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The Relationships Between The Superior Cerebellar Artery and Trochlear Nerve

Cerebellar Arter ve Trochlear Sinir Arasındaki İlişki

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Trochlear nerve palsy has been based on head trauma, various inflammatory and infectious disorders, vascular diseases and neoplasms. In many cases cause of the nerve palsy unclear. We examined in relationship of the superior cerebellar artery (SCA) with the trochlear nerve in 35 cadaveric brains. The trochlear nerves were in contact with main trunk of the SCAs or its branches in all hemispheres. The anatomic relationships between the SCA and the trochlear nerve were observed in this study.

Key Words : ***Trochlear nerve, Superior cerebellar artery, Paresis, Neuroanatomy***

Trochlear sinir felci kafa travmaları, çeşitli enfeksiyonlar, damarsal nedenler veya neoplazilere bağlı olarak gelişebilir. Pekçok vakada sinir felcinin nedeni açıkça ortaya konamamıştır. Biz bu çalışmada 35 kadavra beyni üzerinde superior cerebellar arter (SCA) ile trochlear sinir arasındaki ilişkiyi araştırdık. Trochlear sinir incelediğimiz bütün hemisferlerde SCA veya ana dalları ile temas halindeydi. Bu çalışmada SCA ile trochlear sinir arasındaki anatomik ilişki araştırılmıştır.

Anahtar Sözcükler: ***Trochlear sinir, Superior cerebellar arter, Parezi, Nöroanatomi***

Trochlear nerve palsy has been based on several disorders. In many cases cause of the nerve palsy unclear. Vascular disorders as a cause of trochlear nerve paresis are rare. SCA and trochlear nerve have a close relationship in cerebellomesencephalic fissure. This relationship can be cause of some neurological disorders about the trochlear nerve. We tried to enlighten anatomic relationships between the SCA and the trochlear nerve in this study.

Materials and methods

A total of 70 hemispheres from 35 adult human brains which were obtained routine autopsies investigated. The basilar arteries were cannulated and injected with colored latex. Brains were embalmed 10% formalin solution after injection. The dissections were performed using a surgical microscope (Opmi 99; Carl Zeiss, Gottingen, Germany). The length between the beginning part of the SCA and the point where they contact the trochlear nerve was measured. All measurements were performed with a digital caliper.

Results

The trochlear nerve arose from base of the inferior colliculus of the brainstem in all hemispheres and it continued laterally, encirclesv the brainstem near the pontomesencephalic junction. Also, the SCA originated from the basilar artery as a single trunk in 58 hemispheres (82,8%) and double (duplicated) trunk remain 12 hemispheres (17,2%). All of the SCAs that arise as a single trunk bifurcate into two major trunks, rostral and caudal trunks. The trochlear nerves were in contact with main trunk of the SCAs or its branches in all hemispheres. The contact or close relationship between the nerve and the main trunk of the SCA was absent in 12 hemispheres (17,2%) which have duplicated SCA and in 5 hemispheres (7,1%) which with have early bifurcations. In cases with early bifurcations, the main trunk bifurcated clo-

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se to the basilar artery, at the anterior pontomesencephalic surface.

The trochlear nerve coursed the upper surface of the SCA or its main branches almost all cases except 4 hemispheres (5,7%) at the lateral side of the brainstem. In these 4 hemispheres, trochlear nerve passed between the rostral and caudal trunks of the SCA. One of these hemispheres, trochlear nerve passed between the main branches of the rostral trunk of the SCA and contacted both of them (Figure 1). We think that this kind of relationships of the trochlear nerve and SCA can be caused of the trochlear nerve compression syndromes with or without any vascular pathology like aneurysms or arteriosclerosis.

The trochlear nerve has a contact point with the SCA or its rostral or caudal trunks in all hemispheres. The distance between from the origin of the SCA to contact point was found 26,2±4,2 mm (range, 14,2- 36,7 mm).

Discussion

Vascular disorders like aneurysms as a cause of trochlear nerve paresis are very rare. Aneurysms of the posterior cerebral, basilar, posterior communicating arteries and intracavernous part of the internal carotid arteries have been presented to cause trochlear nerve disorders by some researchers.(1,2) In addition aneurysms of the SCAs have been documented too but lesser than the others.(3,4)

SCA aneurysms more rare appear than the other cerebellar arteries. Aneurysms located distal parts of the SCA are unusual, particularly.(5) Their presentation and clinical management are not well understood. Actually an occlusion of a cerebellar artery may result with an ischemic area but because of the collateral flow no ischemia will occur, usually. Distal part aneurysms of the SCA can present with isolated trochlear nevre palsy.(4)

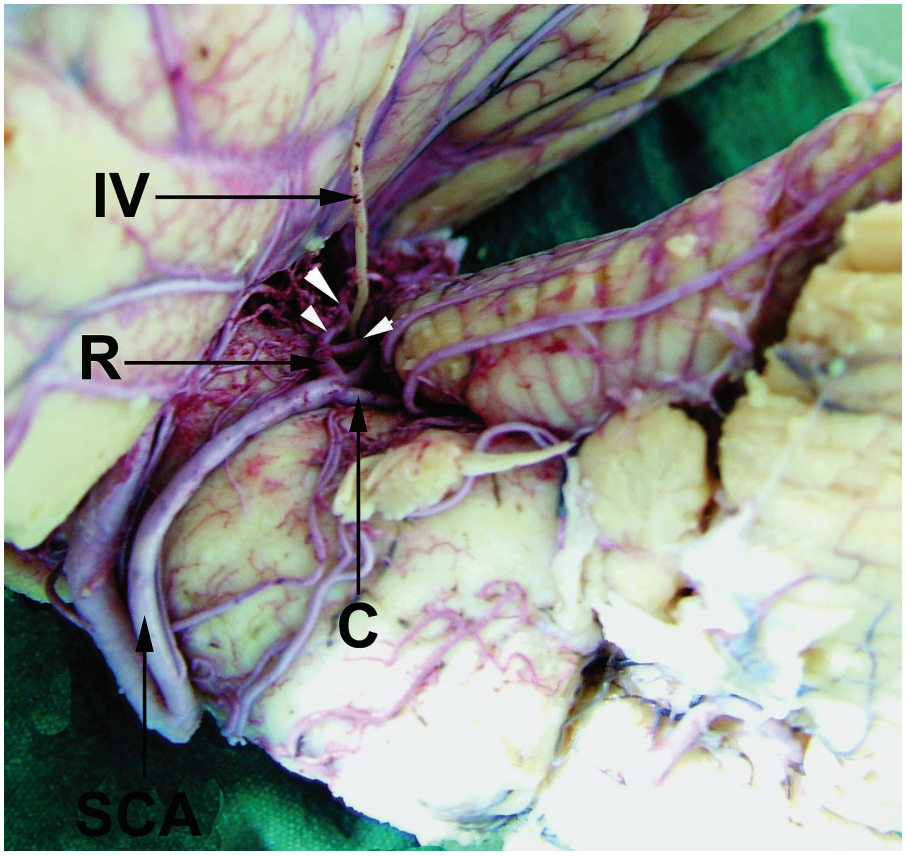

Figure 1: Left cerebellar hemisphere. Prospect from the front. SCA: superior cerebellar artery, C: caudal trunk of the superior cerebellar artery, R: rostral trunk of the superior cerebellar artery, IV: trochlear nerve, white arrowheads: branches of the rostral trunk of the SCA which trochlear nerve passed between them.

Marinković et al. mentioned that the trochlear nerve was surrounded by the trunks and branches of the SCA. This close relationship may compress, stretch, or displace the nevre.(6) Trochlear nerve compression sendroms can be the cause of trochlear nerve palsy which represents with superior oblique myokymia. This situation usually resulted from vascular compression of the trochlear nerve.(7-9)

The SCA originated from basilar artery as a single trunk and bifurcates into main branches, rostral and caudal trunks, mostly. Its proximal part courses below the oculomotor nerve and encircles the brainstem, passing between trochlear and trigeminal nerves. Most of superior cerebellar artery aneurysms presented with subarachnoid and intraventricular hemorrhage.(10) In addition some clinical symptoms, like trigeminal neuralgia or trochlear nerve palsy, may be explained by the relationship of superior cerebellar arteries with the cranial nerves.

When we look at the distance between from the origin of the SCA to contact point with trochlear nerve our results were similar to Hardy et al.(11) We think that this distance can be helpful during diagnosis with angiography and surgery.

Conclusion

We tried to explain that in this study relationship of SCA with trochlear nerve for explain compression syndroms. The SCA and the trochlear nerve have a close relationship in the cerebellomesencephalic fissure. Compression syndroms of this nerve can be develops because of the SCA pathologies.

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