Surgical Neurology International

OPEN ACCESS

For entire Editorial Board visit : http://www.surgicalneurologyint.com

Editor-in-Chief: **James I. Ausman,** MD, PhD University of California, Los Angeles, CA, USA

Case Report

Tentorial branch of the superior cerebellar artery

Alexander G. Weil, Nancy McLaughlin, Daniel Denis, Michel W. Bojanowski

Department of Surgery, Division of Neurosurgery, Notre Dame Hospital, University of Montreal Hospital Centre, 1560 rue Sherbrooke Est, Montreal, Quebec, Canada

E-mail: Alexander G. Weil - alexandergweil@gmail.com; Nancy McLaughlin - nancymc50@hotmail.com; Daniel Denis - danieldenisjr@gmail.com; *Michel. W. Bojanowski - michel.bojanowski.chum@ssss.gouv.qc.ca

*Corresponding author

Received: 06 March 11 Accepted: 8 May 11 Published: 28 May 11

This article may be cited as:
Weil AG, McLaughlin N, Denis D, Bojanowski MW. Tentorial branch of the superior cerebellar artery. Surg Neurol Int 2011;2:71.
Available FREE in open access from: http://www.surgicalneurologyint.com/text.asp?2011/2/1/71/81733

Abstract

Background: The tentorial branch of the superior cerebellar artery (SCA) is not well known and is underreported in the literature. In the present study, the authors report and describe a dural branch arising from the SCA that was encountered during the surgical treatment of a tentorial dural arteriovenous fistula (DAVF). The clinical relevance of this branch is discussed.

Case Description: A 53-year-old patient suffered a third recurrent right thalamic hemorrhage within 2 weeks rendering him comatose. Computed tomography scan revealed a right thalamic hematoma extending into the ventricles, producing acute hydrocephalus and midline shift. Cerebral angiography revealed a right-sided tentorial Borden type III DAVF fed primarily by the tentorial artery of Bernasconi and Cassinari and, to a lesser extent, the petrous branch of the middle meningeal artery. A small dural feeder originating from the SCA was suspected. Venous drainage was via the lateral mesencephalic vein, through an aneurysmal dilated basal vein of Rosenthal, to the straight sinus. The DAVF was approached surgically via a right subtemporal approach. Intraoperatively, after division of the tentorium, a tentorial branch originating from the SCA was identified. This artery was sectioned while preserving the SCA. The draining vein was ligated adjacent to the sinus. Postoperatively, the patient's neurological status improved and postoperative angiography demonstrated complete obliteration of the tentorial DAVF.

Conclusion: Knowledge of the tentorial branch of the SCA is important as it may potentially be sectioned during division of the tentorium or avulsed from its origin in the SCA during surgical manipulation in the ambient cistern.

Key Words: Dural arteriovenous fistula, dural artery, intracranial hemorrhage, malformation, superior cerebellar artery, tentorial artery

Access this article online

Website: www.surgicalneurologyint.com

DOI: 10.4103/2152-7806.81733

Quick Response Code:

INTRODUCTION

A thorough understanding of the arterial supply to the tentorium is essential for safe and effective endovascular or microsurgical treatment of lesions involving this area. Although a tentorial branch of the superior cerebellar artery (SCA) has been described in a cadaveric study,[6] the clinical relevance of this artery has not been emphasized. We report and describe a tentorial branch arising from the lateral pontomesencephalic segment of the SCA, which we encountered during surgical treatment of a tentorial dural arteriovenous fistula (DAVF), and discuss its clinical relevance.

CASE REPORT

A 53-year-old previously healthy male patient was referred to our service after suffering a third recurrent right thalamic hemorrhage within 2 weeks, during which time he was treated for a presumed hypertensive thalamic hemorrhage. Following this third hemorrhage the patient became comatose. Computed tomography scan of the head revealed a hematoma in the right lateral thalamus, extending into the lateral ventricles, producing acute hydrocephalus and a midline shift toward the left [Figure 1]. Cerebral angiography revealed a right-sided tentorial DAVF fed primarily by the tentorial artery of Bernasconi and Cassinari and, to a lesser extent, by the petrous branch of the middle meningeal artery [Figure 2]. In addition, the presence of a small dural feeder originating from the SCA was suspected [Figure 3]. Venous drainage was via the lateral mesencephalic vein, through an aneurysmal dilated basal vein of Rosenthal, to the straight sinus [Figure 2]. Given these angiographic features, the fistula was classified as a Borden type III DAVF.[2]

Figure 1: Brain computed tomography scan showing right thalamic hemorrhage with extension into the lateral ventricle, producing acute hydrocephalus, midline shift toward the left and transtentorial herniation

Endovascular treatment was unsuccessful because of the inability to attain a secure site for embolization. The DAVF was approached surgically via a right subtemporal approach. Intraoperatively, after division of the tentorium, a tentorial branch originating from the SCA was identified [Figure 4]. This 1-mm thick artery originated from the rostral trunk of the SCA, in its lateral pontomesencephalic segment in the ambient cistern under the tentorium in its free edge. It branched off perpendicular to the SCA in a rostral direction straight to the tentorium. This artery was clipped, coagulated, and sectioned while preserving the SCA. Finally, the draining vein was ligated adjacent to the sinus. Postoperatively, the patient's neurological status improved significantly. He was transferred 5 weeks after surgery to a rehabilitation facility where his left hemiplegia and hemianesthesia progressively improved. Postoperative angiography demonstrated complete obliteration of the tentorial DAVF.

DISCUSSION

Recent advances in endovascular and microsurgical techniques have warranted a thorough understanding of the vascular supply to the tentorium in order to safely treat lesions in this region. It is well recognized that the tentorium receives its arterial supply from the cavernous segment of the internal carotid artery (ICA) and the artery of Davidoff and Schecter (ADS), a meningeal

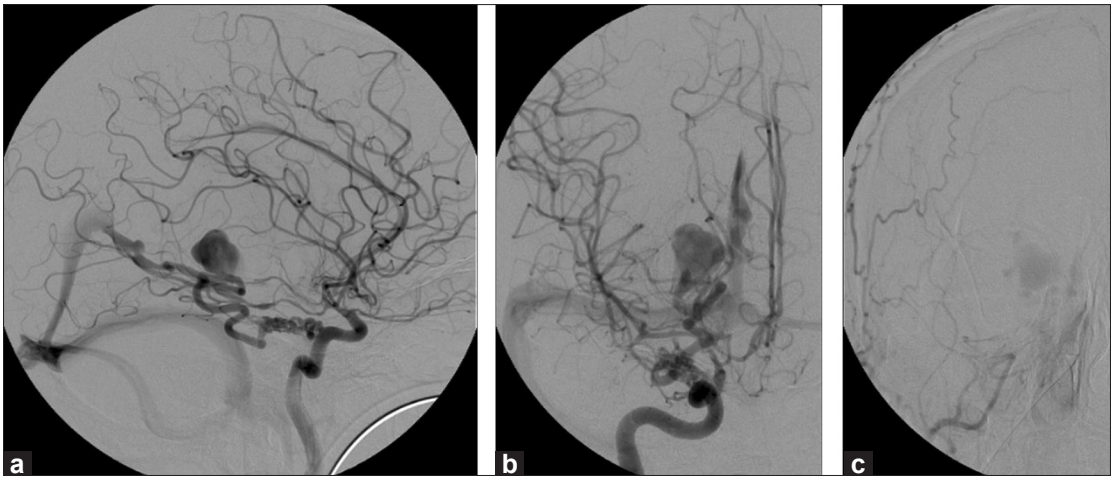

Figure 2: Selective angiogram of the right internal carotid artery (a and b) revealing an arteriovenous fistula, Borden type III, involving the right tentorial leaf fed by the meningohypophyseal trunk. Venous drainage proceeds through the lateral mesencephalic vein to the basal vein of Rosenthal and the straight sinus. The basal vein of Rosenthal has a saccular dilatation of 2 cm on its superior surface representing a false aneurysm most probably responsible for the repetitive hemorrhages. Selective angiogram of the right external carotid artery (c) demonstrating minimal contribution by the petrous branch of the middle meningeal artery

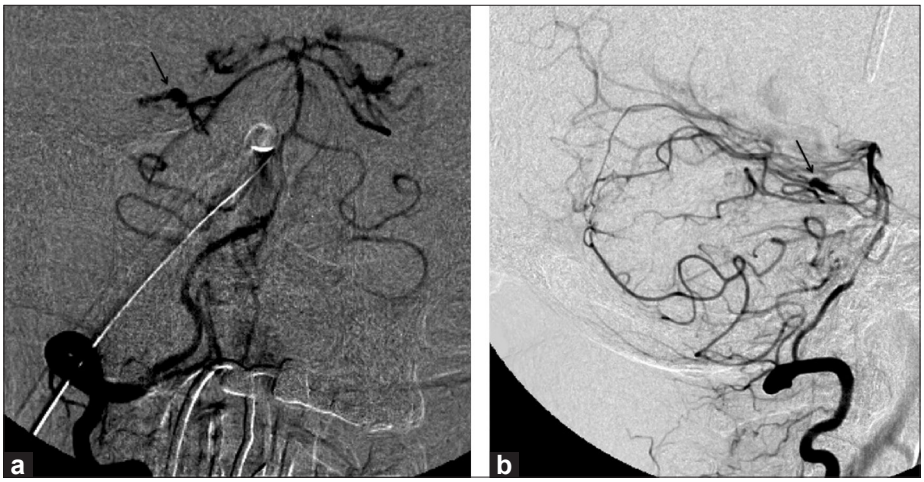

Figure 3: Selective right vertebral arteriogram. Anteroposterior (a) and lateral (b) view demonstrating suspicion of a tentorial branch arising from the rostral trunk of the SCA (arrow)

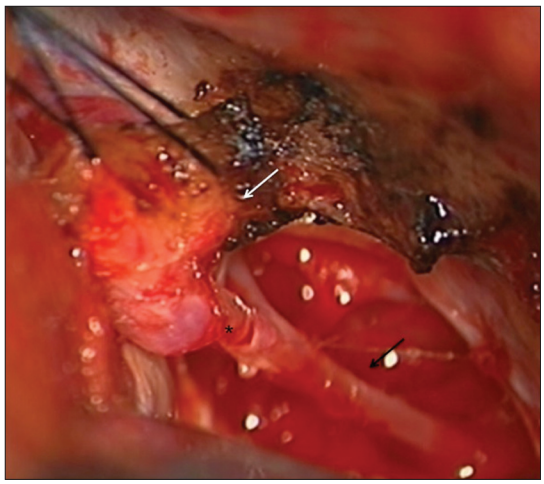

Figure 4: Intraoperative photograph showing the tentorial branch (asterix) arising from the SCA (black arrow) in the ambient cistern after division and elevation of the tentorium (white arrow)

branch of the posterior cerebral artery (PCA).[4,6,7-10] However, the contribution of the SCA is not well known.

The meningeal contribution of the SCA was first described in 1965 by Wollschlaeger and Wollschlaeger in their study of 10 barium-injected brain cadavers dissected with dural preservation. However, the SCA tentorial branch in question was only found in 1 cadaver and was in fact described as a small arterial anastomosis from the SCA to the ADS.[9] Wollschlaeger later reported that although he believed that the ADS was constant, this small arterial connection between the SCA and ADS occurs only occasionally, typically leading rostrally to the quadrigeminal plate.[10]

In a microsurgical study of the tentorial area by Ono *et al*., a tentorial branch arising from the SCA in 28% of the 25 dissected cadaveric adult heads was described. This tentorial branch originates from the rostral trunk of the SCA as it crosses the middle incisural space under the free edge of the tentorium.[6] However, in a masterpiece study by the same group on the microsurgical anatomy of the dural arteries, there is no mention of this tentorial branch of the SCA.[4]

Meningeal branches arising from cerebral arteries are known to be recruited feeders for DAVFs.[1,5] Since Ono *et al*.'s cadaveric description of the SCA tentorial branch, its potential contribution to DAVF of the tentorial incisura has not been well emphasized in the literature. The relevance of recognition of the SCA tentorial branch in patients harboring DAVF reside in the fact that this branch may be an angiographically occult feeder found in lesions that are often treated surgically. Hence, overlooking the potential contribution of an SCA branch to a tentorial DAVF during surgery may lead to inadvertent avulsion of the tentorial branch or the SCA itself. To our knowledge, only a handful of DAVF case series have mentioned an angiographic contribution of the SCA without emphasis on the clinical and surgical relevance.[1,3,11] In a recent retrospective review of 31 patients treated surgically for tentorial DAVFs over a 9-year period, Lawton *et al*. demonstrated the importance of arterial contribution of pial cerebral arteries to tentorial DAVFs. PCAs and SCAs together supply 26% (n=8) of tentorial DAVFs, especially for galenic DAVFs. However, the relative contribution of each artery is not detailed and from a nomenclature perspective, the tentorial SCA branch is not distinguished from the tentorial branch of the PCA, which is in fact the ADS.[10] In Borden *et al*.'s classification system for cranial and spinal DAVFs, a tentorial branch of the SCA is only shown in a drawing depicting a type IIb DAVF of the superior petrosal sinus. This branch is not further described in the text nor detailed in a table summarizing the cases.[2]

In the present study, we report and describe a dural branch of the SCA, which was found during the surgical treatment of a tentorial DAVF. This branch originates

near the free edge of the tentorium and courses rostrally to end in the inferior surface of the tentorium. In our case there was no anastomosis to the dural branch of the PCA. Knowledge of this branch's existence is important as it may potentially be sectioned during division of the tentorium or avulsed from its origin in the SCA during surgical manipulation in the ambient cistern. Before incising the tentorium, one must gently retract the free edge of the tentorium in order to identify and follow the SCA as it courses through the ambient cistern. This allows identification of the tentorial branch under the free edge of the tentorium. After visualizing the branch, it can be safely occluded before incising the tentorium.

CONCLUSION

This is a report of an SCA branch in a tentorial DAVF. This branch must be distinguished from the tentorial branch arising from the PCA, which is the ADS. Recognition of the SCA tentorial branch is relevant for angiographic diagnosis and endovascular management of tentorial DAVFs. Surgically, it is important to be aware of its possible existence in order to prevent damage to the SCA or profuse bleeding resulting from tearing of the branch itself.

REFERENCES

1. Awad IA. Intracranial dural arteriovenous Malformations: Factors predisposing to an aggressive neurological course. J Neurosurg 1990;72:839-50.
2. Borden JA, Wu JK, Shucart WA. A proposed classification for spinal and cranial dural arteriovenous fistulous malformations and implications for treatment. J Neurosurg 1995;82:166-79.
3. Lawton MT, Sanchez-Mejia RO, Pham D, Tan J, Halbach VV. Tentorial dural arteriovenous fistulae: Operative strategies and microsurgical results for six types. Oper Neurosurg 2008;62:ONS110-25.
4. Martins C, Yasuda A, Campero A, Ulm AJ, Tanriover N, Rhoton A. Microsurgical Anatomy of the dural arteries. Neurosurgery 2005;56 Suppl 2:211-51.
5. Newton TH, Cronqvist S. Involvement of dural arteries in intracranial arteriovenous malformations. Radiology 1969;93:1071-8.
6. Ono M, Ono M, Rhoton AL Jr, Barry M. Microsurgical anatomy of the tentorial incisura. J Neurosurg 1984;60:365-99.
7. Weinstein M, Stein R, Pollock J, Stucker TB, Newton TH. Meningeal branch of the posterior cerebral artery. Neuroradiology 1974;7:129-31.
8. Weinstein M, Duchesneau P, Dohn DF. Angiographic identification of the meningeal branch of the posterior cerebral artery. AJR Am J Roentgenol 1977;128:326-7.
9. Wollschlaeger PB, Wollschlaeger G. Eine infratentorielle, meningeale Arterie. Radiologe 1965;5:451-2.
10. Wollschlaeger G, Wollschlaeger PB, Lucas FV, Loez VF. Experience and result with postmortem cerebral angiography performed as routine procedure of the autopsy, Sixty-seventh Annual Meeting of the American Roentgen Ray Society; 1966 September 27-30; San Francisco, California, United States of America.
11. Zhou LF, Chen L, Song DL, Gu YX, Leng B. Tentorial dural arteriovenous fistulas. Surg Neurol 2006;67:472-81.