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Case Report

Anomalous origin of the posterior inferior cerebellar artery from the jugular branch of the ascending pharyngeal artery: A case report ☆,☆☆,★

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ABSTRACT

The posterior inferior cerebellar artery usually arises from the vertebral artery and has several variants. The posterior inferior cerebellar artery originating from the jugular branch of ascending pharyngeal artery has rarely been reported. A 63-year-old woman underwent cerebral magnetic resonance imaging and magnetic resonance angiography; the latter incidentally revealed an anomalous origin of the posterior inferior cerebellar artery. We report and discuss the neuroimaging findings in a patient with this anomaly. Determining the origin of the posterior inferior cerebellar artery is an important factor in planning surgical and endovascular treatment strategies for skull base disorders.

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Introduction

The posterior inferior cerebellar artery (PICA) usually arises from the vertebral artery (VA) between the foramen magnum and the vertebrobasilar junction. There are many PICA variants, including persistent trigeminal artery, duplicate origin, fenestration, and anterior inferior cerebellar artery (AICA)-PICA variant. An extradural origin of the PICA from the VA has been reported in 5%–18%, usually at the C1 and C2 levels, and there have also been reports of the PICA arising from numerous other vessels [1–4]. However, the PICA originating from the ascending pharyngeal artery (APA) has been very rarely reported. This report presents a patient with a hyperplastic APA variant that traversed the jugular foramen and directly anastomosed with the PICA, which was diagnosed using magnetic resonance imaging (MRI), magnetic resonance angiography (MRA), computed tomography angiography (CTA), and digital subtraction angiography (DSA). Recognition of anomalous pial arteries arising from the APA is important when treating skull base disorders. Written informed consent was obtained from the patient for publication of this case report.

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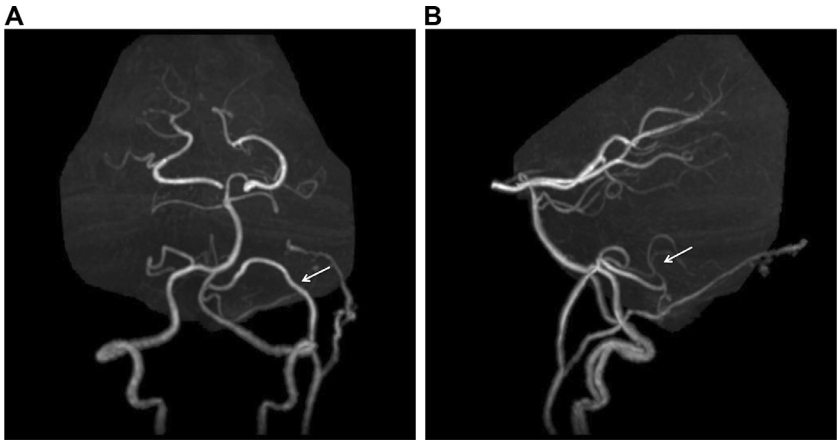

Fig. 1 – Anteroposterior (A) and lateral (B) views of MR angiography show that the left APA is hyperplastic and continues to the left PICA (white arrow).

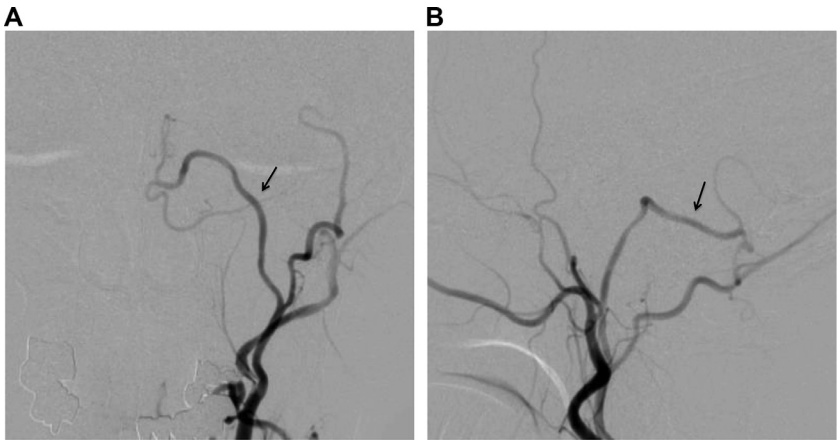

Fig. 2 – Left external carotid digital subtraction angiography shows the anteroposterior (A) and lateral (B) views. There is an unusual anastomosis of the left PICA and the APA (black arrow).

Case report

A 63-year-old woman underwent cerebral MRI and MRA to evaluate right hemifacial spasm; the right PICA was visualized compressing the facial nerve root exit zone. Surgical neurovascular decompression was performed and her symptoms resolved.

Careful examination of the MRI and MRA incidentally revealed an anomalous origin of the left PICA. MRA and DSA showed that the left APA was hyperplastic and continued to the left PICA (Figs. 1A and B; Figs. 2A and B). CTA demonstrated that this artery passed through the medial side of the jugular foramen (pars vascularis) rather than the hypoglossal canal (Figs. 3A–E). Selective DSA revealed that the left PICA arose from the APA passing through the jugular foramen (Fig. 4).

Discussion

Neurointerventionalists generally do not appreciate the importance of the APA, which is a small vessel that divides into pharyngeal and neuromeningeal branches [5] and is known to supply multiple cranial nerves and anastomose with the cerebral and cerebellar circulation, including the PICA. The PICA occurs with many variations. Its territory may be supplied by the AICA, the contralateral PICA, or the superior cerebellar artery. In addition, there are several variations in its origin. Although the PICA usually originates from the distal intracranial segment of the VA, it may arise from the persistent primitive hypoglossal artery [6], proatlantal artery, posterior meningeal artery [2], middle meningeal artery [1], and the intracranial segment of the internal carotid artery [3,4]. Lasjaunias et al. [7] reported the first case of a PICA arising from the APA and

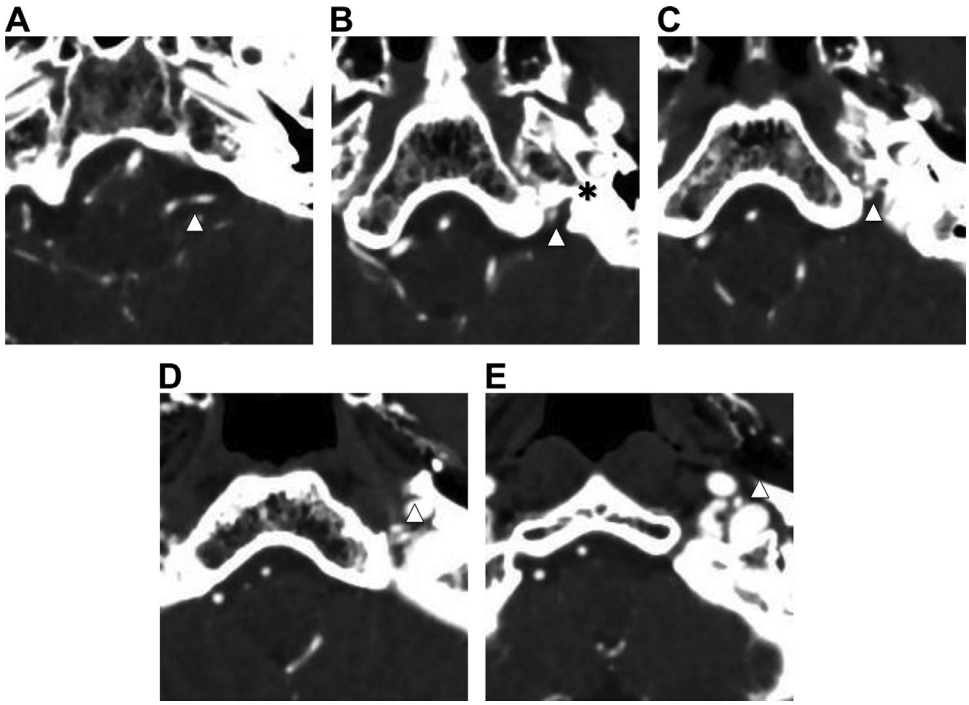

Fig. 3 – (A–E) CT angiography at the level of the jugular foramen (black asterisk) shows the anastomotic artery between the APA and PICA (white arrowhead) passing through the left jugular foramen pars vascularis.

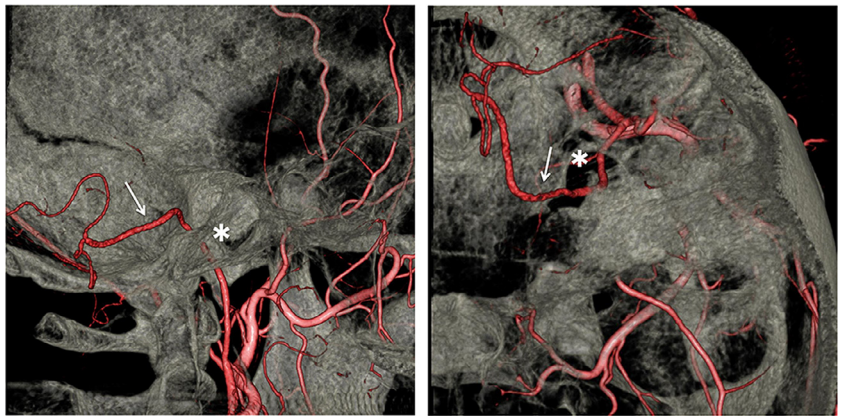

Fig. 4 – Digital subtraction selective angiography of the left external carotid artery. The left PICA (white arrow) is perfused by the left APA passing through the jugular foramen (white asterix).

suggested that this anomaly might represent a cerebellar variant of the persistent primitive hypoglossal artery (PHA). However, they could not ascertain the canal or foramen that this anomalous artery traversed. Kim et al. [6] reported a case of the PHA arising from the external carotid artery and connecting directly with the PICA. Although abnormalities in which the PICA originates from the hypoglossal branch of the APA are considered variants of the PHA [6], our patient had anastomosis between the APA and the PICA via the jugular foramen. This has been previously described in only one prior report [8]. Uchino and Suzuki considered that this variant was formed because of the anastomosis between the posterior meningeal artery (PMA) and the PICA [8]. The PMA usually arises from the VA but occasionally from the hypoglossal or jugular branches of the APA [2]. Tsutsumi et al. [9] reported a case of acquired anastomosis between the PMA and PICA that suggests the possibility of such an anastomosis. Although the developmental factors related to PHA variants seem to be a major contributor to the anastomosis between the hypoglossal branch of the APA and PICA, there are few such factors for the anastomosis between the jugular branch of the APA and PICA. However, the jugular branch of the APA, PMA, and PICA are thought to be closely related and may anastomose.

The case reported here is extremely rare. We consider that the unusual artery observed in this patient is an uncommon variant of the jugular branches of the APA that connect with

the PICA without vertebrobasilar anomalies or developmental background.

Conclusion

We present a case of anastomosis between the jugular branch of the APA and PICA diagnosed by MRA, CTA, and DSA. Recognition of unusual anastomoses between the extracranial and pial arteries is important to avoid ischemic brain complications during head and neck surgery and endovascular treatment of skull base disorders.

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REFERENCES

[1] Kuruvilla A, Aguwa AN, Lee AW, Xavier AR. Anomalous origin of the middle meningeal artery from the posterior inferior cerebellar artery. J Neuroimaging 2011;21:269–72.
[2] Ogawa T, Fujita H, Inugami A, Shishido F, Higano S, Uemura K. Anomalous origin of the posterior inferior cerebellar artery from the posterior meningeal artery. AJNR Am J Neuroradiol 1991;12:186.
[3] Ahuja A, Graves VB, Crosby DL, Strother CM. Anomalous origin of the posterior inferior cerebellar artery from the internal carotid artery. AJNR Am J Neuroradiol 1992;13:1625–6.
[4] Hui MS, Choi WM, Liu HM, Huang KM, Perng HL, Chen LK. Anomalous origin of the posterior inferior cerebellar artery from the pre-cavernous portion of the internal carotid artery—a primitive trigeminal artery variant. Eur J Radiol 1994;19:10–13.
[5] Hacein-Bey L, Daniels DL, Ulmer JL, Mark LP, Smith MM, Strottmann JM, et al. The ascending pharyngeal artery: branches, anastomoses, and clinical significance. AJNR Am J Neuroradiol 2002;23:1246–56.
[6] Kim JT, Heo SH, Lee SH, Choi SM, Park MS, Kim BC, et al. An uncommon anastomosis of the posterior inferior cerebellar artery and the external carotid artery with the patent vertebro-basilar system. Br J Radiol 2009;82:e171–4.
[7] Lasjaunias P, Guibert-Tranier F, Braun JP. The pharyngo-cerebellar artery or ascending pharyngeal artery origin of the posterior inferior cerebellar artery. J Neuroradiol 1981;8:317–25.
[8] Uchino A, Suzuki C. Posterior inferior cerebellar artery supplied by the jugular branch of the ascending pharyngeal artery diagnosed by MR angiography: report of two cases. Cerebellum 2011;10:204–7.
[9] Tsutsumi M, Kanazawa K, Aikawa H, Iko M, Kodama T, Nii K, et al. Developmental of unusual collateral channel from the posterior meningeal artery after endovascular proximal occlusion of the posterior inferior cerebellar artery. Case report. Neurol Med Chir Tokyo 2007;47:503–5.