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Palatal waves: An orthodontic perspective

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Abstract
The purpose of the literature is a mini review of the relationship of the malocclusion categories and palatal rugae pattern. Palatal rugae{PR} shape assist in early interception and prevention of malocclusions, as it is formed in the early intra-uterine life and remains stable throughout the life, equating with other occlusal relations. Platal rugae are unique to every individual, so they can be used as a key in human identification. Palatal rugae shape can be influenced by certain pressure giving habits and certain orthodontic treatments, only little literatures give the valued information of association of palatal rugae pattern with malocclusion and it should be take to be a part of research field, Here we are discussing about the PR patterns associated with different types of malocclusion.

Keywords: palatal rugae, malocclusion, forensic denstistry

Introduction

Palatal rugae located at the Maxillary jaw, on the anterior portion of the hard palate. They are transverse ridges of the mucosa behind the incisor region. Palatal Rugar dimensions and location deviate from the left side to the right side within the individual and from person to person. Palatal rugae are used as aspecification point to evaluate the extent of tooth movement in view of the fact that remain stable throughout life [1]. The intra uterine life of appearance of the PR. begins from the third week with covering connective tissue in the palatine process of maxillary bone, and its development and growth is controlled by epithelial–mesenchymal interactions. The first PR to appear in the human embryo is has a lenghth of about 32-mm Crown-rump length and they are present next to the incisive papilla and are relativelyeminent in prenatal life. Moreover during birth the palatal rugae are well traines with a typical orientation pattern, acquiring the appropriate final feature of at adolescence stage. Although PR experiences changes in their size because of the growing palate, their shape is maintained [2]. They are well protected by the lips, cheek, tongue, buccal pad of fat and teeth during incidents of fire and high impact trauma. After mass disaster or road traffic accidents when there is difficulty in identifying a person according to fingerprints or other dental records, rugae pattern may be helpful [3]. Although, some habits like finger sucking or persistent pressure from orthodontic treatment or dentures and orthodontic extractions may bring about local changes in PR [4] the eruption of the teeth or their loss in no where effected by the form, layout, and characteristics of PR. However, in some cases palatal rugae adjoining the alveolar arch slightly change their position only in case of tooth extraction. The Alteration can take place by some events such as thumb or digit sucking in childhood and even due to orthodontic treatment, where pressure is experienced. It also includes extractions which produces local effect to the direction of the PR. Although, PR pattern is pertinent for human identification owing to the fact of stability, and being equivalent to the fingerprint, is unique for each individual[2].The Study of palatal rugae (PR) characteristics is essential to any research which contains rugoscopy, Moreover wide extensive literature is available on the different methods of acquisition of rugae.

Method of identification of rugae

In order to study the rugae two essential steps are to be carried out

1. Taking photographs of the patient maxiilary Arch
2. Taking impression of the patient's Maxillary arch.

After which palatal rugae of the casts could be traced using a sharp graphite pencil under adequate light and magnification as shown in Figure 1.

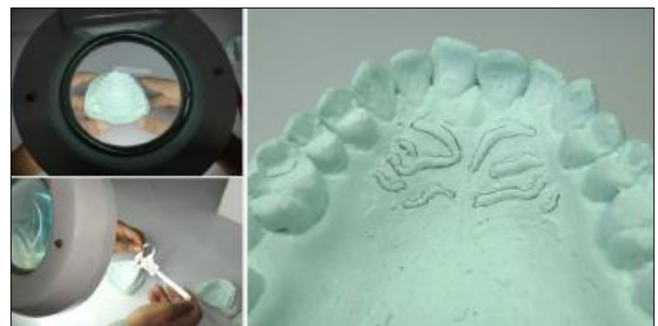

Fig 1: Casts were traced using a sharp graphite pencil

According to Thomas and Kotze10 and Kapali *et al* [6] classification of the Palatal Ruguae the following were recorded

1. Number
2. Length
3. Shape
4. Direction
5. Unification of the palatal rugae

Based on length {fig: 2}

- Primary: =/> 5mm
- Secondary: 3-5mm
- Fragmentary: (2-3mm)

- Rugae less than 2 mm were not considered for any categorization

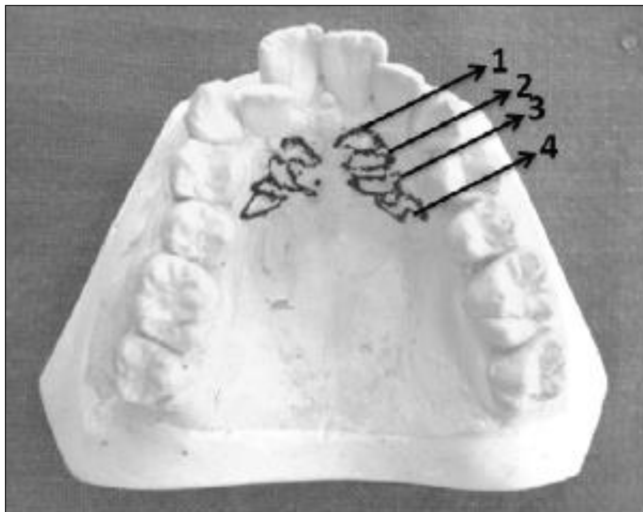

Fig 2: Different patterns of Palatal rugae

Based on shape {fig: 3}
- Straight: rugae ran directly from origin to termination
- Curved: simple crescent shape that curved gently
- Wavy: serpentine or slightest bend at the termination or origin of curved rugae
- Circular: rugae with definite continuous ring formation

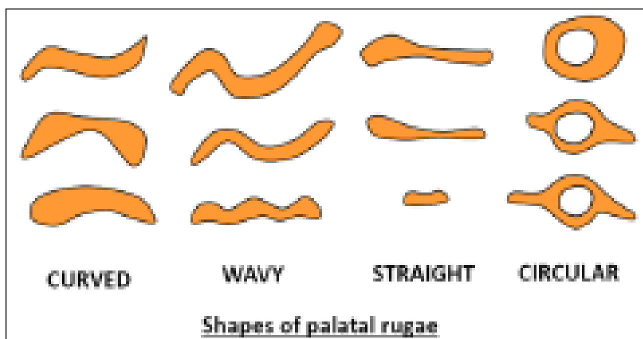

Fig 3: shapes of Palatal rugae

Based on direction (For primary rugae; based on angle between line joining origin and termination and line perpendicular to mid palatine raphae) {fig: 4}
- Forward: positive angle
- Backward: negative angle
- Perpendicular: with zero degree angle

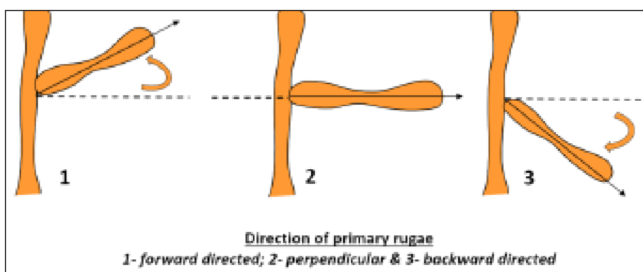

Fig 4: Directions of palatal rugae

Based on unification (Rugae joined at origin or termination) {fig: 5}
- Divergent: two rugae began from same origin but immediately diverge
- Convergent: rugae with different origin join on lateral portions

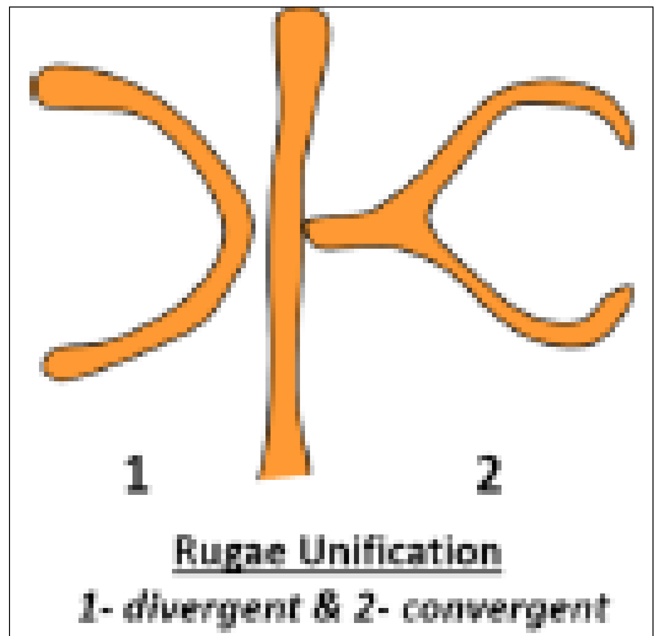

Fig 5: Unification of Palatal rugae

Palatal rugae pattern in different skeletal relationship

The third most occuringoral conditions globally is dental malocclusions and genetic predisposition is the accepted etiology for this condition. High degree of acceptable prognosis with minimum orthodontic and surgical intervention can be achieved with early diagnosis and treatment planinng (Tikare *et al*., 2010) [5].

Various studies evaluated the differences in morphological structure of palatal rugae indifferent populations in comparision to various sagittal skeletal malocclusion. Alshahrani evaluated the Palatal Rugae Characteristics and its Relationship with Angles Class 1, 2 & 3 Malocclusions with the shape of palatal rugae, the study population was divided into four groups. Group I. Casts; Group II. 3Shape intra-oral direct scan images; Group III. 3-Shape cast scanner images and Group IV. SironainEos X5 cast scanner images and concluded his results that. 25.5% wavy simple rugae in class Iand 20.4% wavy+papillary as most predominant complex ruga are appreciated in a class I. Whereas, 40.7% are simple rugae is curved and complex rugae is least can be seen in class II. About 24% of simple rugae is straight, and curved+papillary 9.6% of curved papillary is the predominant complex ruga in class III. However, in class III there is a Combined or complex rugae pattern of 44 % whereas in class Iit is 37.7 % and 26.8 % in class II[5]. According to Gandikota made a Comparative study of palatal rugae pattern in class II div 1 and class I individuals, based on initial maxillary dental casts of individuals with untreated class II div 1 malocclusion and concluded the study with there was a significant constriction of the palatal rugae in class II div 1 individuals as compared to class I individuals, though they were matched for the same inter molar widths. There was a distinct pattern of palatal rugae between the two groups [6]. Moreover, in another study by Oral E on the palatal rugae pattern in different sagittal skeletal relationship in adolescents. The rugae were grouped into class I, II,II with a cephalometric

reading Class I: ANB angle 0° to 4°; Class II: ANB angle > 4°; Class III: ANB angle < 0 which helped to classify the study participants skeletaly[1] from the above mentioned study by Oral E it was concluded that inorder to confirm the relationship between the pattern of palatalrugae and sagittal skeletal malocclusionlarger number of subjects are require which would allow identification of potential suspects through skeletal malocclusions and palatal rugae [1].

Conclusion

From the above studies we can concluded that a relationship is exist between the palatal rugae pattern and malocclusion categories, It is too premature to make a comment on the use of palatal rugae to classify malocclusions. Though an interrelationship between size and pattern was not obtained, further studies in this direction can provide a valuable insight.

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