

Original Research Article

## Cephalometrics as an aid in positioning of anterior teeth during complete denture fabrication- A pilot study

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**Abstract:** Positioning of anterior teeth plays a crucial role in the esthetic outcome of complete dentures. A sense of dentofacial harmony is the main objective of teeth selection and proper teeth positioning for aesthetically pleasing end results. To determine whether cephalometrics acts as an aid in positioning of anterior teeth in complete denture fabrication. The inclinations of maxillary anterior teeth in sagittal plane were correlated with three parameters i.e., Distance between skeletal convexity at Point A to N-Pog line, H-line angle and Nasal prominence. Participants in the age range of 18-25 years were selected based on the predetermined inclusion criteria. Cephalometrics tracings were done, landmarks marked on the tracings and planes constructed. The readings obtained were subjected to statistical analysis using Pearson's correlation test. Weak negative correlation between the distance between skeletal convexity at Point A to N-Pog line and H-Line angle, as well as distance between skeletal convexity at Point A to N-Pog line and Nasal prominence were observed. It can be concluded from the present study that positioning of anterior teeth based solely on cephalometrics is not completely valid.

**Keywords:** Cephalometrics, Dento-facial harmony, Esthetics

### INTRODUCTION

Esthetics plays a pivotal role in instilling self confidence, thereby enhancing the overall social development of the individual. Esthetic replacement along with physiological tooth arrangement makes the complete denture biologically compatible and desirable [1]. According to Young, the major qualities of esthetics are beauty, harmony, naturalness and individuality[2,3] Placement of the anterior teeth should be functional and esthetically pleasing to enhance the psychology of the patient[1,4] Complete dentures constructed today are still incorporating the same techniques and concepts as given 30 years ago. Positioning of the anterior teeth in the sagittal plane is completely based on the subjective perception of lip fullness during the jaw relation procedure. Clinical judgment which varies from person to person, continues to play a major role in the assessment of this important component in the construction of complete dentures during the jaw relation procedure. Accurate positioning of the maxillary anterior teeth in the edentulous patient

proves difficult, as data prior to extraction are lacking.<sup>5</sup> Prosthetic dentistry has always tried to find a method capable of establishing the correct position of the anterior teeth in an edentulous arch [6,7] The existence of varied techniques is proof of the lack of a single secure method. The present study is an attempt to accurately position the anterior teeth using cephalometric analysis with the objective to provide balance between maximum esthetics and proper phonetics. Hence, it is a trial to avoid the subjective errors in placement of anterior teeth by utilizing cephalometric radiographs and evaluating their utility in positioning the anterior teeth.

### METHODOLOGY

#### Inclusion criteria

Participants in the age range of 18-25 years with full complement of teeth, well balanced faces, class I skeletal, molar and canine relationships were included for the study.

### Exclusion criteria

Those with malocclusion, acute or previous temporomandibular disorders were excluded.

### Procedure

Lateral cephalograms were taken, and traced manually. All the required reference points were identified, located and marked as shown in Figure 1. All tracing were completed by a single investigator to avoid any biased results due to interpersonal variations.

### Land marks considered

#### Hard tissue landmarks

- Porion (P): It is the highest bony point on the upper margin of external auditory meatus.
- Orbitale (Or): It is the lowest point in the inferior margin of orbit, midpoint between right and left images.
- Nasion (N): It is the most anterior point of the frontonasal suture in the median plane.
- Pogonion (Pog): The most anterior point of the bony chin in the median plane.
- Point A: Point A is the point at the deepest midline concavity between the two central on the maxilla midway between the anterior nasal spine and prosthion

#### Soft tissue landmarks

- Pronasale (Pn): Most prominent point of nose
- Labrale superius (Ls): The median point in the upper margin of the upper membranous lip
- Soft tissue Nasion (N'): The point of the deepest concavity of the soft tissue contour of the root of the nose
- Soft tissue pogonion (Pog'): The most prominent point on the soft tissue contour of the chin

#### Dimensions and angles considered

- Distance between skeletal convexity at Point A to N-Pog line (Figure 2).
- Nasal prominence: Distance from a line drawn perpendicular to Frankfort horizontal plane and a tangent to the vermilion border of upper lip to tip of the nose (Figure 3).
- H-line angle: H-line angle was formed by intersection of soft tissue nasion and soft tissue pogonion and a line tangent to soft tissue pogonion and the most prominent point of the upper lip (Figure 4).

Thus, the parameters considered were correlated and statistically analyzed using Pearson correlation.

### RESULTS

A total of 21 participants with the mean age of  $22.6 \pm 2.4$  (mean  $\pm$  SD), were included in the study. Among the study population the distance between skeletal convexities at point A to skeletal N-Pog ranged

from -6mm to +5mm, H-line angle from 5 to 28° and nasal prominence from 7mm to 17mm.

The correlation between the distance from skeletal convexity at point A to N-Pog and H-line angle was weakly negative ( $r = -0.158$ ,  $P = 0.247$ ). The correlation coefficient for the comparison between the distance from point A to N-Pog and nasal prominence was also weakly negative ( $r = -0.120$ ,  $P = 0.302$ ).

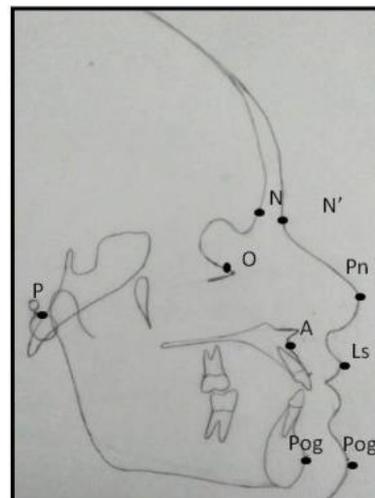


Fig-1: Cephalometric points considered in the present study

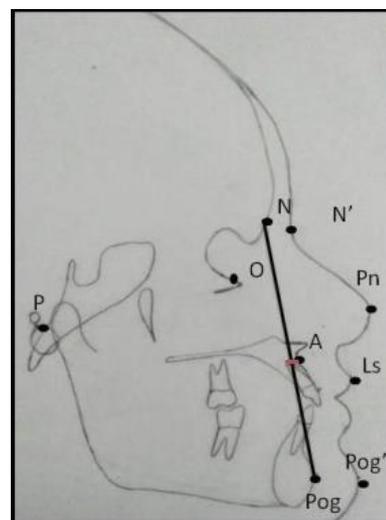


Fig-2: Distance between skeletal convexity at Point A to N-Pog line

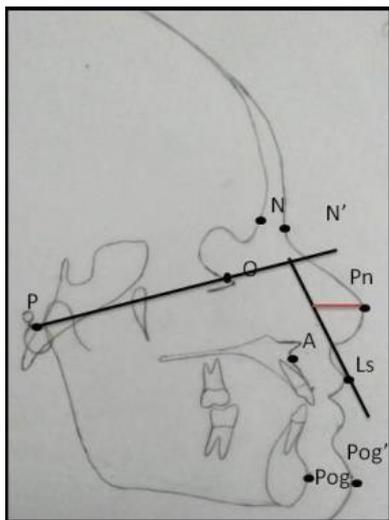


Fig-3: Nasal prominence

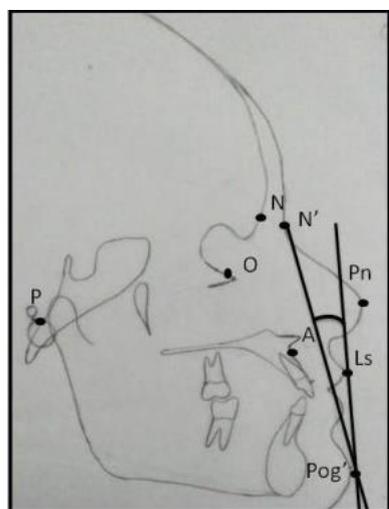


Fig-4: H-line angle

## DISCUSSION

Several techniques have been followed till date to determine the proper positioning of the anterior teeth. The existence of varied techniques is proof of the lack of a single secure method [9-12]. Studies suggest a simultaneous use of angular and linear parameters [3]. On the other hand, other studies put greater emphasis on linear measurement, highlighting the importance of the A:Po line for facial aesthetics [3]. Many anatomical points were taken into consideration such as the canine prominence, the sides of the mouth, the wing of the nose, the incisive papilla [9, 14]. The position of the interincisive papilla is an important reference point for positioning the artificial teeth, which should be located  $8 \pm 10$  mm anterior to this point as it is not greatly involved in the resorption of the maxilla. Here in this study both linear and angular measurements are taken into consideration. Study was attempted with the hypothesis that: "Is there any correlation between the nasal prominence and the skeletal convexity at point A to N-Pog, & H-Line angle. Nose a striking feature of the human face which is considered to be the key stone

of facial esthetics. Skeletal convexity at point A-to N-Pog line dictates dental relationship to produce facial harmony. H-Line angle on the other hand measures upper lip prominence. Here cephalometric tracings were utilized to determine the correlation between these parameters, but none was found. The main drawback of the present study is limited sample size.

## CONCLUSION

Within the limitation of this study, proper positioning of the anterior teeth based on the cephalometrics is not completely valid as there is a weak correlation between the selected parameters. Further studies with increased sample size and comparing with edentulous patients might give additional varied findings.

## REFERENCES

1. Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic treatment for edentulous patients: complete dentures and implant-supported prostheses. Elsevier Health Sciences; 2013 Nov 21.
2. Heartwell CM, Rahn AO. Syllabus of complete dentures. Lea & Febiger; 1986.
3. Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic treatment for edentulous patients: complete dentures and implant-supported prostheses. Elsevier Health Sciences; 2013 Nov 21.
4. Bassi F, Deregibus A, Previgiano V, Bracco P, Preti G. Evaluation of the utility of cephalometric parameters in constructing complete denture. Part I: placement of posterior teeth. Journal of oral rehabilitation. 2001 Mar 1; 28(3):234-8.
5. Beresin VE, Schiesser FJ. The neutral zone in complete dentures. The Journal of prosthetic dentistry. 1976 Oct 1; 36(4):356-67.
6. Downs WB. The role of cephalometrics in orthodontic case analysis and diagnosis. American Journal of Orthodontics. 1952 Mar 1; 38(3):162-82.
7. Robinson SC. Physiological placement of artificial anterior teeth. Journal of the Canadian Dental Association. 1969 May; 35(5):260-6.
8. Isiekwe GI, Utomi IL, Sanu OO. Holdaway's analysis of the nose prominence of an adult Nigerian population. Nigerian journal of clinical practice. 2015; 18(4):548-52.
9. Schiffman P. Relation of the maxillary canines to the incisive papilla. The Journal of Prosthetic Dentistry. 1964 May 1; 14(3):469-72.
10. Shrestha S, Joshi SP, Yadav SK. Relationship of Incisive Papilla to Maxillary Incisors and Canines. The journal of contemporary dental practice. 2016 Apr 1; 17(4):306.
11. Ricketts RM. The role of cephalometrics in prosthetic diagnosis. The Journal of Prosthetic Dentistry. 1956 Jul 1; 6(4):488-503.

12. Pound E. Esthetic dentures and their phonetic values. The Journal of prosthetic dentistry. 1951 Mar 31;1(1):98-111.
13. Pound E. Applying harmony in selecting and arranging teeth. In Dental Clinics of North America 1962 Jan 1 (No. MAR, p. 241). Independence Square West Curtis Center, Ste 300, Philadelphia, PA 19106-3399: WB SAUNDERS CO.
14. Watt DM, Likeman PR. Morphological changes in the denture bearing area following the extraction of maxillary teeth. British dental journal. 1974 Mar 19; 136(6):225.