SERT DAMAK MORFOMETRİSİ VE SUTURA PALATİNA TRANSVERSA ŞEKİLLERİ

Morphometry of the Hard Palate and Shapes of Transverse Palatine Sutura

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ÖZET

Amaç: Sert damak morfometrisi ile elde edilen damak indeks değerleri damak cerrahisinde ve üst çene protezlerinde önemlidir. Bu çalışmanın amacı, sert damağın morfometrik değerlerini ölçmek ve damak indekslerini hesaplamaktır.

Gereç ve Yöntem: Çalışmamızda 50 adet erişkin kafa iskeleti kullanılmıştır. Damak yüksekliği, damak genişliği, damak uzunluğu, sutura palatina mediana ve sutura palatina transversa kumpas ile ölçüldü, damak indeksi ve damak yükseklik indeksi hesaplandı. Ayrıca sutura palatina transversa şekillerine göre sınıflandırıldı.

Bulgular: Bu çalışmada sutura palatina transversa daha çok düz, transvers, her iki tarafta da simetrik olup sutura palatina transversa tipleri ile karşılaştırıldığında tip A (%32) ve F (%16) olarak bulunmuştur. Damak indeksi değerleri ortalama 77.62 ±8.14 mm, damak yükseklik indeksi değerleri ise ortalama 23.11±8.68 mm hesaplandı. Damak indeksi değerlerine göre leptostaphyline (%60), damak yükseklik indeksi değerlerine göre chamestaphyline (%86) damak saptanmıştır. Sutura palatina transversa uzunluğu ile intraparietal uzunluk ve sutura palatina mediana ile kafa uzunluğu arasında bir ilişkisi olmadığı saptandı.

Sonuç: Damağın anatomisinin bilinmesi bu bölgeye yapılacak cerrahi müdahalelerde klinik yönden önem arz etmektedir. Elde etmiş olduğumuz sonuçların mevcut bilinenlere katkısının olacağı kanaatindeyiz.

Anahtar Sözcükler: *Sert damak; Palatal indeks; Sutura palatina transversa*

ABSTRACT

Objectives: Hard palatal index values, obtained from the measurements of the hard palate, are important for surgery and prosthetic dentistry. This research aims to measure morphometric values of the hard palate and to calculate palatal index using the morphometric values.

Material and Methods: In this research, we used 50 adult human dry skulls. We measured the length of the median and transverse palatal sutures, and also measured the height, width and length of the hard palate by a milimetric caliper. Palatal index and palatal height index were also calculated and the transverse palatine sutures were classified with respect to their shapes.

Results: Transverse suture was slightly smooth, transverse and had a similar shape on both sides. For the transverse suture, we commonly found that the rate of type A was 32 % and type F was 16%. The mean palatal index values and palatal height index values were calculated as 77.62±8.14 mm and 23.11±8.68 mm respectively. We classified the palatine sutures according to the palatal index values and palatal height index values. We determined leptostaphyline palate (60%) and chamestaphyline palate (86%) according to these values respectively. We found that there was no correlation between the tranverse suture and width of skull, in addition the same results were determined between the median palatine suture and the length of the skull

Conclusion: Knowledge of the anatomy of the palate is clinically important for surgical operations in this region. We think that our results may contribute to the existing knowledge.

Keywords: *Hard palate; Palatal index; Transverse palatine suture*

INTRODUCTION

The hard palate forms most of the roof of the oral cavity. Its anterior ¾ is formed by the maxilla, while the os palatinum forms the remaining posterior ¼. This bone, having an appearance similar to an L-shape with its horizontal and vertical segments, is located between the maxilla and the pterygoid process of the sphenoid. Anteriorly and laterally, the hard palate is limited by the alveolar process and the gums (1). Transverse palatine suture is located between the palatine processus of the maxilla and the horizontal plate of the palatine bone (2). The incisive fossa is located close to the anterior end of the hard palate, on the midline, and houses incisive foramen at its base. There is an osseous process (torus palatinus), sometimes visible, on the hard palate which extends longitudinally towards the oral cavity (3-5).

Anatomical studies focus on the morphometric measurements of the structures in the human body and the relations between them. Although there are many studies focusing on the hard palate worldwide, there is no comprehensive study which concentraties on people living in the Anatolia region. Determination of the anatomic values may contribute greatly to the other scientific disciplines, as well (6,7).

Hard palate morphometry results vary between and within populations. The structural changes in the hard palate and differences in palatine indices are also important in palatine surgery and maxillary prosthetics (6,8).

The aim of this study is to obtain the hard palate morphometric values and calculate the palatine indices.

MATERIALS AND METHODS

In this study, 50 adult skulls were employed. Palatal height, width, and length of the median palatine suture and transverse palatine suture were measured with a caliper.

According to Martin and Saller, the palatal index (width/length x 100) is calculated from the length and width measurements of the palate. The values obtained by the palatal index were grouped as narrow (leptostaphyline) (X-79.9), medium (mesostaphyline) (80 to 84.9) and large (brachiostaphyline) (85-X).

The palatal index (width/length x 100) and palatal height index (height/width x 100) are shown in Figures 1 and 2. The palates were categorized with regard to the types of transverse palatine suture. Moreover, a possible relation was investigated between the length of the transverse palatine suture and cranial width, and between the length of the median palatine suture and cranial length.

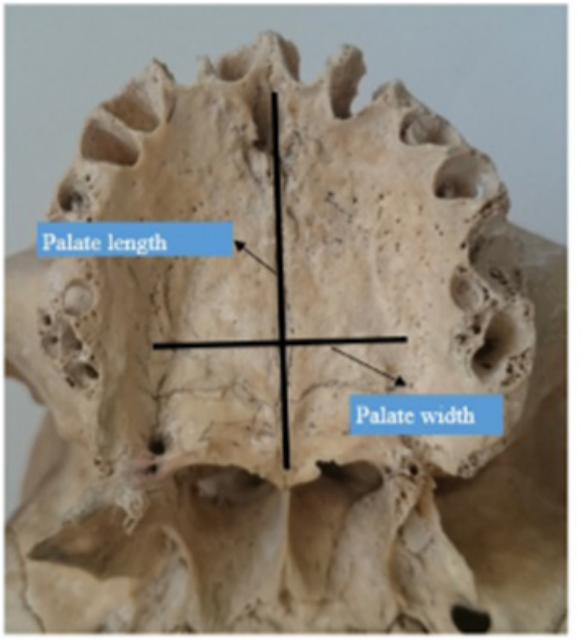

Fig. 1: Width, and length of palate

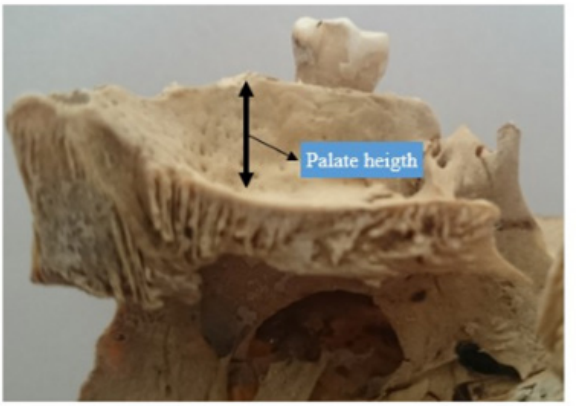

Fig. 2: Heigth of palate

MEASUREMENTS AND OBSERVATIONS

Palatal width: The distance between the alveolar inner borders of the upper second molars (6).

Palatal height: The distance of the midpoint of the line conjoining both endomolars to the maximum palatal arch (6).

Palatal length: The distance between the orale point and the staphylon point (3).

Staphylion point: The midpoint of the line uniting the most rostral points of the posterior borders of the hard palate.

Orale point: The midpoint of the line uniting the alveolar posterior borders of the upper first incisive teeth.
Median palatine suture: Extends across the midline between the incisive foramen and the posterior nasal spine.

Transverse palatine suture: Extends between the palatine process of the maxilla and the horizontal plate of the palatine bone (1,3).

The types of transverse palatine suture are shown in (Figure 3).

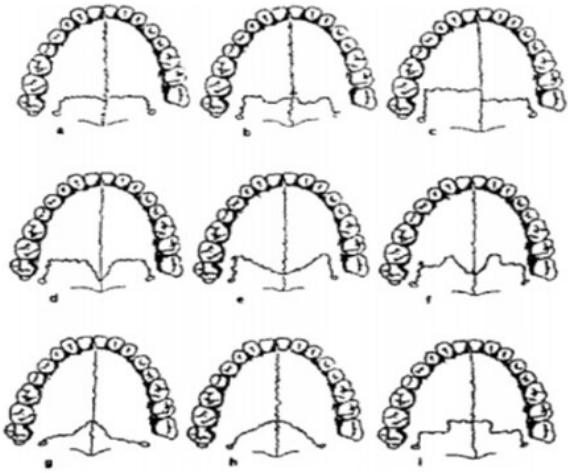

Fig. 3: Suture palatina transversa shapes (11).

RESULTS

The palatal measures obtained from the 50 adult skulls included in our study were evaluated relative to the types of the transverse and median palatine sutures (Table 1 and Table 2). The mean palatal index value was 77.62 ±8.14 and the mean palatal height index value was 23.11±8.68. The palatal index indicated 60% leptostaphyline palate rate, whereas the palatal height index indicated a 86% chamestaphyline palate rate. In this study, most of the cases (32%) exhibited a straight transverse palatine suture showing a transverse course with symmetry on both sides. The types of the transverse palatine suture and their frequencies are shown in Table 3. No correlation was found between the length of the transverse palatine suture and cranial width, or between the length of the median palatine suture and cranial length ($p<0.05$).

Table 1: Index of palatal width and length

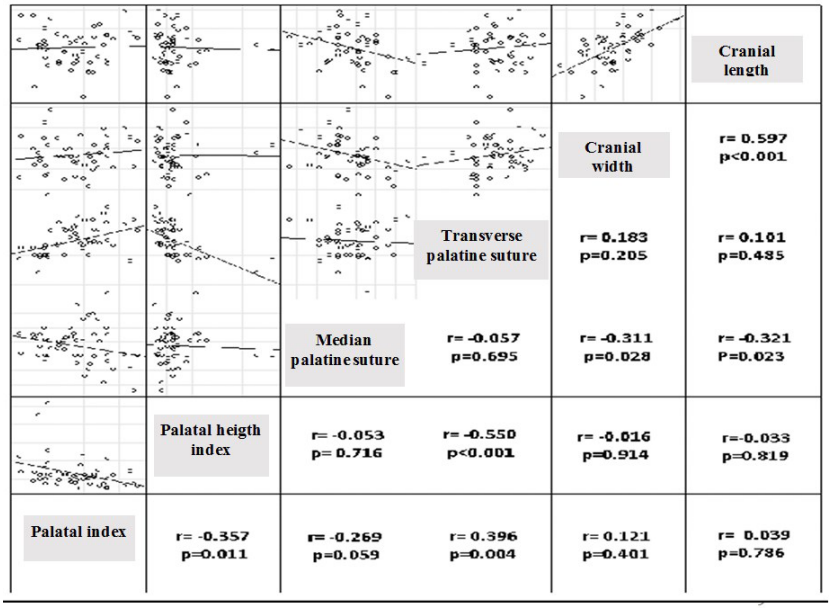

Table 2: Hard palate values an morphometric measurements

	N	Min	Max	Mean ±SD
Palatal width	50	2.72	3.91	3.33±0.28
palatal heigth	50	0.53	1.80	0.76±0.24
palatal length	50	3.63	5.00	4.31±1.28
Sutura palatina mediana (length) (cm)	50	3.12	4.32	3.74±1.27
Sutura palatina transversa (length) (cm)	50	2.36	3.82	3.24±0.96

Table 3: Suture palatina transversa according to shapes frequency and percentage

Sutura palatina transversa shapes	frequency	%
A	16	16
B	7	14
C	2	4
D	3	6
E	4	8
F	8	16
G	6	6
H	2	4
I	2	4

DISCUSSION

The hard palate is formed by the palatine process of the maxilla and the horizontal plate of the palatine bone. Hard palate is limited by the alveolar arch and posteriorly continues as the soft palate. Also the hard palate forms the floor of the nasal cavity (5). The presence of osseous bridges and spines in the palate poses difficulties in dental surgery, causing pain particularly in prosthetic applications because of its compression on the palatal mucosa (9). This bone is recommended to be removed in case spinal portions interfere with the prosthetic teeth or preclude mastication or speech (10). The morphometry of the hard palate has been studied by many researchers due to its importance in terms of dental surgery. In the 19th century, dental anatomists and anthropologists defined morphologic variations and expressed their opinions on differences between races and populations (6). Some authors explain the morphologic variations with types of feeding, vitamin distribution, and bone-inducing proteins, while others prefer to focus on genetic factors (11,12). It is not easy to measure the differences of dental archs between individuals and populations (7).

Cireli et al (13) reported palatal length as 42.8 mm and palatal width as 53.5 mm. Hassanali and Mwaniki (14) conducted a study on the skulls of Kenyan people and found that the mean palatal length and width were 49.2 mm and 40.2 mm, respectively. They determined leptostaphyline palate in 51 (43.2%), mesostaphyline palate in 28 (23.7%), and brachiostaphyline palate in 39 cases (33.1%). Ekinci et al (3) reported palatal length and width as 39.96 mm and 35.25 mm, respectively. Also, they determined 16 (26.6%) leptostaphyline, 10 (16.6%) mesostaphyline, and 34 (56.6%) brachiostaphyline palates; while reporting 6 (10.0%) chamestaphyline and 36 (60%) orthostaphyline palates. Hassanali (14) observed a straight (55.2%) and anteriorly inclined transverse palatine suture. Cireli et all (13) found a straight course in 67.3% of their cases. Gozil et all (15) determined a straight course in 48.2% of the cases. Woo studied Americans (16) and found the frequency of moderate palatal width (83.9%) higher in whites, whereas he observed only narrow palatal width (100%) in blacks. In the Anatolian populations, the frequency of wide palate (79.3) is higher than in others. This is the highest value among other studies performed on Anatolian people. In their study, Basaloglu and Gunbay (17) found the frequency of narrow palatal width as 41%. Cireli et al. examined 150 individuals and calculated an indice value based on their palatal measures, revealing mesostaphyline palate.

In the present study, the palatal height, width, and length, as well as the lengths and types of the palatine sutures were evaluated as shown in Figures I and II. The palatal index values are shown in Tables I and II. The mean palatal index value was 77.62 ±8.14 and the mean palatal height index value was 23.11±8.68. The leptostaphyline palate rate relative to palatal index was 60%, whereas the chamestaphyline palate rate relative to palatal height index was 86%. In the present study, many of the cases had straight transverse palatine suture showing a transverse course with symmetry on both sides. No correlation was found between transverse palatine suture and cranial width or between median palatine suture and cranial length ($p>0.05$). In conclusion, our results are consistent with those of others in the literature, revealing predominance of leptostaphyline relative to palatal index categorization and predominance of chamestaphyline palate relative to palatal height categorization.

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