

Letter to the editor

Pupil-sparing third cranial nerve palsy with aberrant regeneration secondary to cavernous sinus arachnoid cyst



Kelly A. Malloy*, Erin M. Draper, Ashley K. Maglione

Salus University, Neuro-ophthalmic Disease Department, 8360 Old York Rd, Elkins Park, PA 19027, United States

ARTICLE INFO

Keywords:

Aberrant regeneration
Arachnoid cyst
Cavernous sinus
Oculomotor synkinesis
Third nerve palsy

ABSTRACT

A 66 year-old woman presented with a pupil-sparing partial third cranial nerve palsy with aberrant regeneration. Imaging revealed a cystic lesion in the right cavernous sinus, demonstrating signal characteristics consistent with arachnoid cyst. Oculomotor synkinesis and a pupil-sparing third cranial nerve palsy from an arachnoid cyst of the cavernous sinus have not been previously reported. Intracavernous arachnoid cysts are in the differential diagnosis of cranial nerve III palsies, with and without synkinesis or pupil involvement.

1. Introduction

Oculomotor synkinesis rules out a vasculopathic etiology, and is commonly thought to occur with aneurysm, tumor, and trauma. Pupil involvement in a third nerve palsy is also often associated with a compressive etiology, such as aneurysm or tumor. Cystic lesions of the cavernous sinus are rare, and include epidermoid, dermoid, and arachnoid cysts, which demonstrate differing patterns on imaging, helping to distinguish among them.

The purpose of this case report is to present a patient with a pupil-sparing third cranial nerve palsy with aberrant regeneration secondary to a cavernous sinus arachnoid cyst.

2. Case report

A 66 year-old woman presented with a 1-year history of diplopia and a 4-month history of right-sided ptosis. She denied pain, headache, or trauma. Examination revealed best-corrected visual acuity of 20/20 in each eye, with no dyschromatopsia or visual field loss. Pupils were normally reactive and isocoric in both bright and dim illumination, with no light-near dissociation or relative afferent pupillary defect. Exophthalmometry measurements were 16 mm in each eye. There was a 2 mm ptosis of the right eye, with palpebral apertures of 9 mm OD and 11 mm OS. There was lid retraction of the right upper lid on down gaze (Fig. 1). Levator function was asymmetric at 15 mm OD and 20 mm OS. Ductional limitations were noted in the right eye: supraduction (70%), infraduction (80%) (Fig. 1). Cover testing revealed a reversing hyper deviation with left hyper in upgaze and right hyper in downgaze. There was no reported asymmetric sensation in the distributions of cranial

nerve V1 or V2.

Due to the incomplete pupil-sparing right third cranial nerve palsy with synkinetic movements of the upper lid, CTA of the head was performed, and showed no indication of aneurysm. Subsequent MRI demonstrated a cystic lesion of the right cavernous sinus. The cyst followed the CSF signal on T1, T2, and FLAIR imaging, and showed no restricted diffusion (Fig. 2). This pattern is most consistent with a right cavernous sinus arachnoid cyst. The patient has been followed with serial observation by neurosurgery. She was prescribed distance prism glasses, with a clip-on near correction, which increased her comfort and eliminated her diplopia most of the time.

3. Discussion

Arachnoid cysts occur with a frequency of only 1% of all intracranial space-occupying lesions, and usually contain CSF [1]. They have been documented to occur with greatest frequency in the sylvian fissure, and with decreasing frequency in the cerebellopontine angle, supracollicular region, vermis, sellar and parasellar area, interhemispheric fissure, and cerebral convexity [2]. Arachnoid cysts in the cavernous sinus are quite rare. Radiologic features of arachnoid cysts include homogeneous low density on CT imaging, with T1 hypointensity, T2 hyperintensity, FLAIR hypointensity, and no restricted diffusion noted on MRI imaging [3].

The first case of a symptomatic arachnoid cyst in the cavernous sinus was reported in 1999 [4]. That patient presented with an incomplete pupil-involving third cranial nerve palsy with no associated synkinetic movements. Since then, there have been only a handful of other reports of intracavernous sinus arachnoid cysts with associated

* Corresponding author at: Salus University, 8360 Old York Rd, Elkins Park, PA 19027, United States.

E-mail address: kmalloy@salus.edu (K.A. Malloy).

<https://doi.org/10.1016/j.ensci.2018.11.017>

Received 16 October 2018; Accepted 17 November 2018

Available online 19 November 2018

2405-6502/© 2018 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

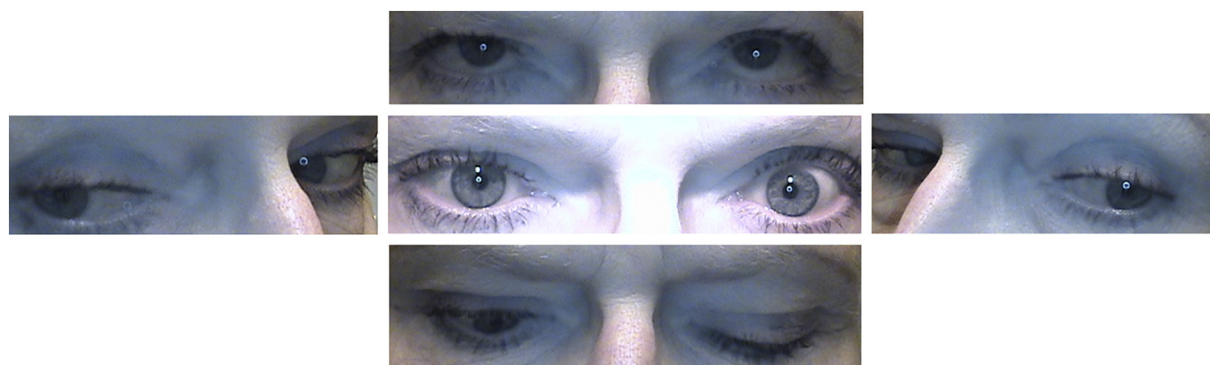


Fig. 1. Center: (primary gaze) Right ptosis and lack of pupil involvement. Top: (upgaze) Right supraduction limitation. Bottom: Elevation of right upper eyelid on infraction, and right infraction limitation. Right: right-gaze. Left: left-gaze.

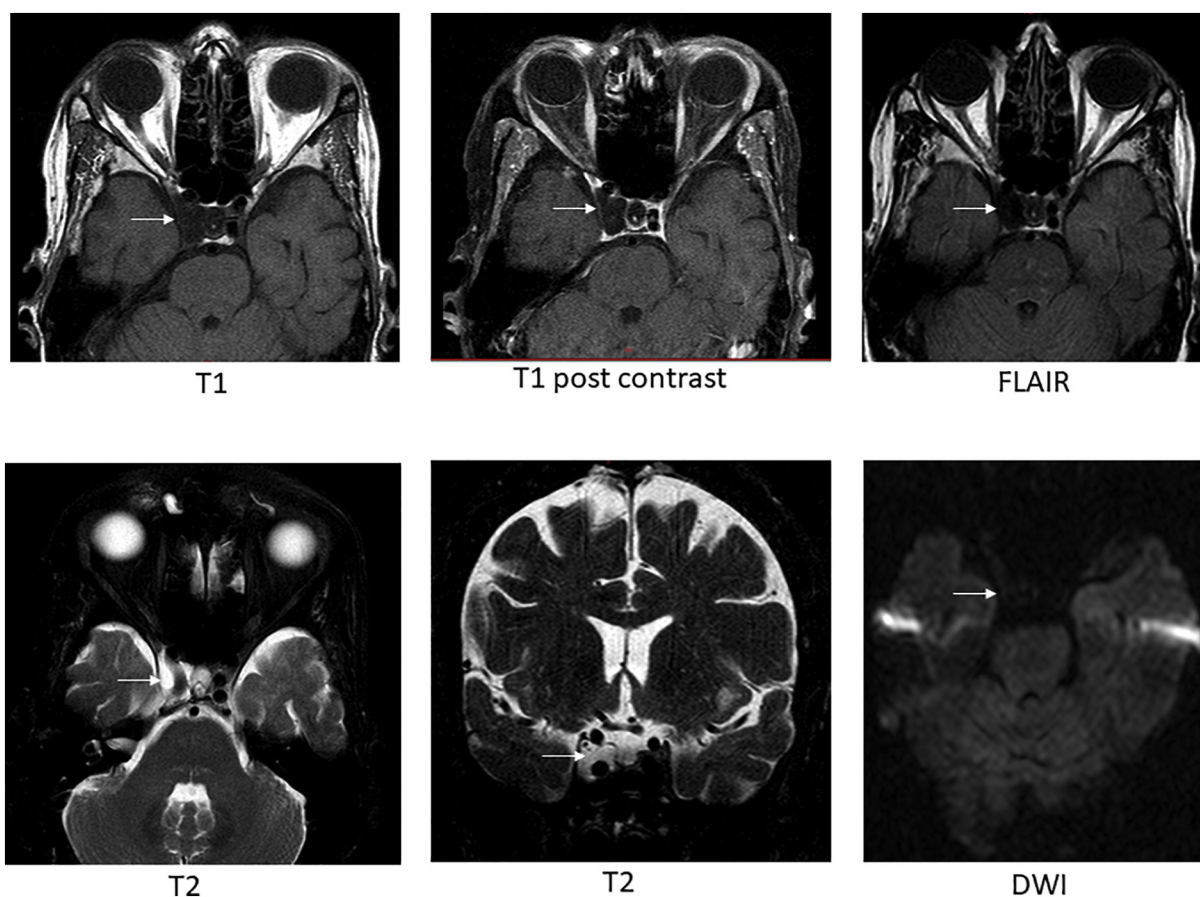


Fig. 2. MRI sequences as indicated. Note arrow pointing to location of right intracavernous cystic lesion. The cyst follows the CSF signal on all sequences, and shows no restricted diffusion on DWI, consistent with an arachnoid cyst.

neuropathy, but none with a third cranial nerve palsy [5–7]. There has been a report of a third cranial nerve palsy, without mention of aberrant regeneration, secondary to an arachnoid cyst in an oculomotor cistern (OMC) which atypically extended into the orbital apex [8]. The OMC is a CSF filled arachnoid-lined dural cuff which is continuous with the basilar cisterns, accompanies the third cranial nerve as it enters the superolateral cavernous sinus roof, and typically terminates near the anterior clinoid process [9,10].

In the case presented here, there is an arachnoid cyst arising from the OCM in the right cavernous sinus, resulting in mass effect on the right third cranial nerve. To our knowledge, this is the first reported case of both a pupil sparing cranial nerve III palsy and aberrant regeneration of the third cranial nerve from an intracavernous arachnoid

cyst. Although rare, intracavernous arachnoid cysts should be in the differential diagnosis of cranial nerve III palsies, with or without pupil involvement, and with or without features of synkinesia.

Conflict of interest

No support or conflict of interest to report.

References

[1] J.S. Leo, R.S. Pinto, G.F. Hulvat, et al., Computed tomography of arachnoid cysts, *Radiology* 130 (1979) 675–680.
 [2] S.S. Rengachary, I. Watannabe, Ultrastructure and pathogenesis of intracranial arachnoid cysts, *J. Neuropathol.* 40 (1981) 61–83.

- [3] S.N. Dutt, S. Mirza, S.V. Chavda, et al., Radiologic differentiation of intracranial epidermoids from arachnoid cysts, *Otol. Neurotol.* 23 (1) (2002) 84–92.
- [4] D. Barr, M.J. Kupersmith, R. Pinto, et al., Arachnoid cyst of the cavernous sinus resulting in third nerve palsy, *J. Neuroophthalmol.* 19 (4) (1999) 249–251.
- [5] N. Kidani, M. Onishi, K. Kurozumi, et al., The supposed intracavernous sinus arachnoid cyst with abducens neuropathy: a case report, *Neurol. Med. Chir. (Tokyo)* 54 (2014) 582–586.
- [6] T. Kobayashi, M. Negoro, S. Awaya, Cavernous sinus subarachnoid diverticulum and sixth nerve palsy, *Neuroradiology* 29 (1987) 306–307.
- [7] C.H. Cheng, H.L. Lin, D.Y. Cho, et al., Intracavernous sinus arachnoid cyst with optic neuropathy, *J. Clin. Neurosci.* 17 (2010) 267–269.
- [8] M.K. Kim, H.S. Choi, S.S. Jeun, et al., Arachnoid cyst in oculomotor cistern, *Korean J. Radiol.* 14 (5) (2013) 829–831.
- [9] K.L. Everton, U.A. Rassner, A.G. Osborn, et al., The oculomotor cistern: anatomy and high-resolution imaging, *Am. J. Neuroradiol.* 29 (7) (2008) 1344–1348.
- [10] C. Martins, A. Yasuda, A. Campero, et al., Microsurgical anatomy of the oculomotor cistern, *Neurosurgery* 58 (4 suppl 2) (2006) (ONS-220-227).