



Research Article

A CLINICAL STUDY TO ASSESS THE THICKNESS OF PALATAL MASTICATORY MUCOSA BY DIRECT BONE SOUNDING

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ABSTRACT

The determination of thickness of palatal masticatory mucosa is important as it is most commonly used as donor material for periodontal plastic surgery. The purpose of the study was to determine the thickness of the palatal mucosa by a direct clinical method using William's periodontal probe, and the association of gender with the thickness of the palatal mucosa.

Materials and Methods: 20 systemically and periodontically healthy subjects were divided into two groups of 10 males and 10 females. A bone sounding method using a periodontal probe was used to assess the thickness of palatal mucosa at 15 pre-determined sites defined according to the gingival margin and palatal raphae. Students 't' test was used to validate differences in mucosal thickness between the groups.

Results: The mean thickness of palatal masticatory mucosa ranged from 2.4±.744. The mean thickness of palatal mucosa for males was 2.5±.7526 and for females was 2.3±.7391. The females had a thinner mucosa than males with non - significant difference.

Conclusion: The mean thickness of palatal masticatory mucosa ranged from 2.4±.744. The females had a thinner mucosa than males with non - significant difference.

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INTRODUCTION

The thickness of palatal mucosa has attracted considerable attention, because it is a potential donor site for connective tissue transplants for plastic surgery.^{1,2} Periodontal plastic surgery is used in coverage of denuded root surfaces,^{3,4} augmentation of confined ridge deformities,^{5,6} for vestibuloplasty,⁷ reconstruction of papilla,⁸ and esthetic surgery around implants. The autogenous soft tissue donor sites used in periodontal plastic surgery include palatal masticatory mucosa or maxillary tuberosity area and edentulous ridge. Palatal masticatory mucosa is used as the donor site for increasing the dimensions of keratinized mucosa around teeth and implants, covering exposed roots, and increasing localized alveolar ridge thickness.⁹ Proper thickness of graft material is important for survival to permit nutrient supply from the recipient site. The graft obtained if too thin can shrink and undergo necrosis,^{10,11} and if it is too thick, its peripheral layer is jeopardized due to excessive tissue separating it from new circulation and nutrients. Hence the thickness of the graft tissue obtained is an important factor for the success of these techniques.

As the dimension of the donor graft tissue plays an important role in the clinical outcome of periodontal plastic surgical procedures, it is important to determine the available dimension of the palatal donor tissue prior to harvesting,

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without violating the neurovascular bundles.^{1,12-15} Thus in this study we tried to evaluate the thickness of palatal masticatory mucosa at various sites in association to gender by the help of direct bone sounding using a periodontal probe.

MATERIALS AND METHODS

20 subjects visiting the outpatient Department of Periodontology, Govt. Dental College and Hospital Srinagar, divided into two groups of 10 each based on gender were considered for the present clinical study after meeting inclusion and exclusion criteria. The inclusion criteria were systemically healthy subjects, ranging between 18 - 45 years with healthy periodontium having all maxillary teeth, with or without the third molars. Subjects having undergone surgery for soft tissue removal in the area to be analysed, history or presence of pathology in the palatal region, teeth with severe morphological alterations, tooth mal-alignment, pregnant women or lactating mothers and smokers were excluded from the study. After explaining about the objectives of the study, the expected outcomes, and the degree of discomfort that might occur, only those patients who gave written consent and fulfilled all the qualifying criteria were taken up for the study.

In the first visit a maxillary impression was made with alginate impression material and poured in a dental stone. Clear acrylic measurement stent was then fabricated on the cast model and trimmed appropriately to include all teeth present in the arch and measurement points were made at distances of 2 mm, 5 mm, and 8 mm from the gingival margin for canine, first and

second premolar, first molar and second molar on the right and left side of the palatal mucosa using the mid-palatine raphae and gingival margin as reference points. A fissure diamond bur was used to create holes at the marked measurement points on the stent at 90 ° to the surface of the stent. The stent provided a consistent location for the assessment of mucosal thickness. Subsequently direct bone sounding with periodontal probe was done. On the second visit, the greater palatine and incisive nerves were blocked with 2% lidocaine, 1:100,000 epinephrine injection. The measurement points were marked with a hematoxylin pencil on the palate, through the holes made in the acrylic stent. Measurements were performed 20 minutes after the injection. The thickness of the palatal masticatory mucosa was measured by bone sounding with William's periodontal probe with a stopper. The values were rounded up to the nearest 0.5mm.

Statistical Analysis

The data was analyzed using statistical software IBM SPSS and Microsoft Excel (version 5.00). Student's t test was used to determine the difference in mucosal thickness between genders at each measurement point, between the two quadrants and between points measured by the probe. The significance level was set at p ≤0.05.

RESULTS

The palatal masticatory mucosa was measured for thickness and ideal site for grafting procedures in 20 systemically healthy individuals. The measurements were compared between men and women. We analyzed our data at both the site level (individual measurement point) and subject level (mean scores of 15 measurement points). Table 1 presents the mean scores of palatal thickness at the subject level. The mean thickness of palatal mucosa was 2.4±.744. The mean thickness of palatal mucosa for males was 2.5±.7526 and for females was 2.3±.7391. Females had thinner mucosa than males, but the difference was not statistically significant.

Table 1 Mean thickness of palatal masticatory mucosa by gender at the subject level

Mean mucosal thickness (mm)	All n=20	Male 10	Female 10
Mean ± SD	2.4±.744	2.5±.7526	2.3±.7391

Analysis of the palatal masticatory mucosa at each measurement point (Table 2, Table 3) indicated that the palatal mucosa was thinnest at the canine region, increased distally, and became thickest at the second molar area, and also in sites farther from the gingival margins.

Table 2 Thickness of palatal masticatory mucosa in 1st quadrant measured using probe

Gender	Canine			Premolar 1			Premolar 2			Molar 1			Molar 2		
	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm
Males	1.4±.516	2.7±.421	3.15±.625	1.3±.411	2.8±.709	3.1±.516	1.6±.474	2.5±.474	3.3±.483	1.7±.563	2.3±.529	3.3±.632	1.7±.483	2.8±.411	3.6±.596
Females	1.4±.459	2.7±.483	3.1±.737	1.35±.474	2.4±.497	2.9±.516	1.5±.437	2.6±.709	3.05±.685	1.5±.577	2.1±.737	3.2±.353	1.6±.459	2.5±.745	3.6±.699

Table 3 Thickness of palatal masticatory mucosa in 2nd quadrant measured using probe.

Gender	Canine			Premolar 1			Premolar 2			Molar 1			Molar 2		
	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm
Males	1.4±.459	2.5±.527	2.9±.737	1.6±.411	2.6±.579	3.3±.788	1.7±.424	2.8±.586	3.4±.516	1.9±.516	2.1±.625	3.5±.685	1.8±.579	2.8±.625	3.8±.674
Females	1.25±.353	2.2±.537	2.9±.516	1.3±.349	2.8±.483	2.65±.474	1.35±.337	2.5±.816	3.15±.747	1.6±.516	2.3±.714	3.3±.474	1.5±.333	2.4±.516	3.5±.816

Table 4 Students t test for gender difference (P value)

	P value	Canine			Premolar 1			Premolar 2			Molar 1			Molar 2		
		2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm	2mm	5mm	8mm
1 st quadrant		.58	1.00	.87	1.00	.16	.39	.63	1.00	.35	.28	.39	.83	.64	.21	.85
2 nd quadrant		.42	.22	1.00	.55	.53	.038*	.032*	.35	.39	.21	.62	.45	.11	.09	.38

*Statistically significant P value ≤0.05

Table 4 shows P value for gender difference and difference in mucosal thickness between the first quadrant and the second quadrant. There was statistically insignificant difference in mucosal thickness between males and females and between 1st and 2nd quadrant but in 2nd quadrant mucosal thickness at 8mm in 1st premolar region and at 2mm in 2nd premolar region was thicker in males than in females, which is statistically significant with p value < .05.

DISCUSSION

An in depth understanding of palatal gingival biotype is required in implant planning, restorative dentistry, prosthetic rehabilitation and surgical therapies in the maxillofacial region. Taking into account the usefulness of the palatal mucosa in periodontal plastic procedures and implant therapy, it is quite evident that this tissue holds a prominent position in the current era of soft tissue aesthetics in dentistry.¹⁶

The palatal masticatory mucosa is the main donor site of connective tissue in periodontal plastic surgery during soft tissue grafting.¹⁷ Palatal area sometimes fails to provide adequate donor tissue, either as a result of palatal anatomic form or insufficient thickness of the soft tissue during graft harvesting. Thus surgical approach may therefore need to be altered accordingly, depending on the availability of adequate tissue. Since dimensions of the donor graft tissues play an important role in the clinical outcomes of periodontal plastic surgical procedures, it is important to determine the available dimensions of the palatal donor tissues, prior to attempting surgical harvesting.¹⁸

The thickness of the palatal masticatory mucosa has been evaluated in different studies. Palatal mucosal thickness has been measured using direct and indirect methods.^{1,2,19,20}

In this study we investigated the thickness of palatal masticatory mucosa in male and females between the age group of 18-45 years using bone sounding technique (a direct clinical measurement using a periodontal probe and local anesthesia together with an acrylic stent to ensure consistent locations for measurements). To define the measurement points on the hard palate, gingival margin and mid-palatal line were used as fixed references for reliable comparison of the mucosal thickness at each measurement point is possible.

In this study, the mean thickness of palatal mucosa was 2.4±.744. The mean thickness of palatal mucosa for males was 2.5±.7526 and for females was 2.3±.7391. Females had thinner mucosa than males, but the difference was not statistically significant

These results are in agreement with the results of previous studies of Studer *et al.*¹Wara-aswapati *et al.* 2001,¹⁵Kuriakose,2012²¹Kolliyavar B 2012 ²²,Gupta *et al.* 2014 ²³.

In this study, we determined that the palatal masticatory mucosa was thinnest in the canine region, increased in the more distal portion and was thickest in the molar area, which is consistent with the report by Wara-aswapati *et al.* 2001,¹⁵ Gupta *et al.* 2014.²³ The thickness increased as the distance from the tooth increased.

The difference in mucosal thickness between the first and second quadrants was measured. There was statistically insignificant difference in mucosal thickness between males and females and between 1st and 2nd quadrant, which is consistent with the report by Gupta *et al.* 2014.

CONCLUSION

The mean thickness of the palatal mucosa ranged between 2.4±.744. Based on the comparison of the measurements of thickness of the palatal mucosa was males and females, the difference in thickness was not significant.

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