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RELATIONSHIP OF THE LATERAL DIMENSION OF THE PALATAL RUGAE TO THE WIDTH OF PALATE

S.Samyukta*[1], Dr.Abilasha.R[2]
[1,2]Saveetha Dental College and Hospitals, Poonamalle Bypass, Chennai.
Email: samyu26797@gmail.com

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Abstract:

Aim: to study the effect of orthodontic treatment on the palatal rugae. Objective: this study is performed to understand the reliability of palatal rugae pattern in identifying an individual Background: Palatal rugae, are the ridges on the anterior part of palatal mucosa, each side of the median palatal raphe and behind the incisive papilla. Rugae patterns have been studied for various purposes, and have been established to have a role in positive identification of individuals in forensic cases. palatal rugae are uniques to a person jus as the finger prints.

Methodology: 20 pre and post treatment casts were collected from the deparment of orthodontics. The 20 casts included 10 male patients and 10 female patients. The inter-canine distance, lateral dimension of the third rugae was measured and the ratio was calculated. The pattern of the third rugae was also noted. The pre- and post treatment measurements were compared.

Reason: Though the rugae are unique to a person the stability of the rugae post orthodontic treatment is still unknown. Hence the study is conducted to have a better understanding about palatal rugae pattern as a tool in forensic odontology.

Keywords: Palatal rugae, Pattern, Lateral dimension, Intercanine width.

Introduction:

Forensic medicine and forensic science is a multidisciplinary system that is involved in criminal investigations(1). Forensic odontology is one of the rapidly emerging branches of forensic science which is mainly used for human identification of both living as well as dead individuals(2). This discipline uses various tools such as cheiloscopy, bite marks, saliva, rugoscopy, dentine translucency etc. For human identification(3). The basic process involved in personal identification in all these methods is comparision between post mortem and ante mortem records(4).

Rugoscopy is the study of palatal rugae . rugae are used as a tool in human identification as they are unique to an individual and are stable throughout an individual's life[5]. Research has shown that even in victims with third degree parafacial burns the palatal rugae pattern is not distorted[6]. Although there are many studies that have proven the qualitative and quantitative stability of plalatal rugae [7]some studies have also proven otherwise. A study conducted by hauser et al. suggests that the mean number of rugae increases during adolescents and peaks between the age of 35 and 40 years [8]. Lysell and his team proved that certain factors such as extreme finger suckling during infancy, intense orthodontic treatment, prosthodontic dentures and surgery can impart changes in the rugae pattern [9].

Rugae pattern was first studied by Winslow in 1732[10] and later in 1775 Santorini made the first illustration[11]. Allen introduced palatal rugae as an alternative tool for human identification in 1889[12]. According to Thomas et al, Rugae patterns are classified into six types namely: stright, curved, converging, divergent,wavy, circular[13].

The present study is focused on determining the reliability of palatal rugae in individual identification in people that have undergone orthodontic treatment.

Materials and methods:

20 pre and post treatment casts were collected from the deparment of orthodontics, saveetha dental college, chennai. The 20 casts included 10 male patients and 10 female patients.

Medial and lateral points were marked on the third rugae and was measured using a divider and a metal scale. The inter-canine distance was measured using the cusp tips as the standard point. Later, ratio between the intercanine distance and the lateral dimension id the third rugae was calculated to establish a relationship. The pattern of the third rugae was also noted.

The data collected was then documented in an excel spread sheet. And statistics was done.

Result:

The mean value of the ratio pre- and post- treatment was not significantly different in both males and females ($p<0.05$). the t value for the males was -0.117 (table:3)and that of females was 0(table:4). there was no change in pattern of the third rugae in both the sexes.

It was found that straight (30%)and divergent type(30%) of rugae was most common amongst the men, followed by wavy(20%), curved(10%) , circular(10%) type of rugaes(table:1). Amongst the females though straight (40%) and wavy(40%) type of rugae were the most common followed by divergent(10%) and convergent (10%) type of rugae(table:2).

Table 1: pre- and post- treatment data collected in males.

pre treatment:					post-treatment:			
intercanine length	third rugae length	third rugae pattern	ratio		intercanine length	third rugae length	third rugae pattern	ratio
32mm	11mm	stright	2.9		36mm	11mm	stright	3.2
36mm	12mm	divergent	3		36mm	12mm	divergent	3
42mm	13mm	curved	3.2		36mm	12mm	curved	3
38mm	9mm	divergent	4.2		40mm	10mm	divergent	4
40mm	10mm	divergent	4		38mm	9mm	divergent	4.2
36mm	10mm	circular	3.6		40mm	10mm	circular	4
38mm	10mm	wavy	3.8		34mm	10mm	wavy	3.4
42mm	13mm	wavy	3.2		38mm	13mm	wavy	2.9
34mm	15mm	stright	2.2		38mm	15mm	stright	2.5
38mm	11mm	stright	3.4		40mm	11mm	stright	3.6

Table 2: pre- and post- treatment data collected in females.

intercanine length	third rugae length	third rugae pattern	ratio		intercanine length	third rugae length	third rugae pattern	ratio
36mm	12mm	stright	3		38mm	12mm	stright	3.1
34mm	9mm	stright	3.7		32mm	9mm	stright	3.5
42mm	10mm	wavy	4.2		36mm	12mm	wavy	3
36mm	10mm	wavy	3.6		40mm	10mm	wavy	4
38mm	14mm	divergent	2.7		40mm	12mm	divergent	3.3
32mm	11mm	convergent	2.9		30mm	11mm	convergent	2.7
30mm	9mm	wavy	3.3		34mm	9mm	wavy	3.7
38mm	12mm	stright	3.1		40mm	12mm	stright	3.3
34mm	11mm	stright	3.2		34mm	11mm	stright	3.2
38mm	11mm	wavy	3.4		40mm	12mm	curved	3.3
	mean:		3.31			mean:		3.31

Table 3: student T test done in males.

Column1	pre- treatment	post- treatment
Mean	3.35	3.38
Variance	0.345	0.3129
Stand. Dev.	0.5874	0.5594
n	10	10
t	**-0.117**	

Table 4: student T test results for females.

Column1	pre- treatment	post-treatment
Mean	3.31	3.31
Variance	0.1921	0.1321
Stand. Dev.	0.4383	0.3635
n	10	10
t	**0**	

Discussion:

Palatal rugae also called transverse palatine folds are transverse and asymmetrical folds of mucous membrane , that extend laterally on either sides of the median palatine raphe[(4)]. The rugae are formed in the 12th -14th week of intrauterine life and remain constant throughout a person's life[(8)]. Palatal rugae has been an area of research interest for various purposes. In recent times its usefulness in personal identification is most talked about. previous researches have proved that the rugae does not undergo any quantitative changes through a persons life expect when the person undergoes extensive surgery like, cleft repair, when the number of rugae decreases significantly[(13)].

In the present research, the pattern of the rugae was assesed in both the sexes and it was found that the straight type of rugae was most common in both males(30%) and females (40%). Gender dimorphisim was found to be absent. This result is in accordance with previous studies[(14)]. There was no difference in the pattern of the rugae pre and post orthodontic treatment in both the genders similar results were noted in earlier studies[(14,15)] .

The lateral dimension of the third rugae was found to be stable through orthodontic treatment. This result is in accordance with research conducted earlier by D. Shukla et al. Who believe this could be because of the reduction in arch circumference which mostly affects the anterior part of the palate and its position near the molar away from the

distal retraction of the anteriors[16] . In the present study it was also concluded that the relationship between intercanine distance and the lateral dimension of the third palatal rugae remained consistent pre and post orthodontic treatment. This could be because the intercanine width is maintained[17] in most of the treatment modality and the third rugae is stable. This ratio may be altered in cases involving the extraction of the premolars in which case the canine moves into the premolar space.

Conclusion:

Orthodontic treatment and tooth moovement do not have any significant effect in the relationship between the intercanine width and the lateral dimension of the third palatal rugae. The pattern of the rugae doesnt show any change post orthodontic treatment. Hence can be used as a stable markers for personal identification. for further studies, it would be helpful to use a wider sample size.

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Corresponding Author:

S.Samyukta*,

Email: *samyu26797@gmail.com*