

Evaluation of the incisive papilla as a guide to the maxillary central incisors and canine teeth position in Iraqi and Yemenian samples

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Summary

Back ground: This study was conducted to estimate the relation ship of the incisive papilla to the antero posterior arrangement of the maxillary anterior teeth in a two different groups (Iraqi and Yemenian groups), because incisive papilla is considered as a reliable and relatively stable anatomic land mark.

Materials and Methods: Maxillary and mandibular stone casts were collected from 100 dental students, (50) of Iraqi dental students in Baghdad university and (50) of Yemenian dental students in Ibb university at the 3rd and 4th classes. Age ranged from 21-25 years. Alginate impression, dental stone, stock trays were used. Photographic technique was used to measure anatomic land marks located on dental casts. A computerized digital caliper (CDC) tool was used in the measurements which were made on scanned images of dental casts .The distances from midpoint and posterior point of incisive papilla were measured .The area on the incisive papilla where the inter canine distance passed was noted , paired t- test and chi-square test were used to analyze the data.

Result: the data obtained suggested that the distance from the labial surface of maxillary central incisors was ranged from 8.9 to 9.92 mm from the midpoint of incisive papilla, this measurement was 8.9 mm in Iraqi sample and 9.92 mm in Yemenian sample. Also the distance from the from the labial surface of maxillary central incisors was ranged from 11.33 to 12.34 mm from the posterior border of incisive papilla , this measurement was 11.33 mm in Iraqi sample and 12.34 mm in Yemenian sample The mean distance of the inter canine line joining the canine cusp tips was 31.9 mm in Iraqi sample and 35.66 mm in Yemenian sample. The differences between Iraqi and Yemenian scores (distance from the labial surface of maxillary central incisors to the mid point and posterior border of incisive papilla in addition to the scores of inter canine distance) were statistically significant ($p < 0.05$). Gender had no significant effect on the relationship of the incisive papilla to the maxillary anterior teeth in both Iraqi and Yemenian samples.

Conclusion: These results suggested that there is a relation ship between the maxillary central incisors, canines and incisive papilla aiding in their antero posterior position. Gender did not affect the measurements. Furthermore, these measurements showed a statistically significant difference between Iraqi and Yemenian samples .The clinical revelance of this study lies in application of incisive papilla as a starting point in the preliminary location of maxillary incisors and canine teeth during construction of dentures.

Key words: incisive papilla, maxillary anterior teeth.

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Introduction

Many dentists have commented on the difficulty of choosing suitable replacement teeth for edentulous patients and arranging these teeth in a natural and esthetic appearance. Errors at this stage can often result in patient rejection of other wise well constructed, comfortable, and efficient dentures (1,5). To achieve a correct speech, lip support and providing a harmonious incisal guidance in making complete dentures, the upper anterior teeth should be positioned as close as possible to the positions originally occupied by the natural teeth(1,6). Ritchie et al (1) , found that the nasal width and incisive papilla can be used as guides for the selection and arrangement of maxillary anterior teeth .Watt et al (5), suggested that the canines should be located in a coronal plane passing through the posterior border of the papilla.

One guide to the antero posterior arrangement of the anterior teeth is the relation to the incisive papilla which is a reliable and relatively stable anatomic land mark on the basis of Caucasian norms, which place the maxillary central incisors 8 to 10 mm anterior to the center of the papilla (2,3). Some investigators have suggested that a line drawn at right angles to the mid line passing through the center of the incisive papilla passes through the tips of the upper canines (4,12). Watt et al (3,5) ,pointed out as a result of morphological changes in the denture bearing area (alveolar ridge resorption) following the extraction of maxillary teeth ,the papilla moved forward about 1.6 mm and 2.3 mm upward as a result of bone remodeling , the relation ship between the incisive papilla and the incisive fossa changed slightly so that the fossa lies slightly posterior to the papilla in the edentulous mouth. To compensate for this alteration they suggested use of the posterior border of the papilla and the

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positioning of the maxillary canines in a coronal plane passing through the posterior border rather than the middle of the papilla. Grave et al (9), found that the mean distance from the labial surface of maxillary incisors and the posterior border of incisive papilla for the group with artificial teeth was significantly smaller than that for the group with natural teeth. Linear measurement between two objects in a three dimensional relationship imposes problem when the objects are not aligned on the same plane in three dimensions (6, 13). To reduce this error a photographic technique was developed and used in this study to evaluate the use of the midpoint and the posterior border of the incisive papilla as a guide for the antero posterior position of maxillary central incisors.

Materials and Methods:

Maxillary and mandibular casts were collected from 100 dental students (50) Iraqi dental students (Baghdad university) and (50) Yemenian dental students (Ibb university) from the Department of Prosthetics, both samples consist of (25) men and (25) women between the ages of 21 and 25 years old, they were selected on the basis of the following criteria: all the maxillary incisors, canines, premolars, and first molars were present, there was no gross misalignment, there were no over erupted teeth, there was no history of orthodontic treatment and severe attrition of canines was not acceptable although mild attrition was accepted, all the students with Angle's CL1 relationship, the incisal edges of the upper central incisors have a 2 mm horizontal over lap (or over jet) with the incisal edges of lower incisors. Irreversible hydrocolloid was used to obtain impressions and casts were poured with dental stone. Each cast was trimmed following the same procedures. One side of the cast was trimmed to produce a flat surface. Also in all the casts, the base of the cast was 33 mm from the top of the occlusal plane. The following anatomic landmarks were marked on the cast, the most labial contour of the central incisor A, the anterior point of the incisive

papilla I1, the posterior point of the incisive papilla I2, the right maxillary canine tip C1, the left maxillary canine tip C2. In cases of where the tips of the canine exhibit wear as a result of attrition, its original position was estimated by joining a line along the mesial and distal cutting edges and a line along the buccal and lingual long axis of the tooth, the point of interception of the two lines would be the estimated canine cusp tip. The casts were placed on the plate form of a photographic copying stand. A camera (real time winder controller set, infra red, Japan) was used. The photographs were taken at a shutter speed of two seconds, the magnifying power (2\3) and a fixed distance between the camera and the casts was 25 cm. Acetate tracing paper was placed on top of the photograph. the outline of the upper central incisors, the anterior point I1 and the posterior point I2 of the incisive papilla, the cusp tip of right canine C1, cusp tip of the left canine C2, were marked on the tracing paper. A line was drawn just touching the most anterior points on the labial outline of both centrals. A second line was drawn and passed through points I1 and I2. The interception point of the two lines was point A. A third line was drawn to join points C1 and C2. The interception of the line C1 C2 with I1 I2 was point B.

A computerized digital caliper (CDC) was employed for location and registration of the points marked on the tracing paper, the (CDC) has a resolution of 0.1 mm. personal information on each subjects was also entered into the computer.

The following information was calculated and analyzed by the Computer: the distance from point A to the midpoint of I1 and I2. The distance from point A to I2, the inter canine distance C1C2, the region where the inter canine line crosses the incisive papilla I1B\I1I2 and the correlation between the preceding findings and gender classification.

Measurements were analyzed with t-test and chi-square test, SPSS version 15.0 for windows was employed.

Results:

Relationship of central incisors to the midpoint of the incisive papilla.;

The mean distance from point A to the midpoint of I1 and I2 (midpoint of incisive papilla) ranged from 8.9 mm in Iraqi sample and 9.92 mm in Yemenian sample. The difference was statistically significant for males and high significant for females comparing Iraqi and Yemenian samples (Table I).

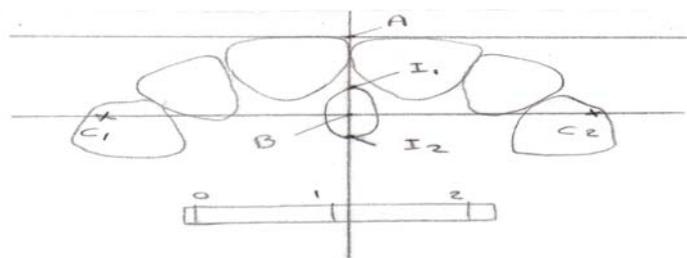


Table I. Mean distance from point A to the midpoint of the incisive papilla in men and women in Iraqi and Yemenian samples.

	sample	No.in sample	mean	SD	SE	t- test	p-value	Sig
Iraqi	Mixed	50	8.901	0.867	0.122	1.26	0.21	NS P>0.5
	Male	25	9.055	1.055	0.211			
	Female	25	8.748	0.611	0.122			
Yemenian	Mixed	50	9.920	1.071	0.151	0.18	0.86	NS P>0.05
	Male	25	9.893	0.943	1.886			
	Female	25	9.947	1.203	0.241			

Comparison between Iraqi and Yemenian samples related to the distance from point A to the mid point of the incisive papilla.

Sample	t-test	p-value	Sig
Mixed	5.23	0.000	HS
Male	2.96	0.048	S
Female	4.44	0.0001	HS

*p<0.05 Significant (S).

**p<0.001 High significant (HS).

Relationship of central incisors to the posterior point of the incisive papilla.

The mean distance from point A to the posterior point of incisive papilla ranged from 11.32 mm in Iraqi sample and 12.34 mm in Yemenian sample. The difference was statistically significant for males and high significant for females comparing Iraqi and Yemenian samples (Table II).

Table II: Mean distance from point A to the posterior point of the incisive papilla in men and women in Iraqi and yemenian samples (A-I2).

	sample	No.in sample	mean	SD	SE	t- test	p-value	Sig
Iraqi	Mixed	50	11.327	0.929	0.131	4.01	0.003	NS P>0.05
	Male	25	11.788	0.592	0.118			
	Female	25	10.866	0.984	0.196			
Yemenian	Mixed	50	12.341	1.302	0.184	1.56	0.13	NS P>0.05
	Male	25	12.625	1.548	0.309			
	Female	25	12.057	0.948	0.189			

comparison between Iraqi and Yemenian samples related to the distance (A-I2).

Sample	t-test	p-value	Sig
Mixed	4.48	0.000	HS
Male	2.52	0.017	S
Female	4.36	0.0001	HS

*p<0.05 Significant (S).

**p<0.001 High significant (HS).

Relationship of canine to the incisive papilla

The incisive papilla was divided into three parts : the anterior , middle , and posterior portions. Results of chi-Square showed that a difference in gender does not influence the relationship of inter canine line and incisive papilla in both Iraqi and Yemenian samples (Table III).

Table III: Location of the inter canine line on the incisive papilla in men and women in Iraqi and Yemenian samples (C1 C2).

Location	No.of men		No.of women		Chi-square	P-value	Sig
	Iraqi	Yemenian	Iraqi	Yemenian			
Anterior third	3	4	2	2	2.531	0.0421	S P<0.05
Middle third	13	13	16	17			
Posterior hird	9	8	7	9			

*of Yemenian sample between male and female Chi-square=1.486 P=0.476 P>0.05 NS.

*of Iraqi sample between male and female Chi-square=0.760 P=0.684 P>0.05 NS.

Comparism between Iraqi and Yemenian samples related to the (C1C2) on the incisive papilla.

Sample	Chi-square	p-value	Sig
Male	0.202	0.904	NS
Female	0.107	0.948	NS

*p>0.05 Non Significant (NS).

Measurements of inter canine distance:

The mean inter canine distance was 32.18 mm in Iraqi sample and 35.81 mm in Yemenian sample. The difference was statistically high significant for both male and female subjects comparing Iraqi and Yemenian samples (Table VI).

Table VI: The inter canine distance C1C2 in Iraqi and Yemenian samples in mm.

	sample	No.in sample	mean	SD	SE	t- test	p-value	Sig
Iraqi	Mixed	50	32.18	1.627	0.230	0.54	0.59	NS P>0.05
	Male	25	32.05	1.759	0.352			
Female	25	32.31	1.510	0.302				
Yemenian	Mixed	50	35.81	1.508	0.213	0.87	0.39	NS P>0.05
	Male	25	35.62	1.358	0.272			
	Female	25	35.98	1.657	0.330			

Comparison between Iraqi and Yemenian samples related to (C1 C2).

Sample	t-test	p-value	Sig
Mixed	11.54	0.000	HS
Male	8.02	0.000	HS
Female	8.23	0.000	HS

*p<0.001 High significant (HS).

Discussion:

The tips of inter dental papillae were used as reference points based on assumption that the plane formed by these points would be closely parallel to the plane formed by the corresponding portions of the edentulous alveolar ridge crest this may not be true in a given clinical situation, but in most instances it is believed that some correlation of the plane exists in a sense of normal statistical distribution (5,8).

In this study the most posterior point and the center point of the incisive papilla were used as anatomic marks in all horizontal measurements because they could be easily and exactly located.

The mean distance from point A to the midpoint of I1 and I2 (corresponding to center of the papilla) in Iraqi sample was 8.90 mm with a standard deviation of 0.87mm. and the mean distance in yemenian

sample was 9.92 mm a standard deviation of 1.07 mm .The values for both samples fall within the recommended range of 8-10 mm and is compatable to findings of Sawiris (10), 8.50 mm and Mavroskoufis and Ritchie (1), 10.2 mm .

The mean distance from point A to the posterior point of the incisive papilla in Iraqi sample is 11.33 mm with a standard deviation of 0.93 mm and in Yemenian sample the mean distance is 12.34 mm with a standard deviation of 1.30 mm which is compatable to the findings of Ortman and Taso (11) 12.4 mm, also Grave and Becker (9) proved this similar measurement as 12 to 13 mm.

The inter canine line passed through the middle third of the incisive papilla in 58% of Iraqi subjects and in 60% of Yemenian subjects. the findings is very similar to that of Sawiris study (10) , in which 64%

of the inter canine lines passed through the center of the papilla .

In this study the inter canine line was used rather than the line joining the most distal point of the canines, because the most distal point of the canines was not found to be any easier to locate than the tip of the canines. The mean value variation between Iraqi and Yemenian samples may be related to that, the measurements were obtained from a slightly different reference point on the central incisor .

Conclusion:

The incisive papilla provides a reference point on the edentulous cast that may be helpful in determining the antero posterior position of the artificial incisors.

It is believed that the application of this anatomic relation (the relation between the incisive papilla to the maxillary central incisor) can provide a reliable point for arranging and checking the position of the anterior maxillary teeth for complete dentures

References:

1. Myroskoufis F, Ritchie G.M. Nasal width and incisive papilla as guides for the selection and arrangement of maxillary anterior teeth .*J.Prosthet.Dent.*1981,45:592.
2. Boucher co. The current state of prosthodontics. *J.Prosthet.dent* .1960,10:411-25.
3. Watt DM, Macgregor AR. Designing partial dentures. London: Saunders, 1984:184-99.

4. Grove HF, Christensen LV. Relation ship of the maxillary canines to the incisive papilla .*J.Prosthet.dent.*1989,61:51-3.

5. Watt DM. Morphological changes in the denture bearing area following the extraction of maxillary teeth . *British dental journal.*1974,136:231-235.

6. Harold R, Ortman D, Ding H, Taso D. Relationship of the incisive papilla to the maxillary central incisor s. *J.Prosthet.Dent.*1979,42,492-496.

7. Lau G. C. K, Clark R. F. K. The relation of the incisive papilla to the maxillary central incisors and canine teeth in Southern Chinese. *J.Prosth.Dent.*1993,70;86-93.

8. Erlich J, Gazit E. Relationship of the maxillary central incisors and canines to the incisive papilla .*J.Oral Rehabil.* 1975,2:209-12.

9. Grave A. M. H, Becker P. J. Evaluation of the incisive papilla as a guide to anterior tooth position. *J.Prosthet.Dent.*1987,57:712-14.

10. Sawiris MM .The role of anthropometric measurements in the design of complete denture *J.Dent* .1977 ;5:141-8 .

11. Ortman HR, Taso DH .Relation ship of the maxillary canines to the incisive papilla . *J.Prosthet.Dent.*1978,42:492-6.

12. Amine WM, Taha ST, AL-Tarawneh SK, Saleh MW, Ghzawi A, The relation ships of the maxillary central incisors and canines to the incisive papilla in Jordanians .*J.contemp.Dent.Pract.*2008,9 (5):42-51.

13. Fu PS, Hung CC, Hong JM and Tasicf. Three dimensional relation ship of the maxillary anterior teeth to the incisive papilla in young adults. *Kaohsiung J.Med.Sci.*2007,23(10):519-25.