Arterial Anatomy of the Ear

By

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Summary: The arterial anatomy of the ear was investigated using seven auricles of seven fresh cadavers that had been injected systemically with a lead oxide – gelatin mixture. The blood supplies of the upper portions of the helix, antihelix and scapha, triangular fossa, tragus and lobule were from the branches of the superficial temporal artery. The blood supplies of the chonca, the middle and lower portions of the helix and scapha, the lower part of the antihelix and most of the posterior auricular surface except the lobule were from the branches of the posterior auricular artery. The posterior auricular artery found to be the dominant blood supply for the ear.

The arterial supply of the ear is well known to be provided by the anterior auricular branches of the superficial temporal artery and the auricular branches of the posterior auricular artery. However, their pathways and communications have not been precisely delineated. We demonstrated the arterial anatomy of the ear in detail by an angiographic method.

Materials and Methods

Seven fresh cadavers were systemically injected with a lead oxide – gelatin mixture, and seven auricles were dissected with the surrounding skin. First, in order to observe the three-dimensional relationships among the arteries of the ear, the specimens were stereoscopically radiographed. Then, the surrounding skin was removed from the specimens, and the skin of the anterior surface with the perichondrium was removed in order to differentiate vessels on the anterior surface from those on the posterior surface and observe these communications. Each specimen was imaged utilizing a soft x-ray technique.

Results

In the stereograms, the courses of branches of the superficial temporal and posterior auricular arteries were observed three-dimensionally (Figs. 1, 2, 3 and 4). The superficial temporal and posterior auricular arteries located at similar depth, and the branches of the posterior auricular artery arose relatively perpendicularly. Communications of these branches and the arterial arcade at the helix were clearly visualized.

An intimate vascular network was formed in the auricle (Fig. 5). By dividing a specimen into two layers: the skin of the anterior surface with the perichondrium and cartilage with skin from the posterior surface, pathways and anastomoses of branches of the superficial temporal and posterior auricular arteries were clearly recognized (Figs. 6 and 7).

The superficial temporal artery gave off two large branches to the helix and lobule and small branches to the tragus. One of the large branches arose near the helical spine and ascended giving off branches to the helical crus. It ran along the helix and anastomosed with a branch of the posterior auricular artery. A marginal artery was thus formed. The other arose at the lower margin of the lamina tragi and ran, giving off branches to the lobule, along the inferior margin of the antitragus. This communicated with branches of the posterior auricular artery through the antitragohelicina fissure.

The posterior auricular artery ascended, giving off branches, between the auricular cartilage and the mastoid process. The branches were categorized into two groups. Branches running toward the helix on the posterior auricular surface supplied blood to the majority of the posterior surface and formed the marginal artery along the helix. Branches piercing the cartilage on the groove between the auricular cartilage and the mastoid process supplied blood to the antitragus, chonca and...
Explaination of Figures
Plate I

Fig. 1. An angiogram of the left ear. The cranial or auricular aspect can be obtained by viewing this fig. and fig. 2 stereoscopically. The superficial temporal artery (STA). The posterior auricular artery (PAA).
Plate II

Fig. 2. An angiogram of the left ear. Figs. 1 and 2 are a stereogram.
Fig. 3. The same angiogram of fig. 2. The other side can be visualized by viewing this fig. and fig. 4 stereoscopically.
Plate IV

Fig. 4. The same angiogram of fig. 1.
antihelix. Relatively large anastomoses between the superficial temporal artery and the posterior auricular artery were observed at the antitragohelicina fissure and the helix near the tuberculum auriculae. In one of seven auricles, the branch of the superficial temporal artery near the spina helicis was small and the posterior auricular artery reached the top of the helix compensatorily.

A schema of the artery of the ear is shown in Fig. 8.

Discussion

It is well known that the blood supply of the ear is provided by the superficial temporal and posterior auricular arteries.1–10,12,13) Gray13) describes the auricular branches of the posterior auricular artery as ascending deeply to reach the auricularis posterior, then ramifying on the cranial aspect of the auricle; some branches pierce this area, others curve a round it to supply its lateral aspect, and the anterior auricular branches of the superficial temporal artery are distributed to the lobule and anterior part of the auricle and the external acoustic meatus, while branches of the posterior auricular artery piercing the cartilage and branches to the lobule are illustrated in Pernkopf’s Anatomy.5) In certain, angiographic investigations have been performed4,12), but there have been no angiographic studies demonstrating the pathways and communications of these branches in detail. In the present study, branches to each region of the ear were clearly demonstrated and a marginal artery along the helix with a relatively large diameter was recognized. The nutrient territory of the superficial temporal artery was the upper part of the ear and lobule (Fig. 9). The posterior auricular artery supplies most regions of the posterior surface of the ear, the exceptions being the lobe and the middle third of the anterior surface. The posterior auricular artery represents the dominant for blood supply of the ear.

References

Plate V

Fig. 5. Angiogram of the left ear. A highly complex vascular network is apparent. Helix (1), scapha (2), concha (3), antihelix (4), tragus (5), lobule (6), antitragohelicina fissure (7) and triangular fossa (8).
Plate VI

Fig. 6. Angiogram of the skin of the anterior surface with the perichondrium. Branches of the superficial temporal artery to the helix (1) and the lobule (2). Branches of the posterior auricular artery running on the anterior surface after piercing the chonca (3), auricular tuberculum (4) and antitragohelicina fissure (5).
Plate VII

Fig. 7. Angiogram of the cartilage with the skin of the posterior surface. Branches of the superficial temporal artery to the helix (1). The posterior auricular artery running on the posterior surface of the ear (2) can be seen to give off several branches. A marginal artery along the helix (small arrows).
Fig. 8. A schema of the arteries of the ear. Note branches of the posterior auricular artery piercing the cartilage (arrows) and a marginal artery along the helix (small arrows). The superficial temporal artery (STA). The posterior auricular artery (PAA).
Plate IX

Fig. 9. The skin territory supplied by the superficial temporal artery (dotted area) and the posterior auricular artery (white area).