Occlusive Cerebrovasculopathy after Internal Radiation and Bleomycin Therapy for Craniopharyngioma

—Case Report—

Masachika SAGOH, Hideki MURAKAMI, Yuichi HIROSE, and Keita MAYANAGI

Department of Neurosurgery, Ashikaga Red Cross Hospital, Ashikaga, Tochigi

Abstract

A 34-year-old female presented with occlusive cerebrovasculopathy without definite ischemic symptoms and regrowth of a cystic tumor in the third ventricle. She had been treated for a craniopharyngioma 19 years previously by internal irradiation with $^{198}$Au colloid combined with intracavitary administration of bleomycin via an Ommaya reservoir. Cerebral angiography demonstrated complete occlusion of the clinoid portion of the left internal carotid artery and stenosis of the left posterior cerebral artery, and numerous transdural anastomoses which had developed after craniotomy. Endoscopic management achieved collapse of the cystic tumor. No treatment for the occlusive cerebrovasculopathy was necessary because of the collateral blood supply. Careful follow-up examinations to detect occult cerebrovasculopathy after such treatment is recommended.

Key words: craniopharyngioma, endoscopic surgery, occlusive cerebrovasculopathy, radiation

Introduction

Obstruction of the internal carotid artery (ICA) by intracranial tumors is relatively rare, and most commonly involves meningiomas, gliomas, and pituitary adenomas. However, occlusive cerebral vasculopathy after radiation therapy is well known. The association of occlusive cerebrovascular diseases with craniopharyngiomas is relatively rare, with only 10 previously cases. We describe a case of unilateral ICA occlusion and posterior cerebral artery stenosis which occurred 19 years after internal irradiation therapy and intracavitary administration of bleomycin for craniopharyngioma.

Case Report

A 15-year-old left-handed female was admitted to our hospital in November 1977, because of convulsions and visual disturbance of several months duration. Neurological examination disclosed bilateral impaired visual acuity and papilledema, left oculomotor nerve paresis, left facial nerve paresis, and left cerebellar sign. Computed tomography showed a cystic mass occupying the left frontal and temporal base, partially extending to the posterior fossa. No cerebral vascular lesions were noted. Partial removal of the tumor was performed through a left frontotemporal craniotomy. Histological examination of the specimen revealed craniopharyngioma. Two months later, an Ommaya tube was emplaced in the tumor and connected to a reservoir under the temporal scalp, and internal irradiation with $^{198}$Au colloid (20 mCi) combined with intracavitary administration of bleomycin (5 mg) was carried out. After the treatment, her left facial nerve paresis and left cerebellar sign were improved but she had developed right homonymous hemianopsia and slight right hemiparesis. Her postoperative course thereafter was good, except for some neurological deficits, and the tumor collapsed.

Follow-up magnetic resonance (MR) imaging in July 1996 showed regrowth of a cystic tumor in the third ventricle, but no change in the partially calcified solid parasellar tumor (Fig. 1). She was readmitted for further examination and treatment. Left carotid angiography showed complete occlusion of the clinoid portion of the left ICA and transdural anastomosis after craniotomy, but no formation of abnormal netlike (so-called “moyamoya”) vessels in

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the basal ganglia (Fig. 2). Left vertebral angiography showed stenosis of the left posterior cerebral artery (Fig. 3). Right carotid angiography showed no abnormalities. Single photon emission computed tomography with ethylene-cystenete oxotechnetium (99mTc) diethylester showed decreased cerebral blood flow in the left occipital lobe. Endoscopic management of the regrown cystic tumor in the third ventricle was attempted. A rigid endoscope with a diameter of 8 mm was inserted via a frontal burrhole. The wall of the cyst was opened with a Nd:YAG laser and decompressed through the left lateral ventricle and foramen of Monro. Postoperative MR imaging demonstrated the cystic tumor in the third ventricle had collapsed (Fig. 4).

**Discussion**

Ischemic symptoms of radiation-induced vasculopathy usually appear within several years of ex-

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ternal radiation therapy, and only one case of vasculopathy after internal radiation therapy associated with intracerebral hemorrhage has been reported.\(^6\) In our patient, occlusive vascular disease was diagnosed 19 years after the first treatment with internal radiation therapy and intracavitary administration of bleomycin for craniopharyngioma. The occlusive vascular lesions had probably progressed within several years after radiation therapy like many other cases but the patient did not demonstrate definite ischemic symptoms because of the collateral blood supply via the transdural anastomosis which developed after craniotomy.

The occlusive vascular lesions in our case were considered to be mainly associated with radiation therapy, but the localization of the partially calcified solid tumor\(^6\) suggested the tumor might involve the cerebral arteries. Moreover, a previous case of stroke in the ipsilateral middle cerebral artery territory which developed after intracavitary treatment of craniopharyngioma with bleomycin\(^6\) suggests that bleomycin may be a cause of vasculopathy.

An effective treatment of occlusive vasculopathy is external carotid artery-ICA bypass surgery, even in cases of occlusive vasculopathy after radiation therapy for brain tumors.\(^6,11,12,18\) In our case, the blood supply via the transdural anastomosis was sufficient except for the left occipital lobe. Our patient demonstrated right homonymous hemianopsia which developed after intracavitary treatment of craniopharyngioma with bleomycin.\(^6\) It is possible that the tumor invaded the third ventricle, so development of hydrocephalus was possible, requiring closure of the cystic tumor. Therefore, burrhole surgery with endoscopy was selected.\(^9\) Endoscopic management is considered useful in such selected cases.

Occlusive cerebrovasculopathy was incidentally diagnosed accompanying regrowth of the tumor in our patient. Occlusive cerebrovasculopathy after radiation or chemotherapy without ischemic symptoms might not be rare, so careful follow-up examination after such treatment is necessary.

References

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Address reprint requests to: M. Sagoh, M.D., Department of Neurosurgery, Ashikaga Red Cross Hospital, 3-2100 Honjo, Ashikaga, Tochigi 326, Japan.