

Anatomic Study of the Distance Between the Articular Eminence and Foramen Spinosum and Foramen Spinosum and Petrotympenic Fissure

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Purpose: The middle meningeal artery is in close proximity to the medial aspect of the temporomandibular joint (TMJ). A major potential complication of surgery in the area of the TMJ is possible severance of the middle meningeal artery. An understanding of the relationship of the middle meningeal artery to easily identifiable landmarks lateral to the TMJ can help prevent the complications associated with TMJ surgery. The aim of the present study was to define the location of the middle meningeal artery by relating the distance between the easily identifiable bony landmarks of the articular eminence, petrotympanic fissure, and foramen spinosum.

Materials and Methods: Using a cross-sectional study design, we selected dried skulls from the Hamman-Todd skeleton collection at the Cleveland Museum of Natural History that were older than 20 years of age at death. The primary study variables were the distances between the articular eminence and foramen spinosum and the foramen spinosum and petrotympanic fissure. To appropriately analyze the variables, stratifications of age, gender, race, and anatomic location were applied. To measure the relationship between the stratifications and distances, a multivariate analysis of variance test was performed. The statistical results were deemed significant at $P < .05$.

Results: The sample consisted of 354 skulls or a total of 708 complexes. In analyzing the data, we noted that the only stratifications that bore any statistical significance were gender, with $P < .0001$, and the race-distance correlation, with a P value of .0007.

Conclusions: The results of the present study suggest a definite difference in regard to gender on the distance between both sets of anatomic landmarks. Future studies could be tailored to further explore the effect of age on the distance, as a slight correlation was noted in our study.

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The middle meningeal artery is in close proximity to the medial aspect of the temporomandibular joint (TMJ). A major potential complication of surgery in

the area of the TMJ is possible severance of the middle meningeal artery.^{1,2} An understanding of the relationship of the middle meningeal artery to easily

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identifiable landmarks lateral to the TMJ could help prevent the complications associated with TMJ surgery. Previous studies have found landmarks such as the superior petrosal triangle, defined by the root of the zygoma, the foramen spinosum, and the head of the malleus, as viewed by the middle cranial fossa, to be unreliable when predicting the location of the foramen spinosum.³ Alternatively, they gathered insufficient data to relate the articular eminence to the middle meningeal artery.⁴ The purpose of the present study was to define the location of the middle meningeal artery by relating it to the distance between the easily identifiable landmarks of the articular eminence and petrotympanic fissure (Fig 1). We hypothesized that as the subject's age increases, a correlating change of the distance would occur correlates. Similarly, we hypothesized that the distance would also differ across the categorical variables of gender and race.

Materials and Methods

STUDY DESIGN AND SAMPLE

To address our research goal, a cross-sectional study was designed and implemented. A total of 354 skulls (708 joints) from the Hamman-Todd skeleton collec-

tion at the Cleveland Museum of Natural History were assessed. These skulls were organized numerically within the collection and were then labeled by age, race, and gender. All specimens were from the years of 1850 to 1950.

VARIABLES

The sample size of 354 skulls gave us a power of 99% to find an effect size of 0.78 using a P value of .05 in a 2-sided t test. The skulls were measured from the height of the articular eminence, defined as the most superolateral position of the inverted skull, the lateral aspect of the foramen spinosum, and the petrotympanic fissure, which was measured at the most lateral aspect of the glenoid fossa. To be included in the study, the skulls were required to fit a set of criteria. The skull had to be free of fractures in the posterior zygoma and temporal region to not confound the data and the mandible had to be present to determine the dentition status. Those specimens that lacked complete labeling were omitted. The skulls were also required to be devoid of any developmental abnormalities, and as such, certain skulls found to be scaphocephalic were omitted from the present study. Additionally, any skulls with obvious degenerative bone disorders of the



FIGURE 1. View of skull showing the easily identifiable landmarks of the articular eminence and petrotympanic fissure.

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