Medulloblastoma Presenting with Tentorial “Dural-Tail” Sign: Is the “Dural-Tail” Sign Specific for Meningioma?

ABSTRACT—To the best of our knowledge, the association of a medulloblastoma with a “dural-tail” sign has not been previously reported.

A 24-year-old male developed severe headaches and right-sided dysmetria that worsened over 1 month. Magnetic resonance (MR) imaging of the brain demonstrated a heterogeneously enhancing lesion in the posterior fossa. The lesion appeared to be tentorially based and exhibited a characteristic “dural-tail” sign, which is considered pathognomonic for meningioma. Cerebellar tonsil ectopia and hydrocephalus were also present. The presumptive diagnosis of tentorial meningioma was made.

The lesion was resected by a posterior fossa approach. At surgery, the appearance of the tumor was inconsistent with the diagnosis of meningioma, and histopathologic evaluation yielded the diagnosis of medulloblastoma.

This case and the literature demonstrate that malignant tumors can present with the characteristic MR imaging appearance of a meningioma. This possibility must be considered when treatment is planned, especially if a nonoperative course is favored.

Since Goldsher et al.¹ originally reported the “dural-tail” sign demonstrated by magnetic resonance (MR) imaging, it has been considered a highly specific finding for meningiomas. Recent reports, however, have shown that the “dural-tail” sign can be associated with tumors other than meningiomas, many of which are malignant.^{2–11} The following case demonstrates that the dural-tail sign can also be associated with medulloblastomas.

CASE REPORT

During the course of 1 month, a previously healthy, 24-year-old Caucasian male developed a progressively worse occipital cervical headache. Physical examination was unremarkable, but a neurologic evaluation revealed mild dysmetria on his right side. Laboratory studies were unremarkable, but MR imaging (Fig. 1)

Figure 1. (A) Noncontrast sagittal, (B) contrast-enhanced T1-weighted sagittal, and (C) coronal magnetic resonance images demonstrating a heterogeneously enhancing lesion in the posterior fossa. The lesion, which appeared to be tentorially based and associated with a dural-tail sign, suggested the diagnosis of meningioma. Histopathological analysis after surgical resection, however, yielded the diagnosis of medulloblastoma.

demonstrated a heterogeneously enhancing mass in the posterior fossa. The mass appeared to be tentorially based and was associated with a “dural-tail” sign. The inferior cerebellar tonsils were herniated to the level of C1. The third and lateral ventricles were dilated consistent with obstructive hydrocephalus. Based on the MR

imaging findings, a tentorial meningioma was diagnosed.

Given the patient’s symptoms, which were clearly associated with intracranial hypertension, surgical resection of the lesion was pursued. The patient underwent a stereotactic wand-guided (ISG Frameless

Stereotactic Guidance System, ISG Technologies, Mississauga, Ontario, Canada) torcular craniotomy and supracerebellar infratentorial approach. The intraoperative appearance of the tumor, however, was inconsistent with a meningioma. Furthermore, the lesion abutted but was not attached to the tentorial dura. The lesion was resected under high-power microscopy, and a medulloblastoma was diagnosed histopathologically.

The patient suffered no neurologic deficits as a result of surgery. Postoperative MR imaging showed no enhancement in the resection bed to suggest residual tumor. The patient's preoperative hydrocephalus resolved, and the dysmetria in the right upper extremity improved. He was discharged to home and underwent craniospinal radiotherapy on an outpatient basis.

DISCUSSION

Wilms and colleagues¹² first described the MR imaging finding of dural enhancement associated with a meningioma. In 1990 Goldsher et al.¹ first applied the term "dural-tail" to describe dural enhancement on consecutive MR images in the same imaging plane. On T1-weighted MR imaging with contrast, the dura adjacent to the tumor is hyperintense and the thickness of the tail tapers away from the tumor.

A number of theories have been proposed to explain this radiographic finding. Wilms et al.¹² believe

that the "dural-tail" represents direct extension of the tumor into the dura mater. Tokumaru and coworkers¹³ proposed that reactive changes induced by the adjacent tumor might account for the sign after identifying increased loose connective tissue, hypervascularity, and dilated vessels in patients who exhibited the finding. Nägele et al.¹⁴ attributed this appearance to enhancing cortical veins, suggesting that the presence of the tumor caused changes in the adjacent tentorium (angiogenesis or inflammation) that produced the appearance of a dural tail.

The "dural-tail" sign, however, has also been associated with nonmeningiomas lesions (Table 1). Besides meningiomas, the most frequently reported lesions associated with the sign have been convexity glioblastomas multiforme (n = 6) and acoustic neuromas (n = 4). The growing literature suggests that most intracranial locations could harbor lesions that would produce such a sign. Thus far, 13 such supratentorial lesions and 18 infratentorial lesions have been reported.

This case report adds medulloblastoma to the list of nonmeningiomas cranial neoplasms that can demonstrate the "dural-tail" sign on MR imaging. The increasing evidence^{3,5-12,15} that malignant lesions can be associated with an MR imaging finding believed pathognomonic for meningioma is an important point for physicians to remember when discussing treatment options with patients, especially if a nonoperative approach is being considered for a lesion with a dural-tail sign.

Table 1. Tumors Other than Meningiomas Producing the "Dural-Tail" Sign

<i>Author</i>	<i>Diagnosis</i>	<i>Location</i>
Detwiler (this report)	Medulloblastoma	Cerebellar tentorium
Henn ¹⁶	Hemangioblastoma	Cerebellar tentorium
Wilms et al. ²	Nasopharyngeal carcinoma	Frontal convexity
	Glioblastoma multiforme	Frontal convexity
	Glioblastoma multiforme	Frontal convexity
	Glioblastoma multiforme	Temporal convexity
	Glioblastoma multiforme	Temporo-occipital tentorium
	Bronchial carcinoma	Frontal convexity
	Glioblastoma multiforme	NR
	Glioblastoma multiforme	NR
	Parenchymal metastasis	NR
	Parenchymal metastasis	NR
Tien et al. ³	Chloroma	Frontal convexity
	Neurosarcoidosis	Frontal convexity
	Lymphoma	Temporal pole
Koenigsberg and Patil ¹⁰	Pituitary adenoma–apoplexy	Sella turcica–clivus
Kutcher et al. ⁹	Acoustic neuroma	Cerebellopontine angle–tentorium
Morioka et al. ⁸	Adenoid cystic carcinoma	Cerebellum–tentorium
Bourekas et al. ¹¹	Non-Hodgkin's lymphoma	Sylvian fissure/temporal convexity
	Syphilitic gumma	Petrous bone–tentorium
	Papillary middle ear tumor	
Senegor ⁶	Papillary adenocarcinoma	Temporal lobe–tentorium
Paz-Fumagalli et al. ⁷	Acoustic neuroma	Cerebellopontine angle–posterior fossa
Sze ⁵	Acoustic neuroma	Cerebellopontine angle–posterior fossa
Schörner et al. ¹⁵	Oligodendroglioma	NR
	Acoustic neurinoma	Cerebellopontine angle–posterior fossa

NR—not reported

REFERENCES

1. Goldsher D, Litt AW, Pinto RS, Bannon KR, Kricheff II: Dural "tail" associated with meningiomas on Gd-DTPA-enhanced MR images: Characteristics, differential diagnostic value, and possible implications for treatment. *Radiology* 1990;176:447-450
2. Wilms G, Lammens M, Marchal G, Demaerel P, Verplancke J, Van Calenbergh F, Goffen J, Plets C, Baert AL: Prominent dural enhancement adjacent to nonmeningiomatic malignant lesions on contrast-enhanced MR images. *AJNR* 1991;12:761-764
3. Tien RD, Yang PJ, Chu PK: "Dural tail sign": A specific MR sign for meningioma? *J Comput Assist Tomogr* 1991;15:64-66
4. Tien RD, Brasch RC, Jackson DE, Dillon WP: Cerebral Erdheim-Chester disease: Persistent enhancement with Gd-DTPA on MR images. *Radiology* 1989;172:791-792
5. Sze G: Diseases of the intracranial meninges: MR imaging features. *AJR* 1993;160:727-733
6. Senegor M: Prominent meningeal "tail sign" in a patient with a metastatic tumor. *Neurosurgery* 1991;29:294-296
7. Paz-Fumagalli R, Daniels DL, Millen SJ, Meyer GA, Thieu T-M: Dural "tail" associated with an acoustic schwannoma in MR imaging with gadopentetate dimeglumine. *AJNR* 1991;12:1206
8. Morioka T, Matsushima T, Ikezaki K, Nagata S, Ohta M, Hasuo K, Fukui M: Intracranial adenoid cystic carcinoma mimicking meningioma: Report of two cases. *Neuroradiology* 1993;35:462-465
9. Kutcher TJ, Brown DC, Maurer PK, Ghaed VN: Dural tail adjacent to acoustic neuroma: MR features. *J Comput Assist Tomogr* 1991;15:669-670
10. Koenigsberg RA, Patil K: Pituitary apoplexy with dural (tail) enhancement. *AJR* 1994;163:227-228
11. Bourekas EC, Wildenhain P, Lewin JS, Tarr RW, Datsur KJ, Raji MR, Lanzieri CF: The dural tail sign revisited. *AJNR* 1995;16:1514-1516
12. Wilms G, Lammens M, Marchal G, Van Calenbergh F, Plets C, Van Fraeyenhoven L, Baert AL: Thickening of dura surrounding meningiomas: MR features. *J Comput Assist Tomogr* 1989;13:763-768
13. Tokumura A, O'uchi T, Eguchi T, Kawamoto S, Kokubo T, Suzuki M, Kameda T: Prominent meningeal enhancement adjacent to meningioma on Gd-DTPA-enhanced MR images: Histopathologic correlation. *Radiology* 1990;175:431-433
14. Nägele T, Petersen D, Klose U, Grodd W, Opitz H, Voigt K: The "dural tail" adjacent to meningiomas studied by dynamic contrast-enhanced MRI: A comparison with histopathology. *Neuroradiology* 1994;36:303-307
15. Schörner W, Schubeus P, Henkes H, Lanksch W, Felix R: "Meningeal sign": A characteristic finding of meningiomas on contrast-enhanced MR images. *Neuroradiology* 1990;32:90-93
16. Henn JS, Detwiler P, Porter RW, Levy EI, Speltzlar RF: Heman-gioablastoma with a "dural tail" sign: Case report. *BNI Quarterly* 1998;14:22-24