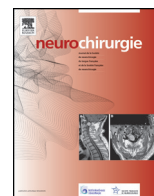




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Clinical case

Bilateral ophthalmic origin of the middle meningeal artery



Origine ophtalmique bilatérale de l'artère méningée moyenne

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ABSTRACT

The origin of the middle meningeal artery (MMA) may vary although it can arise from the ophthalmic artery (OA) with a 0.5% prevalence. We report the exceptional bilateral asymmetric origin from the OAs that has not previously been reported in the literature. Surgeons should be aware of this variation as it could be crucial in the setting of an endovascular approach for meningeal lesions, as in our observation. A 50-year-old male underwent a preoperative cerebral digital subtracted angiography that incidentally revealed MMAs arising from the OA on both sides. In fact, the origin was asymmetric because it was complete on the right side with the anterior and posterior branches of the MMA arising from the OA, whereas it was partial on the left side, with only the anterior branch arising from the OA. The CT scan showed the absence of the foramen spinosum only on the right side. This paper discusses the unique anatomic variation in the light of MMA embryology and its different origins. Knowledge of this variation may have a practical impact in cases of cerebral embolization.

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R É S U M É

L'origine de l'artère méningée moyenne (AMM) peut varier. Elle peut naître de l'artère ophtalmique (AO) dans 0,5% des cas. Nous rapportons ici l'origine bilatérale et asymétrique des artères ophtalmiques qui est exceptionnelle et encore jamais décrite dans la littérature. Cette variation devrait être connue pour pratiquer des approches endovasculaires des lésions méningées, comme nous allons le voir dans cette observation. Une angiographie cérébrale préopératoire a été réalisée chez un homme de 50 ans qui a révélé de manière fortuite une origine ophtalmique des deux artères méningées moyennes. Plus précisément cette origine était asymétrique car elle était complète à droite avec les branches antérieures et postérieures de l'AMM naissant de l'AO alors qu'elle était incomplète à gauche avec seulement une branche antérieure naissant de l'AO. Le scanner cérébral montrait l'absence de foramen spinosum seulement à droite. Cet article discute cette variation anatomique, unique jusqu'alors, en éclaircissant les points embryologiques qui expliquent les différentes origines de l'AMM. La connaissance de cette variation a une implication pratique directe en cas d'embolisation cérébrale.

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1. Introduction

The middle meningeal artery (MMA) normally arises from the external carotid system, more precisely from the maxillary artery. However, it can present anatomic variations. Its origin can depend, in rare cases, on the internal carotid system namely the ophthalmic artery (OA). Moreover, an embryologic study of the area explains

this type of variation, due to the close developmental relationship between both arteries.

A recent review of the literature has focused on the different origins of the MMA [1] and shows a 0.5% prevalence of an ophthalmic origin [1–3].

Our article presents the vascular embryology of the MMA and describes the MMA's unique origins from the OAs on both sides.

2. Observation

A 50-year-old male underwent a preoperative arteriography, which suggested the possible embolization of an occipital

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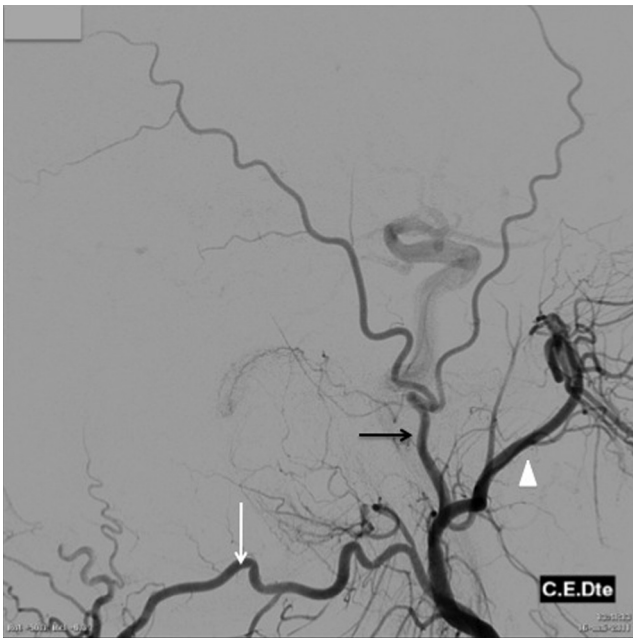


Fig. 1. Right external carotid opacification (lateral view). Occipital artery (white arrow), maxillary artery (arrowhead), superficial temporal artery (black arrow). Note the absence of both anterior and posterior branches of the middle meningeal artery (MMA).

Opacification de la carotide externe droite (vue latérale). Artère occipitale (flèche blanche), artère maxillaire (tête de flèche), artère temporale superficielle (flèche noire). Notez l'absence des branches antérieure et postérieure de l'artère méningée moyenne (AMM).

meningioma. Embolization was chosen as a bleeding limitation strategy for this recurrent occipital meningioma.

A selective angiography of the external and internal carotid arteries, ipsilateral and contralateral to the tumour was performed.

The right external carotid angiography showed the two terminal branches of the external carotid artery: the internal maxillary artery and the superficial temporal artery. Although the other branches were visible (i.e. occipital artery, pharyngeal ascending artery and posterior auricular artery) the MMA was absent (Fig. 1). In contrast, the right internal carotid artery angiography revealed the MMA arising from the ipsilateral OA (Fig. 2).

On the left side, the anterior branch of the MMA arises from the OA (Fig. 3), while the posterior branch arises from the external carotid system (Fig. 4), rendering this anomaly bilateral and asymmetric.

In view of the aberrant origins of both MMA, embolization was avoided.

Subsequently, retrospective analysis of the CT scan with an osseous algorithm showed the foramen spinosum present only on the left side whereas it was absent on the right side (Fig. 5).

3. Discussion

At the cranial part of the embryo, six aortic arches appear. The first gives birth to the maxillary artery, the second to the stapedia artery and the third to the future internal carotid artery.

The stapedia artery divides into two branches:

- the maxillo-mandibular, penetrates into the spinosum foramen and is annexed by the external carotid artery, thus forming the definitive maxillary artery and the extracranial segment of the MMA;
- the supraorbital division reaches the supraorbital fissure, thus providing intraorbital and retro-orbital branches which

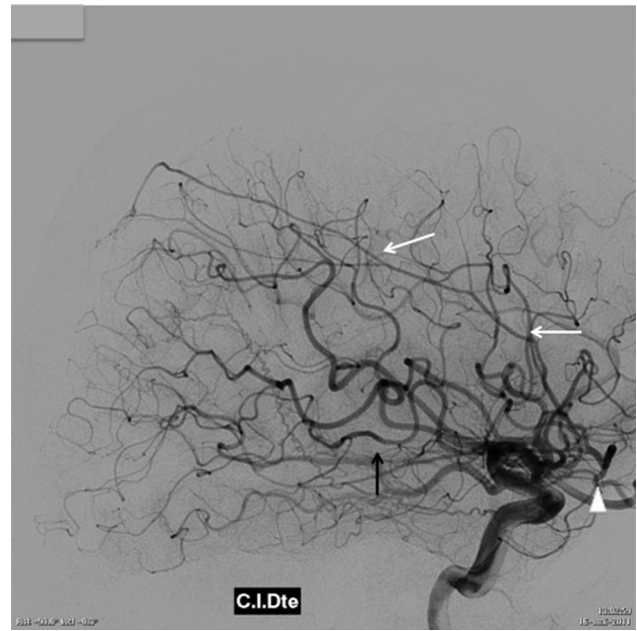


Fig. 2. Right internal carotid opacification (lateral view). Anterior branch of the middle meningeal artery (MMA) (white arrow), posterior branch of the MMA (black arrow), ophthalmic artery (arrowhead).

Opacification de la carotide interne droite (vue latérale). Branche antérieure de l'artère méningée moyenne (AMM) (flèche blanche), branche postérieure de l'AMM (flèche noire), artère ophtalmique (tête de flèche).

anastomoses with the OA. This division forms the intracranial segment of the MMA.

The proximal part of the stapedia artery is subsequently involuted, while the supraorbital artery becomes the definitive MMA after losing its anastomoses with the OA.

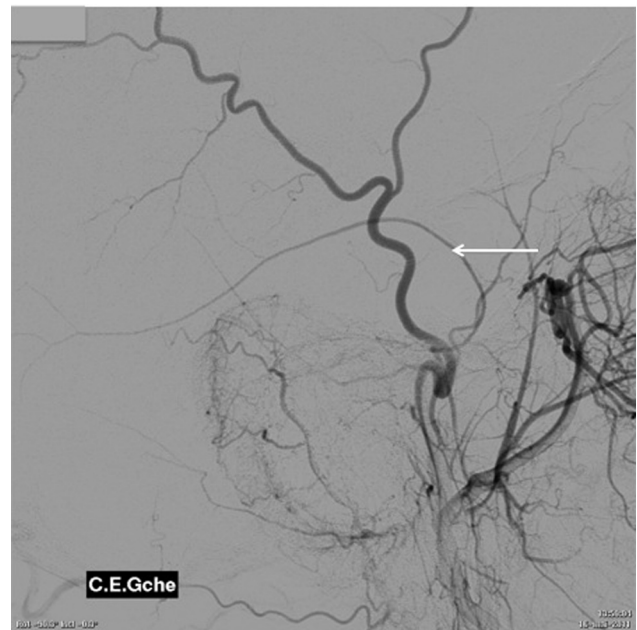


Fig. 3. Left external carotid opacification (lateral view), posterior branch of middle meningeal artery (MMA) (arrow). Note the absence of MMA anterior branch.

Opacification de la carotide externe gauche (vue latérale). Branche postérieure de l'artère méningée moyenne (AMM) (flèche). Notez l'absence de la branche antérieure de l'AMM.

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