Case Report

Tortuous Cavernous Internal Carotid Artery Mimicking a Cavernous Sinus Mass: A Case Report

Bhuwid Chinwatanawongwan MD[1], Waneerat Galassi MD[1], Temphon Kruamak MD[1]

[1] Department of Radiology, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand

The authors presented a case of a 74-year-old male initially suspected of having a left cavernous sinus mass detected on a computed tomography [CT] scan. A magnetic resonance imaging [MRI] and magnetic resonance angiography [MRA] of the brain were performed for further investigation and the lesion turned out to be a tortuous left cavernous internal carotid artery [ICA]. Cavernous sinus mass is a very rare presentation of tortuous carotid ICA. To the best of the authors knowledge, it has never been referenced in the literature.

Keywords: Tortuous, Exaggerated internal carotid artery, Cavernous sinus mass

J Med Assoc Thai 2018; 101 (10): 1463-5
Website: http://www.jmatonline.com

The cavernous internal carotid artery [ICA] may become quite tortuous characterized by exaggerated loops at its posterior, anterior bends, and a sharply sloping horizontal segment[1].

A redundant intracavernous ICA was present in 27.5% of the 100 computed tomography [CT] angiograms reported by Jittapiromsak et al[2]. In the present case, an incidental cavernous sinus mass, which turned out to be the tortuous left cavernous ICA on magnetic resonance imaging [MRI] and magnetic resonance angiography [MRA], was presented.

Case Report

A 74-year-old male with no significant past medical history, came to the psychiatric out-patient department with a chief complaint of progressive amnesia. He stated that the condition had been ongoing for 10 years. His physical examination revealed nothing out of the ordinary.

The patient then underwent a contrast-enhanced CT scan of the brain that showed a homogeneous enhancing lesion at the left cavernous sinus that was causing bulging of the posterior wall of the left sphenoid sinus (Figure 1). The lesion was suspected to be a cavernous sinus mass or caroticocavernous fistulas [CCF].

The lesion in concern was further evaluated by an MRI and MRA study of the brain. It was subsequently revealed to be a cavernous segment of the left ICA. It had a tortuous and elongated horizontal portion mimicking a cavernous sinus mass detected on the prior CT scan (Figure 2).

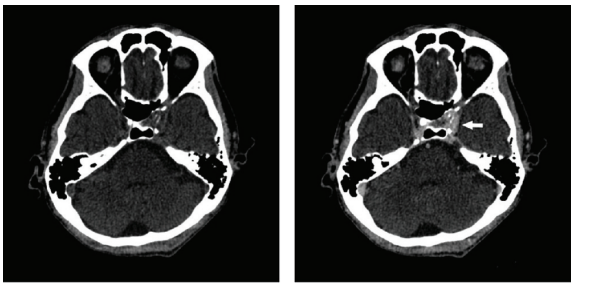

Figure 1. Noncontrast (a) and contrast-enhanced (b), axial CT scan of the brain at the level of cavernous sinus shows a homogeneous enhancing lesion at the left cavernous sinus causing bulging of the posterior wall of the left sphenoid sinus (solid white arrow).

The patient was informed about this condition. In the end, there was no need for further investigation or any specific treatment.

Discussion

The ICA is a terminal branch of the common carotid artery that has several classification systems. The most recent ICA classification system was described in detail by Bouthillier et al in 1996[3]. There are seven segments in the Bouthillier classification: 1) cervical segment, 2) petrous (horizontal) segment, 3) lacerum segment, 4) cavernous segment, 5) clinoid segment, 6) ophthalmic (supraclinoid) segment,

Correspondence to:

Chinwatanawongwan B. Department of Radiology, Faculty of Medicine, Naresuan University, Phitsanulok 65000, Thailand.
Phone: +66-55-965114
Email: bhuwid_jk@hotmail.com

How to cite this article: Chinwatanawongwan B, Galassi W, Kruamak T. Tortuous cavernous internal carotid artery mimicking a cavernous sinus mass: a case report. J Med Assoc Thai 2018;101:1463-5.

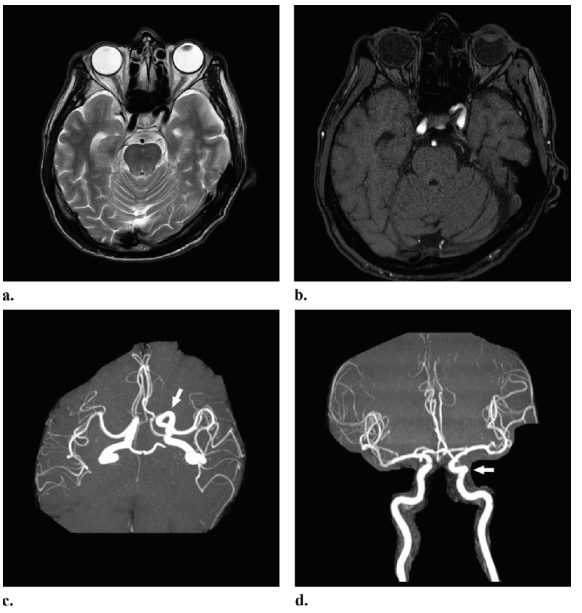

Figure 2. The axial T2-weighted image shows a signal void of both ICAs, (a) axial three-dimentional (3D) time-of-flight [TOF] MRA image also confirmed that the lesion in concern to be the tortuous left ICA, (b) 3D reconstructed TOF MRA, (c, d) indicates elongation and tortuosity in the horizontal orientation of the left cavernous ICA with an exaggerated loop at its anterior aspect (solid white arrows).

and 7) communicating (terminal) segment. The C4 (cavernous) ICA segment begins at the superior margin of the petrolingual ligament. The C4 ICA has three sub-segments: (a) a posterior ascending or vertical portion, (b) a longer horizontal segment, and (c) a short anterior vertical portion. Here, the authors described a unique case of a patient with tortuous cavernous ICA presented with left cavernous sinus mass detected on the prior CT scan. A cavernous sinus mass has a wide differential including vascular, neoplastic, infective, and infiltrative lesions arising in the cavernous sinus or via extension from adjacent intra- and extra-cranial regions[4,5]. To the best of the authors' knowledge, tortuous cavernous ICA mimicking a cavernous sinus mass has yet to be found in the literature. The most probable explanation for this is that it is clinically silent.

Tortuosity of the carotid artery is considered common and has been mentioned in many studies[6-10]. Lin et al classified the tortuous cavernous ICA into four types based on the geometry of the anterior and posterior genus and used the classification as a predictor of procedural complexity in pipeline embolization[9]. According to the classification, the tortuosity of the cavernous ICA in the present case should be classified as type II, which is considered moderate tortuosity due to the closed configuration of the anterior genu. Gottfried et al demonstrated the way in which a redundant loop of the cavernous ICA displaces superomedially and abuts the supraclinoid carotid artery detected on cerebral angiograms[11]. They hypothesized that their patient's vascular anomaly was in part the result of underlying fibromuscular dysplasia.

In the present case, the tortuous left cavernous ICA also protruded into the sphenoid sinus, which coexisted with dehiscence of the sphenoid sinus wall. During the process of development, neighboring structures of the sphenoid sinus such as the ICA and optic nerve can protrude into the sinus causing anatomical variations[12,13].

Conclusion

In the present case, the patient had no known underlying disease and the authors assumed that the tortuous cavernous ICA incidentally found was likely to be a normal variation. MRI and magnetic resonance angiography [MRA] have the advantage of non-invasiveness and is the best option for further investigation following CT scan. Recognition of such a situation is important to rule out a mimicking cavernous sinus tumor and to prevent harmful complications resulting from surgical procedures.

What is already known on this topic?

A cavernous sinus mass has a wide differential including vascular, neoplastic, infective, and infiltrative lesions arising in the cavernous sinus or via extension from adjacent intra- and extra-cranial regions. Vascular lesions that have been reported to be able to mimic a cavernous sinus mass are the aneurysm, thrombosis, and CCF. Tortuous cavernous ICA mimicking a cavernous sinus mass has yet to be found in the literature.

What this study adds?

Tortuous cavernous ICA should be included in the differential diagnosis of cavernous sinus mass.

Potential conflicts of interest

The authors declare no conflict of interest.

References

1. Osborn AG, Jacobs JM. Diagnostic cerebral angiography. 2nd ed. Philadelphia: Lippincott Williams & Wilkins; 1999.
2. Jittapiromsak P, Sabuncuoglu H, Deshmukh

P, McDougall CG, Spetzler RF, Preul MC. Anatomical relationships of intracavernous internal carotid artery to intracavernous neural structures. Skull Base 2010;20:327-36.
3. Bouthillier A, van Loveren HR, Keller JT. Segments of the internal carotid artery: a new classification. Neurosurgery 1996;38:425-32.
4. Razek AA, Castillo M. Imaging lesions of the cavernous sinus. AJNR Am J Neuroradiol 2009; 30:444-52.
5. Boardman JF, Rothfus WE, Dulai HS. Lesions and pseudolesions of the cavernous sinus and petrous apex. Otolaryngol Clin North Am 2008; 41:195-213, vii.
6. Anderson RD. Tortuosity of the cavernous carotid arteries causing sellar expansion simulating pituitary adenoma. AJR Am J Roentgenol 1976; 126:1203-10.
7. Huber P. Cerebral angiography. 2nd ed. New York: Thieme Medical Publishers; 1982.
8. Lang J, Reiter U. Über den Verlauf der Hirnnerven in der Seitenwand des Sinus cavernosus. Neurochirurgia (Stuttg) 1984;27:93-7.
9. Lin LM, Colby GP, Jiang B, Uwandu C, Huang J, Tamargo RJ, et al. Classification of cavernous internal carotid artery tortuosity: a predictor of procedural complexity in Pipeline embolization. J Neurointerv Surg 2015;7:628-33.
10. Waihrich E, Clavel P, Mendes GAC, Iosif C, Moraes K, I, Mounayer C. Influence of carotid siphon anatomy on brain aneurysm presentation. AJNR Am J Neuroradiol 2017;38:1771-5.
11. Gottfried ON, Soleau SW, Couldwell WT. Suprasellar displacement of intracavernous internal carotid artery: case report. Neurosurgery 2003;53:1433-4.
12. Sirikci A, Bayazit YA, Bayram M, Mumbuç S, Güngör K, Kanlikama M. Variations of sphenoid and related structures. Eur Radiol 2000;10:844-8.
13. Hewaidi G, Omami G. Anatomic variation of sphenoid sinus and related structures in libyan population: CT scan study. Libyan J Med 2008; 3:128-33.