Meningitis Diagnosed With Computed Tomography Scan of Brain

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Background
Meningitis is an infection, usually viral or bacterial, of the cerebrospinal fluid. Viral meningitis is usually less severe and can resolve without specific treatment, while bacterial meningitis is more severe and can lead to brain damage, hearing loss, or learning disability.¹ Common symptoms of meningitis are high fever, headache, and stiff neck, usually developing over several hours until 1 to 2 days. Other symptoms may include nausea, vomiting, photophobia, confusion, and drowsiness. As the disease progresses, patients may have seizures.¹

Timing of antibiotics administration in bacterial meningitis is crucial. Appropriate antibiotics treatment reduces the risk of dying to below 15%. Anti-seizure medication such as steroids is used to alleviate intracranial pressure.²

Although lumbar puncture still the main modality to diagnose meningitis, a number of departments are performing cranial CT in patients without clinical signs of raised intracranial pressure to determine the safety of lumbar puncture.³ Contrast-enhanced CT could present the beginning of meningeal enhancement, which becomes clearer in later stages of disease.

Parenchymal lesions are not easily visualized, except for areas of ischemia due to secondary vasculitis. CT scan is important to define pathology that may cause meningitis, such as infection of the paranasal sinus or petrous bone as well as inner ear infection and mastoiditis. In later stages, persistent drowsiness and meningeal signs should be regarded as an indication for repeat CT to rule out a resorbive hydrocephalus. If external ventricular drainage is required, further CT studies to check on ventricular size will help the surgical decision.⁴ Therefore, we present this case study about meningitis imaging of CT scan with contrast enhancement.

Abstract
Meningitis is defined as inflammation of the meninges, which consists of dura mater, arachnoid mater, and pia mater. Meningitis can be caused by infectious and non-infectious processes such as autoimmune disorders, cancer, drug reactions. Meningitis can have a varied clinical presentation. Symptoms such as fever, neck pain or stiffness, photophobia, headache, dizziness, confusion, delirium, irritability, and nausea or vomiting may present. Signs of increased intracranial pressure such as altered mental status, neurologic deficits, and seizures indicate poor prognosis. Meningitis is diagnosed through cerebrospinal fluid analysis. However, there is controversy that the lumbar puncture could lead to brain herniation in the presence of increased intracranial pressure. Thus, Computed Tomography Scan (CT scan) could be alternative modality. In this case, we present meningitis diagnosed with CT scan of brain.

Keywords: Brain, Computed tomography, Meningitis

Figure 1.
CT scan revealed meningitis with no ventriculomegaly/hydrocephalus
Discussion

A 47-year-old woman was presented to our outpatient clinic with a progressively worsening headache, high fever, neck stiffness, and seizure. She gave a history of gradually increasing headaches that over the past 3 days had become unbearable and associated with fever and chills. She had tonic clonic seizure thrice with loss of consciousness. She also had neck stiffness. The patient did not feel nauseated. There was no travel history or recent ill contacts. She had a history of hypertension and dyslipidemia, and take 10 mg amlodipine once daily as regular medications. She had not taken any new medication recently, and did not smoke or drink alcohol. She had not given any antimicrobial therapy prior to her admission. CT scan without and with 50 cc of lohexol 300 contrast intra-vein axial section shows enhancement and increased thickness of 5-10 mm from base to vertex, indicating meningitis, no ventriculomegaly/hydrocephalus was seen, indicating no increased intracranial pressure. From this result, we can conclude that the patient had Meningitis. Lumbar puncture was proposed to confirm the diagnosis.

Computed tomography (CT) scanning is often performed first to exclude contraindications for lumbar puncture. Unfortunately, while increased intracranial pressure is considered a contraindication to lumbar puncture, normal CT scan findings may not be enough to exclude increased intracranial pressure in patients with bacterial meningitis. MRI is better than CT scanning in the evaluation of patients with suspected meningitis, as well as in demonstrating leptomeningeal enhancement and distention of the subarachnoid space with widening of the interhemispheric fissure, which is reported to be an early finding in severe meningitis. However, MRI is very high-cost and unavailable in our hospital. Thus, Contrast enhancement brain CT scan still the first line diagnostic modality to help diagnose meningitis.
List of abbreviations
CT - Computed tomography
MRI - Magnetic Resonance Imaging

Declarations

Ethics approval and consent to participate
Informed consent from the patient has been obtained before the study.

Consent for publication
Consent for publication regarding patient data has been obtained before the study. All the patient identity has been kept secret.

Availability of data and materials
Not Applicable

Competing interests
The authors declare that they have no competing interests.

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