incisors
5. To provide space distal to the maxillary lateral incisors for composite build up

TREATMENT PLAN

To correct the unaesthetic dentition, it was decided to treat this patient with preadjusted edgewise appliance and 0.022" slot MBT prescription was used. Frenectomy was planned to excise the thick band of fibrous connective tissue between the maxillary central incisors causing the diastema. The procedure was planned to be executed just before the closure of spaces towards the end of orthodontic treatment. After the completion of orthodontic treatment, the patient was to be referred to an aesthetic dentist for composite buildup of her peg shaped lateral incisors.

TREATMENT PROGRESS

After complete banding and bonding, leveling and aligning were done in both the upper and lower arch with 0.012", 0.014", 0.016", 0.018", 0.020" NiTi arch wires following sequence 'A' of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. Reverse curve of spee in the lower arch and exaggerated curve of spee in the upper arch was incorporated in the heavy archwires to prevent the excessive bite deepening during retraction process and also to maintain the normal overjet and overbite. Individually both the arches were consolidated from molar to molar with figure of eight ligature tie and active bend back was placed in the archwire distal to the molar tube. Additional labial root torque was built into the

anterior segment of lower arch wire. 0.2mm of proximal stripping was done in the lower anterior region for provision of space for correction of crowding. Following initial alignment, retraction and closure of spaces with the help of Elastomeric chains was done on 0.19"x 0.25" heavy stainless steel arch wire until all spaces except the midline diastema space was closed. This was followed by a minor frenectomy surgical procedure under local anesthesia in which the thick fibrous band of connective tissue between the maxillary central incisors was excised. Elastomeric chains were again applied after the procedure for closure of midline diastema space.Final finishing and detailing of occlusion were done which took about 2 months of time. Finally light settling elastics were given with rectangular steel wires in lower arch and 0.012" light NiTi wire in upper arch for settling , finishing, detailing and proper intercuspation. After 16 months of treatment, the fixed appliance was debonded, a fixed lingual bonded retainer was bonded in the upper and lower anterior region. Sufficient space was maintained distal to the maxillary lateral incisors according to the Golden proportion for composite build-up of the peg shaped lateral incisors at the end of orthodontic treatment.

TREATMENT RESULTS

All of the original treatment objectives were achieved. Maxilary midline diastema was corrected. Spacing in the upper arch was closed and crowding in mandibular anterior teeth was unraveled .The rotated and mesially inclined peg shaped lateral incisors were aligned and sufficient space was maintained distal to the lateral incisors for composite build up. The maxillary and mandibular arches were well aligned and coordinated without midline deviations. Normal overbite and overjet was maintained. Class I incisor, Class I canine and Class I molar relationship was maintaied. The chief complaint of spaced upper and crowded lower front teeth was addressed. Patient had a pleasant smile and a pleasant dentition at the end of the treatment which continued over 16 months.

DISCUSSION

It is important for an Orthodontist to consider contributing factors before determining an optimal treatment plan. These include normal growth and development, tooth size discrepancies, excessive incisor vertical overlap of different causes, mesiodistal and labiolingual incisor angulation, generalized spacing and pathological conditions. A carefully developed differential diagnosis enables the practitioner to choose the most effective orthodontic and/or restorative treatment. Restorative and prosthetic treatment is usually employed to treat Diastemas based on tooth-size discrepancies. The most appropriate treatment often requires orthodontically closing the midline diastema. A well-chosen individualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects. Class I malocclusion with spacing might have any number of a combination of the skeletal and dental component. Hence, identifying and understanding the etiology and expression of Class I spaced malocclusion and identifying differential diagnosis is helpful for its correction. The patient's chief complaint was spaced upper and crowded lower front teeth .The selection of orthodontic fixed appliances is dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference/familiarity and laboratory facilities. The execution of only fixed

appliance therapy appropriately resulted in an improvement in the patient's dentition in this case. This case was a collaboration of 3 specialists namely an Orthodontist who aligned the teeth and corrected spacing in upper arch, crowding in lower arch and provided additional space for composite build-up of peg shaped lateral incisors, a Periodontist who performed a meticulous frenectomy for removal of the fibrous band of connective tissue between the maxillary central in incisors thus correcting the midline diastema and finally an Endodontist/Aesthetic dentist who build up the unaesthetic looking peg shaped lateral incisors with composites. However limitation of this case report was that intraoral photograph after composite build-up was not taken. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time. The overall treatment time was 16 months. After this active treatment phase, the dentition of this 31 year old female patient improved significantly as seen in the post treatment Extra oral photographs.

POST TREATMENT CEPHALOMETRIC READINGS

Parameters	Post-Treatment
SNA	82°
SNB	80°
ANB	2°
WITS	1mm
Max. Length	75mm
Man. Length	97mm
IMPA	95°
Nasolabial Angle	105°
U1 TO NA Degrees	24°
U1 TO NA mm	2mm
L1 TO NB Degrees	22°
L1 TO NB mm	1mm
U1/L1 Angle	133°
Saddle Angle	126°
Articular Angle	145°
Gonial Angle	130°
FMA	27°
Y Axis	65°

POST TREATMENT EXTRAORAL PHOTOGRAPHS

POST TREATMENT INTRAORAL PHOTOGRAPHS

COMPARISON OF PRE AND POST TREATMENT CEPHALOMETRIC READINGS

Parameters	Pre-Treatment	Post-Treatment
SNA	82°	82°
SNB	80°	80°
ANB	2°	2°
WITS	1mm	1mm
Max. Length	75mm	75mm
Man. Length	98mm	97mm
IMPA	96°	95°
Nasolabial Angle	103°	105°
U1 TO NA Degrees	26°	24°
U1 TO NA mm	3mm	2mm
L1 TO NB Degrees	23°	22°
L1 TO NB mm	2mm	1mm
U1/L1 Angle	132°	133°
Saddle Angle	127°	126°
Articular Angle	144°	145°
Gonial Angle	129°	130°
FMA	27°	27°

Y Axis	64°	65°

CONCLUSION

This case report addressed all the chief complaints of the patient. Maxillary midline diastema was corrected and additional space was provided for composite buildup of the peg shaped lateral incisors. The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was maintained with class I incisor, canine and molar relationship. This case emphasizes on the interdisciplinary collaboration of 3 specialties of dentistry namely Orthodontics, Periodontics and Endodontics for successful treatment and promising results.

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