Case Report

ACUTE NON-COMMUNICATING HYDROCEPHALUS DEVELOPED WITHIN 48 HOURS IN A PATIENT WITH SYSTEMIC LUPUS ERYTHEMATOSUS

Abstract

Hydrocephaly is a rare manifestation of systemic lupus erythematosus (SLE), and the pathogenesis is still unclear. Some studies suggest cerebral venous thrombosis, immune complex deposition within the arachnoid villi, or direct post-inflammatory lesions of the central nervous system (CNS) as possible causes, but these remain unproven. We report a case of acute non-communicating hydrocephalus secondary to stenosis of the aqueduct of Sylvius. The condition developed within a 48-hour period as the result of cerebrovascular accident in a 40-year-old man with previously diagnosed SLE. The pathophysiologic mechanism of hydrocephalus in SLE is subject to various arguments and remains a dilemma facing researchers.

Introduction

Genetic and acquired etiologies of hydrocephalus have been identified, each with different pathogeneses and pathophysiologic mechanisms. SLE is a systemic autoimmune connective tissue disease with a variety of clinical manifestations that affect various internal organs, oral and conjunctival mucosa, cardiac and blood vessel endothelium, pericardial serosa and valves of the heart, joints, muscles, skin, lung pleura, liver, kidney glomeruli, and the central and peripheral nervous systems (1,2). A review of the literature shows that during any time point in the course of SLE up to 50% of patients show neuropsychiatric involvement (3). Hydrocephalous is a rare manifestation of SLE associated with central nervous system (CNS) involvement. In this case we report a patient with acute hydrocephalous developed within 48 hours as a result of an SLE-related cerebrovascular accident. We review the literature and attempt to prove the pathogenesis and pathophysiology of acute hydrocephaly associated with systemic lupus erythematosus.

Case presentation

A 40-year-old male with a history of SLE, hypertension, nephritis and chronic renal failure was admitted to the emergency unit with complaints of weakness in the left upper extremity and facial paralysis. A classic form of cerebrovascular accident (CVA) was the initial diagnosis, after cranial Magnetic Resonance Image (MRI) (axial plan, Flair and T2 Weighted image) examination revealed subcortical hyperintense lesions thought to be secondary to lupus (bilaterally in the thalamus and corona radiata and in the left side of the mesencephalon), The patient developed anisocoria secondary to the vasculopathic lesion in the mesencephalon, but he was alert. Coma developed within 24 hours (Glasgow Coma Score was 8 with E2M4V2). Left eye ptosis, pupil dilatation and absence of light reflex on the left side, left hemiplegia and right hemiparesis were seen on examination. The next day, the patient had a Glasgow Coma Score of 6 and respiratory difficulties. Intubation was done, and the patient was sent to the intensive care unit, Axial plan cranial Computer Tomography (CT) result was almost similar lesions of cranial MRI taken 3 days before and stil no signs of hydrocephalus. Laboratory tests showed normal results except for blood urea of 214 mg/dl and creatinine of 3.11 mg/dl high values compared to normal levels. Rheumatology department was consulted, intravenous prednisolone (1 gram/day) was prescribed for the first 3 days, then the dose was decreased to 40 mg in the morning and 20 mg in the evening to be continued for 4 weeks. Control cranial CT demonstrated non-communicating hydrocephaly, which had developed approximately within the last 48 hours as indicated by the CT image obtained 2 days earlier. External ventricular drainage was applied. Examination of the

cerebrospinal fluid (CSF) showed increase in a cell count of 684, with 95% polymorphonuclear leukocytes. Because of the presence of meningoencephalitis, antibiotherapy was started empirically. The patient was followed for the next 9 days in the intensive care unit. There was no improvement in the patient's clinical course despite supportive mechanical ventilation and medical treatment he died of sepsis.

Discussion

SLE is a systemic autoimmune connective tissue disease with a variety of clinical manifestations. The causes of SLE are unknown but are believed to be linked to genetic, environmental and hormonal factors (1). The diversity of neuropsychiatric involvement creates difficulties in diagnosis and research. During any time point in the course of systemic lupus erythematosus (SLE), up to 75% of patients show neuropsychiatric involvement, one of the major causes of morbidity and second most frequent cause of mortality in SLE. Neuropsychiatric lupus includes various syndromes affecting central, peripheral, and autonomic nervous systems, but increased pressure communicating or noncommunicating hydrocephalus are rarely recognized complication concomitant with SLE(3).

The pathogenesis and pathophysiologic mechanism of hydrocephalous associated with SLE are yet unproven (4), although several alternative mechanisms have been proposed in the literature. One hypothesis is that corticosteroids and other immune suppressive agents used in the treatment of SLE can lead to increased risk of opportunistic CNS infection, and these infections can lead to impairment of CSF and subsequent hydrocephalus (5). Normal pressure hydrocephalus (NBH) in a 77-year-old patient with SLE has been reported, but no cause was found (6). On the other hand, Krauss and associates showed a highly significant association between idiopathic NPH and arterial hypertension (7).

Verrees hypothesizes that the development of hypertension beyond the limits of cerebral autoregulation leads to breakdown of the blood-brain barrier in the cerebellum and development of posterior fossa edema secondary to focal transudation of protein and fluid. All of these studies show hypertension as an impotant contributing cause of NPH and obstructive hydrocephalus due to vascular encephalopathy (8). In some lupus patients, hyperviscosity disrupt blood flow and might be involved in hydrocephalus (9). Immune complex deposition can affect the brain parenchyma directly, or within the cerebrovascular system that can impair CSF flow into the arachnoid villi. Thromboembolic formation that blocks the small arteries, choroid plexus or cerebral venous system can be conceived as another pathophysiologic mechanism to explain the development of intracranial hypertension (4). Kitching et al. (10) described two cases of communicating hydrocephalus in SLE patients, with cerebral phlebitis involving both deep and cortical veins demonstrated through angiography. In postmortem examination of one of the patients, periphlebitis and periarteritis were noted in the brain and leptomeninges, and thrombosis and recanalization were seen in veins and arteries. Secondary antiphospholipid antibody syndrome (Hughes syndrome) is another cause of communicating-type hydrocephalus(10,11,12). The hypercoagulable state caused by antiphospholipid antibodies increases the risk of developing generalized blood clots (thrombosis) in both arteries and veins. In rare cases, catastrophic antiphospholipid syndrome, associated with a high risk of death, may cause rapid organ failure usually painless, sudden onset of paralysis, loss of speech and intracranial hypertension syndrome (13). Borenstein and Jacobs (10) reported the case of a 46-year-old woman with SLE and non-communicating hydrocephalus. They concluded that the cause of the non-communicating hydrocephalus was aqueduct stenosis caused by post-inflammatory lesions of CNS lupus.

In the diffusion MRI, sections showed localized irregular basal ganglia and midbrain infarction or infarction-like lesions with diffuse edema on the left side of the superior peduncle and the

quadrigeminal plate region (Figure 1). A follow-up cranial CT taken 3 days later showed almost similar lesions but no hydrocephalus (Figure 2). Somnolence and coma developed, and approximately 48 hours later a new CT of the brain revealed non-communicating hydrocephalus (Figure 3). We could not have a control diffusion MRI for comparison, but the last control cranial CT was demonstrative to some extent. However, we were able to observe only the narrowing of the basal cisterns, partial narrowing of aqueduct cerebri and the hydrocephalus. It is worthy to mention that specific serological tests, radiological modalities such as PET CT, functional MRI, MRI angiography, CSF flow MRI and venography (to detect the pathogenesis of dural sinuses obstruction and aqueduct stenosis) and Digital Substraction Angiography (DSA) are of extreme important to provide informations and subsequently in evaluation of neuropsychiatric SLE patients. Unfortunately we couldn't obtain such investigation methods for our case to obtain evidents that strength our data and to prove our argument.

To discern the pathogenesis and pathophysiologic mechanisms of hydrocephalus in the case reported here, the most important question to be answered is how hydrocephalus developed within 48 hours. The rapid development of hydrocephalus in this case raises doubts about stroke as a manifestation of SLE. Regarding the pathogenesis of stroke in SLE patients, primary and secondary causes have been suggested. The primary causes include vasculitis, specific antineuronal antibodies and lupus anticoagulants. The secondary causes are renal disorders, hypertension and steroid administration (14).

Although most of the above-mentioned pathogeneses and pathophysiologic mechanisms that can lead to communicating hydrocephalus and other neuropsychiatric manifestations are also predisposing risk factors for stroke which estimated to occur in 5–20% of SLE patients (14). This wide range of incidence might partly reflect recent advances in neuroradiologic techniques as well as the actual duration of observation. The patient reported in our case had chronic renal failure and treatment resistant hypertension, his SLE had been previously and recently treated with corticosteroids, and he showed evidence of current meningoencephalitis**.**

The pathogenesis and pathophysiologic mechanisms of communicating-type hydrocephalus in patients with SLE, such as dural sinus thrombosis, hypertension, hyperviscosity, renal failure, infection, immunocomplex deposition in the arachnoid villi, and so forth can also be considered predisposing risk factors for stroke and a provocative pathogenesis of non-communicating hydrocephalus. Ischemic cerebral edema is usually a combination of cytotoxic and vasogenic edema, and there is evidence to suggest that even small infarcts may result in edema that contributes to further ischemia, which appears to contribute heavily to morbidity and mortality in stroke (15,16).

We can conclude that multiple pathogeneses and pathophysiologic mechanisms may act in a synergic way in the development of both communicating and non-communicating hydrocephalus. Reviewing the litrature we can realize that our maniscription might be the first to mention about all the pathogenesis and pathophysiologic mechanisms that can lead to communicating hydrocephalus and other neuropsychiatric manifestations are also predisposing risk factors for stroke and subsequently to noncommunicating hydrocephalus. In the case reported here, we theorize that direct compression of the aqueduct of Sylvius by SLE post-inflammatory reactions led to ischemic infarct and brain edema. This resulted in secondary aqueduct stenosis and then to non-communicating hydrocephalus within 48 hours (Figure 3).

Since hydrocephalus is associated with significant morbidity and mortality, prevention is vital. Early diagnosis of hydrocephalus as part of SLE neuropsychiatric manifestations and detection of its causes may play a key role in the choice of treatment strategy, more accurate patient prognosis and

better outcomes. Further researches and studies, such Stereotactic biopsy, postmortem brain and leptomeningeal tissue immunohistochemical investigations are needed to enable scientists interested in this subject to clarify the pathogenesis and pathophysiological mechanisms of the enigma of hydrocephalus associated with SLE.

Consent Disclaimer:

As per international standard or university standard, patient's written consent has been collected and preserved by the authors'.

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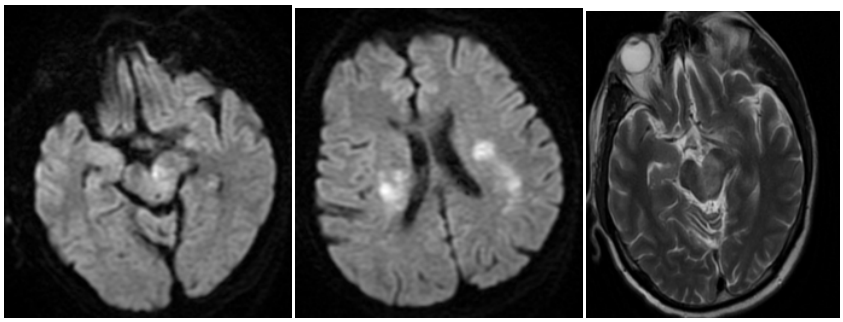

Figure 1: Axial plan cranial diffusion MRI showing a basal ganglia and midbrain infarction or infarction-like lesions with diffuse edema on left side of superior peduncle and quadrigeminal plate region

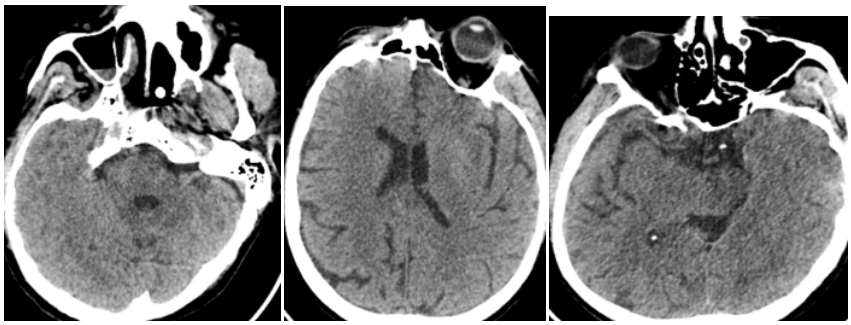

Figure 2: Axial plan cranial CT taken 3 days after the above diffusion MRI, showing almost similar lesions and no sign of hydrocephalus

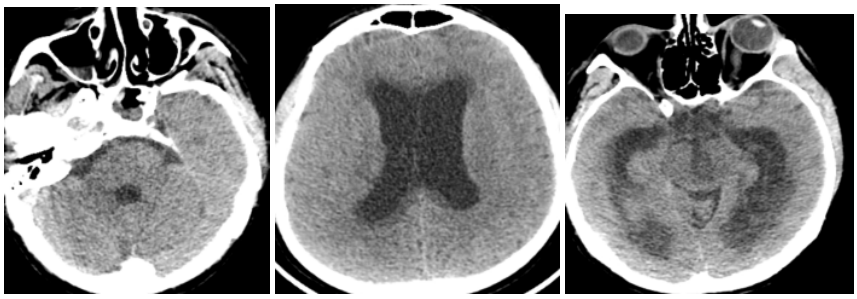

Figure 3: Axial plan cranial CT approximately 48 hours after the previous cranial CT revealed non-communicating hydrocephalus; also observe the narrowing of the basal cister

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