Cerebellar Mutism After Posterior Fossa Surgery

—Two Case Reports—

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Abstract

Two adults (aged 71 and 74 years) developed cerebellar mutism after posterior fossa surgery for a mass lesion in the superior cerebellar hemisphere or upper vermis. Histological examination showed one was a hemangioblastoma, the other a metastatic brain tumor. The tumors were totally removed via the occipital transtentorial approach. Both patients developed mutism on the 2nd postoperative day, which persisted for 3-4 weeks and was followed within 2-4 months by cerebellar dysarthria. Thereafter, their condition improved. Transient cerebellar mutism usually occurs in pediatric patients after the removal of a mass lesion in the upper vermis. Cerebellar mutism in adults is rare. The predominance of cerebellar mutism in children may be attributable to the predilection for vermian tumor and their tendency to experience personality and behavioral changes after posterior fossa surgery.

Key words: mutism, posterior fossa, surgery

Introduction

Mutism is the condition of complete absence of speech in a conscious individual. Postoperative mutism has occurred after extensive callosotomy, bilateral thalamotomy, or resection in the supplementary motor area. However, mutism after posterior fossa surgery is rare,^{1-15,17-23,25-34)} and almost all reported cases were in children. We describe two cases of cerebellar mutism after posterior fossa surgery in elderly adults.

Case Reports

Case 1: A 71-year-old male had a 1-year history of writing disturbance. One month prior to admission he began to experience loss of appetite and bouts of vomiting. Neurological examination on admission showed right cerebellar dysfunction and ataxic gait. Computed tomography (CT) and magnetic resonance (MR) imaging revealed a tumor in the superior cerebellar hemisphere (Fig. 1).

The tumor was totally removed via the occipital transtentorial approach. The histological diagnosis

Fig. 1 Case 1. Axial T₁-weighted magnetic resonance image with gadolinium contrast medium demonstrating a mass lesion in the superior cerebellar hemisphere.

was hemangioblastoma. Postoperative MR imaging confirmed total removal of the tumor, and showed hyperintensity areas in both paravermian regions

Fig. 2 Case 1. Axial T₁-weighted magnetic resonance image with gadolinium contrast medium obtained 6 months after the operation showing no enhancement in the area of resection.

Fig. 3 Case 2. Axial T₁-weighted magnetic resonance image with gadolinium contrast medium demonstrating a mass lesion of 3 cm diameter in the right superior vermis with reticular enhancement.

(Fig. 2).

Immediately after surgery, he was alert. Neurologi-

cal examination showed only mild truncal ataxia and moderate right arm ataxia. However, on the 2nd day after surgery he became unable to speak, apart from answering "yes" and "no." He could not form words or sentences or initiate gestures, although he was clearly able to understand simple commands. One month after surgery, he began to utter sounds and gradually regained the ability to speak with mild dysarthria. He was admitted to our rehabilitation facility 2 months after surgery. At the 4-month follow-up examination he was able to speak normally. **Case 2:** A 74-year-old female had a 2-month history of headache, nausea, and gait disturbance. Neurological examination showed papilledema, right abducens nerve palsy, bilateral oculomotor nerve palsy, and moderate truncal ataxia. CT and MR imaging revealed a mass lesion in the right cerebellar upper vermis with hydrocephalus (Fig. 3).

The tumor was totally removed via the occipital transtentorial approach. The histological diagnosis was metastatic adenocarcinoma. After posterior fossa surgery, the primary lesion was found in the rectum.

Immediately after surgery, the patient was alert and able to speak. On the 2nd postoperative day, she ceased to speak, but remained alert with normal comprehension and was able to express her emotions by laughing and crying. There were no lower cranial

Fig. 4 Case 2. Computed tomography scan with contrast medium obtained 2 months after the operation showing no enhanced lesion in the area of resection.

nerve deficits. About 3 weeks after surgery, she began to speak a few words but with severe dysarthria. At the 2-month follow-up examination she was speaking almost normally (Fig. 4).

Discussion

Transient postoperative cerebellar mutism was first described after stereotactic surgery to the bilateral dentate nucleus for dyskinetic syndromes¹⁶⁾ and after surgery for tumors in the posterior fossa.²⁷⁾ One hundred and twelve cases of cerebellar mutism after surgery have been reported,^{1-15,17-23,25-34)} but only 10 of these (9%) occurred in adults. The mean age of the 102 pediatric patients was 9.1 years, and there was no sex prevalence. Most of the 10 adult cases (age over 15 years) involved young adults^{7,11,12,29,33)} (Table 1). In contrast, both of our patients were elderly (71 and 74 years). The tumors were medulloblastoma (n = 3), astrocytoma (n = 3), metastatic brain tumor (n = 2), pineoblastoma (n = 1), and hemangioblastoma (n = 1), suggesting that the syndrome is not tumor-type specific.

The clinical characteristics of mutism after posterior fossa surgery are as follows: Almost all patients have a period ranging from 12 hours to 7 days after surgery when there is no mutism (mean 1.7 days), the mutism persists for 3 days to 16 weeks (mean 5.6 weeks), the mutism is followed by cerebellar dysarthria within 3 weeks to 21 months (mean 4.4 months), the mutism is transient, the lesion is located in the superior vermis or deep cerebellar nuclei, and there is no particular pathogenesis. These

characteristics are the same in both pediatric and adult cerebellar mutism (Table 1). Our two adult cases were similar to pediatric cases in that the mutism developed after the 2nd postoperative day and persisted for 3-4 weeks.

Why cerebellar mutism tends to occur in children is unclear. The predominance in children of posterior fossa tumors and/or the incomplete development of their verbal and emotional functions have been suggested as possible factors. We analyzed 164 patients with cerebellar tumors treated in our clinic between 1969 and 1995.²⁴⁾ Ninety-two (56%) were adults and 72 (44%) were children. Vermian tumors were present in 48 children (29.3%) and hemispheric tumors in 24 children (14.6%). In contrast, 22 adults (13.4%) had vermian tumors and 70 (42.7%) had hemispheric tumors. This indicates a significant predominance of vermian tumors in children ($p < 0.01$). Young people tend to have reduced verbalization and personality and behavioral changes after posterior fossa surgery.⁶⁾ Emotional stress and prolonged hospitalization associated with brain surgery may be factors in the manifestation of cerebellar mutism.²⁹⁾ Pediatric patients with cerebellar mutism do regain the ability to speak after discharge.^{15,22)} We suggest that the predominance of cerebellar mutism in children is related to the higher incidence of vermian tumors in children and their tendency to suffer personality and behavioral changes after posterior fossa surgery.

The cerebellar vermis was the tumor site in 92 of 112 cases (82.1%) with mutism. Radical splitting of the inferior vermis may result in the syndrome of

Table 1 Analysis of 10 adult (over 15 years old) cases of cerebellar mutism

Author (Year)	Age (yrs)	Sex	Tumor site	Histological finding	Latency of mutism	Duration of mutism	Dysarthria after mutism
Wisoff and Epstein (1984) ³³⁾	17	M	vermis	astrocytoma	48 hrs	several wks	NM
Salvati <i>et al.</i> (1991) ²⁹⁾	16	F	vermis	astrocytoma	24 hrs	several wks	NM
	20	M	vermis	medulloblastoma	46 hrs	4 wks	2 mos
D'Avanzo <i>et al.</i> (1993) ¹²⁾	20	F	vermis	medulloblastoma	48 hrs	6 wks	5 mos
	45	M	vermis	medulloblastoma	68 hrs	6 wks	3 mos
	22	M	vermis	pineoblastoma	72 hrs	16 wks	6 mos
Çakir <i>et al.</i> (1994) ⁷⁾	61	M	cerebellar hemisphere	metastasis	immediate	4 days	NM
Dailey <i>et al.</i> (1995) ¹¹⁾	20	F	vermis	astrocytoma	12 hrs	8 wks	3 mos
Present Case 1	71	M	cerebellar hemisphere	hemangioblastoma	48 hrs	4 wks	4 mos
Present Case 2	74	F	vermis	metastasis	48 hrs	3 wks	2 mos

NM: not mentioned in the literature.

oral pharyngeal apraxia with mutism.¹¹⁾ However, bilateral edema within the brachium pontis is significantly associated with cerebellar mutism whereas the size of the tumor or the length of the vermian incision is not.²⁶⁾ Damage to the superior vermis, the paravermian area, the superior cerebellar peduncles, and/or the posteromedial region of the dentate nucleus is also a possible factor in the development of cerebellar mutism.^{10,13,17)} Fibers emanate from the site of these lesions through the superior cerebellar peduncles to the contralateral red nucleus and the thalamus and supplementary motor area connected by the dentatohalamocortical pathway.^{10,17)} Regions in and peripheral to the superior vermis may be important anatomical structures in cerebellar mutism. The dentate nucleus was not injured in our two patients because of the tumor location and the surgical approach using the occipital transtentorial route. The cerebellar mutism in our patients may be ascribable to injury of the superior cerebellar peduncle connecting the dentate nucleus and the red nucleus.

Cerebellar mutism may follow the removal of mass lesions in the upper vermis, and this complication is not limited to pediatric patients.

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