A Case of Multiple Brain Infarctions Associated With *Erysipelothrix rhusiopathiae* Endocarditis

Sang-Bae Ko, MD; Dong-Eog Kim, MD; Hyung-min Kwon, MD; Jae-Kyu Roh, MD, PhD

A 63-year-old woman was admitted to our hospital because of fever and altered mental status. Brain magnetic resonance imaging showed multiple infarctions at the basal ganglia, cerebellum, and subcortical white matter with petechial hemorrhage, which was more easily seen on gradient echo images. *Erysipelothrix rhusiopathiae* was cultured from her blood, and echocardiography showed septic vegetations in the mitral valve. She recovered fully after 6 weeks of appropriate antibiotic treatment.

Organisms of *Erysipelothrix rhusiopathiae* usually colonize in the tonsils and gastrointestinal tract of various animals, such as swine, chicken, dogs, eels, and fish. Because these animals are continuously shedding *E rhusiopathiae* through urine or fecal materials, human infection usually occurs to persons at risk such as veterinarians, butchers, farmers, and fishermen, who are in intimate contact with these animals.

Human infections by *E rhusiopathiae* are rare, although there are some clinical forms of infection, the most common being the self-limiting erysipelas cellulitis. The others are diffuse cellulitic and septic bacteremic forms, with or without endocarditis. Intracranial manifestation of the *E rhusiopathiae* infection is rare. To our knowledge, there has been only one case report describing the intracranial manifestation as hemorrhagic infarction, identified from brain computed tomography.

Herein we report a case of multiple brain infarctions caused by *E rhusiopathiae* endocarditis with brain magnetic resonance (MR) imaging findings.

**REPORT OF A CASE**

A 63-year-old woman was admitted to our hospital because of fever and altered mental status. She was a fisherwoman who was a heavy drinker and a carrier of hepatitis B. One month previously, she had cut her fingers with a sickle during work. The wound did not heal completely, but she kept fishing for small octopus and digging out shellfish at the seashore.

Twenty-five days before admission, she had developed pinhead-sized multiple erythematous skin lesions on her left upper extremities, which subsided spontaneously, without treatment. Twenty days before admission, she had developed headache and fever with nausea, and was admitted to another hospital. Results of neurologic examination were normal, but brain T2-weighted MR images showed multiple high signal intensities in the right temporal lobe, corpus callosum, and right middle cerebellar peduncle. Diagnosed as having neurocysticercosis, the patient was treated with praziquantel. Enzyme-linked immunosorbent assay tests of serum and cerebrospinal fluid were negative for cysticercosis, and the patient’s condition did not improve after medication. Fifteen days before admission, her fever was aggravated and she became stuporous. A follow-up T2-weighted image showed multiple high signal intensities at the bilateral thalamus, bilateral cerebellum, bilateral basal ganglia, and corona radiata, which had not been seen in previous images (Figure, B). Corresponding lesions showed high signal intensities on diffusion-weighted imaging (Figure, C). Apparent diffusion coefficient values of the right corona radiata
were low (455.8±48.5 × 10^−6 mm^2/s). These lesions had a hemorrhagic nature, which was confirmed by gradient echo imaging (Figure, D). After this, she was transferred to our hospital for further evaluation.

On admission, her body temperature was 38.5°C; blood pressure, 150/90 mm Hg; and pulse rate, 80 beats/min. There was a diastolic murmur on cardiac auscultation. On neurologic examination, she was comatose. Fundus examination showed multiple hemorrhagic spots on her retina, but results of other cranial nerve examinations were normal. Her motor power was decreased on her right side (Medical Research Council grade 2/5) and she localized the pain to her left hand. Deep tendon reflexes were symmetrically 3+, and plantar responses were bilaterally extensor; neck stiffness was also observed.

Transthoracic echocardiography, performed on the day of admission, showed 1-cm vegetations in the aortic valve cusps, with a moderate amount of aortic regurgitation. Diagnostic cerebrospinal fluid tapping demonstrated pleocytosis (white blood cell count, 56 cells/µL) and elevated protein level but normal glucose level (protein, 5.5 g/dL; glucose, 60 mg/dL [3.3 mmol/L]; serum glucose, 116 mg/dL [6.4 mmol/L]). With a diagnosis of multiple infarctions associated with bacterial endocarditis, the patient was treated with nafcillin sodium, 2 g 6 times per day, plus gentamicin sulfate, 120 mg 3 times per day. However, her fever persisted and mental status did not improve. From her blood culture, gram-positive rods compared with gram-negative cocci, did not improve. From her blood culture, gram-positive rods compared with gram-negative cocci, were isolated. Clinically significant pathogens are rare among infections.6 and there are many cases of infections in patients with a poor general condition, such as renal transplantation,7 acute leukemia,8 or terminal cancer.9 Our patient was a heavy drinker and a carrier of hepatitis B, which, together with her liver cirrhosis, may have contributed to high signal intensities on diffusion-weighted imaging, of multiple brain infarctions with E. rhusiopathiae endocarditis. There has been a report about intracranial manifestation of E. rhusiopathiae.3 In general, neurologic manifestations of infective endocarditis are related to sites of endocarditis and are more common in patients with mitral valve infection than with aortic or tricuspid valve infections.5 The manifestations also depend on the virulence of the pathogen.3 Erysipelothrix rhusiopathiae endocarditis is common in the aortic valve, but its virulence is low. Taken together, these may explain the rarity of intracranial manifestations. In our patient, her general condition may have played a role in the pathogenesis. Chronic alcohol ingestion is accepted as the most common underlying medical condition in Erysipelothrix infections,8 and there are many cases of Erysipelothrix infections in patients with a poor general condition, such as renal transplantation,7 acute leukemia,9 or terminal cancer.4 Our patient was a heavy drinker and a carrier of hepatitis B, which, together with her liver cirrhosis, may have contributed to systemic Erysipelothrix infection.

The nature of the intracranial lesions was thought to be multiple infarctions caused by septic emboli. In addition, gradient echo imaging demonstrated multiple tiny lesions with dark signal intensity, suggesting hemorrhagic foci, which were not detected on the conventional T1- or T2-weighted images. Thus, gradient echo imaging seems to have a role in the diagnosis and management of E. rhusiopathiae infections.

On the initial blood cultures, gram-positive rods were isolated. Clinically significant pathogens are rare among gram-positive rods compared with gram-negative cocci,
gram-negative rods, or gram-positive coccobacilli. Usually, gram-positive rods that grow in cultures are regarded as contamination. However, there are some possible pathogens, such as Corynebacterium, Listeria, Nocardia, Actinomyces, and Erysipelothrix species. Therefore, when gram-positive rods are isolated in cultures, we should consider E rhusiopathiae as one of the possible sources, especially in immunocompromised patients and persons at high risk, such as fishermen, butchers, farmers, and veterinarians.

The mortality rate for E rhusiopathiae infection can be as high as 38%, from the literature, under appropriate antibiotic treatment. Fortunately, our patient recovered fully after the appropriate antibiotic treatment was given. Although Erysipelothrix infection is rare, we should think of it as part of the differential diagnosis and start appropriate antibiotics in patients in the high-risk category when gram-positive rods are isolated.

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Corresponding author and reprints: Jae-Kyu Roh, MD, PhD, Department of Neurology, Seoul National University Hospital, Yongon-dong 28, Chongno-gu, 110-744, Seoul, Korea (e-mail: rohjk@snu.ac.kr).

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