

ANATOMICAL VARIATION OF POSTERIOR AURICULAR ARTERY

VARIAÇÃO ANATÔMICA DA ARTÉRIA AURICULAR POSTERIOR

VARIACIÓN ANATÓMICA DE LA ARTERIA AURICULAR POSTERIOR



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ABSTRACT

The posterior auricular artery (PAA) usually arises from the posterior border of the external carotid artery (ECA), superior to the occipital artery. Although relatively small, the PAA plays a key role in supplying the scalp, auricular region, and parotid gland, and is frequently employed in pedicled flaps and reconstructive procedures. The present study aimed to describe an anatomical variation of the PAA, with detailed morphometric analysis. A dissection was performed on a 45-year-old male cadaver from the anatomical collection of the Universidade do Estado do Amazonas (UEA). The PAA arose atypically from the anterior border of the ECA, 23.98 mm from the bifurcation of the common carotid artery (CCA). The PAA measured 2.12 mm in diameter and 24.53 mm in length, shorter than the 47.59 mm reported in the literature. Its origin was located 47.77 mm from the external acoustic meatus in the vertical plane and 22.28 mm in the horizontal plane. The artery followed a posterosuperior course, dividing into auricular, mastoid, and transverse nuchal branches. According to the classification of Lee, Kim, and Phi, this case corresponds to class 1, since the artery terminates below the ear helix. In conclusion, this variation highlights the atypical anterior origin and reduced length of the PAA, reinforcing the importance of systematic anatomical studies given its surgical relevance in the cervical and auricular regions.

Keywords: Anatomy. Anatomical Variation. Neck. External Carotid Artery. Posterior Auricular Artery.

RESUMO

A artéria auricular posterior (AAP) geralmente surge da borda posterior da artéria carótida externa (ACE), superior à artéria occipital. Embora relativamente pequena, a AAP desempenha um papel fundamental no suprimento do couro cabeludo, da região auricular e da glândula parótida, sendo frequentemente empregada em retalhos pediculados e procedimentos reconstrutivos. O presente estudo teve como objetivo descrever uma variação anatômica da AAP, com análise morfométrica detalhada. Foi realizada uma dissecação em um cadáver masculino de 45 anos do acervo anatômico da Universidade do Estado do Amazonas (UEA). A AAP surgiu atipicamente da borda anterior da ACE, a 23,98 mm da bifurcação da artéria carótida comum (ACC). A AAP media 2,12 mm de diâmetro e 24,53 mm de comprimento, menor que os 47,59 mm relatados na literatura. Sua origem localizava-se a 47,77 mm do meato acústico externo no plano vertical e a 22,28 mm no plano horizontal. A artéria seguia um trajeto posterossuperior, dividindo-se em ramos

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auricular, mastoideo e transverso da nuca. Segundo a classificação de Lee, Kim e Phi, este caso corresponde à classe 1, uma vez que a artéria termina abaixo da hélice da orelha. Em conclusão, essa variação evidencia a origem anterior atípica e o comprimento reduzido do AAP, reforçando a importância de estudos anatômicos sistemáticos, dada sua relevância cirúrgica nas regiões cervical e auricular.

Palavras-chave: Anatomia. Variação Anatômica. Pescoço. Artéria Carótida Externa. Artéria Auricular Posterior.

RESUMEN

La arteria auricular posterior (AAP) generalmente surge del borde posterior de la arteria carótida externa (ACE), superior a la arteria occipital. Aunque relativamente pequeña, la AAP desempeña un papel clave en la irrigación del cuero cabelludo, la región auricular y la glándula parótida, y se emplea con frecuencia en colgajos pediculados y procedimientos reconstructivos. El presente estudio tuvo como objetivo describir una variación anatómica de la AAP, con un análisis morfométrico detallado. Se realizó una disección en un cadáver masculino de 45 años de la colección anatómica de la Universidade do Estado do Amazonas (UEA). La AAP surgió atípicamente del borde anterior de la AEC, a 23,98 mm de la bifurcación de la arteria carótida común (ACC). La AAP medía 2,12 mm de diámetro y 24,53 mm de longitud, más corta que los 47,59 mm reportados en la literatura. Su origen se localizó a 47,77 mm del conducto auditivo externo en el plano vertical y a 22,28 mm en el plano horizontal. La arteria seguía un trayecto posterosuperior, dividiéndose en las ramas auricular, mastoidea y transversa nugal. Según la clasificación de Lee, Kim y Phi, este caso corresponde a la clase 1, ya que la arteria termina por debajo del hélix auricular. En conclusión, esta variación resalta el origen anterior atípico y la longitud reducida del AAP, lo que refuerza la importancia de los estudios anatómicos sistemáticos dada su relevancia quirúrgica en las regiones cervical y auricular.

Palabras clave: Anatomía. Variación Anatómica. Cuello. Arteria Carótida Externa. Arteria Auricular Posterior.

1 INTRODUCTION

The posterior auricular artery is a smaller muscular artery that branches from the external carotid artery. This artery travels to the region posterior to the ear. The function of the posterior auricular artery is to perfuse the scalp and the ear. The minor function of the posterior auricular artery is to provide collateral blood flow via the anastomoses that form with the superior temporal artery, the parietal artery, and the anterior auricular artery. The anastomoses with the superior temporal artery provide collateral blood supply to the temporal region of the head. The connection between the posterior auricular artery and the anterior auricular artery provides complete perfusion of the auricular part (cartilage part of the ear) of the ear. The connection between the posterior auricular artery and the parietal artery provides additional blood to the parietal region of the skull.

The posterior auricular artery (PAA) is classically described as a branch of the external carotid artery (ECA), usually emerging from its posterior border just above the occipital artery. Despite its relatively small caliber, it significantly contributes to the vascularization of the scalp, auricle, and parotid region.

During embryology, the arteries in the face, neck, and chest form from the aortic arches. The aortic arches will form around the same time as the formation brachial apparatus. The third aortic arch will develop into the common carotid artery. The common carotid artery will ascend laterally along the face, neck, and head. At the level of cervical vertebra four, the common carotid artery will bifurcate into the external carotid artery and internal carotid artery. The external carotid artery is responsible for perfusing the face and head. One of the branches that come off the external carotid artery is the posterior auricular artery. The external carotid artery branches into the posterior auricular artery at the level of the angle of the mandible. The posterior artery will then ascend towards the region posterior to the ear.

Anatomical variations of the PAA have been documented in several studies and are of particular interest for reconstructive procedures in the head and neck region. Pedicled flaps based on the PAA, otologic surgeries, and parotid interventions may be directly influenced by its course, origin, and dimensions.

This case report describes an atypical anterior origin of the PAA with a comprehensive morphometric evaluation, comparing the findings with established anatomical standards.

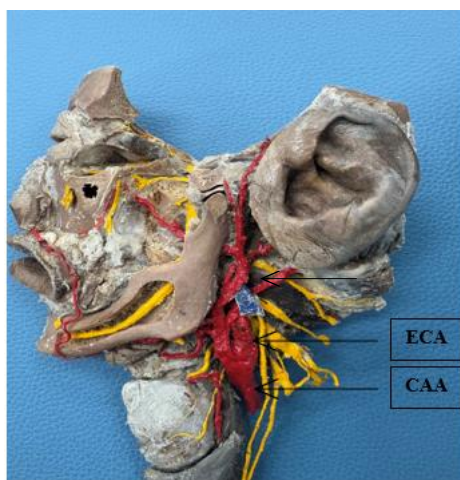
2 MATERIALS AND METHODS

The dissection was performed on a 45-year-old male cadaver, part of the anatomical collection of the Universidade do Estado do Amazonas (UEA). The carotid system was carefully exposed to identify the common carotid artery (CCA), internal carotid artery (ICA), ECA, and its branches. The specimen underwent plastination for long-term preservation, and the neurovascular structures were enhanced using synthetic enamel paint for better visualization. Morphometric data were obtained using a digital caliper (MTX®), including diameters of the CCA, ICA, ECA, and PAA, as well as distances from the PAA origin to the carotid bifurcation and external acoustic meatus. All ethical standards for research on human cadavers were respected.

The CCA measured 8.32 mm in diameter and bifurcated into the ICA (6.14 mm) and ECA (6.24 mm). The PAA originated atypically from the anterior border of the ECA, 23.98 mm from the carotid bifurcation. At its origin, the ECA measured 5.30 mm in diameter. The PAA measured 2.12 mm in diameter and 24.53 mm in length, markedly shorter than the 47.59 mm reported by Trzeciak et al. (2023). The artery originated 47.77 mm from the external acoustic meatus in the vertical plane and 22.28 mm in the horizontal plane. Its trajectory was posterosuperior, coursing posterior to the ECA and dividing into auricular, mastoid, and transverse nuchal branches. According to the classification proposed by Lee, Kim, and Phi (2021), this variation is categorized as class 1, since the artery terminates below the auricular helix.

Figure 1

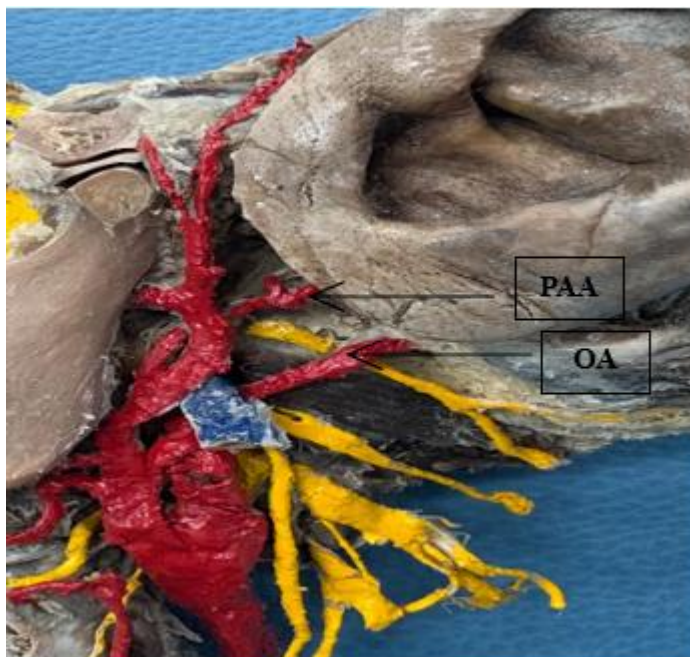
Left hemiface. External carotid artery and its branches.



Legend: CAA- Common carotid artery, ECA-External carotid artery
Source: Laboratory of Anatomy (2025).

Figure 2

Posterior Auricular Artery



Legend: PAA-Posterior Auricular Artery, OA-Occipital Artery.
Source: Laboratory of Anatomy (2025).

3 DISCUSSION

The posterior auricular artery will ascend towards the posterior side of the ear. The posterior auricular artery then perfuses the majority of the ear and the posterior region of the scalp. The posterior auricular artery will give off small auricular branches that perfuse the ear. Another branch that comes from the posterior auricular artery is the stylomastoid artery. The stylomastoid artery will perfuse the styloid process of the temporal bone, the mastoid process of the temporal bone, and the facial nerve. The facial nerve receives blood from the stylomastoid artery as it exits the stylomastoid foramen.

The posterior auricular artery forms anastomoses that will provide collateral blood flow to other regions on the face and head. Three main anastomoses form with the superior temporal artery, the parietal artery, and the anterior auricular artery.

Kolhe et al⁵ in 1987 reported a study with 39 dissections of the posterior auricular vessels, 26 in cadavers, and 13 in clinical cases; this was a first approach to this question. They carried out India ink injection in 5 cadavers and found that the PAA perfused a constant area of skin, which was represented by both nonhair-bearing and hair-bearing skin. The auriculomastoid skin and adjacent area of neck skin over the sternomastoid muscle, extending 2 to 3 cm behind and below the earlobe, were the nonhair-bearing area. Adjacent

to this area, a 2- to 3-cm strip of scalp extending toward the occipital and temporal area was also perfused by the PAA.

The PAA is known for its considerable anatomical variability regarding its origin, course, and branching pattern. Anterior origin from the ECA, as observed in this case, is a rare variation and seldom reported in the literature.

In another study of 8 cadaver specimens published by McKinnon et al⁶ in 1999, they performed ink and latex injections. This was the second study to approach the PAA angiosome; it described a territory in the retroauricular region dependent of the PAA measured from the upper portion of the tragus with average dimensions of 6.88 cm to the superior border, 5.31 cm to the posterior border, and 7.59 cm to the inferior border of the stained area. Additionally, they accomplished measurements from the tip of the mastoid process with average distances of 9.99 cm to the superior border, 6.68 cm to the posterior border, and 3.99 cm to the inferior border of the stained area.

From a clinical perspective, such variations may have significant implications for reconstructive surgeries that rely on pedicled PAA flaps, as well as for otologic and parotid procedures. The reduced length found in this specimen may limit surgical applications that require longer pedicle flaps, emphasizing the importance of preoperative anatomical knowledge.

The paucity of morphometric studies specifically addressing the PAA underscores the need for systematic investigations with larger samples, which may provide surgeons with more reliable anatomical parameters.

4 CONCLUSION

This study reports a rare anatomical variation of the posterior auricular artery, which originated from the anterior border of the external carotid artery and presented a reduced length compared with established standards. Detailed morphometric analysis reinforces the relevance of recognizing such variations for surgical planning and safety in head and neck procedures. Further anatomical studies are necessary to broaden the understanding of PAA morphology and its clinical implications.

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