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CT Recognition of Optic Nerve Sheath Meningioma: Abnormal Sheath Visualization

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Optic nerve sheath meningiomas and optic nerve gliomas can be difficult to differentiate by computed tomography (CT). Three patients with optic nerve sheath meningiomas were studied with a CT/T 8800 scanner with 1.5-mm-thick axial sections and intravenous contrast material. In each case, an abnormal optic nerve sheath was identified by CT. A soft-tissue mass arose from one side of the sheath in one patient, and the entire sheath was enlarged in two patients. This provides a basis for distinguishing optic nerve sheath meningioma from optic nerve glioma.

The optic nerve/sheath is enlarged in both optic nerve glioma and sheath meningioma. We have used computed tomography (CT) to distinguish these tumors by identifying abnormal optic nerve sheaths in patients with sheath meningiomas.

Materials and Methods

CT studies were performed with a CT/T 8800 scanner with the patient supine. In the three patients evaluated, 5- and 1.5-mm-thick axial sections of the orbits were obtained with the gantry parallel to the axis of the optic nerves. For the coronal sections (5 and/or 1.5 mm thick), the patient's head was maximally extended in a head-holder. A lateral localizer scan was used to determine optimal gantry angulation for coronal sections to avoid artifacts from dental fillings. All patients were studied after contrast enhancement consisting of 200 ml of 30% iodinated contrast medium infused rapidly just before imaging and the remaining 100 ml infused slowly during imaging. One patient was also studied before intravenous contrast administration. Technical factors included 9.6 sec scan time, 960–1150 mAs, and 120 kV.

Results

In the three patients studied, abnormal tissue was identified adjacent to the optic nerves. This tissue was slightly hyperdense with respect to the optic nerves after intravenous contrast enhancement in two patients and densely calcified in one patient. In one patient the abnormal tissue appeared as a soft-tissue mass lateral to the optic nerve at the orbital apex (fig. 1). In two patients the abnormally dense tissue circumferentially enveloped the optic nerve (figs. 2 and 3). Two of three patients had anterior clinoid hyperostosis and tumor extension into the chiasmatic cistern. At surgery, optic nerve sheath meningiomas correlating with the abnormal tissue visualized on the CT scans were found in two patients. In the third patient (fig. 2), the intracranial part of the sheath meningioma was removed, but the orbit was not explored and a postoperative scan showed the intraorbital tumor unchanged.

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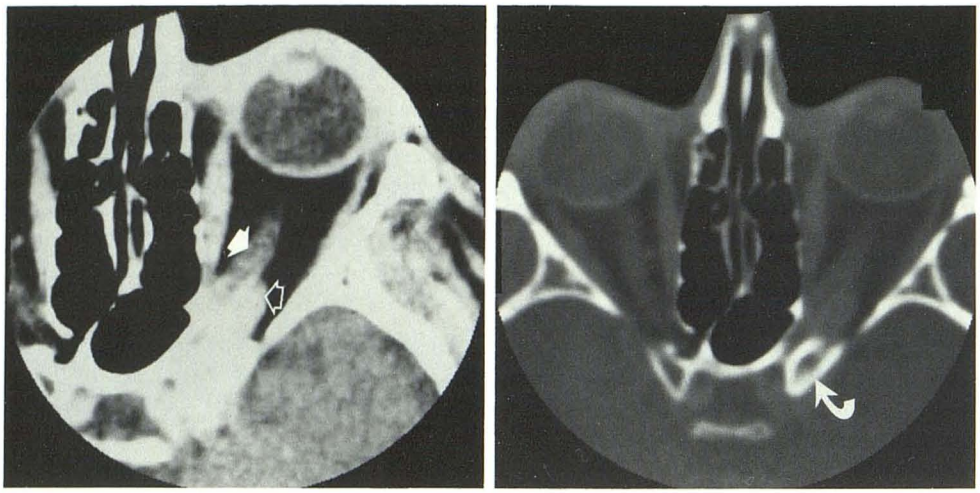

Fig. 1.—**A,** Axial scan. Focal meningiomatous sheath involvement (*open arrow*) lateral to left optic nerve (*closed arrow*). **B,** Wide window. Left anterior clinoid process (*arrow*) is hyperostotic.

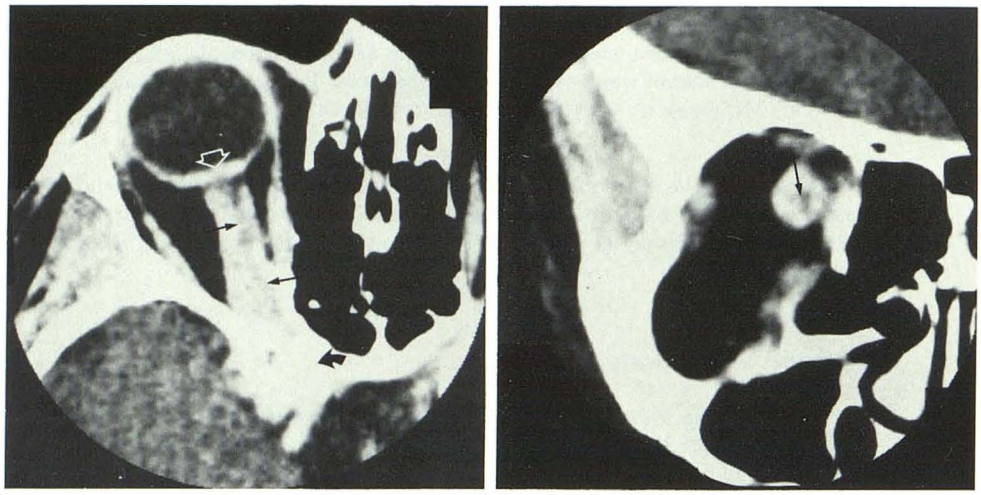

Fig. 2.—Optic nerve sheath meningioma seen medial and lateral to optic nerve (*small black arrows*) in axial section (**A**) and encircling optic nerve (*arrow*) in coronal section (**B**). Posterior globe flattening (*open arrow*) from mass effect and intracranial tumor (*curved arrow*).

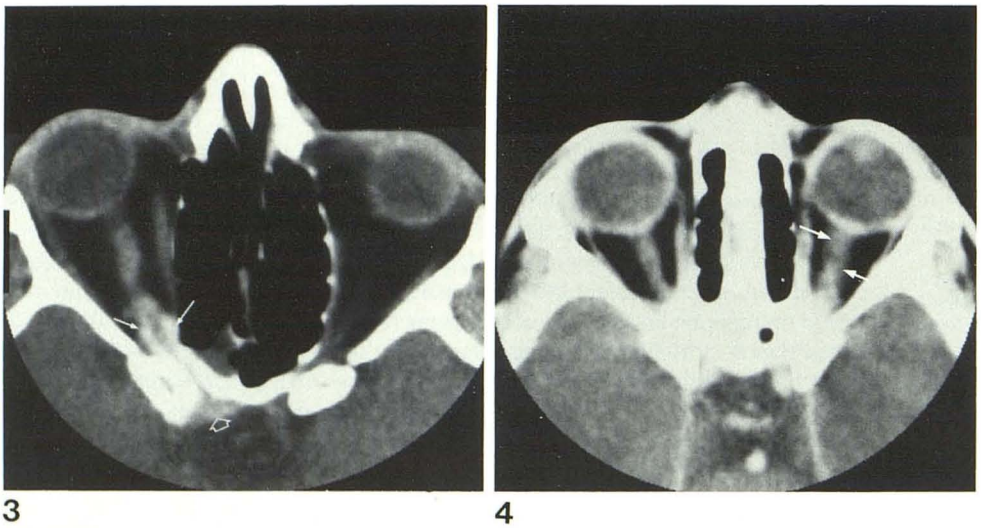

Fig. 3.—Calcified nerve sheath meningioma (*arrows*) medial and lateral to right optic nerve. Suprasellar tumor extension (*open arrow*).

Fig. 4.—Contrast-enhanced scan in patient with optic nerve glioma. Diffuse nerve thickening (*arrows*). Sheath and nerve cannot be distinguished.

Discussion

Characteristic plain radiographic and/or CT features of optic sheath meningiomas include hyperostosis of the sphenoid bone, dense tumor calcification, marked tumor enhancement after intravenous contrast material, and optic canal widening with tumor extension [1–5]. We describe another feature of optic nerve sheath meningioma. It was possible to differentiate abnormal sheath from normal nerve in three patients with surgically proven optic nerve sheath meningioma. Whereas the normal sheath and nerve cannot be distinguished by CT, the meningiomatous sheath, being hyperdense with respect to the optic nerve after intravenous contrast administration, can be distinguished by 1.5-mm-thick axial sections. Optic nerve sheath involvement with meningioma was either focal, seen as a mass next to the nerve, or diffuse, appearing as dense bands adjacent to the optic nerve in axial section or as a dense ring surrounding the nerve in coronal section. Optic nerve gliomas usually have a uniform density so that sheath and tumor cannot be distinguished fig. 4).

To detect a possible sheath meningioma when the optic nerve/sheath is enlarged, 1.5-mm-thick axial sections and 5-mm-thick coronal sections through the optic nerve after intravenous contrast material are recommended. Scans with contrast material can be done if tumor calcification is questioned.

REFERENCES

1. Gyldensted C, Lester J, Fledelius H. Computed tomography of orbital lesions. A radiological study of 144 cases. *Neuroradiology* **1977**;13:141–150
2. Wende S, Aulich A, Nover A, et al. Computed tomography of orbital lesions. A cooperative study of 210 cases. *Neuroradiology* **1977**;13:123–134
3. Forbes GS, Sheedy PF, Waller RR. Orbital tumors evaluated by computed tomography. *Radiology* **1980**;136:101–111
4. Byrd SE, Harwood-Nash DC, Fitz CR, Barry JF, Rogovitz DM. Computed tomography of intra-orbital optic nerve gliomas in children. *Radiology* **1978**;129:73–78
5. Lloyd GAS. *Radiology of the orbit*. London: Saunders, **1975**:17, 45, 119–126