ORTHODONTIC TREATMENT IN A CLASS I BIMAXILLARY PROTRUSION MALOCCLUSION : CLINICAL AND CEPHALOMETRIC RESULTS

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ABSTRACT

Esthetically pleasing face with harmonious soft tissue profile, stable occlusion and pleasant smile are important goals of orthodontic treatment. This case report along with the treatment results is of Class I bimaxillary protrusion malocclusion treated with fixed orthodontic appliance after extraction of all first premolars. The orthodontic treatment involving extraction of premolars brought about good esthetic changes in the face and dentition resulting into improvement in the soft tissue profile, occlusion and attainment of a more harmonious smile and dentofacial esthetics.

Key words: bimaxillary protrusion, dentofacial esthetics, fixed orthodontic treatment

INTRODUCTION

The art and science of facial esthetics has intrigued mankind since the time of Egyptian culture, 5000 years back. Edward Angle[1] was one of the first to quote about facial esthetics and importance of soft tissues in terms of balance, harmony, beauty and ugliness in orthodontic literature. He stated that orthodontics is always related to the art of the human face in which the mouth forms a potent factor in making or marring the beauty and the character of the face. Since then, esthetically pleasing face with harmonious soft tissue profile and stable occlusion formed important goals of orthodontic treatment.[2,3] Orthodontics is on the threshold of a change in diagnosis and treatment planning from the traditional emphasis on the dental and skeletal components of a problem to a greater attention to soft tissues. The treatment of malocclusion, only after due consideration of the soft tissue profile and lip changes have gained more popularity now.4 While planning correction of the malocclusion, the orthodontist must consider the soft tissue changes that might occur with the incisor retraction. The measures to obtain balanced facial aesthetics have become as important as achieving an ideal functional occlusion at the end of orthodontic treatment. The improved facial balance and harmonious lip relationship after the orthodontic treatment forms an important dimension to mark the success of orthodontic treatment.[5, 6]

The bimaxillary protrusion is a common form of malocclusion in Nepal. The literature is found to be very scanty regarding the soft tissue changes in this population group and no reliable ratios and correlations have been used so far as a guide for the diagnosis and treatment planning of this group of patients. The extraction treatment has gained the popularity due to its greater long term stability and greater esthetic changes after treatment especially in those cases where there is dentoalveolar protrusion. This case note is about a typical case of class I bimaxillary protrusion treated with all first premolars extraction at Dept of Orthodontics, College of Dental Surgery, B P Koirala Institute of Health Sciences, in Dharan, Nepal with distinct clinical and cephalometric changes. I am reporting this case to make the readers known that orthodontic treatment of severe malocclusions due to dentoalveolar protrusion not only corrects the facial appearance but also the self confidence of the patient, hence the quality of personal and social life can be improved dramatically.

CASE REPORT

A 24 year old female reported to the orthodontic clinic with a chief complaint of forwardly placed front teeth and lips and unpleasant smile. Patient's parents complained regarding social difficulties for getting a good match for their daughter

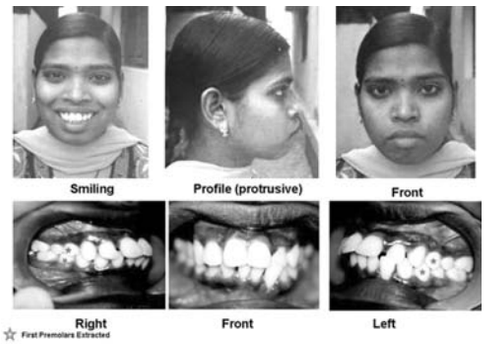

Figure 1: *Pretreatment facial and intraoral Photographs*

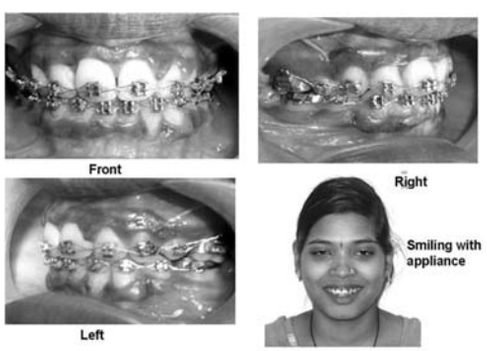

Figure 2: *Intraoral photographs with the fixed appliance and smile view*

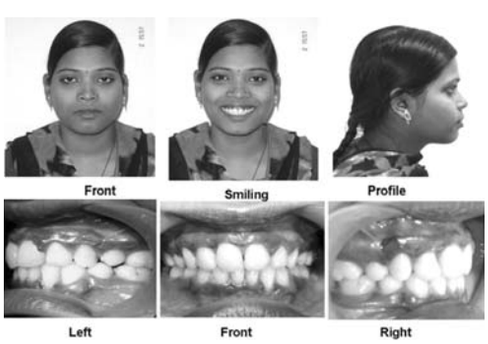

Figure 3: *Post treatment facial and intraoral Photographs*

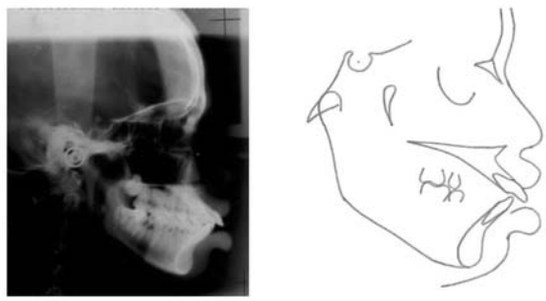

Figure 4: *Pretreatment lateral cephalogram and tracing outline*

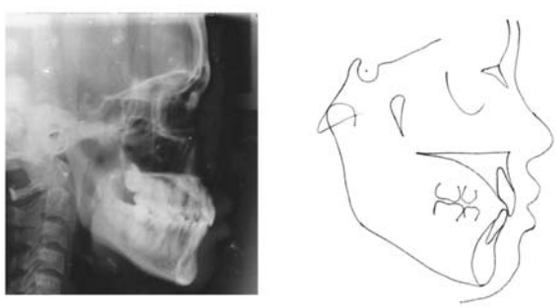

Figure 5: *Post treatment lateral cephalogram and tracing outline*

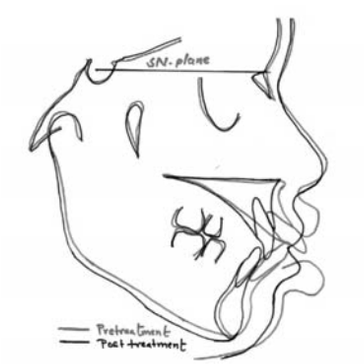

Figure 6: *Superimposition of tracings to demonstrate the treatment changes.*

because of her unaesthetic face due to protrusive lips and teeth. General examination showed mesomorphic body form, mesocephalic head form, mesoprosopic face form, severely convex facial profile, apparently symmetrical face and potentially competent lips. Functional examination showed normal speech, oronasal breathing pattern, mature swallowing pattern, clinically asymptomatic TMJ. Intraoral examination showed slightly enlarged tongue, average palatal depth and healthy periodontium. Dental examination showed Class I molars, premolars, and canine relationship bilaterally and severely proclined upper lower anterior dentoalveolar segments. Study models, lateral cphalogram, OPG radiographs were advised and upon completion of the pretreatment record; the case was analysed for craniofacial and dental parameters (Fig1). The case was finally planned to be treated with all four first premolars extraction. Fixed orthodontic treatment was undertaken using readjusted appliance with 0.022 X 0.028 Roth brackets set up with maximum anchorage mechanics. (Fig2).

TREATMENT RESULTS

The fixed orthodontic treatment resulted in to marked changes in the the position of upper and lower anterior teeth and the lip positions. Upper incisors retracted by 14mm and upper lip retracted by 4mm. Lower incisors retracted by 10mm and lower lip retracted by 9mm. For 1 mm upper lip retraction to occur the upper incisor retracted by 3.5mm establishing the ratio of upper incisor to upper lip retraction

of 3.5:1. For 1 mm lower lip retraction to occur the lower incisors retracted by 1.11mm establishing the ratio of lower incisor to lower lip retraction of 1.1:1.The nasolabial angle opened from 86 degree to 105 degrees and mentolabial angle opened from 91 degree to 121 degrees thus improving the lip relationship. Post treatment H angle angle was 8 degrees and Z angle was 78 degrees. The interincisal angle increased from 91 degrees to 142 degrees as a result of uprighting and retraction of incisors. Upper incisor to SN angle was 45 degrees and it increased to 95 degrees and IMPA increased from 72 degrees to 86 degrees. The upper and lower lips retracted by 4.5mm and 3.5 mm respectively with respect to E line. There was reduction of lip strain by 2mm and 7mm in upper and lower lips respectively. The skeletal changes in vertical and sagittal direction were minimal. The total time for the completion of treatment was 2 years and presently the case is in the retention phase therapy. (Fig 3, 4, 5, Table 1)

DISCUSSION

Bimaxillary protrusion is a condition characterized by protrusion of anterior dentoalveolar segment of upper and lower jaws and an increased procumbency of the lips and convex facial profile. It is seen commonly in African-American[7–11] and Asian[12-14] populations, but it can be seen in almost every ethnic group. Because of the negative perception of protrusive dentition and lips in most cultures, many patients with bimaxillary protrusion seek orthodontic care to decrease the lip protrusion.

The etiology of bimaxillary protrusion is multifactorial and consists of a genetic component as well as environmental factors, such as mouth breathing, tongue and lip habits, and large tongue volume.[13.] However, in few studies of its kind in other population, Keating[14] in bimaxillary protrusion in Caucasian population found a shorter posterior cranial base,

Table: 1 **Cephalometric reading before and after orthodontic treatment**

Variables	Pretreatment	Post treatment	Difference
Sagittal skeletal Changes			
SNA (degree)	91	90	1
SNB (degree)	86.5	85	1.5
ANB (degree)	4.5	5	0.5
Wits Appraisal (mm)	-3mm	1.5	4.5
Facial Angle(degree)	88	85	3
Vertical skeletal Changes			
FMA (degree)	21	22	1
Y axis (degree)	56	57	1
Jarabak ratio (%)	66.37	66	0.3
Dental changes			
Upper incisor to NA (degree)	48	7	41
Upper incisor to SN (degree)	45	95	45
IMPA (degree)	72	86	14
Lower incisor to NB (degree)	50	24	26
Soft tissue Changes			
Upper Lip thickness (mm)	9	11	2
Upper lip length (mm)	16	20	4
Upper lip Taper (mm)	12	10	2
Lower Lip thickness (mm)	19	16	3
Lower lip length (mm)	16	17	1
Lower lip Taper (mm)	15	8	7
Upper lip to E –line (mm)	4.5	0	4.5
Lower lip to E-line (mm)	7	3.5	3.5
Nasolabial angle (degree)	86	105	19
Mentolabial angle (degree)	91	121	30
Hangle (degree)	16	8	8
Z angle (degree)	73	78	5

a longer and more prognathic maxilla, and a mild Class II skeletal pattern and procumbent soft tissue profile. Tan[12] in Chinese adult bimaxillary patients found favorable soft tissue and dental changes after the extraction of four premolars. Lew[11] looked at profile changes after the extraction of four first premolars and orthodontic treatment of bimaxillary protrusion in Asian adults. There was decrease in upper and lower incisor proclination, increase in nasolabial angle, increase in upper and lower lip length, and reduction in upper and lower lip protrusion.

The results of this case report is similar to the case report on the use of four premolar extraction and lingual appliances for the corrections of bimaxillary protrusion by Kurz[15] where he found that the upper and lower incisors became more retroclined and retrusive.

These results suggest that the mechanics used in the treatment of individuals with bimaxillary protrusion have no significant effect on the skeletal parameters but the major changes occur in dentition and the overlying soft tissue of the face. The efficacy of extraction treatment is also found variable in terms of the extent of retraction, completeness of space closure, treatment time, and anchorage management and nature of the soft tissues. Other factors such as interlabial gap, lip redundancy and muscle tone must be evaluated in the patient with bimaxillary protrusion to gain more information on the possible consequences of incisor retraction.[7]

In this study the esthetic changes in the face and the dentition has occurred as a result of extraction of first premolars, sound permanent teeth and retraction of the incisors which resulted in retraction of the upper lips and reduction of the lip strain and procubency. Judicious use of mechanics and orthodontic forces bears good clinical result and prevents the patient to undergo traumatic orthognatic surgical procedures to correct the dentofacial problems causing structural imbalance, functional inefficiencies and esthetic disharmony.

A further study with large sample size to study the skeletal, dental and soft tissue changes would be useful so that nature and the extent of changes could be standardized for Nepalese population which could be useful for diagnosis and treatment planning in Orthodontics.

The orthodontic treatment brought about reduction of the facial profile convexity as a result of retraction of anterior teeth & simultaneously retraction of lips. There were proportionate changes in the soft & hard tissues following the correction of malocclusion. Improvement of facial esthetics was brought about by the combined effect of the changes in skeletal, dental and soft tissues resulting into a more balanced profile and esthetically pleasing smile. The extraction of first premolars has proved extremely successful in improving the dentofacial esthetics in this case.

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