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# A rare cause of hyperprolactinemia: persistent trigeminal artery with stalk-section effect

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**Abstract** The primitive trigeminal, otic, hypoglossal, and proatlantal intersegmental arteries are fetal anastomoses between the carotid and vertebrobasilar systems. Persistent trigeminal artery (PTA) is the most frequent embryonic communication between the vertebrobasilar and carotid systems in adults. We report a case of PTA compressing the left side of the pituitary gland and stalk, in a patient with elevated blood prolactin level.

**Key words** Persistent trigeminal artery · MRI · Angiography · Hyperprolactinemia

## Case report

A 27-year-old female patient who presented with headache and galactorrhea was found to have hyperprolactinemia (blood prolactin level: 80 ng/ml; normal: < 20 ng/ml). On MRI of the pituitary gland, a vascular structure arising from the posteromedial part of the cavernous segment of the left internal carotid artery compressing the left side of the pituitary gland and stalk was noted. The vascular structure extended to communicate with the basilar artery (Fig. 1). No micro- or macroadenoma could be detected in the pituitary gland. Magnetic resonance angiography and digital subtraction angiography (DSA) were performed with a pre-diagnosis PTA (Figs. 2, 3a). With these examinations, the PTA arising from the C4 part of the cavernous segment of the left internal carotid artery which coursed posteromedially and communicated with the basilar artery just proximal to the superior cerebellar artery was demonstrated. The proximal part of the basilar artery was hypoplastic (Fig. 3b).

Since the pituitary gland was interpreted as normal for adenoma on dynamic MRI, we assumed that the reason for the hyperprolactinemia was related to the compression of the infundibulum by the PTA.

## Discussion

Four different persistent embryonic communicating arteries are described between the carotid and vertebrobasilar systems: hypoglossal; otic; proatlantal; and trigeminal arteries. Trigeminal arteries comprise 85 % of the carotid and basilar anastomoses [1, 2]. They are observed in 0.1–0.2 % of cerebral angiograms [3, 4]. The incidence may rise to approximately 1 % when correcting for unreported and undiagnosed cases. The first PTA was reported in the autopsy series by Quain [4], and Sutton [5] published the first angiography of such a case. Saltzman reported eight cases in 1959 and classified PTA into three types [6]. In our case, vertebrobasilar system distal to the anastomosis was supplied by the PTA and posterior communicating arteries were incompletely filled which suited the description of Saltzman type 1, a variation.

There are different ways to classify the intracranial course of the PTA, the latest and most widely accepted

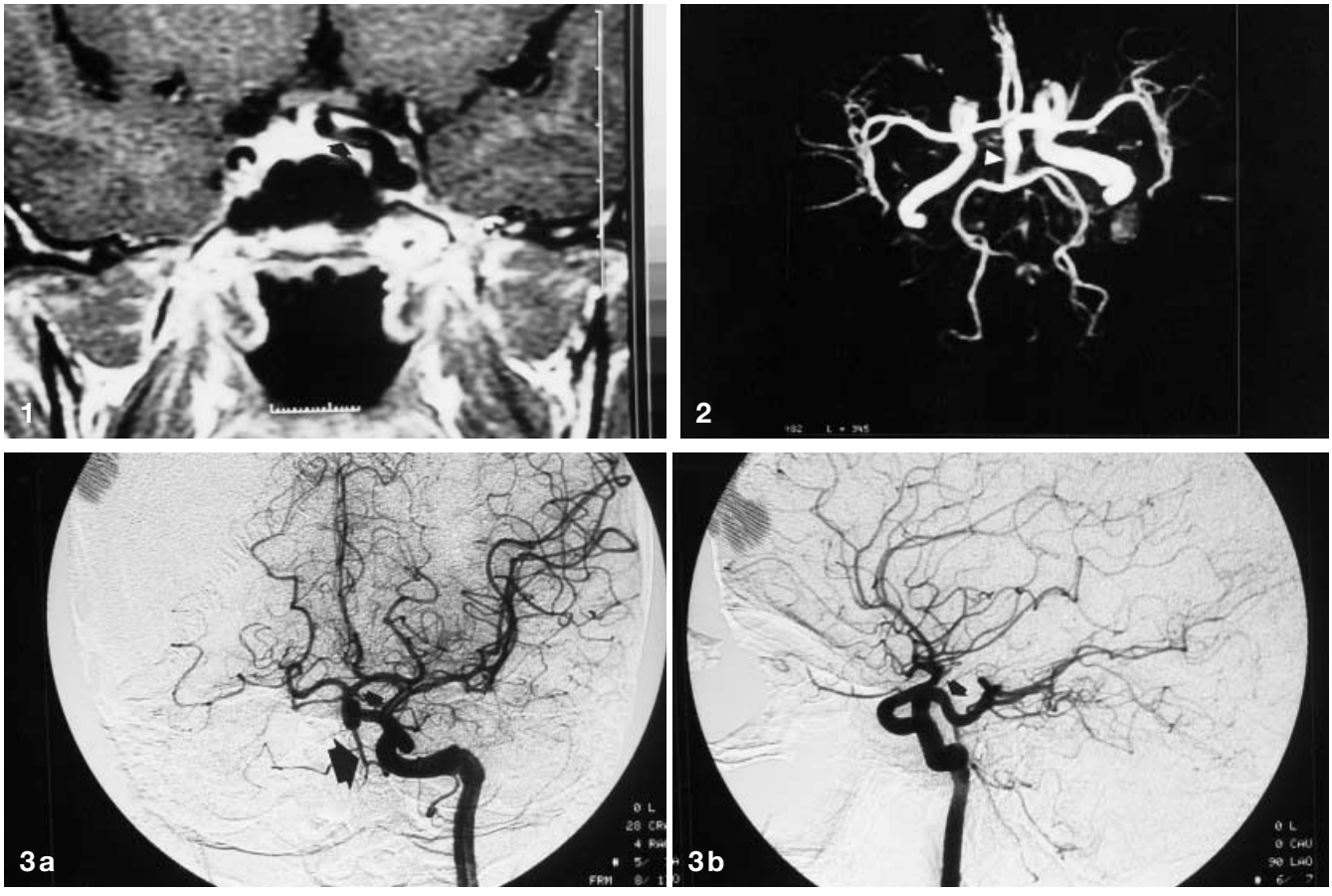


**Fig. 1** T1-weighted MR image in the coronal plane. Signal-void tubular structure arising from the cavernous segment of the left internal carotid artery compressing the left side of the pituitary gland and stalk *(arrow)*. Left internal carotid artery is hyperplastic

**Fig. 2** Three-dimensional time-of-flight magnetic resonance angiography in the cranio-caudal-view plane. Vascular structure arising from the cavernous segment of the internal carotid artery and extending to the basilar artery is consistent with the persistent trigeminal artery (*PTA*; *arrowhead*)

**Fig. 3** **a** Anteroposterior view and **b** lateral view of the left internal carotid artery digital subtraction angiography examination demonstrates the PTA *(small arrow)*. Basilar artery proximal to the PTA connection is hypoplastic *(large arrow)*

belonging to Salas et al. [7]. The relationship of PTA with the abducens nerve helps to distinguish between the lateral (petrosal) and medial (sphenoidal) variations. Our case is a medial variation with the PTA arising from the posteromedial C4 part of the cavernous segment of the left internal carotid artery with a course medial to the abducens nerve.

Most of the carotid-vertebrobasilar anastomoses are incidental findings, but there have been reports of PTA with several clinical manifestations. In cases with severe internal carotid artery (ICA) occlusion, vascular steal phenomena can occur between the basilar and carotid systems through the PTA [7, 8]. Aneurysms have been reported most commonly at the origin of the PTA and at the connection with the basilar artery [9, 10]. Isolated sixth cranial nerve palsies can occur if the aneurysm happens to be at the carotid connection due to the compression caused by the aneurysm [11]. The petrosal variant has been reported with clinical symptoms of trigeminal neuralgia and diplopia [12, 13]. In our case the trigeminal artery compressed the left side of the pituitary gland and stalk. This is a unique feature since, to our knowledge, there are two PTA cases reported in the literature with an intrasellar course [14, 15], but no relationship with the pituitary stalk was reported. Our case had no findings of an adenoma of the pituitary gland, and the elevated blood prolactin levels are thought to be a result of the compression caused by the PTA. The hyperprolactinemia due to compression is believed to result from a loss of dopaminergic inhibition on pituitary lactotrophs and is described as the "stalk-section effect" [16].

There are several causes of hyperprolactinemia, and the findings in our case suggest that hyperprolactinemia can also be caused by a persistent trigeminal artery with an intrasellar course.

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