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Baghdad College of Dentistry



# **Relationship of Anatomic Landmark with the Occlusal Plane**

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of  
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## **CERTIFICATION OF THE SUPERVISOR**

I certify that this project entitled ( Relationship Of Anatomic Landmark With The Occlusal Plane) was prepared by Ali Mohammed Hasson under my Supervision at the College of Dentistry/University of Baghdad in partial fulfillment of the graduation requirements for the Bachelor Degree in Dentistry.

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# **DEDICATION**

As well as everything that I do, I would be honored to dedicate this project to my parents and my brother. They supported me and encouraged me on every step in my life and they gave me everything necessary to be who I am now.

Finally my dream came true and I am writing my graduation project from the College of Dentistry / University of Baghdad.

Last but not least I would like to thank my supervisor Shorouq Majid Abass to help me in this project and I am very lucky to be under her supervision.

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## INTRODUCTION

Occlusal plane is defined as “the average plane established by the incisal and occlusal surfaces of the teeth. It is anatomically related to the cranium and theoreticall touches the incisal edges of the incisors and tips of the occluding surfaces of the posterior teeth, it can be the surface of wax occlusal rim for arrangement of denture teeth or a flat metallic plate for arranging artificial teeth. It is not a plane in the true sense of word but represents the mean curvature of the surface **(Shetty et al 2013)**.

In orientation jaw relation for completely edentulous patients the maxillary occlusal plane should be made parallel to the base of the skull. The orientation of the occlusal plane to the base of the skull is the most important step in prosthodontics for any prosthesis fabrication. Establishing the exact parallelism to the base of the skull becomes difficult because of the presence of the muscle tissues covering the skull and mandible **(Gupta and Singh 2009)**.

In order to make this procedure easy there are several landmarks proposed to define the level of occlusal plane, which can broadly be divided into intraoral and extraoral approaches. Intraoral landmarks include upper lip, commissure of the mouth, height of the retromolar pad (RMP), hamular notch-incisive papilla plane and buccinator groove. Commonly described extraoral landmarks include inter-pupillary line (IPL) and Camper’s plane or the ala-tragus line (ATL) **( Mehwish et al 2021)**.

## **AIM OF THE STUDY**

The aim of this study was to review and explain various anatomical landmarks, concepts and techniques involved in the orientation of occlusal plane for complete denture fabrication for edentulous patient in addition to clinical procedure.



# **CHAPTER ONE**

## **REVIEW OF LITERATURE**

# Chapter One

## Review of the Literature

### 1.1 Occlusal Plane

Recording the maxillomandibular relationship of a jaw to establish an occlusal plane is one of the most critical steps in fabricating a complete denture.

The occlusal plane is the common plane established by the incisal and occlusal surfaces of the teeth. The orientation of the occlusal plane for edentulous patients is important in achieving denture treatment esthetic ( **Karkazis and Polyzois 1987** ).

The occlusal plane forms a basis for the ideal tooth arrangement, fulfilling the necessary esthetic and mechanical requirements and aiding in proper oral function. In complete denture fabrication, the location of the occlusal plane can be determined depending on various soft and hard tissue landmarks and the clinician's clinical judgment. The properly positioned occlusal plane helps the normal function of the tongue and cheek muscles, enhancing denture stability during function (**Sharab et al 2023**).

## **1.2 Occlusal Plane Orientation**

Considering the importance of the accurate establishment of the location and inclination of occlusal plane on function, esthetics and speech, a method to conform it to the occlusal plane that existed in the natural teeth seems necessary. The question which arises in clinical practice is how to discover which position was occupied by the “natural occlusal plane” after the loss of natural teeth and exactly, how can the optimal position of the occlusal plane be found in every edentulous patient (**Sinobad 1988**).

The occlusal plane in anterior and posterior regions may vary and therefore, these should be evaluated separately.

It is generally agreed that in the anterior region the vertical height of the occlusal plane is governed by esthetic requirements and less frequently by functional demands (**Celebic 1995**).

The anterior maxillary occlusal plane may be determined by lip relationships at rest and when smiling. Speech also provides for positional accuracy. When viewed from the front, the occlusal plane should be parallel to the interpupillary line (**Winkler 2004**).

With regard to the orientation of the occlusal plane in the posterior region, however, there are contrasting views (**Shetty et al 2013**).

## **1.3 Clinical Significance of Establishing Occlusal Plane in Completely Edentulous Patients**

Rehabilitation of the completely edentulous patients can be Removable or Fixed prosthesis, tooth or implant supported overdentures involves the various anatomic, physiologic and mechanical factors have to be considered to restore the functions and health of the stomatognathic system (**Jayachandran, Ramachandran and Varghese 2008**).

The following facts describes the importance and significance of the

occlusal plane.

- Optimal functional achievement with effective biomechanics of the prosthesis.
- Ideal tooth arrangement for mechanically balanced articulation and improved stability of the prosthesis.
- For achieving the effect of smile line with natural look of curvature and position of teeth in relation to the lips and avoiding artificial Denturist smile.
- The occlusal plane in complete denture should be as harmonious providing normal function of tongue, cheek, muscles, enhancing the denture stability and masticatory efficiency.
- Too high occlusal plane or too low occlusal plane with reference to the previous natural occlusal plane leads to tongue and cheek biting, difficulty in speech.
- Governs the optimum esthetics, phonetics and overall comfort of the patient.

**(Kumar et al 2020).**

Literature provides evidence for several landmarks for clinicians to determine the occlusal plane.

## **1.4 Anatomical land mark**

In literature, numerous techniques and biometric guidelines have been proposed for correctly locating the occlusal plane, which can broadly be divided into intraoral and extraoral approaches ( **Mehwish, et al 2021** ).

### **1.4.1 Intraoral landmarks include:**

- Parotid Papilla
- Hamular Notch – Incisive Papilla

- Retromolar Pad
- Lateral Border of Tongue
- Commissure of Lips
- Buccinator Groove

#### **1.4.1.1 Parotid Papilla**

The papilla of parotid duct is a small elevation where the parotid duct opens into the vestibule of the mouth next to the maxillary second molar tooth.

**Lunquist and Luther (1970)** measured the distance with a different reference for the occlusal plane (i.e. cusp tip of maxillary molars) and suggested parotid papilla was located 4 mm above the occlusal plane.

**Foley and Latta (1985)** used the parotid papilla as a reference guide for occlusal plane orientation. They examined dentulous patients to determine the distance of the occlusal plane from the inferior border of the right and left parotid papillae. They found that the parotid papilla was 3.3 mm above the occlusal plane.

**Winkler (2004)** suggested that the parotid papilla is located 1/4th inch (6 mm) above the occlusal surface of maxillary first molar teeth.

**Shigli, Chetal and Jabade (2005)** in their study found out that mean distance of parotid papilla was 2.56 mm above the maxillary occlusal plane. They made impressions with the help of an oral screen which extended to the distal aspect of the mandibular second molar on both sides (**Shetty et al 2013**).

**Mehta and Chhetri (2021)** determine the position of parotid papilla in relation to maxillary occlusal plane. study was conducted in the 45 dentate subjects and they found position of parotid papilla was superior to the position of maxillary occlusal plane with the mean distance of 3.69mm.

### **1.4.1.2 Hamular Notch – Incisive Papilla**

Hamular notch is an anatomical landmark which is not affected by degenerative process or surgical interference, and the incisive papilla is a significant landmark in dentulous subjects but only its posterior border is relatively stable after the loss of anterior teeth. Hamular notch-incisive papilla (H. I. P) plane is one such plane which minimizes the error and can be recorded easily on the dentulous cast (**Tippashetty et al 2020**).

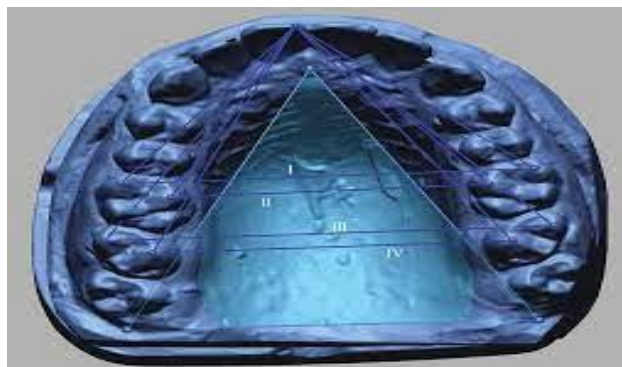
**Cooperman (1975) and Rich (1982)** observed in their study that the occlusal plane showed a close relationship to the hamular notch–incisive papilla plane.

**Fu et al (2007)** in their study used a three dimensional. surveying software to check parallelism between the hamular notch–incisive papilla plane and four types of occlusal planes formed by different anterior and posterior reference points on maxillary teeth and found out that parallelism exists between the natural occlusal plane (defined as mesial-incisal edge of upper right central incisor and distal-buccal cusp tips of upper first molars) and hamular notch–incisive papilla plane.

**Jayachandran, Ramachandran and Varghese (2008)** evaluated the reliability of the hamular notch/incisive papilla plane (HIP) in establishing the occlusal plane. The study was done both in dentulous as well as edentulous patients. In dentate subjects, the maxillary stone cast was mounted on the Wills surveyor with HIP made parallel to the horizontal plane using the tripod method. The vertical distance between the occlusal plane and floor of the surveyor was measured at four points. When the measured values were equal, the two planes were confirmed to be parallel for that situation. In the edentulous subjects, the occlusal plane, established clinically using the ala-tragal line, was compared with the HIP radiographically using lateral cephalograms. They

concluded that the HIP was parallel to the occlusal plane (**Shetty et al 2013**).

**Tippashetty et al (2020)** their study was conducted on Dentulous casts of two hundred participants were mounted on the Hanau Wide-View articulator . And they found Occlusal plane defined by mesio-labial incisal edge of upper right central incisor to mesio-buccal cusp tips of upper second molars is the most parallel plane to H.I. P plane in tested dentulous subjects, suggesting that H.I. P plane can be used as an anatomical landmark for the orientation of the occlusal plane. As shown in figure(1.1)



**Figure (1.1):** Marking the hamular notch-incisive papilla and occlusal Planes I, II, III, and IV on scanned cast (**Tippashetty et al 2020**).

### **1.4.1.3 Retromolar Pad**

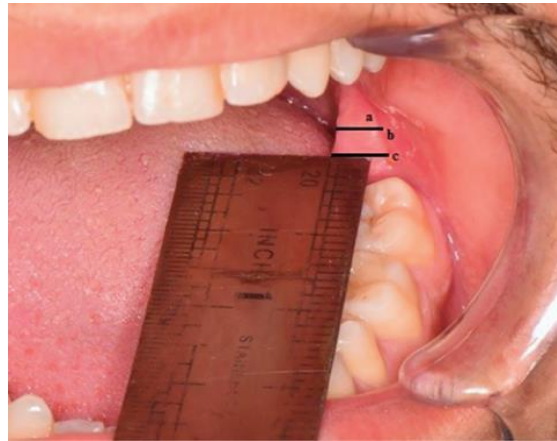
The retromolar pad also called piriformis papilla is a mucosal elevation located in the retromolar area covering the retromolar triangle. After molar loss, the bony alveolar process and surrounding soft periodontal tissue remodel, mainly resorb and blend with retromolar pad. It is a key intraoral landmark in prosthodontics (**Sharma et al 2016**).

Various authors suggested this landmark for orienting the occlusal plane by dividing it into 2 or 3 parts. as show in figure (1.2)

It has a disadvantage that it cannot be used as a guide for tooth supported full mouth rehabilitation and has a drawback that it was a soft tissue landmark and the borders cannot be demarcated accurately. Though it was not a reliable

landmark, the lower third of retromolar pad can be used commonly for posterior occlusal plane of mandibular teeth setting (**Kumar et al 2020**).

**Shankar et al (2016)** They found retromolar pad showed that the lower third of retro-molar pad coincides with occlusal plane in class I subjects and with middle third of retromolar pad in II and class III subjects.



**Figure (1.2):** The parts of retromolar pad (**Mehwish, et al 2021**)

#### **1.4.1.4 Lateral Border of Tongue**

A study made neutral zone moldings using phonation and found that the ala-tragus line extending from the inferior border of the ala of the nose to the inferior border of the tragus presented the closest relationship to the prosthetic occlusal plane corresponding to the lateral borders of the tongue. The tongue is a highly movable organ in the oral cavity and thus its reliability in the occlusal plane orientation is questionable. Also, after extraction of all teeth the tongue becomes hypertrophied, resulting in the change of the anatomy of the lateral border of the tongue. (**Ghosn et al.2012**).

#### **1.4.1.5 Commissure of Lips**

The commissure is the corner of the mouth, where the vermillion border of the



superior labium (upper lip) meets that of the inferior labium (lower lip).

A study was investigate the positional relation of the commissure line of the mouth to the maxillary first molars. Thirty-five volunteers, 20 to 40 years old, with normal natural dentitions were recruited and they found the commissure line of the mouth may be used to mark the orientation of the occlusal plane. The degree of mismatch of this dynamic landmark to the occlusal plane was within the range of 0.2 to 1.3 mm. The validity of this observation in the construction of complete dentures is still to be determined (**Alshhrani et al 2015**).

A sutdy was determine the position of Commissure of Lips in relation to maxillary occlusal plane. study was conducted in the 45 dentate subjects And was found to be at the level of maxillary occlusal plane in 48.89%, superior to maxillary occlusal plane in 42.22% and inferior to maxillary occlusal plane in 8.89% (**Mehta and Chhetri 2021**).

#### **1.4.1.6 Buccinator Groove**

A study done by **Lunquist and Luther (1970)** made intraoral vestibular impressions with the help of a plastic screen which was cut to fit the labial and buccal vestibules without impinging the mucosa. The relation of the buccinator groove was first established with respect to the commissure of the lips and then to the occlusal plane. They found out that in 90–95 % of subjects the commissure of the lips was in the same plane as that of the buccinator groove, and thus, the occlusal plane is in the range of 1–3 mm to the commissure of the lips as well as of the buccinator groove.

**Shigli, Chetal and Jabade (2005)** in their study used vestibular impressions with the help of an oral screen to determine the relation of the buccinator groove to the occlusal plane and found that the mean value of all readings of buccinators groove was 0.94 mm below the mandibular occlusal

plane.

**Gupta and Singh (2009)** used a custom made buccinator groove relator to compare the level of the buccinator groove to the occlusal plane. They concluded that in 70 % of males and 66 % of females the occlusal plane was at the same level as the buccinator groove and can be used as a reliable landmark for orientation.

The buccinator groove could be a reliable landmark only in patients with good muscle tone as aging causes progressive loss of muscle tone (**Shetty et al 2013**).

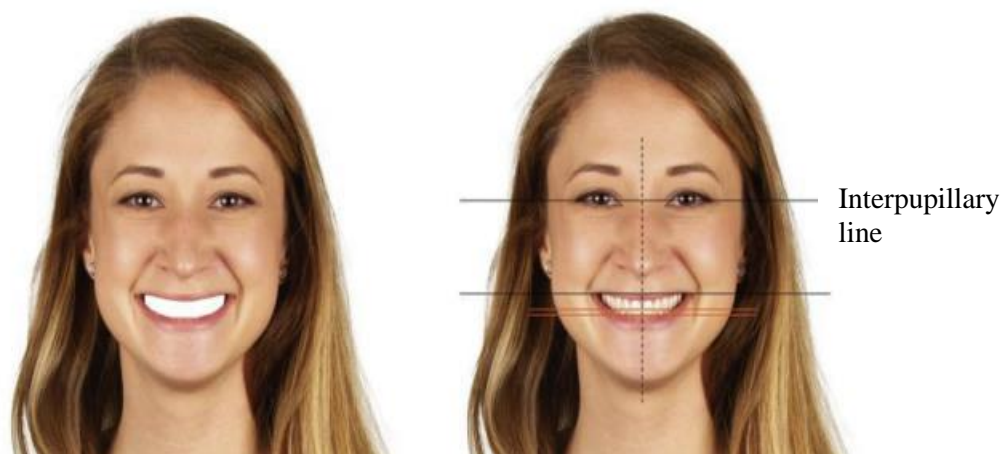
### **1.4.2 Extraoral landmark include:**

- inter-pupillary line
- ala-tragus line (Camper's plane)
- Ear lobe

#### **1.4.2.1 inter-pupillary line**

An imaginary horizontal line drawn between the centers of the pupils of the eyes. The length of the line is the interpupillary distance. as shown in figure(1.3)

This line is of major importance in the construction of complete dentures. (**Arthur et al. 2009**)



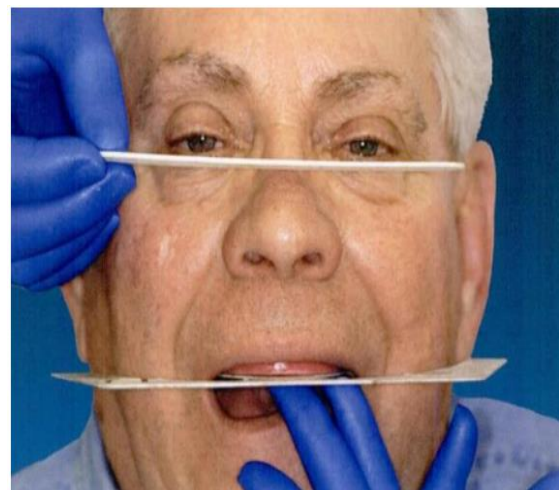
**Figure(1.3):** Interpupillary line (**Revilla et al., 2019**)

The fox occlusal plane plate will be used to establish the anterior plane parallel to an interpupillary line, and the anterior-posterior plane parallel with Camper's plane (ala-tragus line). The occlusal plane of most natural posterior teeth is approximately parallel with these landmarks. As shown in figure (1.4) This plane ideally would be parallel to the interpupillary line, equally split the distance between the opposing ridges, be at the level of the middle to upper third of the retromolar pad, be parallel to remaining ridges, and be just below the corners of the mouth when the patient smile. (**Arthur et al. 2009**)

study was evaluate the parallelism of natural maxillary occlusal plane with inter-pupillary line of the 109 subjects with a mean age of  $23.03 \pm 1.36$  years, 76/(69.72%) were females. They found Horizontal parallelism of occlusal plane with inter-pupillary line was observed with a mean angle of  $1.17 \pm 1.27$  degrees. as shown in figure (1.5) (**Mehwish et al 2021**).



**Figure (1.5):** parallelism of natural maxillary occlusal plane with inter-pupillary line (**Mehwish et al 2021**)



**Figure (1.4):** Interpupillary Line with Fox Bite Registration of occlusal rim (**Arthur et al., 2009**)

### **1.4.2.2 Ala-tragus line (Camper's plane)**

One of the most popular methods is to orient the occlusal plane parallel to a line drawn from the lowest point of the ala of the nose to the external auditory meatus or tragus, as shown in figure (1.6)

Definitions of the ala-tragus line by different authors are a cause of confusion due to disagreement on the exact point of reference, on the ala and the tragus (**Shetty et al 2013**).

Numerous authors have stated as well as researched in this area and found out that all the three parts of the tragus i.e. superior, middle and inferior, as shown in figure(1.7). Have been proved to be guides for occlusal plane orientation in edentulous patients.

**Gupta and Singh (2009)** In their study also fabricated an occlusal plane analyzer and concluded that in 72 % of female subjects, the occlusal plane was found parallel to Camper's plane with the anterior reference point as the ala of the nose and the posterior reference point as the middle part of the tragus and in 80 % of female subjects, the occlusal plane was found parallel to Camper's plane with the anterior reference point as the ala of the nose and the posterior reference point as the superior part of the tragus.

**Al Quran , Hazza'a and Al Nahass (2010)** Carried out a study to determine the most reliable ala-tragus line as a guide for the orientation of the occlusal plane in complete denture patients by the analysis of prosthodontically related craniofacial reference lines and angles of lateral cephalometric radiographs. They concluded that the superior border of the tragus with the inferior border of the ala of the nose was most accurate in orienting the occlusal

plane.

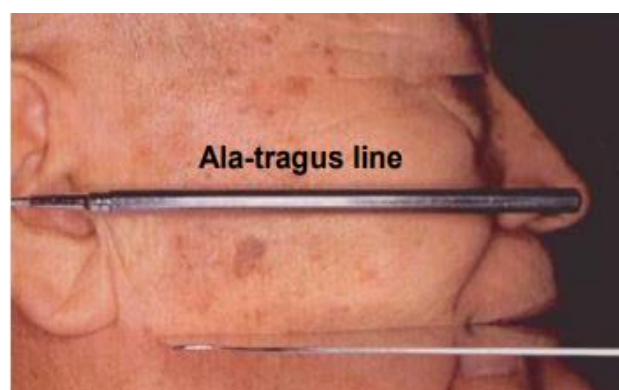
**Cephalometric study done by Hindocha et al (2010)** Found out that the tragal reference in their study population was more towards the inferior of the tragus. They obtained lateral cephalograms after outlining the tragus and the base of the ala of the nose with radiopaque markers.

A study carried out by **Chaturvedi and Thombare (2013)** On dentulous and edentulous subjects to find out the most appropriate point on tragus to be used as a reference point at time of marking ala-tragus line while establishing occlusal plane also concluded that the inferior point is the most appropriate. Lateral cephalograms of all subjects were taken. The tragus was marked at all three points and three lines were formed by joining to the ala of the nose.

Study by **Kumar, Garg and Gupta (2013)** Used digital photography in orthognathic profile patients to determine accurately the part of the tragus to be used to form the ala-tragal line and found out that the line joining from ala to the lower border of the tragus was parallel to the occlusal plane in 53.3 % of the subjects.

**Shankar et al (2016)** Was found to be close to ala-middle border of tragus in class I subjects and with ala-lower border in class II and class III subjects.

**Mehwish et al (2021)** they evaluate the parallelism of natural maxillary occlusal plane with ala-tragus line of the 109 subjects with a mean age of  $23.03 \pm 1.36$  years, 76/(69.72%) were females and they found The angle between the occlusal plane and the inferior ala-tragus line was 4.25 degrees on the right side, and 4.50 degrees on the left.



**Figure(1.6):** Parallelism of occlusal plane with ala-tragus line (Nabeel 2019)



**Figure(1.7):** Different levels of Ala-tragus plane (Lekha, et al 2015).

### 1.4.2.3 Ear lobe

Study done by **khalaf (2008)** On 30 subjects participated with an age range of 22-40 years to Compare the parallelism of the interpupillary line with the ear lobes.

He was found the ear lobes were reliable and dependable alternative landmarks for the orientation of the occlusal plane and could be used with less effort than that of the conventional method utilizing the interpupillary line. Figure (1.8)

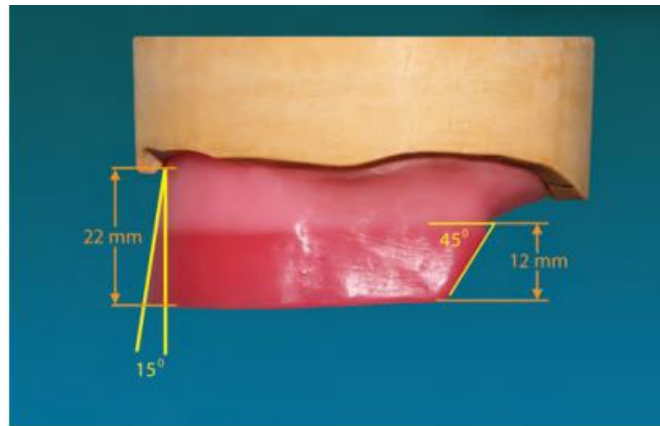


**Figure (1.8):** Using Ear Lobes During Maxillomanibular Relationship Registration (**khalaf 2008**).

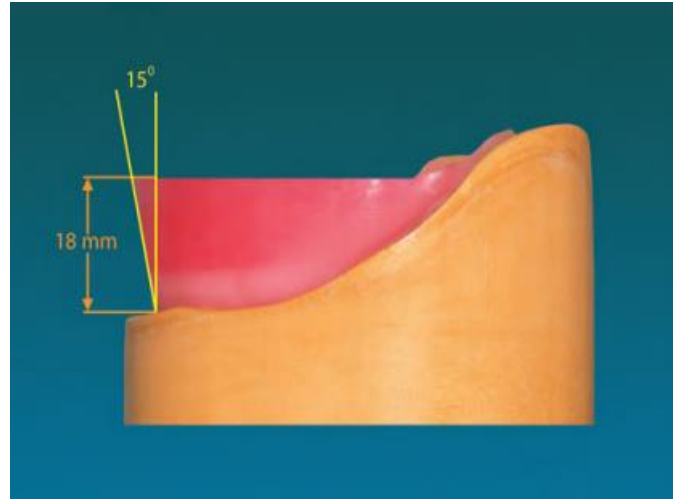
## **1.5 clinical procedure of recording occlusal plane**

before starting the clinical procedure rim width and height of occlusal rim is an important features that can contribute to the ease of the clinical registration stage (**Johnson and Wood 2012**).

- A properly contoured maxillary record base and occlusion rim along with the desired dimensions. Note that the plane of occlusion is parallel with the base of the cast, and the labial inclination of the anterior portion of the occlusion rim is at approximately a 15° angle to offer lip support. The numbers provided (22 mm and 12 mm) are averages that will generally provide slightly more wax than necessary. This rim will be contoured intraorally to establish the final plane of occlusion and lip support. The posterior of the maxillary occlusion rim should slope occlusally at approximately a 45° degree angle from the record base, beginning approximately 8 mm from the posterior extent of the record base. This will generally provide space for the mandibular record base once placed intraorally (**Arthur et al 2009**). As show in figure (1.9)
- A properly contoured mandibular record base and occlusion rim along with desired dimensions. Note that the plane of occlusion runs parallel with the base of the cast, which was trimmed to be parallel with the residual ridges. Also the plane of occlusion is approximately at the level of the middle-to upper-third of the retromolar pad (**Arthur et al 2009**). as show in the figure (1.10)



**Figure (1.9):**Maxillary occlusal rim (Arthur et al 2009).



**Mandibular occlusal rim (Arthur et al 2009).**

Most patients require modifications in the occlusal rim in order to suit the patient; these alterations should be done before recording the jaw relation.

**Nabeel (2019)** suggested when occlusal rims are inserted into the patient's mouth the following factors are checked.



- Contouring of the occlusal rim (observed from the front and profile views): The occlusal rims should provide lip and cheek support together with the labial and buccal fullness. The proper contouring of the occlusion rims for lip & cheek support allows the muscles of facial expression to act in a normal manner during maxilla-mandibular relation recording. The best anatomic guides to aid in determining the proper contouring of the anterior section of upper & lower bite rims are the nasolabial sulcus & mentolabial sulcus which become deeper when support is absent, the philtrum is flattened & the commissures of lips is drooped. When over-supported the sulci are distorted & become shallow, the philtrum obliterated & the commissures are distorted laterally. Upper and lower rims should be placed over the crest of the ridge taking the shape of the arch (within the neutral zone). This is important because if the occlusal rims have excess wax buccally, the buccal musculature will produce displacement of the occlusal rim also the teeth will produce cheek biting, as show in figure (1.11)



**Figure (1.11): Proper lip support (Arthur et al 2009).**

- The vertical length of bite rim (height or level of the occlusal plane): Anteriorly, the height of maxillary bite rim should be extended approximately 2 mm below the relaxed upper lip or with it in old age

patients. As show in figure(1.12)

The bite rim should be extended 2 mm below the relaxed upper lip when the patient say “F” or “V”, the incisal edge of maxillary bite rim should contact the lower lip at the muco-cutaneous junction of the lip.as show in figure (1.13)

The occlusal level of the mandibular bite rim (anteriorly) should be at the level of the lower lip and angle of the mouth. Posteriorly, it should be at the 2/3rd height of the retromolar pad area.



**Figure (1.12):** The height of maxillary bite rim is 2 mm below the relaxed upper lip (Nabeel 2019)



**Figure (1.13):** Proper contact of the wet/dry line of the lower lip with the labial edge of the maxillary occlusion rim during a “f”/”v” phonetic check(Arthur et al 2009).

- Orientation of occlusal plane of the occlusal rims should be parallel to the plane of the maxilla. This can be done by using a tool called Fox-bite of Fox-plane. as show figure (1.14)

Anteriorly, the upper occlusion rim should be parallel to the inter-pupillary line. as show figure (1.15)

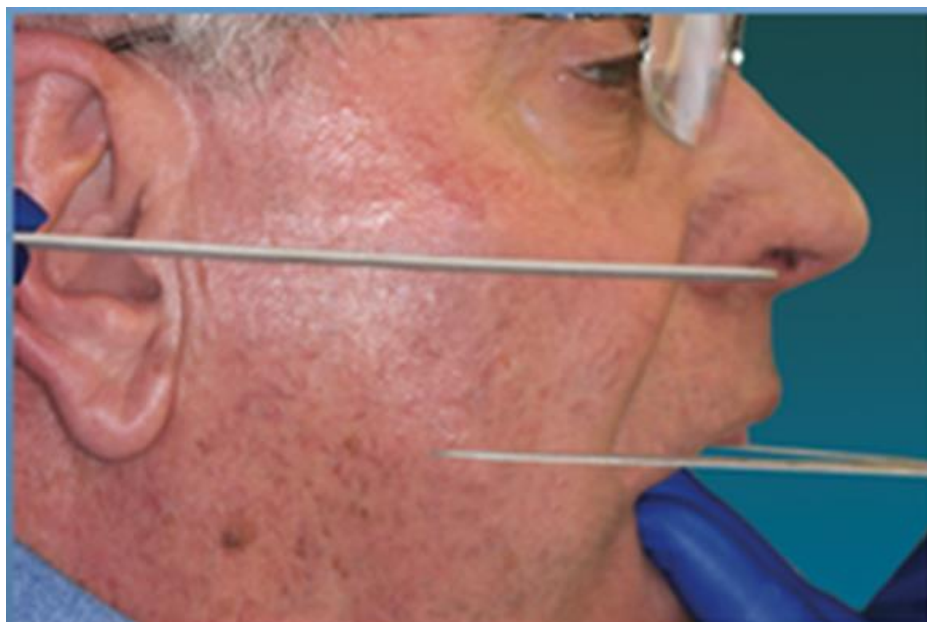
Posteriorly, it should be parallel to ala-tragus line. As show figure (1.16)



**Figure (1.14):** Fox bite (Nabeel 2019)



**Figure (1.15):** The upper occlusion rim parallel to inter-pupillary line (Anterior plane) (Nabeel 2019)



**Figure (1.16):** The upper occlusion rim parallel to ala-tragus line (Anterior-posterior plane) (Arthur et al 2009).

## **CHAPTER TWO**

## **CONCLUSIONS**

## CONCLUSIONS

Within the limitation of this study we can be concluded that there were different anatomical landmark intraoral (Parotid Papilla, Hamular Notch – Incisive Papilla, Retromolar Pad, Lateral Border of Tongue, Commissure of Lips and Buccinator Groove) and extraoral (inter-pupillary line, ala-tragus line and Ear lobe) could be used for the orientation of occlusal plane in edentulous patients. However no single method seems entirely accurate to locate the occlusal plane, So we must used Combination of various landmarks along with a judicious clinical judgment should be taken into account for the location of the occlusal plane in edentulous patients.

## **REFERENCES**

## REFERENCES

- ❖ Al Quran FA, Hazza'a A, Al Nahass N (2010). The position of the occlusal plane in natural and artificial dentitions as related to other craniofacial planes. *J Prosthodont*;19(8):601–605.
- ❖ Alshhrani W, Won-suk Oh, Saglik B, Hansen C (2015). The Commissure Line of the Mouth for Orienting the Occlusal Plane. *The International Journal of Prosthodontics*; 28 (3): 243–245
- ❖ Arthur O. Rahn, John R. Ivanhoe and Kevin D. Plummer. (2009). Textbook of Complete Dentures, sixth edition people's medical publishing house shelton, connecticut.
- ❖ Celebic A, Valentic-Peruzovic M, Kraljevic K, Brkic H( 1995). A study of the occlusal plane orientation by intra-oral method. *J Oral Rehabil* 22:233–236.
- ❖ Chaturvedi S, Thombare R (2013). Cephalometrically assessing the validity of superior, middle and inferior tragus points on ala-tragus line while establishing the occlusal plane in edentulous patient. *J Adv Prosthodont* ; 5:58–66.
- ❖ Cooperman HN (1975) HIP plane of occlusion in oral diagnosis. *Dent Surv* ; 51:60–62.
- ❖ Foley PF, Latta GH (1985) . Study of the position of the parotid papilla relative to the occlusal plane. *J Prosthet Dent*.53:124.
- ❖ Fu PS, Hung CC, Hong JM, Wang JC (2007). Three-dimensional analysis of the occlusal plane related to the hamular-incisive-papilla occlusal plane in young adults. *J Oral Rehabil* ; 34:136.
- ❖ Ghosn CA, Zogheib C, Makzoume JE (2012). Relationship between the occlusal plane corresponding to the lateral borders of the tongue and the ala-tragus line in edentulous patients. *J Contemp Dent Pract*;13(5):590–594.



- ❖ Gupta RH, Singh SP (2009). Relationship of anatomical landmarks with occlusal plane. *J Indian Prosthodont Soc.*9(3):142–147.
- ❖ Hindocha AD, Vartak VN, Bhandari AJ, and Dudani M (2010). A cephalometric study to determine the plane of occlusion in completely edentulous patients: part I. *J Indian Prosthodont Soc*; 10(4):203–207.
- ❖ Jayachandran S, Ramachandran CR, Varghese R (2008). Occlusal plane orientation. a statistical and clinical analysis in different clinical situations. *J Prosthodont* ; 17(7):572–575.
- ❖ Johnson T and Wood DJ (2012). Techniques in Complete Denture Technology, First Edition Published by Blackwell Publishing Ltd.
- ❖ Karkazis, H.C and Polyzois, G.L (1987). A study of the occlusal plane orientation in complete denture construction. *J. Oral Rehabil.* 14,399–404.
- ❖ Khalaf BS (2008). Ear lobes as facial landmarks for determining the occlusal plane. *MUSTANSIRIA DENTAL JOURNAL*; 5(3): 270-273
- ❖ Kumar CD, Mohan J, Manimaran P, Selvaraj S and Sandhya G (2020). Fundamentals for orientation of occlusal plane in completely edentulous patients – A review . *IP International Journal of Maxillofacial Imaging*;6(2):37–40
- ❖ Kumar S, Garg S and Gupta S. (2013) A determination of occlusal plane comparing different levels of the tragus to form ala-tragal line or Camper's line: A photographic study. *J Adv Prosthodont*; 5(1):9-15
- ❖ Lekha K, Shaikh SA and Mathur G (2015). Relationship Between Occlusal Plane and Three Levels of Ala Tragus line in Dentulous and Partially Dentulous Patients in Different Age Groups: A Pilot Study. *J Clin Diagn Res*; 9(2): 39–42.
- ❖ Lunquist DO, Luther WW (1970). Occlusal plane determination. *J Prosthet Dent.* 14(4): 399-404
- ❖ Mehta P and Chhetri S (2021). Position of parotid papilla and

commissure of lip in relation to maxillary occlusal plane among patients visiting a tertiary care centre of Nepal. *Journal of Nepalese Prosthodontic Society (JNPS)*;4(1)

- ❖ Mehwish K, Kazmi MR, Khan FR, Sameer and Quraeshi (2021). Relationship of natural occlusal plane with different anatomical landmarks. Article in *Journal of the Pakistan Medical Association*. 71(3):863-867
- ❖ Nabeel F (2019). Maxillo-mandibular relation in CD. University of Mustansiria collage of dentistry.
- ❖ Pradeep Dathan , K Chandrasekharan Nair, Ambadi Jayakumar and Lakshmi Ajithan (2021). The Validity of Retromolar Pad as an Intraoral Landmark in the Fabrication of Complete Dentures. *Acta Scientific Dental Sciences*; 5(8):48-51
- ❖ Revilla-León, M., Meyer, M., Barrington, J., Sones, A., Umorin, M., Taleghani, M. and Zandinejad ( 2019). Perception of occlusal plane that is nonparallel to interpupillary and commissural lines but with the maxillary dental midline ideally positioned. *The Journal of Prosthetic Dentistry* ;122(5):482-490.
- ❖ Rich H ( 1982). Evaluation and registration of the HIP plane of occlusion. *Aust Dent J*;27:162.
- ❖ Shankar R, Navata, Pradeep, Sudhakar H, krishna H and Kumar S. (2016) Determination of Occlusal plane parallelism with Ala-tragus line and Retromolar pad in Class I, Class II and Class III individuals. *J Res Adv Dent*;5(3):61-68.
- ❖ Sharab L, Jensen D, Hawk G and Kutkut, A March (2023). A Cephalometric Analysis Assessing the Validity of Camper's Plane to Establishing the Occlusal Plane in Edentulous Patients. *Journals Dentistry* .11 (3.15) .
- ❖ Sharma A, Deep A , Siwach A, Singh A , Bhargava A and Siwach R

- (2016). Assessment and Evaluation of Anatomic Variations of Retromolar Pad. A Cross Sectional Study. *Journal of Clinical and Diagnostic Research*; 10 (5) :143 - 145
- ❖ Shetty S, Majeed N, Shenoy K, Rekha V (2013). Occlusal plane location in edentulous patients - A Review. *J Indian Prosthodont Soc*; 13(13):142–8.
  - ❖ Shigli K, Chetal B, Jabade J (2005). Validity of soft tissue landmarks in determining the occlusal plane. *J Indian Prosthodont Soc*;5:139–145.
  - ❖ Sinobad D (1988). The position of occlusal plane in dentulous subjects with various skeletal jaw relations. *J Oral Rehabil*. 15:489–498.
  - ❖ Tippashetty SK, Joshi S, Sajjan C, Konin P, Kumari S, and Sajan RP (2020). Determining the occlusal plane using hamular notch incisive papilla plane evaluator: An in vivo study. *J Indian Prosthodont Soc*; 20(1): 61–68.
  - ❖ Winkler S (2004). A simple procedure for minimizing adjustment of immediate complete denture: a clinical report. *The Journal of Prosthetic Dentistry*. 92(2): 125-127