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Rapid diagnosis of serotype K1 *Klebsiella pneumoniae* meningitis via an immunochromatographic strip assay on cerebrospinal fluid

Dear Editor,

Central nervous system infection is associated with devastating sequelae requiring prompt diagnosis and treatment. We, herein, describe a case of acute bacterial encephalomeningitis caused by serotype K1 *Klebsiella pneumoniae* diagnosed via a rapid immunochromatographic strip test directly from the patient's cerebrospinal fluid (CSF).

A 62-year-old diabetic man presented to the emergency department with altered mental status for 1 day. On presentation, his temperature was 40.5 °C (104.9 °F), blood pressure 76/51 mmHg, pulse rate 132/minute, and respiratory rate 38/min. Initial Glasgow Coma Scale score was 9, and neck stiffness was noted. Due to the respiratory distress, he was intubated. On exclusion of intracranial hemorrhage after brain computed tomography, lumbar puncture was performed, and an opening pressure of 12 cm H_2O was noted. CSF analysis showed turbid appearance, white blood cell count of 16909/μL (85% neutrophils), glucose <10 mg/dL (serum glucose 81 mg/dL), and protein >600 mg/dL. Initial rapid tests using the FilmArray® Meningitis/Encephalitis panel (BioFire Diagnostics, USA) described before did not detect any causative pathogens.[1] Moreover, serotype K1 *K. pneumoniae* was diagnosed via immunochromatographic strip test (KeMyth Biotech, Taiwan) (Fig. 1 A). Initial antibiotic regimen with vancomycin and meropenem was then shifted to ceftriaxone intravenous 2 g every 12 h accordingly. Follow-up CSF culture grew *K. pneumoniae* sensitive to all antibiotics except for ampicillin. Further capsular serotype determination by polymerase chain reaction, using the protocol as described, was serotype-K1 consistent with the initial strip test result.[2] The magnetic resonance imaging of the brain performed later indicated encephalomeningitis (Fig. 1B). A thorough investigation did not reveal other metastatic infectious foci. His condition improved after treatment but had severe neurological sequelae with tetraparesis and low cognitive functions. He was eventually transferred to a long-term care facility for further chronic care.

In Taiwan, *K. pneumoniae* is one of the leading causative pathogens with a prevalence rate of approximately 25%–40% among adult with community bacterial meningitis.[3] Serotype K1/K2 were the major serotypes among those with concomitant liver abscess or primary bacterial meningitis.[3,4] Current available rapid diagnostic meningitis panel can rapidly evaluating 14 pathogens using a sample of the patient's CSF with results being available within an hour.[1] However, *K. pneumoniae*, a locally prevalent pathogen of bacterial meningitis in Taiwan, could not be detected via this assay. The colloidal immunochromatographic strip assay we presented here has been reported successfully dectecting serotype K1/K2 *K. pneumoniae* from pus and positive flagged blood culture.[2] It has been approved by Taiwan Food and Drug Administration for rapid detection of serotype K1/K2 *K. pneumoniae* directly from various types of samples. Early diagnosis of serotype K1/K2 *K. pneumoniae* could help clinicians proper initial antibiotic prescription. Moreover, due to high risk for metastatic foci at other sites in patients with serotype K1/K2 *K. pneumoniae*, immediate detection serotype K1/K2 *K. pneumoniae* can alert clinicians search for possible occult metastatic foci as liver abscess which need further therapeutic intervention to improve sepsis control. Therefore, the immunochromatographic strip test can be utilized as a supplementary rapid diagnostic tool in patients with meningitis in Taiwan.

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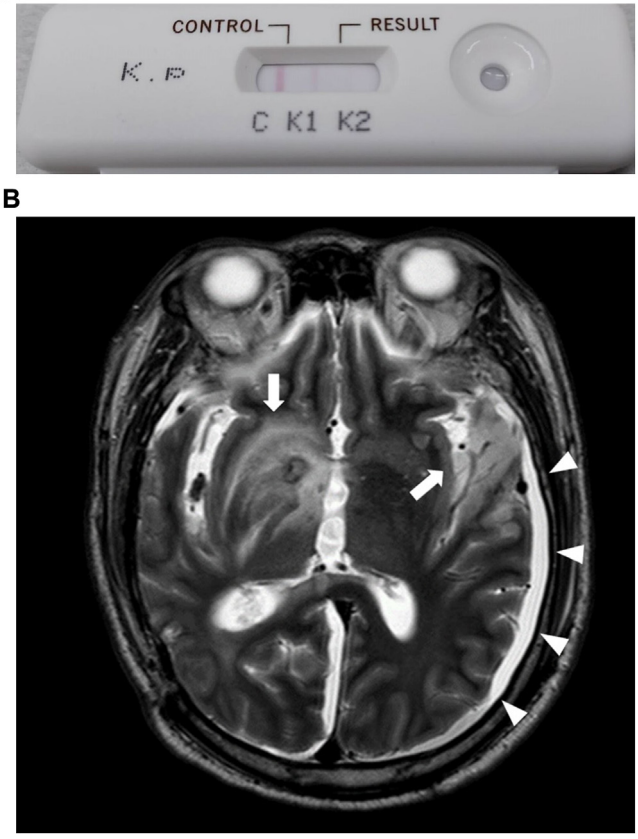

Figure 1. A Immunochromatographic strips showed positive serotype K1. Fig. 1B. Axial T2-weighted image of magnetic resonance imaging of the brain, showing subdural effusion, cerebritis change in left temporal lobe and right basal ganglion with small abscess-like lesion, indicative of encephalomeningitis.

Declaration of competing interest

None.

Acknowledgments

None.

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