# PRELIMINARY CLINICAL-STATISTICAL STUDY REGARDING SPATIAL POSITION ON LATERAL CEPHALOMETRIC RADIOGRAPHS OF THE UPPER INTERINCISAL POINT TOWARDS OTHER ANATOMICAL LANDMARKS

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Keywords: lateral cephalometry, upper interincisal point, anatomic landmarks **Abstract:** The use of lateral cephalometric radiographs for the diagnosis and treatment of edentulous patient is nowadays more frequent than ever. The aim of this study is to evaluate the positions of teeth in completely dentate patients towards bone points considered to be stable in time, in order to see whether there is a reproductive relation applicable to establish the correct position of artificial teeth in edentulous patients.

## INTRODUCTION

Restoring the morphology and functionality of edentulous arches with complete denture imply teeth mounting in a position as close to the natural. Arranging artificial teeth according to anatomic landmarks, based on specialty literature (1,2,3), reduces to establish the position of central upper incisor and upper canine to anatomical formations as interincisive papilla and transverse palatine folds (rugae).

#### PURPOSE

The purpose of the study is to analyze the position of the upper interincisal point towards different bone landmarks. Median and symmetrical landmarks were analyzed. Some segments of the upper section of the face have fixed dimension in time (1-5), but others are variable with one fixed end the other are being the upper interincisal point.

This study intends to establish bone landmarks involved in determining a more accurate position of the interincisal point.

#### MATERIALS AND METHODS

This preliminary clinico-statistical analysis is based on precise measurements between pre-established landmarks in lateral teleradiographies of 20 patients (12 females and 8 males).

The patients aged between 19-42 years old referred to dental offices for orthodontic treatment in November 2011 - June 2013.

The subjects were included in the study after a detailed clinical exam, followed by writing an examination file and a written consent.

The inclusion criteria were:

- minimum age: 18 years old;
- the presence on the maxillary arcade of both upper central incisors;
- at least one upper central incisor to be in favourable position in order to predict the final outcome of the orthodontic treatment;

- no previous accidents that could have modified the maxillo-facial bone structure;
- no dento-maxillary anomalies or hereditary diseases.

Figure no. 1. Landmarks established on lateral cephalometry



The following landmarks were determined on the lateral cephalometric (6-8) image (figure no. 1):

- N Nasion the most anterior point on nasofrontal suture;
- ANS Anterior Nasal Spine the most anterior point on maxillary bone (the tip of the spinous process of the maxilla forming the most anterior projection of the floor of the nasal cavity in the mid-sagital plane);
- UI Upper Interincisal point the most labial point on the crown of the maxillary central incisor. This is a stable point

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and its' position will not be affected by the orthodontic treatment. UI - correspond to the mesio-incisal angle of the maxillary incisor;

- Or Orbitale the lowest point on the interior borders of the bony orbits;
- T the most superior point situated on the upper border of the orbit.

Figure no. 2. Analysed measurements



Measurements:

The following measurements were analyzed based on the interrelationship of the above mentioned landmarks and the AudaxCeph program (figure no. 2):

- I (height of the orbit) distance between Or and point T;
- Or-UI distance between Orbitale and the Upper Interincisal point;
- N-Or distance between Nasion and Orbitale;
- N-UI distance between Nasion and Upper Interincisal point;
- N-ANS distance between Nasion and Anterior Nasal Spine;
- ANS-UI distance between Anterior Nasal Spine and Upper Interincisal point;

The computer program of analysis was calibrated using a 5cm scale marked in mm available in the cephalometric image.

Calculated values:

The following proportions were evaluated:

- Or-UI/Or-T;
- N-UI/N-Or;
- ANS-UI/N-ANS.

As denominator, standard segments were used based only on bony landmarks.

As for the numerator there was a common point on all segments: the UI.

Statistical analysis:

This preliminary study showed a basic statistical analysis in order to see which of the measurements have less errors.(9,10) These will guide the research towards the analysis of values with fewer variations (the lowest standard deviation).

#### RESULTS

The values obtained after measurements on the cephalometric image were summarized in table no. 1 and table no. 2.

Table no. 1. Analysis of mean and standard deviation for the measurements between certain landmarks on cephalometry

	Age	Or-T	Or-UI	N - Or	N-UI	ANS - UI	N-ANS
Mean	28.95	33.505	53.445	29.905	77.755	30.6	51.345
Std Dev	6.516	2.419	4.060	4.252	6.896	4.786	4.457

Table no. 2. Mean and standard deviation for the 3 analyzed relations

	Or-UI/Or-T	N-UI/N-Or	ANS-UI/N-ANS	
Mean	1.599495603	2.626200357	0.59325908	
StdDev	0.12676944	0.236529709	0.048586212	

There is a considerable variance for the values on N-UI/N-Or proportion (StdDev=0.2365) and a less variance for Or-UI/Or-T rapport (StdDev = 0.1267). The lowest variance was observed at ANS-UI/N-ANS rapport (StdDev = 0.048).

The standard deviation is a measure of how spread out numbers are. The lowest its value is, the more numbers are around the mean value.

The standard deviation is bigger when the differences are more spread out from the mean values

Figure no. 3. Distribution values for the three different proportions



#### DISCUSSIONS

The initial analysis of the interconnected values is useful in referring the patients to orthodontist. Younger patients, especially women are more interested in obtaining a harmonious smile.

Mean and Standard Deviation values were purely descriptive, as orthodontic diagnosis was not concluding for this study. Age, sex, maxillary position towards the cranial base and frontal and lateral occlusion were not evaluated.(11)

The purpose of the study was to investigate different proportions between certain radiologic segments. The denominator was a segment between two bony cephalometric landmarks and the numerator was an established segment between a bony landmark and the Interincisal point.

Mid-sagittal and bilateral landmarks were used.

All proportional correlations, irrespective of the orthodontic diagnosis, don't have random values.

For Or-UI/Or-T rapport, the values are concentrated around the mean values = 1.599495603, Standard Deviation = 0.12676944. This proportion has an average value, because Or-T segment is shorter than Or-UI.

The bigger values were recorded for the N-UI/N-Or rapport. N-UI segment is longer then N-Or, so mean value (2.626200357) increased and also the Standard Deviation (0.236529709).

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The smallest values were noted for the ANS-UI/N-ANS proportion. The segment ANS-UI is shorter then N-ANS and the values obtained were nearby the mean values = 0.59325908, and Standard Deviation = 0.048586212.

The standard deviation measures the spread of the distributions about its mean. The lower the Standard Deviation is, the data values are concentrated closely near the mean. In other data sets, the data values are more widely spread out from the mean.(12)

### CONCLUSIONS

Interesting conclusions were elaborated after statistical analysis of the data sets:

- 1. Using mid-sagittal bony landmarks generates less error of determining measurements and calculus.
- 2. Lateral bony landmarks are more susceptible to measurements errors.
- 3. It will be taken in consideration the extension of the study group in the next study.
- 4. The evaluation of the UI point towards other mid-sagital cephalometric landmarks is compulsory.

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