

To determine the most posterior limit of the maxillary complete denture thru the position of vibrating line in relation with the fovea palatinae in complete denture patients visiting at tertiary care center.

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Abstract:

Introduction: Currently many new treatment choices are present but removable complete denture is still treatment of choice. Retention, stability and support are the essential qualities of removable complete dentures and for these to achieve, borders of the prosthesis should be harmonized contact with surrounding tissues to produces a seal and that seal is known as peripheral seal.

Objective: To determine the most posterior limit of the maxillary complete denture through position of vibrating line in relation with the fovea palatinae in complete denture patients visiting at Prosthodontics department of Isra dental college, Hyderabad.

Methodology: During this cross-sectional study from June 2018 to March 2019, 155 edentulous patients of either gender, having age ranges from 40-60 years and above were included. Indelible pencil was used for marking of vibrating line location and results of vibrating line location whether it is anterior, at or posterior to fovea palatinae were recorded in written proforma when patient pronounce the word "Ah" in normal unexaggerated manner.

Results: Among 155 edentulous patients, we found vibrating line anterior to fovea palatinae in almost 53% cases followed next in frequency it was found at the fovea palatinae in 46.5% cases.

Conclusion: Fovea palatinae is best anatomical structures to help in location of vibrating line and posterior palatal seal and vibrating line in most cases is located anterior to the fovea palatinae

Keywords: Fovea palatinae, maxillary denture, posterior palatal seal area, retention and vibrating line.

Introduction:

Loss of complete dentition is a distressing and an irretrievable condition.^{1,2} Natural dentition plays an essential role in human's positive behaviour maintenance.³ Though, most of the persons in the old age even maintain their dentition but still then substantial percentage of the peoples required artificial prosthesis for their missing teeth.⁴⁻⁷ Treatment of completely edentulous patients are very challenging job for prosthodontist. For rehabilitation of the lost natural dentition, though many new treatment choices are present, but still remains the choice of treatment is removable complete denture. Removable complete dentures prosthesis re-establishes the function, enhance aesthetics and increase self-confidence.^{1,5} Complete dentures are the prosthesis which not only replaces the lost natural dentition by artificial means but also the related oral structures.⁸ Theses prosthesis also harmonized with the oral and

neuromuscular functions such as speaking, chewing, deglutination and smiling including the movements of tongue, lips, cheeks and floor of the mouth.^{9,10} Retention, stability and support are the essential qualities of removable complete dentures. For retention and stability purpose of removable complete prosthesis, borders of the prosthesis should be harmonized contact with surrounding tissues produces a seal and that seal is known as peripheral seal.¹¹⁻¹⁵ Peripheral seal creates between the flanges of the complete denture prosthesis and the underlying oral mucosa which inhibits deceiving of air & fluids underneath complete prosthesis.¹⁶ Posteriorly in maxillary denture, it's very challenging to obtain this type of seal. Posterior palatal seal have very important and major role in retention of removable maxillary complete prosthesis that's why well established seal must be recorded. It also helps in gag reflex reduction, food accumulation reduction under the complete denture posteriorly and provides comfort to the patient as well.^{7, 17, 18}

Certain reliable anatomical landmarks guide the exact position of posterior limit of upper complete denture. Fovea palatinae are reliable anatomical structures which are clinically observable small depressions on either side of the palatal midline and are generally found at or close to vibrating line.¹⁹⁻²¹ Hence, position of the vibrating line is usually considered as a valuable guide for posterior limit of upper complete dentures. Vibrating line is an imaginary line which is

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drawn across the palate from one hamular notch to the other and mark with indelible pencil when patient say “ah” and movements begins in the soft palate.^{22,23} It is exist at the junction of movable and immovable part of soft palate. It is visually located thru phonetic method (when patient say “ah” and soft palate lifts up), palpatory method with T burnisher, nose blowing or swallowing methods.^{9,24}

Objective:

Current study will be helpful for dentists in locating the limit of the upper removable complete dentures posteriorly with help of determining position of fovea palatinae and vibrating line.

Methodology:

This cross-sectional study was carried out from June 2018 to March 2019 at Department of Prosthodontics, Isra Dental College, Hyderabad. During study period 155 edentulous patients of either gender, having age ranges from 40-60 years and above were recruited. Depending upon the age, patients were divided into three groups; group 1 aged 40-49 years, group 2 aged 50-59 years and group 3 aged 60 years and above. For all those included; palatal mucosa was normal, healthy and of pink colour, fovea palatinae was present and clearly visible. Patients having any pathology, inflammation of palatal mucosa, history of trauma, surgery, any acquired or congenital craniofacial defects like cleft palate, and inadequate mouth opening were excluded. Informed consent obtained after explaining the purpose of the study in mother tongue of patient.

Patients were settled in straight erect position on dental unit then trained them to speak word “Ah” repeatedly in normal unexaggerated manner. After rehearsal of pronunciation of word “Ah”, teach the patients to open their mouth widely. Gauze piece used for drying of palatal mucosa so that the upward movement of soft palate may be clearly seen when patient pronounce “ah”. Once the fovea palatinae is located, both fovea palatinae and vibrating line are marked with indelible pencil. Location of vibrating line; whether anterior, posterior or at fovea palatinae, recorded in proforma. SPSS version 21 was used for analysis of data. Descriptive analysis was performed for frequency, percentages and cross tabulation was included from the data analysis.

Results:

Among 155 edentulous patients, 90 (58%) were females and 65 (42%) were males. Overall, 52 (33.5%) patients were in 40-49 years of age group, 73 (47.1%) patients were in 50-59 years of age group and 30 (19.4%) were in age group of 60 years and above as shown in table 1.

Table No 1: Frequency and percentage of the patients according to the age groups

| Age Group | Frequency | Percent |
|--------------|-----------|---------|
| 40-49 | 52 | 33.5 |
| 50-59 | 73 | 47.1 |
| 60 and above | 30 | 19.4 |
| Total | 155 | 100 |

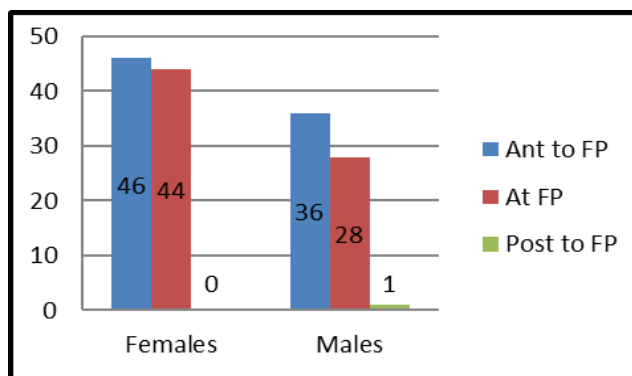
Out of 155 edentulous patients, location of vibrating line recorded anterior to the fovea palatinae in 82 (52.9%) edentulous patients, location of vibrating line recorded at the fovea palatinae in 72 (46.5%) edentulous patients and location of vibrating line recorded posterior to the fovea palatinae in only 01 (0.6%) edentulous subject (Table 2).

Table No 2: Frequency and percentage of the patients according to the location of vibrating line to the fovea palatinae.

| Location of vibrating line | Frequency | Percent |
|------------------------------|-----------|---------|
| Anterior to Fovea palatinae | 82 | 52.9 |
| At Fovea palatinae | 72 | 46.5 |
| Posterior to Fovea palatinae | 01 | 0.6 |
| Total | 155 | 100 |

From total number of edentulous patients, 46 female and 36 male subject's vibrating line located anterior to fovea palatinae, 44 females & 28 male subject's location of vibrating line were recorded at the fovea palatinae while only in 01 male subject had location of vibrating line was recorded posterior to the fovea palatinae as shown in fig 1.

Figure 1: Showing different position of the vibrating line in relation to gender of the patient.



Discussion:

In spite of the new treatments available such as implant dentistry, the removable complete denture prosthesis is still number 1 treatment choice. Thus, aimed at successful treatment, removable complete denture prosthesis should be functional, well retained and accepted by patient.^{25,29} Perfect posterior palatal seal is very essential for retention of complete dentures and for proper posterior palatal seal, properly locate the vibrating line. Fovea palatinae are very significant anatomical landmark for locating the vibrating line. Different methods used for locating the vibrating line but clinically "ah" method is commonly used and this method is also used in the current study.^{30, 31}

Many studies showed the relationship of fovea palatinae and posterior limit of maxillary complete denture prosthesis. Some studies showed that the fovea palatinae are reliable to locate vibrating line for posterior limit of removable complete denture, while others are considered it unreliable.³²⁻³⁴ Results of current study shows that the vibrating line is located in 82 (52.9%), 72 (46.5%) and only 01 (0.6%) patients anterior, at and posterior to the fovea palatinae respectively. Research of Alousi⁸ showed that vibrating line location was 44.5%, 50.9% and 6.4% in front, at and behind in relation to fovea palatinae respectively. Almost similar findings reported by Ahmed et al,³ that showing that the vibrating line located in front, at and behind fovea palatinae in 72(45%), 81(50.6%) and 7(4.4%) patients respectively. Another study of Lye³⁵ revealed that out of 100 patients, 92 patients had presence of fovea palatinae. His study revealed that location of vibrating line anterior, at & posterior to the fovea palatinae in 12 patients, 16 patients and 64 patients respectively. Studies of Krysinski et al and Salloum et al concluded that for determining vibrating line, fovea palatinae are the reliable anatomical landmark.^{16, 36} Many studies showed that the fovea palatinae can be reliable anatomical structure which helps in locating the vibrating line and posterior palatal seal for posterior limitation of upper removable complete dentures.³⁷ Some studies showed that patients whom adequate palatal outline at hard & soft palate junction, broader will be the posterior palatal seal part.¹⁴

Study of Chen³⁷ showed that the total patients were 104. Out of them, 72 patients had clinically visible fovea palatinae. Amongst his selected patients, 75% subjects had vibrating line found anterior to the fovea palatinae, 25% subjects had at the fovea palatinae and none of the patients had posterior to the fovea palatinae. These results are consistent with findings of current study.

Conclusion:

For determining posterior limit of maxillary removable complete denture, fovea palatinae stand as a reliable anatomical landmark to guide the location of vibrating line, consequently helps in placement of posterior

palatal seal and retention of upper removable complete denture prosthesis.

References:

1. Ahmed R, Maheshwari R, Agarwal S, Negi T. Relationship of fovea palatine to anterior vibrating line as a reliable guide in determining the posterior limit of maxillary denture. *Int J Scie Res.* 2017; 6(4): 262-4.
2. Cunha-Cruz J, Hujoel PP, Nadanovsky P. Secular trends in socio-economic disparities in edentulism: USA, 1972-2001. *J Dent Res.* 2007 Feb;86(2):131-6. doi: 10.1177/154405910708600205. PMID: 17251511.
3. Ahmed S, Das G, Rana MH et al. Upper complete denture; Location of vibrating line with reference to fovea palatinae in determining posterior border. *Prof Med J.* 2018; 25(3): 419-23.
4. Limbu IK, Basnet BB. Relationship of fovea palatinae to vibrating line as a reliable guide in determining the posterior limit of maxillary denture. 2019 11 (2); 68-71.
5. Kumar B, Naz A, Rashid H, Butt AM. Location of the vibrating line with respect to fovea Palatini in class I, class II and class III soft palate types. *J Pak Den Asso.* 2016; 25(2) : 59-64.
6. Zarb GA, Bolender CL. *Prosthodontic treatment for edentulous patients.* 12th ed. St. Louis: Mosby; 2004. <https://evolve.elsevier.com/cs/product/9780323092173?role=student>.
7. Douglass C, Shih A, Ostry L. Will there be a need for complete dentures in the United States in 2020? *J Prosthet Dent.* 2002; 87: 5-8.
8. Al-Alousi YT. Reliability of fovea palatine in determining the posterior palatal seal. *J Bagh College Dentistry.* 2009; 21:41-45.
9. Fernandes VA, Chitre V, Aras M. A study to determine whether the anterior and posterior vibrating lines can be distinguished as two separate lines of flexion by unbiased observers: a pilot study. *Indian J Dent Res.* 2008 Oct-Dec;19(4):335-9. doi: 10.4103/0970-9290.44538. PMID: 19075438.
10. Iwanaga J, Kido J, Lipski M, Tomaszewska IM, Tomaszewski KA, Walocha JA, Oskouian RJ, Tubbs RS. Anatomical study of the palatine aponeurosis: application to posterior palatal seal of the complete maxillary denture. *Surg Radiol Anat.* 2018 Feb;40 (2):179-183. doi: 10.1007/s00276-017-1911-2. Epub 2017 Aug 19. PMID: 28823003.
11. S. Parithimarkalaignan. The post dam - A review; *Indian Journal of Dentistry* 5: 2014. DOI: 10.1016/j.ijid.2012.07.003
12. Maller SV, Karthik KS. A review on posterior palatal seal. *J Indian Acad Dent.* 2010; 1(1): 16-21.
13. Bindhoo YA, Thirumurthy VR, Jacob SJ, Anjanakurien, Limson KS. Posterior palatal seal: a literature

- review. *Int J Prosth Res Dent*. 2011; 1: 108-14.
14. Pasam N, Hallikerimath RB, Arora A, Gilra S. Effect of different curing temperatures on the distortion at the posterior peripheral seal: an in vitro study. *Indian J Dent Res*. 2012 May-Jun;23(3):301-4. doi: 10.4103/0970-9290.102209. PMID: 23059563.
 15. Oh WS, Saglik B. Modified record base featuring postpalatal seal using silicone bite registration material. *J Prosthodont*. 2011 Aug;20(6):491-3. doi: 10.1111/j.1532-849X.2011.00740.x. Epub 2011 Jul 20. PMID: 21777336.
 16. Krysiński ZJ, Pryliński M. Carving of a master cast to obtain a posterior palatal seal of a complete maxillary denture as performed by four prosthodontists: a pilot study. *J Oral Sci*. 2007 Jun;49(2):129-32. doi: 10.2334/josnurd.49.129. PMID: 17634725.
 17. Kim Y, Michalakos KX, Hirayama H. Effect of relining method on dimensional accuracy of posterior palatal seal. An in vitro study. *J Prosthodont*. 2008 Apr;17(3):211-8. doi: 10.1111/j.1532-849X.2007.00268.x. Epub 2007 Jan 11. PMID: 18194207.
 18. Darvell B., Clark, R. The physical mechanisms of complete denture retention. *Br Dent J* 189, 248-252 (2000). <https://doi.org/10.1038/sj.bdj.4800734>
 19. Akhtar N, Tanveer S, Choudhary MAG, Ahmad S. The reliability of fovea palatinae in determining the location of vibrating line in edentulous patients. *Pak Oral Dent J*. 2017; 37(2): 368-370
 20. Bhayana R, Jain SR, Bhayana D, Sanadhya S, Singh DP, Kusha G. Fovea Palatini - what lies beneath and down under. *J Dentofacial Scie*. 2013; 47-50.
 21. Alfadda SA, Al Amri MD, Al-Ohali A, Al-Hakami A, Al-Madhi N. Two-Implant-Supported Mandibular Overdentures: Do Clinical Denture Quality and Inter-Implant Distance Affect Patient Satisfaction? *Int J Prosthodont*. 2017; 30(6): 519-25.
 22. Wicks R, Ahuja S, Jain V. Defining the posterior palatal seal on a definitive impression for a maxillary complete denture by using a nonfluid wax addition technique. *J Prosthet Dent*. 2014; 112: 1597-600.
 23. Kyung KY, Kim KD, Jung BY. The study of anatomic structures in establishing the posterior seal area for maxillary complete dentures. *J Prosthet Dent*. 2014; 112: 494-500.
 24. Charles M. Heartwell, Arthur O. Rahn Syllabus of Complete Dentures. 5th ed. Hamilt.Lond: BCDInc; 2002.
 25. MacEntee MI, Nolan A, Thomason JM. Oral mucosal and osseous disorders in frail elders. *Gerodontology*. 2004 Jun;21(2):78-84. doi: 10.1111/j.1741-2358.2004.00008.x. PMID: 15185987.
 26. Vohra FA, Rashid H. Implant retained over denture as first choice of care for edentulous mandibles: a presentation of two cases. *J Pak Dent Assoc*. 2012; 21: 182-87.
 27. Rashid H, Vohra FA, Shahzad A. Altered cast technique: Improving tissue support for the distal extension bases. *J Pak Dent Assoc*. 2013; 22: 234-36.
 28. Sajjan C. An altered cast procedure to improve tissue support for removable partial denture. *Contemp Clin Dent*. 2010 Apr;1(2):103-6. doi: 10.4103/0976-237X.68600. PMID: 22114393; PMCID: PMC3220079.
 29. Vohra FA, Rashid H, Hanif A, Ghani SM, Najeeb S. Trends in complete denture impressions in Pakistan. *J Ayub Med Coll Abbottabad*. 2015; 27: 108-12.
 30. Rashedi B, Petropoulos VC. Current concepts for determining the post palatal seal in complete dentures. *J Prosth Dent*. 2003; 12: 265-70.
 31. Hussain SZ, Samejo I, Qamar K. Investigation in to the concepts and techniques used for establishing post palatal seal in undergraduate dental curriculum. *Pak Oral Dent J*. 2010; 30: 250-53.
 32. Tandan A, Gupta NK, Dwivedi R, Gupta M. Simple visual technique for location of anterior vibrating line. *Ind J Pub Health Dev*. 2012; 3: 1-3.
 33. Goiato MC, Filho HG, Santos DM, Barao VAR, Junior ACF. Insertation and follow up of complete denture: A literature review. *Gerd Soc J W S*. 2010; 00: 1-8.
 34. Mojon P, Thomason JM, Walls AW: The impact of falling rates of edentulism. *Int J Prosth*. 2004; 17: 434-40.
 35. Lye TL. The significance of fovea palatini in complete denture prosthodontics. *J Prosthet Dent*. 1975; 33: 504-10.
 36. Salloum AM. Evaluation of the conventional method for establishing the posterior palatal seal. *KSU J Dent sci*. 2012; 3: 61-67.
 37. Chen MS. Reliability of the fovea palatini for determining the posterior border of the maxillary denture. *J Prosth Dent*. 1980; 43: 133-37.