

Ventriculitis Associated with Extended Spectrum Beta-Lactamase Producing *Klebsiella pneumoniae* after Acupuncture

Soo-Hyun Park, MD and Wi-Sun Ryu, MD, PhD

Department of Neurology, Stroke Center and Korean Brain MRI Data Center, Dongguk University Ilsan Hospital, Goyang, Korea

Background: Ventriculitis is a rare and critical infection of the central nervous system. Here, we report a case of ventriculitis by extended spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae*, after acupuncture at the low back.

Case Report: A 72-year-old woman visited our center with fever, headache, and decreased mental status, after undergoing low back acupuncture. Brain imaging showed the fluid-debris level in the lateral ventricle, suggesting ventriculitis. ESBL producing *Klebsiella pneumoniae* were cultured from the cerebrospinal fluid. After the administration of antibiotics, although the ventriculitis was treated, the quadriplegia remained.

Conclusions: This case stresses the importance of aseptic techniques during acupuncture.

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Corresponding Author:

Wi-Sun Ryu, MD, PhD
Department of Neurology, Stroke Center
and Korean Brain MRI Data Center,
Dongguk University Ilsan Hospital, 27
Dongguk-ro, Ilsandong-gu, Goyang
10326, Korea
Tel: +82-31-961-7217
Fax: +82-31-961-7212
E-mail: wisunryu@gmail.com

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INTRODUCTION

Ventriculitis is a rare infection of the central nervous system caused by infection of the ventricular drainage system.¹ It is a life-threatening infection, with a high mortality ranging from 30 to 70%, and an early diagnosis is essential for appropriate treatment.¹ Ventriculitis is the secondary manifestation following meningitis, cerebral abscess, intraventricular hemorrhage or iatrogenesis. Brain surgery and invasive procedures have been reported as probable causes of ventriculitis.² Staphylococci is the leading bacterial pathogen of ventriculitis,³ and other strains have also been reported.

Extended-spectrum beta-lactamase (ESBL) producing bacterial infection has emerged as a serious complication after

a neurosurgical procedure.^{4,5} However, ventriculitis caused by ESBL producing *Klebsiella pneumoniae* has rarely been reported. To relieve musculoskeletal pain, acupuncture is widely performed in East Asia, particularly in Korea.⁶ Herein, we report a case of ventriculitis caused by ESBL producing *Klebsiella pneumoniae* after acupuncture on the low back.

CASE REPORT

A 72-year-old housewife was admitted to our hospital, with symptoms of irritability and a decreased level of consciousness. She had undergone acupuncture on the day of admission, due to a history of chronic low back pain.

She received multiple acupuncture from L1 to L5 for more than an hour. On the night of acupuncture treatment,

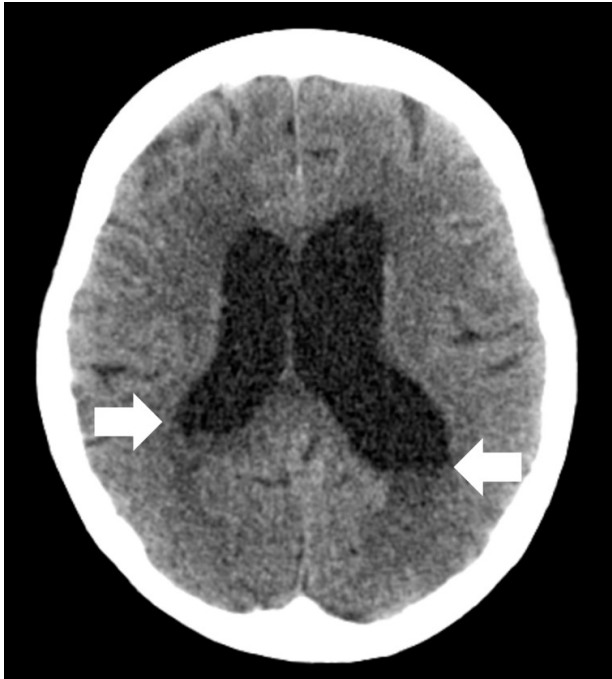


Figure 1. Brain CT showed diffuse ventriculomegaly with fluid level (white arrows), suggesting hydrocephalus and ventriculitis. Brain CT showed multifocal low attenuation in periventricular white matter, suggesting chronic ischemic lesion or interstitial edema. CT, computed tomography.

she complained of a headache and vomiting, and became drowsy. Her past medical history was unremarkable, except for poorly controlled diabetes mellitus. At admission, her body temperature was 37.2°C. Neurological examination revealed stupor and a sluggish light reflex, pupil dilatation, and ptosis of the left eye, and neck stiffness. On physical examination, no abscess or local inflammation was observed in the low back area. Laboratory study revealed increased C-reactive protein (38.39 mg/dL) and normal leukocyte count (7880/mm³). Cerebrospinal fluid (CSF) analysis revealed elevated leukocyte count 30750/mm³ (89% were neutrophils), low glucose concentration (10 mg/dL), and elevated protein level (441 mg/dL). Brain computed tomography on admission showed moderate dilatation of both lateral ventricles due to fluid accumulation (Fig. 1), suggesting ventriculitis. Brain magnetic resonance imaging demonstrated mild dilatation of the both lateral ventricles surrounded by increased signal, subtle diffusion high signal fluid-debris levels in both occipital horns, and high signal along with ependyma (Fig. 2). These features were consistent with ventriculitis. There was no growth on aerobic culture, but there was growth of small white hemolytic colonies grew after 48 hours from the CSF inoculated onto fastidious anaerobic broth media. However, no bacteria were detected

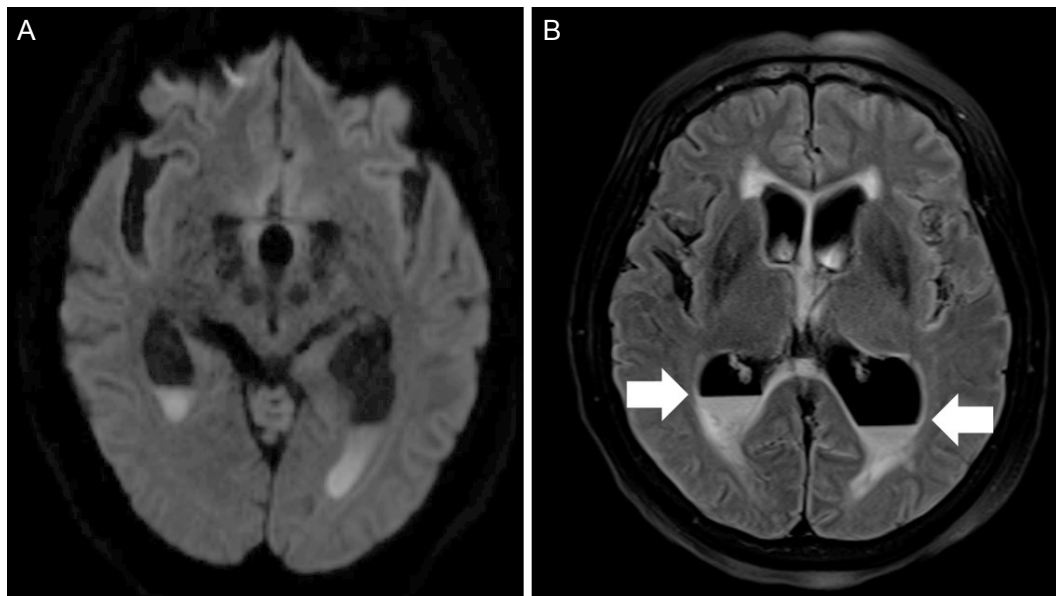


Figure 2. Diffusion-weighted brain magnetic resonance imaging (A) showed diffuse subtle high signal intensity along the sulci, and ventricular enlargement. Fluid-attenuated inversion recovery image (B) showed fluid-debris levels (white arrows) in both occipital horns.



Figure 3. Follow-up brain computed tomography showed remarkable improvement with hydrocephalus and ventriculitis.

in blood culture. Biochemical profiling demonstrated that the colonies were *Klebsiella pneumoniae*. Initially, the patient received empirical antibiotic therapy, of 2 g of intravenous ceftriaxone every 12 hours, 1600 mg of intravenous ampicillin every 4 hours, 1 g of intravenous vancomycin every 12 hours, and intravenous dexamethasone (4 mg) every 6 hours. Following the results of biochemical profiling, the antibiotics were changed to intravenous meropenem 2 g every 8 hours. External ventricular drainage and intrathecal administration of antibiotics (amikacin at 30 mg per day for 10 days) was performed. Brain imaging demonstrated hydrocephalus with interval regression and focal intracranial hemorrhage along the external ventricular drainage tract (Fig. 3). After the end of treatment, she became to be alert, although the tetraplegia persisted.

DISCUSSION

This is the first report of ventriculitis by ESBL producing *Klebsiella pneumoniae*, after acupuncture. Symptoms developed after the patient underwent acupuncture on the lower back; the absence of systemic leukocytosis in the ini-

tial laboratory test, and no growth of bacterial in the blood culture suggest that a direct inoculation of ESBL producing *Klebsiella pneumoniae* during acupuncture may be the cause of ventriculitis.^{7,8}

The causative organism, ESBL producing *Klebsiella pneumoniae*, has not been previously reported as a cause of ventriculitis. *Klebsiella pneumoniae* is found as normal skin flora, and recent epidemics of ESBL producing *Klebsiella pneumoniae* have been recurrently reported.^{9,10} Most of the infections of ESBL producing *Klebsiella pneumoniae* were nosocomial, via inadequately decontaminated hands of medical personnel and contaminated surfaces and equipment.^{11,12} In addition, ESBL producing *Klebsiella pneumoniae* are often found in the intestinal organs or respiratory organs of immunocompromised persons.¹³ Thus, it is reasonably assumed that insufficient aseptic technique during acupuncture may have inoculated the normal skin flora into the CSF.¹⁴

Acupuncture is a group of procedures involving stimulation of anatomical locations on or in the skin, by various techniques.⁶ Numerous approaches are available for the diagnosis and treatment, that incorporate medical traditions from China, Japan, Korea, and other countries.¹⁵ Various complications after acupuncture, including pneumothorax, spinal cord injury, cellulitis, and systemic bacteremia, have reported.¹⁵ Acupuncture is often performed without properly disinfection of the patient's skin, and the needle might be reused without adequate sterilization.¹⁵

In this case, the patient had poorly controlled diabetic mellitus, and may have received the acupuncture treatment without proper preparation of the skin. Our case demonstrates that acupuncture on the skin around the CSF space could result in serious central nervous system infection due to the direct inoculation of bacteria. To prevent grave infections following acupuncture, meticulously aseptic technique should be implemented during the procedure.

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