

REVIEW ARTICLE

CORRELATION BETWEEN THE FORM OF THE MAXILLARY CENTRAL INCISOR AND THE INVERTED FORM OF THE FACE (PART I: LITERATURE BACKGROUND)

* Boujoual, I., Mouhibi, A., Juhadi, E.M. and Andoh, A.

Department of Fixed Prosthodontics, Faculty of Dentistry Hassan II University, Casablanca, Morocco

ARTICLE INFO

Article History:

Received 24th July, 2018
Received in revised form
27th August, 2018
Accepted 20th September, 2018
Published online 30th October, 2018

Keywords:

Central maxillary incisor,
Face, Forms,
Harmony,
Golden ration

ABSTRACT

This is the first of a set of two papers dealing with the relationship between the shape of the maxillary central incisor and the inverted form of the face. The central incisor is a tooth that dominates the anterior region in terms of shape, size and location. This makes it the key to the success of any aesthetic rehabilitation. In addition, it is the only tooth to completely face the smile, which reinforces the impression of dominance. (M. Crétôt, 2015 and Etienne *et al.*, 2007) James Leon William in 1914 advanced a theory, in which he assumes that there is a harmony between the shape of the face and that of the inverted upper central incisor. (Crétôt, 2015) Leon Williams had classified the central incisors into 3 main forms: "Ovoid", "square / rectangular", "triangular" This theory remains, today, the most accepted in the field of choice of prosthetic teeth as well as in smile design software (L. Ibrahimagi and V. Jerolimov, 2001) In this work we aim to treat the subject as follows: - At first we will briefly discuss the fundamental reminders including the anatomy of the central incisor, the harmony of the face (the golden ratio), and the theory of Leon Williams. - A second chapter will concern our literature review on the correlation between the shape of the face and that of the upper central incisor. - A third chapter will concern our report on the correlation on a small sample in order to illustrate to compare and discuss our observations with those of the literature.

Copyright © 2018, Boujoual, I., Mouhibi, A., Juhadi, E.M. and Andoh, A. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The central incisors represent the center of interest of a dental composition: they must dominate the dental composition so that the smile is expressive. But their presence will be determined by age, sex, personality, the thickness of the lips and the anatomical component. (Etienne and Paris, 2007). The central incisor, at the heart of the smile, plays a major role in the dental composition. The analysis of the harmony can be done on several levels: first, in the forms and the proportions of the tooth, then in the frame of the smile, finally more widely in the facial frame (Lasserre, 2008). If we try to classify the maxillary central incisors according to their forms we find the three large families which are used for the industrial manufacture of artificial teeth for removable prostheses: the rectangular or square typology, the triangular typology and the ovoid one. Usually, the upper central incisor is used as a key for the choice of the artificial anterior teeth because it is seen as the crucial tooth of the smile and appearance. Since this tooth is the most perceptible to the casual spectator in unstrained facial motion, it gives the best statement of patient age, whereas lateral incisor reflects the patient's sex, whereas the canine reveals the patient's vigor

The anatomical context: The harmony is perceived on several levels: first, in the forms and the proportions of the tooth (dental anatomy), then in the frame of the smile (low line, average line, high line), finally more widely in the facial frame.

Anatomy of the central incisor: Its length is between 10.4 and 11.2 mm and the width between 8.87 mm and 9.3 mm. In the vestibular view, the mesial edge is slightly convex, its point of contact with the contra lateral central incisor is close to the free edge (occlusal third). The distal edge is more convex than the mesial and the point of contact with the lateral incisor is more apical (between the fourth and the occlusal third of the height of the crown). The free edge is rectilinear and very slightly oblique distally and apically. The distal angle formed by the junction between the free edge and the distal edge is more rounded and less acute than the mesial angle (almost at right angles) (Björn Maier, 2012). In the young subject, it presents two grooves divided into three lobes that fade with wear. The occlusally concaved semi-circle cervical margin connects the mesial and distal neck. The very convex vestibular surface in the cervical third is softer in the two-thirds occlusal. The harmonious curves are responsible of the difference of behaviors concerning light reflection in the buccal face. A rectilinear buccal surface will result in a monochrome appearance and a free edge that is too thick and will give a less translucent look. (Crétôt, 2015).

*Corresponding author: Boujoual, I.,

Department of Fixed Prosthodontics, Faculty of Dentistry Hassan II University, Casablanca, Morocco.

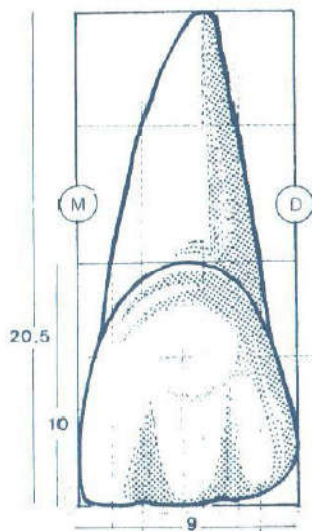
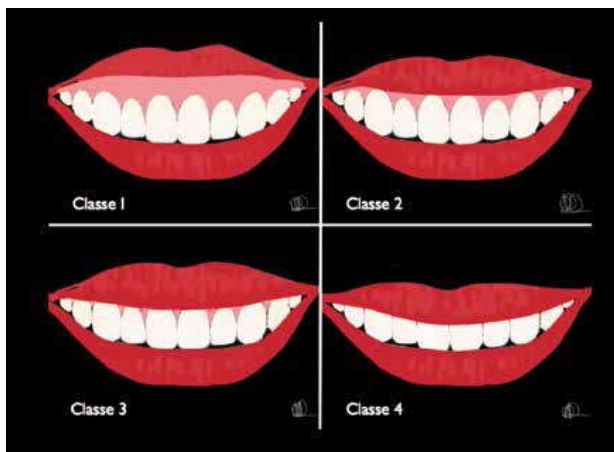


Figure 2. The anatomy of the central maxillary incisor by CRETOT



Smile line classification based on periodontium visibility (by Liebart 2004)

Harmony of the smile

The first impression that we have of an individual is often based on what we perceive of his face, and particularly of his smile because it's the more attractive pole in it. Indeed, the smile always focuses in our social relations, our attention and allows communicating all types of emotions, verbal and nonverbal. In odontology, the smile represents the first exposure of dental aesthetics in the labial area. Thus our objective, in the realization of an esthetic reconstitution, is to improve, even to imitate, the appearance and the illusion of the dental natural exhibited by the smile. (M. Dodds *et al.*, 2014) Liebart *et al.*, (2004) proposed a classification, essentially periodontal, of the different types of smile:

- **Class I: (very high line):** corresponds to a smile that discovers a continuous band of gums 3mm or more in height.
- **Class II: (high line):** corresponds to a smile that discovers a continuous band of gums less than 2 mm in height.
- **Class II: (middle line):** presents only the spaces filled with or not by the papillas.
- **Class IV: (low line):** does not show any gums at all. (Fig. 3)

Harmony of the face: « The golden ratio »

The face, and particularly, the smile is the most important communications tool for humans. Platon said: « it is impossible to combine two things without a third. There must be a link between them... thus it is the nature of the proportion. ». Pacioli in 1509 in "De Divina Proportione" Found out that two lengths such that the ratio between the large part and the small is equal to the ratio of the whole. Leonardo da Vinci found out that the greater part and the small is equal to the ratio of everything, and gave it the name of "Sectia aurea", golden section, which takes the numerical value of 1.618 ... hence the name of "Golden Number " or golden ratio. (Crétôt, 2015)

$$a/b = (a+b)/a = 1.6180339887498948420$$

In a seductive face, the Bipupillary Line (LB) represents the horizontal aesthetic reference of the face in 88.4% of cases. Only 11.6% of faces show vertical asymmetry. The Median Sagittal Plane or the Median of LB represents the axis of symmetry and forms with the horizontal reference a "T" whose centering and perpendicularity greatly favor the perception of the harmony of the face. In the sagittal plane, the drawing of the lips, upper and lower, is an element of appreciation of the profile, which must serve as a guide to the situation of the teeth. (Dodds *et al.*, 2014)

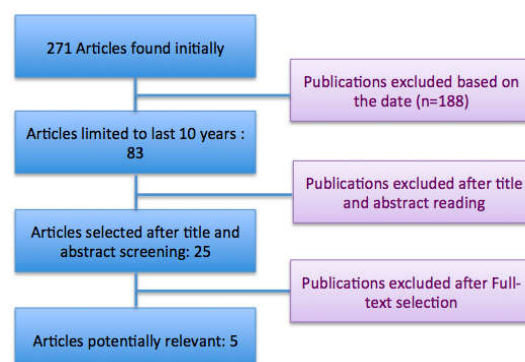
Literature background

Purpose: Our aim was to evaluate the level of scientific proof of the Leon Williams theory, which supposes that there is a correlation between the shape of the face and that of the upper central incisor.

MATERIAL AND METHOD

We asked the Medline database through Pubmed using the keywords Mesh: Face, central incisor, according to the combination: (central incisor AND face). We have selected articles in English: We obtained 271 articles, then we limited the research for only the articles published during the last 10 years the result was 83 articles. A first selection was made after reading the titles and / or abstracts, and yielded a number of 25 articles. Articles that compare profile photos with the anteroposterior shape of the central incisor were excluded since we propose to study the correlation of contour shapes in frontal view. A second assessment was provided by two independent reviewers based on the critical screening of the quality of the studies (levels of proof and relevance) and resulted in 5 articles that deal with the same subject as our work.

RESULTS



AUTHOR AND PUBLICATION	YEAR	SAMPLE AND GENDER	AGE	TEST	RESULTS
Shaweesh et al. <i>J Prosthet Dent. Mar ;113(3):198-204</i>	2015	200 (100m 100f)	22 to 28	anova The post hoc tukey test	The contours are similar ($p > 0.05$) with more correlation of shape for men
Furtado.& al. <i>Indian J Dent Res. 2014 Mar-Apr;25(2):178-83. doi: 10.4103/0970-9290.135914.</i>	2014	50 (20 m 30 f)	15 to19	anova kappa test kolmogorov–smirnov	The difference of form is non- statistically significant: ($P > 0.05$)
Koralakunt & al <i>J Oral Sci. 2012 Sep;54(3):273-8.</i>	2012	200 (79 males and 121 females)	18-28	Chi square test	A correlation $>50\%$ a was observed by a visual method par Conversely Only 31.5% Williams method (low correlation)
Pedrosa.al <i>Braz Oral Res. 2011 May-Jun;25(3):210-6. Epub 2011 Apr 15.</i>	2011	100 (35 m 65 f)	16 to 35	Bowker's test Pearson's Correlation,	(Bowker's test, $p = 0.0015$) There is a positive correlation between the width of the central incisor and the one of the face (Pearson's Correlation, $r = 0.9731$; $p < 0.001$) A higher correlation prevalence was observed with the ovoid forms .
de Oliveira Farias <i>Int J Dent. 2010;2010. pii: 561957. doi: 10.1155/2010/561957. Epub 2010 Sep 8.</i>	2010	100 (40 m 60 f)	20	Pearson correlation coefficient Kappa test	No relationship between the shape of the face and that of the central incisor.

DISCUSSION

The results of our review revealed that there are different testing methods, heterogeneity of protocols, and most are in small population samples, which make the comparison of the studies difficult. A. Shaweesh & *et al.*, 2015, stated that the mathematical methods like the Fourier analyses make the study of the variables easier by making the qualitative variables (forms) quantitative and then easy to measure and to study. (shaweesh, 2015). The studies made by, A. shaweesh 2015 (shaweesh, 2015), A O Pedrosa 2011 (Oliveira Pedrosa, 2011) Furtado & al. 2014 (Gisela Crippa Furtado, 2014) established that there is a strong correlation between the shape of the central maxillary incisor and that of the face and so they all confirmed the theory of Leon Williams. However the study run by Karalakunte et al. 2014 showed only a weak correlation between de two forms, Otherwise De Oliveira Farias 2010 (F. de Oliveira Farias *et al.*, 2010) exhibited no correlation between these two structures completely different. Pedrosa 2011 Focused also on the study of the aesthetic aspect combined to the correlation between the face and the central incisor. He concluded that even though there is a strong correlation of typology, there is no link between this correlation and the beauty of the person observed. So the aesthetic is not altered if the form of face isn't in harmony with that of the central maxillary incisor. Moreover, A. Shaweesh & *et al.*, 2015 highlighted that the contours are similar ($p > 0.05$) with more correlation of shape for men, so the gender influence this correlation of forms, however other studies didn't mention that link.

Conclusion

This first part was written to remind some notions of anatomy and to provide a vision of the literature background; a second part will focus on a statistical study on a sample to compare the results with those of the literature. The central incisors characterize the heart of a dental composition: they must dominate the so that the smile is expressive.

REFERENCE

- Björn Maier, 2012. Directives esthétiques pour prothèses à l'allure naturelle , *cosmetic dentistry 3_2012* spécial _ techniques prothétiques
- Crétôt, M. 2015 : Arcade dentaire humaine + Variations morphologiques des dents
- Crétôt, M. 2015. Arcade dentaire humaine + Variations morphologiques des dents Editeur : CDP Année: (8ème édition)
- de Oliveira Farias, F., Ennes, JP., Zorzatto, J R. 2010. Aesthetic Value of the Relationship between the Shapes of the Face and Permanent Upper Central Incisor *Hindawi Publishing Corporation International Journal of Dentistry Volume, Article ID 561957, 6 pages doi:10.1155/2010/561957 Research Article*
- Dodds, M., Laborde, G., Devictor, A., Maille, G. and Sette, Les, A.P. 2014. Références esthétiques : la pertinence du diagnostic au traitement *Stratégie prothétique mai-juin vol 14, n° 3*
- Dodds, M., Laborde, G., Devictor, A., Maille, G., Sette, A. P 2014. Les références esthétiques : la pertinence du diagnostic au traitement *Stratégie prothétique mai-juin• vol 14, n° 3*
- Etienne, JM., JC Paris Au centre du sourire L'incisive centrale. *l'information dentaire mai 2007*
- Gisela Crippa Furtado, 2014. Relationship between the morphology of the maxillary central incisor and horizontal and vertical measurements of the face, *Indian Journal of Dental Research, 25(2)*.
- Ibrahimagi, L., Jerolimov V. 2001. Relationship Between the Face and the Tooth Form *Coll. Antropol. 25 2: 619–626 UDC 572.545:611.314 Original scientific paper*
- Ibrahimagi, L., Jerolimov, V. 2001. Relationship Between the Face and the Tooth Form *Coll. Antropol. 25 2: 619–626 UDC 572.545:611.314 Original scientific paper*
- Lasserre, JF. 2008. Forme et harmonie de l'incisive centrale, *l'information dentaire n° 41 - 26 novembre*.

- Oliveira Pedrosa, 2011. Study of the morpho-dimensional relationship between the maxillary central incisors and the face *Braz Oral Res.*, May-Jun;25(3):210-6
- Oliveira Pedrosa, 2011. Study of the morpho-dimensional relationship between the maxillary central incisors and the face
- Pavankumar R. 2012. Koralakunte Original A clinical study to evaluate the correlation between maxillary central incisor tooth form and face form in an Indian population *Journal of Oral Science*, Vol. 54, No. 3, 273-278.
- Pavankumar R. Koralakunte , 2012. Original A clinical study to evaluate the correlation between maxillary central incisor tooth form and face form in an Indian population.
- Shaweesh, A. 2015. Studying the relationships between the outlines of the face, maxillary central incisor, and maxillary arch in Jordanian adults by using Fourier analysis, *the journal of prosthetic dentistry 03- Volume 113 Issue 3*
- Vajao, FM., Nogueira. SN. 2006. Correlation between maxillary central incisor form and face form in 4 racial groups VOL 37 quintessence publishing Decembre.
- Vasanth Kumar M. 2011. *The Science of Anterior Teeth Selection for a Completely Edentulous Patient: A Literature Review J Indian Prosthodont Soc.*, 11(1):7-13 DOI 10.1007/s13191-011-0058-
- Vasanth Kumar, M. 2011. *The Science of Anterior Teeth Selection for a Completely Edentulous Patient: A Literature Review*
