

Cephalometric Floating Norms for the Position of the Lower Incisors

Kefalometrijske norme za orijentaciju položaja donjih inciziva

Marina Lapter¹
Zelimir Muretić¹
Vjekoslav Jerolimov²

¹Schol of Dental Medicine
University of Zagreb, Croatia

²Clinical Department of
Dental Prosthodontics
Clinical Hospital "Dubrava",
Zagreb, Croatia

Summary

This study was carried out with the aim of assessing the graphic presentation of cephalometric values which can provide guidance for the position of the lower incisors in relation to the mandibular plane in subjects with different interbasal and occlusal-mandibular angles.

The sample consisted of 80 individuals with normal occlusion. Variables ML-NL, OL-ML and I-ML were performed on lateral cephalograms.

Significant correlation between variables OL-ML and ML-NL ($r=0.60$), ML-NL and I-ML ($r= -0.35$) and I-ML and OL-ML ($r= -0.52$) were assessed.

Graphic presentation of concordant corresponding values was constructed on the basis of the correlation between the variables by means of regression analyses, with the purpose of assessing the inclination of the lower incisors in different skeletal jaw relationships.

Key words: *cephalometric, norms, incisors*

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Introduction

The position of the lower incisors related to the rest of the facial skeleton has come to play a leading role in the treatment of orthodontic cases. It has been emphasized that lower incisor position should be related to the surrounding structures in an individualised pattern.

An adequate analysis of skeletal pattern is important since nature may achieve considerable dental compensation in cases displaying skeletal disharmony (1).

It is desirable to understand the dentoalveolar compensatory mechanism which is a system that at-

tempts to maintain normal relation between arches under varying jaw relationships in all three dimensions.

As significant correlations between skeletal cephalometric variables have been assessed, the norms constructed on the variability of the associations among some cephalometric variables that have a certain relation to each have to be presented (2).

The relationship between the inclination of the lower incisors and various reference lines has been included in many cephalometric analyses (3,4,5).

Hasund and Be (6) introduced the interbasal angle ML-NL as an additional guiding variable including the vertical basal configuration of the face. The-

ir studies show that satisfactory guidance for the position of the lower incisors must take account of the vertical dimension.

Hasund and Ulstein (7), using multiple regression analysis, found the mean values of the axial inclination of incisors by different sagittal and vertical maxillo-mandibular relationships.

The aim of this study was to present a method of describing the position of the lower incisors in individuals with different interbasal (ML-NL) and occlusal mandibular angles (OL-ML).

Subjects and methods

The subjects included in the study comprised 80 Croatian adults, 41 females and 39 males with normal occlusion (complete dentition, no history of orthodontic treatment, Class I relationship, harmonious soft-tissue profile, absence of functional disorders).

Lateral cephalograms were taken by using the same X-ray device and by a standardized technique.

The following variables were performed on lateral cephalograms:

ML-NL = angle between the mandibular and nasal line;

OL-ML = angle between the occlusal and mandibular line;

\bar{I} -ML = angle between the axial inclination of the lower central incisor and the mandibular line.

Reference points, lines and angles are illustrated in Figure 1.

Statistical analysis comprised essential statistic values, calculation of Pearson's correlation and linear and multiple regression analysis.

Results

Table 1 shows the mean values, standard deviations and range of the three variables under investigation.

Table 1. Descriptive statistics

Tablica 1. Deskriptivna statistika

Cephalometric variables	Mean	SD	Min	Max
ML-NL	22,79°	4,78°	12°	33°
OL-ML	15,53°	3,76°	6°	25°
\bar{I} -ML	91,84°	6,64°	76°	111°

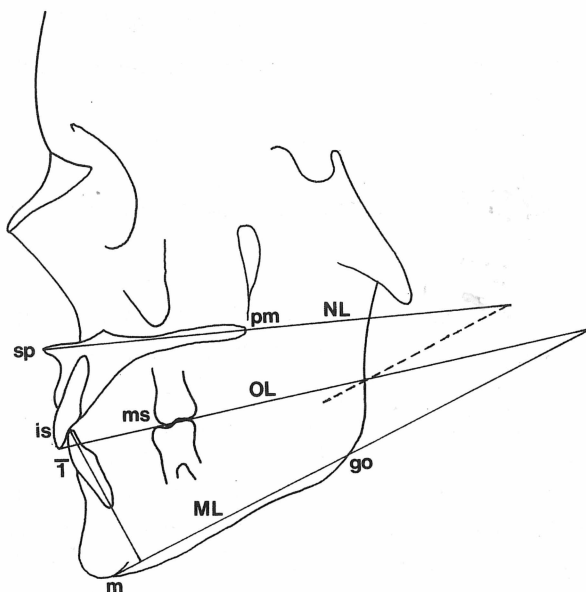


Figure 1. Reference points, lines and angles

Slika 1. Referentne točke, linije i kutovi

The relatively wide range of measured variables in clinically interesting, since all the subjects had normal occlusion. It suggests that in cases with normal occlusion the basal and dentobasal characteristics can vary greatly. Correlation coefficients (r) between the cephalometric variables are shown in Table 2.

Table 2. Correlation coefficients (r) between variables ML-NL, OL-ML and \bar{I} -ML

Tablica 2. Koeficijenti korelacija (r) između varijabla ML-NL, OL-ML and \bar{I} -ML

Cephalometric variables	ML-NL	OL-ML	\bar{I} -ML
ML-NL	1.000		
OL-ML	0.6004	1.000	
\bar{I} -ML	-0.349	-0.524	1.000

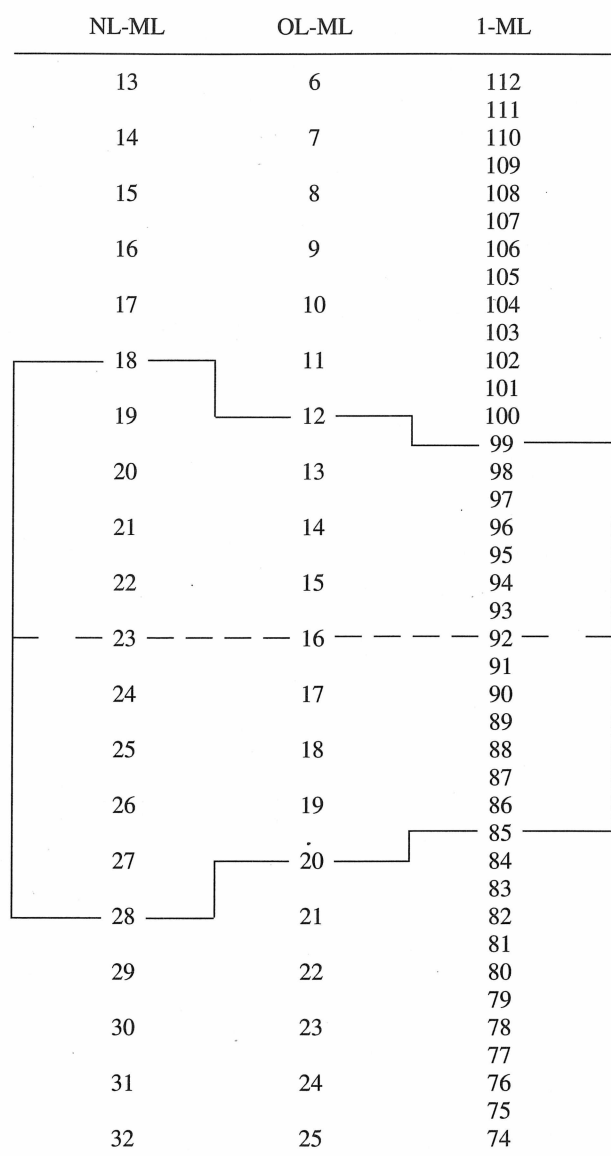


Figure 2. Graphic presentation of the correlations between variables in the form of a frame

Slika 2. Grafički prikaz korelacija između varijabli u obliku okvira

A graphic presentation of concordant corresponding values was constructed on the basis of the correlation between the variables ($r = 0.60$, $r = -0.35$ and $r = -0.52$) by means of regression analysis (Figure 2).

Graphic presentation of cephalometric values in the form of a frame gives guidance for the position of the lower incisors in relation to the mandibular plane in subjects with different interbasal and occlusal-mandibular angles. It can also indicate whet-

her the correlations between the variables are harmonious. In the vertical middle of the frame the mean values of the variables have been listed on a horizontal line, and the upper and lower borders of the frame determined by using values representing one standard deviation.

A harmonious combination of variables would not necessarily require the values to be on a perfectly straight horizontal line, and certain deviations could be tolerated. If all values fall within the borders, the combination of values considered more or less harmonious.

Graphic presentation of cephalometric values can give satisfactory guidance for the position the lower incisors in relation to the mandibular plane in subjects with different interbasal and occlusal-mandibular angles.

Discussion and conclusions

The mean values of the cephalometric variables were compared to those found by other authors.

In the investigated sample the mean value of the interbasal angle (ML-NL) was 22.79° , what is similar to the values found by Hasund and Bøe (6) 22° on a sample of the Norwegian population.

On an Austrian sample Droschl (8) found a mean value of 23.2° , Segner (1) found 19.8° and for a Finnish population the mean value was 24.2° (9).

On a sample of 67 untreated Germans Hasund and Janson (10) found a mean angle of 19.5° in a Taiwan population Chang (11) found much higher value 28.4° .

In the Croatian sample the mean value of the variable I-ML was 91.84 .

Downs (3) found a mean angle of 91.4° , Broadbent (12) 89.5° and Corelius (13) 92.5° . Schwartz (14) found a mean angle of 85.9° . The mean value in a Finnish population was 95.1° (9).

In our sample the mean angle for the variable OL-ML was 15.53° , which is almost identical to the findings of Schwartz 15.6° (14). Solow (2) suggested a mean value of 17.32° , while Ross (15) suggested a higher angle, 18.2° .

The great variety of mean values in different ethnic and population groups shows the importance of assessing the norms for each population group.

The inclination of the mandibular to the nasal line was to be significantly correlated to the inclination of the lower incisors to the mandibular line ($r = -0.349$). Similar correlations have been demonstrated by Solow (2) and Riger (16). This indicates that in individuals with a high interbasal angle the lower incisors would be retroinclined in relation to the mandibular base and *vice versa*.

In their investigations Rak and Muretić (17) Jenatschkea (18), and Janson and Hasund (10) found lower angles of the axial inclination of the lower incisors to the mandibular line in individuals with high interbasal angle compared to eugathic patients. In this case both variables were topographically related to each other through the reference line ML.

Interbasal angle is also significantly correlated to the inclination of the occlusal plane to the mandibular plane ($r = 0.60$). Solow (2) found similar correlation ($r = 0.66$).

Schudy (19) suggested that subjects with lower occlusal-mandibular angle have lower incisors more protruded in relation to the mandibular plane. These findings are similar to those found in this study. In conclusion, high interbasal angles are followed by higher occlusal-mandibular angles and retroinclined lower incisors.

Analysing the correlations between the vertical intermaxillary relations and dentition we can conclude that the inclination of the mandibular base will be strongly correlated with the inclination of the occlusal plane. Significant correlation was found between the inclination of the occlusal plane to the mandibular plane and the inclination of the lower incisors to the mandibular plane ($r = -0.524$). This suggests that the high angle between the occlusal and mandibular line will be compensated by more retroinclined lower incisors.

This study indicated that dentoalveolar compensatory mechanism is able to achieve an "ideal" occlusion even in cases with basal configuration quite different from what is considered ideal, by changing the incisor inclination to compensate different basal and vertical relationships.

Consequently, a wide range in the lower incisor position must be expected in subjects with normal occlusion.

The present study demonstrates that normal occlusion is attained naturally in individual cases by dentoalveolar compensation of the basal discrepancy.

KEFALOMETRIJSKE NORME ZA ORIJENTACIJU POLOŽAJA DONJIH INCIZIVA

Sažetak

Istraživanje je poduzeto sa svrhom da se izradi grafički prikaz kefalometrijskih vrijednosti koji bi omogućio što bolju procjenu orijentacije donjih sjekutića u odnosu prema mandibularnoj ravnini u osoba s različitim međučeljusnim i okluzo-mandibularnim kutevima. Uzorak se sastojao od 80 osoba s normalnom okluzijom. Varijable ML-NL, OL-ML i \bar{I} -ML izmjerene su na latero-lateralnim rendgenogramima.

Značajne korelacije pronađene su između varijabli OL-ML i ML-NL ($r = 0,60$), ML-NL i \bar{I} -ML ($r = -0,35$) i I-ML i OL-ML ($r = -0,52$). Na temelju nađenih korelacija regresijskom je raščlambom napravljen grafički prikaz harmoničnih korespondirajućih vrijednosti sa svrhom da omogući procjenu inklinacije donjih inciziva u različitim međučeljusnih skeletnih odnosa.

Ključne riječi: kefalometrija, norme, incizivi

Address for correspondence:
Adresa za dopisivanje:

Dr.sc. Marina Lapter
Zavod za ortodontiju
Stomatološki fakultet
Gundulićeva 5
10000 Zagreb

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