



Effectiveness of neuroendoscopic ventricular irrigation for ventriculitis



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ABSTRACT

Objectives: Ventriculitis is an uncommon condition with a poor prognosis, especially when complicated by brain abscess. We compared the therapeutic efficacy of neuroendoscopic ventricular irrigation with those of conventional treatments such as ventricular drainage and continuous irrigation via a ventricular drain.

Patients and methods: We retrospectively analyzed 14 consecutive patients treated for ventriculitis at our institution between 2001 and 2015. Included were the six patients treated with neuroendoscopic (NE) irrigation (NE group), which we adopted in 2011, and the eight patients treated before 2011 with conventional treatments (non-NE group). We compared mortality, modified Rankin Scale (mRS) score 6 months postoperatively, and duration of ventricular/spinal drainage-catheter placement between groups.

Results: Mean age at onset was 49.3 years (range, 32–68 years) in the NE group and 50.3 years (range, 8–78 years) in the non-NE group. At 6-month follow-up, good clinical outcome (mRS ≤ 3) was observed in 66.7% of the NE group, whereas it was observed in 25.0% of the non-NE group. There were three deaths (37.5%) in the non-NE group but none in the NE group. Duration of drainage-catheter placement was significantly shorter in the NE group than in the non-NE group (19.8 days vs. 70.9 days, $p < 0.001$). Among patients in the NE group, only those who underwent irrigation on the day of diagnosis maintained a low mRS score.

Conclusion: Neuroendoscopic ventricular irrigation was safe and effective in the treatment of ventriculitis. Immediate intervention after diagnosis may lead to an improved prognosis.

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1. Introduction

Even with antibiotic treatment, ventriculitis has a poor prognosis, especially when accompanied by brain abscess. Mortality associated with ventriculitis has been reported to be 30–50% [1], and only a small proportion of patients become independent. Although there is not sufficient information for the incidence of ventriculitis especially for ventriculitis following spontaneous infection such as meningitis, it has been reported that ventriculitis occurred in 1–2% of patients who underwent neurosurgery and 3.4–21.9% of patients with ventricular drainage placement [2,3]. We have treated ventriculitis with neuroendoscopic (NE) irrigation since 2011. Although there are several case reports of NE irrigation for ventriculitis [4–7], its benefits have not been widely reported.

We compared the therapeutic efficacy of NE ventricular irrigation for ventriculitis and those of conventional treatments, such as ventricular drainage or continuous irrigation via intraventricular catheter, to determine their effects on mortality, durations of ventricular/spinal drainage-catheter placement and hospital stay, and complications.

2. Patients and methods

2.1. Study population

This was a single-center, retrospective study conducted in accordance with the Declaration of Helsinki and approved by the institutional review board of Kyoto University Hospital. We analyzed 14 consecutive patients with ventriculitis treated at our institution between 2001 and 2015. Clinical characteristics of the study population were collected from medical records.

Among the 14 patients, were six treated with NE irrigation (NE group), which we adopted in 2011. Their treatment strategy

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Table 1
Characteristics of patients with ventriculitis treated with or without neuroendoscopy-assisted ventricular irrigation.

Patient No.	NE irrigation	Age (years)	Sex	Initial symptoms	Predisposing factors	Site of brain abscess	Drainage catheter placement (days)	Hospital stay (days)	Pre-infection mRS	6-month mRS	NE wait time (days) ^a
1	–	53	F	Fever/DOC	AML, lung abscess, pyogenic spondylitis, Ommaya reservoir	Lt temporal	49	49	3	6	NA
2	–	39	F	Fever	VP shunt	None	41	55	3	3	NA
3	–	49	M	Fever, DOC	VP shunt	None	76	140	2	6	NA
4	–	78	M	Fever/DOC/Rt hemiparesis/convulsion	PLIF surgery	Bilateral epidural	39	39	3	6	NA
5	–	68	M	DOC	Dural AVF surgery with spinal drainage	None	84	193	4	5	NA
6	–	75	F	DOC	Liver abscess	None	41	84	0	3	NA
7	–	32	F	Fever/headache/nausea	VP shunt	None	91	134	3	4	NA
8	–	8	M	DOC	Craniopharyngioma surgery with ventricular drainage	None	146	187	4	5	NA
9	+	49	M	DOC	Cerebellar hemangioblastoma surgery	Epidural	30	138	3	5	12
10	+	43	F	DOC	Intraventricular ependymoma surgery	None	9	101	3	3	0
11	+	32	M	Fever/nausea/DOC	Pearl tumor tympanitis/T1DM	Lt temporal/periosteum	32	72	0	3	4
12	+	61	M	Fever/fatigue	T2DM	Rt Occipital/Rt temporal/Lt parietal	11	42	1	2	3
13	+	43	M	Fever/headache/nausea	T2DM	Lt cingulate gyrus	13	42	0	0	0
14	+	68	M	Fever/aphasia	None	Lt temporal	24	66	1	4	4

AVF: arteriovenous fistula; AML: acute myeloid leukemia; AVM: arteriovenous malformation; DOC: decline of consciousness; F: female; IVH: intraventricular hemorrhage; Lt: left; M: male; mRS: modified Rankin scale; NE: neuroendoscopic; PLIF: posterolateral interfusion; Rt: right; T1DM: type 1 diabetes mellitus; T2DM: type 2 DM; VP: ventriculoperitoneal.

^a Time from diagnosis of ventriculitis to endoscopic irrigation.

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