Biometric evaluation of topographic changes in shapes of Retromolar pad in Edentulous patients.

Sajid Naeem[1], Muntaha Manzoor[2], Rummana Aqeel[3], Anam Shaukat[4], Ibrahim Rafi[5], Mashal Arif[5]

ABSTRACT

Objective: To evaluate the different shapes and sizes of retromolar pad in selected age range of completely edentulous patient.
Study Design: A cross sectional observational study.
Place and Duration: At Prosthodontic Department of Lahore Medical and Dental College, Lahore from 2nd August 2020 to 2nd November 2020.
Methodology: One hundred and fifty completely edentulous patients of both genders were selected by non-probability purposive sampling. The diagnostic cast were made to evaluate the shape of retromolar pad of both sides (right, left) and categorized into three shapes; pear, rounded and triangular. The means of longitudinal and transverse diameters of both sides were compared.
Results: Difference between shapes of retromolar pad was found to be statistically significant p<0.05. Significant difference in mean transverse and longitudinal diameters was observed. The mean longitudinal diameter on right was 8.91 ±1.80 and of left was 8.89 ±1.79 (p value 0.00), whereas mean transverse diameter of right was 6.17± 0.92 and let was 6.16± 0.92 (p 0.00).
Conclusion: Great variation in shape and diameter of retromolar pad was seen in completely edentulous patient. Among the shapes the triangular and pear shaped retromolar pad has more surface area than the rounded shaped.
Keywords: Retromolar pad, Variability, Shape, Stability, Piriformis papilla, Residual ridge resorption.

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INTRODUCTION

Retromolar pad is the supporting and the limiting area of the mandibular arch[1,2]. The retromolar pad also known as piriformis papilla; is a mucosal mass located in the retromolar area[3]. It covers the retromolar triangle with attached muscle fibers behind 3rd molar[4,5]. It is composed of non-keratinized loose tissue and has some mobility[6,7]. Many muscle fibers of different muscles like that of superior constrictor, temporalis, buccinators and masseter are attached to it[7].

After the loss or extraction of teeth, it is important to cover the retromolar pad while fabricating complete dentures for edentulous patients[8]. Retromolar pad is a very important structure in mandibular arch because this pad along with buccal shelf area of the mandible is the support areas as they can efficiently bear occlusal stresses[7-9]. As this pad has muscular elements attached to it care must be taken not be subject this area into too much compression[9].

Retromolar pad is considered as a stable landmark that does not change its size and location even after tooth loss[6]. Apart from this, the posterior occlusal plane level can be determined by its height as its height correlates with the occlusal plane height of the edentulous patient[7,10]. It is the posterior limit of the mandibular denture and provides marginal seal and ensures complete denture stability by resisting denture base movements[8].

The retromolar pad shows variation in shapes after the loss of 3rd molar; because of healing process and bone remodeling (a process of replacing old bone tissues with new and enabling bone tissues to adapt to different physiological conditions)[9,11,12].

1. Professor of Prosthodontics, Lahore Medical and Dental College, Lahore
2. Dental Surgeon, THQ Hospital, Qila Gujjar Sing Police Lines Hospital, Lahore.
3. Assistant Professor of Oral Pathology, Lahore Medical and Dental College, Lahore.
4. Post Graduate Resident of Prosthodontics, Lahore Medical and Dental College, Lahore.
5. Dental Surgeon Department of Prosthodontics, Lahore Medical and Dental College, Lahore.

Correspondence:
Sajid Naeem
Professor of Prosthodontics,
Lahore Medical and Dental College, Lahore
Email: drsajidnaeem@hotmail.com

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There is less literature available on the type of mucosa, bone, muscle shapes sizes and forms in posterior mandibular area in edentulous mouth[13].

The histology of the mucosa of retromolar pad may be changed by the muscle activity of those muscles that are inserted in it. Different shapes and sizes of retromolar pad may affect the peripheral seal and thus the denture stability. Consideration should be focused on these resultant shapes and their clinical significance. Very few articles are found related to this topic in recent local literature. By knowing the anatomical variations in the shapes of retromolar pad in our patients; we can educate health planners to better plan, design and fabricate the dentures by incorporating those additional features that can enhance peripheral seal, support and stability of the dentures. The aim of the study was to evaluate the different shapes and sizes of retromolar pad in selected age range of completely edentulous patient.

METHODOLOGY

A total of 150 completely edentulous patients of both genders were selected from the Prosthodontics Department of Lahore Medical and Dental College. The cross-sectional observational study was conducted in 3 months period from 2nd August 2020 till 2nd November 2020. Patients between the age from 50 to 70 years were selected by using non-probability purposive sampling. Completely edentulous patients between the selected age range were included in the study. Only correct impressions made from impression compound material covering anterior two third of retromolar pad area were included. Patients with normal neuromuscular control and those with completely healed mandibular ridges were included. Patients who were unwilling, those who did not fall in the selected age range, with mandibular hemi-mandibulectomy were excluded. All over extended and under extended impression in the impression try were also excluded. Informed verbal consent was taken from each patient and ethical approval was obtained from the institutional ethical committee.

A single qualified prosthodontist obtained the impressions of patients' mandibular arches using impression compound thermoplastic material. Impressions were poured in dental plasters to fabricate diagnostics casts. Cast analysis was done. The shapes of retromolar pads on both sides of the mandibular arch were assessed and marked with pencil. Different shapes of retromolar pad on right and left side were noted and divided into 3 shapes based on clinical classification as pear, rounded and triangular shaped[12]. The longitudinal and transverse diameters of different shapes of retromolar pad were recorded for both right and left sides of edentulous mandibular ridges using digital vernier caliper. Mean longitudinal and transverse diameters of retromolar pad on both right and left sides of the mandibular edentulous ridge were compared and their correlation with various shapes of retromolar pad was obtained.

Data Analysis: SPSS Version 20 was used for statistical analysis. Analysis of retromolar pads of both sides was done and frequency and percentages were obtained for descriptive variable like shapes of retromolar pad. Chi-square test was used for comparing different shapes. The quotative variables like longitudinal and transverse diameters were showed in mean and standard deviation. Student t test was used to compare the longitudinal and transverse diameters and the comparison with various shapes of retromolar pad was done with ANOVA.

RESULTS

A total of 150 completely edentulous patients were selected and the shapes of retromolar pad were evaluated. The evaluation of shapes of retromolar pad showed that the pear shape was the most commonly observed shape i.e.; 154(51.33%). Pear shape was also the most common shape observed on right (75;50.0%) and left side (71;47.3%) of the edentulous mandibular ridge. Table-I. The second most frequently observed shape was the triangular shape of the retromolar pad i.e.; 75(25.0%). It was also the second most frequent shape evaluated on right (38;25.3%) and left side (43;28.7%) of edentulous ridges, Table I. The least commonly observed shape of retromolar pad was the round shape (71;23.67%). It was also found as least frequent shape observed on right (36;24.0%) and left (33;24.0%) side of the edentulous ridges. The p value showed significant difference ($p< 0.05$) Table-I.

Table-I: Frequency distribution of various shapes of retromolar pad, (N=150)

Shape	Right side n (%)	Left side n (%)	Total	P value
Pear	75	71	154	0.00
	50.0%	47.3%	51.33%	
Round	36	33	71	
	24.0%	24.0%	23.67%	
Triangular	38	43	75	
	25.3%	28.7%	25.00%	
Total	150	150	300	
	100.0%	100.0%	100.0%	

The mean longitudinal diameter of the retromolar pads on both right and left sides of the edentulous ridges was recorded. The mean longitudinal diameter on right side was 8.91± SD 1.80 and on left side was 8.89 ±SD1.79 respectively, Table-II. The longitudinal diameter on both sides of edentulous ridges was compared with t test. The difference obtained was statistically significant (p value> 0.05) Table-II. The mean transverse diameter of retromolar pad on right and left sides of the edentulous ridges was also recorded. The mean transverse diameter on right side was 6.17± SD 0.92 and on left side was 6.16 ±SD 0.92 respectively, Table-II.

Table-II: Comparison of longitudinal and transverse diameters of retromolar pad on right and left sides of edentulous ridge. (N=150)

	Side	Number	Mean	SD	p- value
Longitudinal Diameter	Left	150	8.89	1.79	0.00
	Right	150	8.91	1.80	
Transverse Diameter	Left	150	6.16	0.92	0.00
	Right	150	6.17	0.92	

The transverse diameter on both sides of edentulous ridges was compared with t test. The difference obtained was statistically significant (P value> 0.05) Table-II.

Transverse and longitudinal diameter of right and left sides of edentulous mandibular ridges were correlated with respect to variation in shapes of retromolar pad (pear, round and triangular) using Anova. The results obtained showed significant difference (p value <0.05) Table-III. The post hoc comparison showed that both right and left longitudinal diameters in triangular shaped pads were greater than pear and round shaped pad. Similarly, the transverse diameters of retromolar pads of both right and left sides were greater in pear and triangular shape than the rounded, Table-III.

Table-III: Comparison of transverse and longitudinal diameter with respect to shapes of retromolar pad (N=150)

	Sr. no	Right	Mean	SD	Anova	P value	Post hoc comparison
Left side longitudinal diameter	1	Pear	9.54	.713	307.49	.000	3>1,2 1>2
	2	Round	6.19	.767			
	3	Triangular	10.34	.954			
Left side transverse diameter	1	Pear	6.76	.495	114.50	.000	1,3>2
	2	Rounded	5.00	.696			
	3	Triangular	6.13	.616			
Right side longitudinal diameter	1	Pear	9.57	.732	301.10	.000	3>1,2 1>2
	2	Rounded	6.19	.778			
	3	Triangular	10.34	.960			
Left side transverse diameter	1	Pear	6.77	.485	114.50,	.000	1,3>2
	2	Rounded	5.03	.710			
	3	Triangular	6.11	.615			

p<0.05 is significant

DISCUSSION

Bone resorption after the loss of 3rd molar results in the remodeling process which becomes limited in the retromolar pad area. This happens due to the bounded ligaments and muscular attachments that play their role in limiting the remodeling process[13]. This limitation makes the retromolar pad a stable landmark even in the resorbed ridges[3,7,13]. The bone remodeling and blending of periodontium is affected by patients' genetics, health and systemic conditions and may result in anatomical variation in shapes[14]. The current study was carried out in edentulous patients to evaluate biometric variations in shapes and sizes of retromolar pad.

The retromolar pad shows variation in shapes after the loss of 3rd molar; because of healing process and bone remodeling[9], In the present study we found variation in anatomical shapes of retromolar pad i.e., (51.33%) pear shaped, (23.67%) rounded and (25.00%) triangular shaped pads. In concordance with the results of current study Bernarda[15] and coworkers also reported anatomical variation in the retromolar pad. They reported that the most commonly observed shape was pear shaped (53%) followed by rounded (29%), whereas the least common was the triangular shaped pad (17.3%). Similarly, Nissan[16] and coworker reported great variability in shapes and dimensions of retromolar pad in their study. In contrast Nazia[13] and coworkers reported pear shaped retromolar pad (55%) the most commonly observed shape but triangular shaped pad (29.4%) the second most common shaped followed by the rounded (15.5%.). Similarly in contrast with the results of our study Anil Sharma[17] and coworkers evaluated anatomic variations of retromolar pad in a cross-sectional study and reported triangular shaped pads 103(34.30%) the second most common shaped observed after the pear shaped 154(51.30%). They reported rounded shaped pad as the least observed shape in their patients; 43 (14.30%). The variation in the results could be explained on the basis that the genetics and racial factors affect bone remodeling and periodontium blending and this results in variation in shapes[8].

The diameter of a retromolar pad is of great importance as it marks the posterior most extension of mandibular complete denture and provides marginal seal and stability[7,13]. In the current study we found significant variation in longitudinal and transverse diameter of various shapes on both right and left sides. We observed mean longitudinal diameter on left and right sides (8.89, 8.91) and mean transverse diameter on left and right sides (6.1, 6.17) respectively. Similar to the results of current study Anil Sharma[17] et al reported significant difference in diameters when compared right and left sides i.e. the mean longitudinal diameter on left and right sides was (8.81, 8.69), whereas mean transverse diameter on left and right sides was (6.79, 6.82). Bernarda[15] and co-workers conducted biometric study on 81 retromolar pad reported significant difference in shapes of retromolar pad and reported mean transverse and longitudinal diameter (7.94 ± SD 2.09) (11.202 ± SD 2.5089).

Various shapes of retromolar pad may have different diameters that is directly related to the surface areas available for denture prosthesis[9]. We found significant difference in mean longitudinal and transverse diameter when different shapes were correlated. In contrast to the current study Sharma[17] et al reported insignificant difference in mean longitudinal and transverse diameters on both sides (p=0.55, p=0.81). Insignificant difference in various shapes was also reported by Nazia[13] and co-workers in Kashmiri population. This difference of observation could be due to the variation of genetics and race[8]. After the loss of teeth, bone and tissue remodeling occurs under the influence of many factors. The duration of edentulousness and sequence of tooth loss along with duration of denture wear also influence the remodeling process[9].

We can suggest through the results of the current study that different populations show variations in size and shape of retromolar pad and it affects the denture stability. Larger surface area and larger diameter results in improved denture stability because forces are better distributed on larger area[18]. The rounded shaped retromolar pad has comparatively small diameter than the pear and triangular shaped pads. The patient with resorbed ridge will face the stability and border seal issues way more than the patients with pear and triangular shaped. Careful observation and evaluation of retromolar pad should be done while fabricating complete denture prosthesis and additional features should be incorporated in dentures to enhance their marginal seal and stability.

CONCLUSION

Great variation in shape and diameter of retromolar pad was seen in completely edentulous patients. Among the shapes the

triangular and pear shaped retromolar pad has more surface area than the rounded shaped.

Limitations: Very less literature is available on different shapes of retromolar pad and further studies are needed in different areas of population. Clinical evaluation of the relationship between complete denture stability and different retromolar pad shapes is needed. The retromolar pad is stable landmark observed clinically and not only provides support and stability to complete denture prosthesis but plays a vital role in occlusal plane determination.

AUTHOR'S CONTRIBUTION

Naeem S: Designed research Methodology, Manuscript final proofreading
Manzoor M: Conceived idea
Aqeel R: Statistical analysis
Shaukat A: Data collection
Arif M: Manuscript writing
Rafi I: Literature review

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