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A novel method for correlating the height of external auditory meatus and the length of maxillary central incisor

[1]Ms. Lekhika Ashok Dhoot, BDS, Intern, Dept of Prosthodontics, School of Dental Sciences, KIMSDU, Karad.

[2]Dr. Sushma R, MDS, Associate Professor, Dept of Prosthodontics, School of Dental sciences, KIMSDU, Karad.

[3]Ms. Krupa Mahesh Patil, BDS, Intern, Department of Prosthodontics, School of Dental Sciences, KIMSDU, Karad

Corresponding Author: Ms. Lekhika Ashok Dhoot, BDS, Intern, Dept of Prosthodontics, School of Dental Sciences, KIMSDU, Karad.

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Abstract

Patients are becoming increasingly aware of their dental appearances and for many; aesthetic concerns have become one of the primary reasons for seeking dental treatment.[1,2] The smile is the most important factor of facial expression and maxillary central incisor are the most dominant teeth. The objective of this study was to determine a correlation between the Height of external auditory meatus and the crown length of maxillary central incisor in aiding teeth selection.

This study was conducted on 120 dentate subjects (60 males and 60 females) in the age range of 18-25 years. Each participant included, had all teeth present excluding 3rd molars, Class 1 jaw relation, and a harmonious as well as symmetrical face. Anthropometric measurements were recorded clinically in millimeters using a modified digital Vernier calliper. The data was input into a SPSSV.20 statistical software package for analysis. Pearson's correlation coefficient test was utilized to study the correlation. The mean height of external auditory meatus was 10.6 mm in males and 10.2 mm in females. The mean crown length of maxillary central incisor was 10.8 mm in males and 10.3 mm in females. The results showed a significant correlation between the pair external auditory meatus and crown length of maxillary central incisor.

This is a novel technique, using height of external auditory meatus as a guide for selection of maxillary central incisor which does not show any evidence in the literature.

Keywords: Crown Length, External Auditory Meatus, Height, Maxillary Central Incisor

Introduction

Loss of natural teeth results in a sequelae, leading to loss of function (mastication and swallowing), speech (phonation), aesthetics and a negative psychological as well as social effect on an individual.[3,4] Complete success of prosthesis lies in restoring masticatory function with reconstruction of the original occlusion, along with achieving the aesthetics acceptance by the patient. Now a days, the focus in Prosthodontic has shifted from removal to fixed prosthesis with implants, still the concepts like jaw relation and teeth selection remain at the base.[5,6] Recording the correct jaw relation and proper teeth selection is significant to achieve optimum function as well as understanding aesthetic perception of the patient. Therefore it is important to identify objective parameters in order to achieve direction for optimal reconstruction.[7] Growing interest continues to be in dental

aesthetics since it is associated with the patient's quality of life and general well-being.[8] The maxillary central incisors are the most dominant teeth and commonly the most visible on smiling. But so far there is no evidence in the literature for correlating the height of External auditory meatus in selection of the teeth. However no method is more accurate than other. This method is a handy, inexpensive, less time consuming method which does not cause any exertion to the patient.

Methodology

This prospective cross-sectional was conducted at Prosthodontic department. Clearance from the Institutional Ethical committee was obtained (protocol number 0168/2018-19). An informed consent and subject's willingness and participation in the study were ensured. This study was conducted on 120 dentate subjects (60 males and 60 females) in the age range of 18-25 years. Each participant included, had all teeth present excluding 3rd molars, Class 1 jaw relation, and a harmonious as well as symmetrical face. Study Subjects younger than 18 and above 25 years were not considered. Participants with signs of gingival alteration, hyperplasia, inflammation, altered passive eruption, or gingival recession were excluded. Subjects with open bite or deep bite cases, teeth anomalies, attrition, extensive prosthesis or restorations in the oral cavity, temporomandibular joint disorders or any other pathology in the maxillofacial region, history of trauma, orthodontic treatment were not included. All the readings were recorded with the patient seated on dental chair. Patients head was straight with mandible parallel to the ground. Patient was asked to bite lightly on his/her posterior teeth with the lips in competent position.

Digital Vernier calliper under brand name Yuri, was used to measure the crown length of the maxillary anterior teeth. Then the height of the external acoustic meatus was measured from Concha to Intertragic notch. Also, a standardized digital photograph of face was generated from the frontal aspect and lateral aspect using a digital camera.

1. Height of External Auditory Meatus shown in **fig 1**
2. Length of Maxillary Central Incisor as shown in **fig 2.**

Results

One hundred and twenty subjects entered the study; 60 males and 60 females with an age range of 18-25 years. For all the parameters of the study, mean standard deviation and range was calculated.

The data was input into a SPSSV.20 statistical software package for analysis. Pearson's correlation coefficient test was utilized to study the correlation. A significant correlation was found (r=0.41), P=0.001 for male and (r=0.39), P= 0.0016 for female; for the pair External Auditory Meatus and Maxillary Central Incisor.

Discussion

Aesthetic replacement and physiological tooth arrangement made the prosthesis biologically compatible and desirable. Proper placement of tooth should be functional and aesthetically pleasing to enhance the psychology of the patient.[9] The goal is to restore the maxillary anterior teeth in harmony with the facial appearance.[10]

Bell RA. Conducted a study on 31 subjects to determine the validity of William's geometric theory of tooth selection. The maxillary central incisors were radiographed and photographed; casts were made of the maxilla but there was no correlation between the form of the face and the form of the maxillary central incisors.[11]

Kern BE in his study used anthropometric measurement of skulls to determine the ratios between the size of certain bony structures and the size of the anterior teeth[12] Abdulhadi LM et al. conducted a study using photographs and maxillary cast which concluded the face and CI lengths were correlated statistically, but it was time consuming method.[13] Abdulhadi LM conducted a study where facial biometrical measurements (bizygomatic width and nasion-pogonion height) were recorded directly using the cephalometer and digital caliper. The measurements for CI were made directly on casts of the maxillary arch of each subject and concluded that a visual matching of the face and the tooth form was seen.[14]

However, there is little scientific data in the dental literature to use as a guide for defining the proper size and shape of the anterior teeth or determining normal relationships for them.[15,9] If proper tooth selection is not done then it might hamper mastication, speech, aesthetics and later have temporomandibular problems. The relative dimension of teeth seem to be among the most objective dental criteria within the esthetic requirement.[16]

The method to be used in teeth selection must meet the criteria, including: inexpensive and repeatable measurements, easily adapted technique, completeness of the tools needed and shorter duration of time. However, there is no opinion stating a method is more accurate than the other methods. Based on this background, the height of external auditory meatus is examined for selection of maxillary central incisor using a digital Vernier calliper. There is no evidence in the literature which uses height of external auditory meatus as a guide for selection of maxillary central incisor.

In this study, there was a significant correlation between the height of external auditory meatus and the length of maxillary central incisor (r=0.41) for males and (r=0.39) for females. Since the external auditory meatus is physically unaltered and is a part of the face itself, it is chosen for teeth selection in an individual. By this method, agony of the patient can be reduced since it is handy, inexpensive, less time consuming method which does not cause any exertion to the patient as well as the operator. It also avoids complicated calculations and no specialized skills are required by the operator.

Limitations- Findings of the current study need more research to be carried out on a larger sample size to confirm its applicability universally.

Conclusion

The anthropometric study showed that there was a significant relationship between the height of external auditory meatus and the length of maxillary central incisor. It is a reliable method for teeth selection of maxillary central incisor. This method is simple, inexpensive and non-invasive. It also decreases the chair time and exertion to the patient as well as the operator. Hence this method could be recommended for everyday practice.

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Legend Tables and Figures

Fig 1: Height of External Auditory Meatus

Fig 2: Length of Maxillary Central Incisor

Table 1: Descriptive statistics of Height of External Auditory Meatus and Length of Maxillary Central Incisor

SEX	Measurements	Mean (mm)	Standard Deviation	Min (mm)	Max (mm)
Males	Height of External Auditory Meatus	10.6	0.37	9.5	11.2
	Length of Maxillary Central Incisor	10.8	0.41	10.0	11.5
Females	Height of External Auditory Meatus	10.2	0.42	8.7	11.2
	Length of Maxillary Central Incisor	10.3	0.41	8.9	11.0