

Two Dimensional Analysis of Facial Movement in Normal Adults



Swati Sharma
Senior Lecturer,
Dept. of Orthodontist,
Eklavya Dental College,
Kotputli, Rajasthan, India

Abstract

Objective – To determine correlation between gender and movement of corner of mouth in two dimension and laterality of asymmetry between right and left hemiface.

Material and Methods – Sample consists of 235 adult patients of which 115 are male and 120 female. The average age of males is 23.5 years and average age of females is 22 years. Frontal at rest and smiling standardized photos were taken. The amount of movement of right and left commissure was analyzed in smiling photos as compared to at rest photos.

Results– Males show greater amount of movement of commissure of mouth during smiling in vertically, whereas females show greater movement horizontally. Left side laterality was found more in females and right side laterality was found more in males.

Conclusion– Treatment should be planned depending on amount of lip movement. It varies in male and female. Tooth movement especially intrusion and extrusion is planned depending on lip position at rest and at smile.

Keywords: Lips, Photographic Analysis, Laterality, Smile.

Introduction

Beauty lies in the eyes of the beholder. Beauty gives highest degree of pleasure to the senses or to the mind. In today's world of globalization, beauty is given highest priority. Therefore esthetic concern is main reason for orthodontic treatment. Goal of orthodontic treatment is guided by "Jacksons triad" which comprises of structural balance, functional efficiency and esthetic harmony. Roy Sabri has also elaborated on various components of a balanced smile like lip line, smile arc, upper lip curvature, lateral negative space, smile symmetry, occlusal frontal plane, dental and gingival components.¹

Numerous factors such as cleft lip, hemifacial microsomia, and childhood fracture of the jaw have been Reported to be associated with facial asymmetry. These conditions often result in severe and pathologic asymmetry of the face. On the other hand, minor, nonpathologic facial asymmetry, which is defined as the difference in size between the left and right hemifaces, or normal asymmetry, is relatively common.

Facial expressions reflect the function of the underlying neuromuscular structure of the face.² Characterization of musculature is employed for the treatment of facial motor deficiencies.³

Attractiveness is determined both by amount of lip movement and laterality of face and photographs have been found as an effective way of analyzing attractiveness.

Aim of the Study

To determine the correlation between gender and movement of corner of mouth in two dimension and laterality of asymmetry between right and left hemiface.

Material and Method

The sample consisted of 235 healthy volunteers (mean age; males – 23.5 years, females – 22 years). All the subjects met the following inclusion criterion:

1. All subjects were over 18 years of age.
2. None of the subjects had any congenital deformity including cleft lip and palate
3. No facial paralysis
4. No history of noticeable scar or skin disease in neck
5. No psychiatric disorder
6. No subjectively or objectively discernible jaw dysfunction⁴

7. No participant had undergone any maxillofacial surgery or anterior maxillary tooth prosthodontic rehabilitation.⁵

Subjects were made to sit on a fixed chair with natural head position at a distance of 80 cm from the wall behind. DSLR camera (18-55mm lens) was

mounted on a tripod at a distance of 80 cm from the subject. Standardized photographs were taken at rest and during posed smile. For posed smile, subject was requested to present his/her full smile a few times and photograph was taken when subject successfully repeated the full smile pattern.

Fig.1: Standardized Pictures Taken For Each Subject



For each subject following measurements were taken on standardized photographs at rest and during posed smile:

- Right canthus (RC) to right commissural outline (RCO)
- Left canthus (LC) to left commissural outline (LCO)

- Distance from alar base of nose (subnasale) to most superior portion of upper lip
- Distance from alar base of nose (subnasale) to most inferior portion of lower lip
- Distance between most superior portion of upper lip and most inferior portion of lower lip.

Table1: Mean and standard deviation of measured variables

Parameters	Male				Female			
	Rest		Smile		Rest		Smile	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RC – RCO	31.52	0.73	25.38	0.58	29.44	0.68	24.0	2.45
LC – LCO	31.51	0.72	25.38	0.58	29.43	0.67	24.1	2.44
RCO – LCO	50.8	4.14	15.14	0.30	14.9	0.32	17.57	0.37
Sn – Upper lip	21.96	2.97	17.25	2.7	22.25	1.92	16.83	2.53
SN – Lower lip	10.27	3.08	18.64	0.31	29.44	0.68	31.54	0.73

Fig.2: Measurements taken at rest

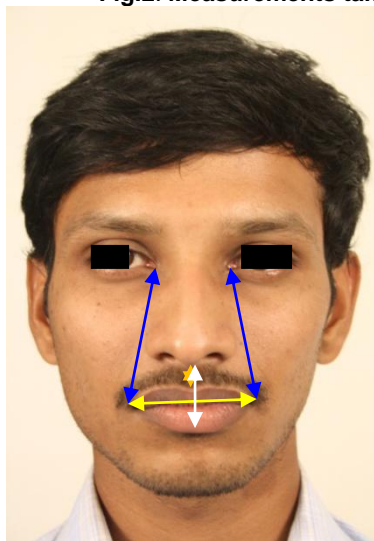
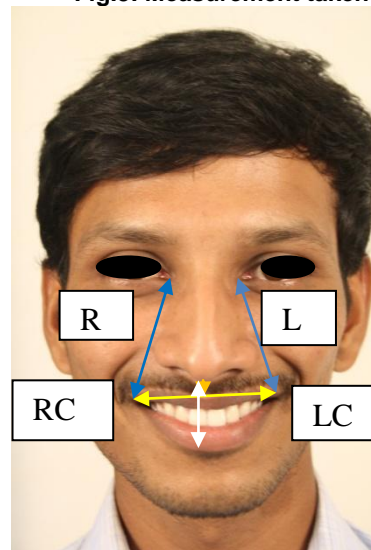


Fig.3: Measurement taken during smile



Results

Mean and standard deviation derived for all measured variables of all subjects are reported in Table 1. A statistically significant sexual dimorphism was apparent in most of the measured variables. During posed smile there is movement of corners of mouth in horizontal and vertical direction from the rest position. Statistical analysis shows greater horizontal movement of right and left commissure in females than in males. The variation in movement of right and left corners of mouth was used to assess the laterality of face. There was greater left laterality in females and greater right laterality in males. The vertical displacement of corners of mouth is measured by decreased distance between canthus and commissure. Distance between right canthus and right commissure outline reduced during smile more in males than in females. During posed smile, the upper and lower lips also separated. Distance between upper and lower lip increased in females significantly as compared to males. Subnasale to upper lip distance reduced in females more than in males. But subnasale to lower lip distance increased in males significantly compared to females.

Discussion

The present study showed that ability to produce certain facial expressions differs with gender. Males were found to have greater vertical movement during pose smile which is in accordance with Weeden et al, that males have greater maximum movement than females.³ According to Bjorkqvist, greater vertical movement in males is due to their aggressive demeanor.⁶ However there was greater horizontal movement of corners of mouth in females than males which is in accordance with finding by Otto.⁷

The difference between lip movement in males and females helps during treatment planning and smile designing. Smile arc can be altered by certain methods. Firstly, by altering occlusal plane in pre adolescents by growth modification. Secondly, surgically altering the occlusal plane in late adolescent and adult patient. Thirdly, by modifying the bracket position vertically. Fourthly, by use of porcelain or composite laminates in case of multidisciplinary approach.⁸

Okamoto has described difference in right and left hemiface as cause of facedness during voluntary smile. Facedness means greater muscular control on one side of the face. It can be due to severe and pathologic asymmetry of face.⁹ But in this study we have considered normal non pathologic facial asymmetry.

In this study, left laterality more than right in females and right laterality is more in males which is supported by Okamoto who also found predominant left laterality in females.⁹ Haraguchi found right hemiface was wider than left hemiface which is in accordance with present study results.¹⁰

Conclusion

Diagnosis and treatment planning is the most crucial step during orthodontic treatment. Achieving an esthetically acceptable smile is the goal of orthodontic treatment. It is important to consider the difference between soft tissue profile of males and females. In this article, we have discussed a comprehensive methodology for recording, assessing and planning of smile during orthodontic treatment considering the sexual dimorphism.

Endnotes

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