

## Case Report

# Multiple Brain Abscess in a Patient with Community - Acquired *Klebsiella Pneumoniae* Invasive Syndrome

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- Multiple Brain Abscess
- *Klebsiella Pneumoniae*
- Type 2 Diabetes
- Acquired-community infections

**Abstract**

Multiple brain abscesses is a life threatening condition, which challenges physicians clinical skills. We present a 65 years old man with a medical history of Type 2 Diabetes presented to ED with a history of 2 days of confusion and chest pain. The patient remained stable for a few days. After that he developed fever and his neurological status began to worsen. Abdomen CT revealed a liver abscess. CSF analysis matched for meningitis, brain MRI showed multiple focal images with a bilateral, supra and infratentorial distribution and restrictive intra-ventricular content interpreted as pyoventriculitis. Despite the thorough treatment with broad range antibiotics and drainage of the liver abscess, generalized infection persisted, leading to a septic shock and eventually his decease. *Klebsiella Pneumoniae* is a well known human pathogen. Extra-hepatic complications resulting from bacteraemic dissemination, including endophthalmitis, meningitis, necrotising fasciitis, and other illnesses, have also been recorded. *K pneumoniae* is known for being involved in Healthcare-Acquired infections but in the past few years it has become a source of acquired-community infections leading to a broad variety and eventually severe clinical presentation.

**INTRODUCTION**

Bacteria responsible for brain abscesses can be aerobic (most frequently *Staphylococcus*, *Streptococcus* and *Pneumococcus*) and anaerobic. *Klebsiella pneumoniae* usually causes urinary tract infections, pneumonia, and other infections in hospitalized persons whose immunity is compromised. Researchers have noted a distinctive syndrome of community-acquired pyogenic liver abscess that is complicated by metastatic infections [1].

Diabetes mellitus (DM) seems to be a risk factor for the liver abscess and it is associated with poor visual outcome in patients with endophthalmitis. Glycaemic control might prevent the development of metastatic complications caused by *Klebsiella pneumoniae* serotypes K1 and K2. In the United States, 53.6 years was the mean age of presentation. Men represented 68% of the cases. The most ethnic origin affected was de Asian, followed by Hispanic, Blacks and Whites. It seems that the ethnic origin of patients is important but the reasons for the predominance of liver abscess in Asian people are unclear. The main underlying disorder is DM (29%), followed by Hepatobiliary diseases. Main metastatic infection is targeted to the lung (16%), eye (11%) and CNS (8%) [2].

Brain abscess is a localized infection of the CNS. It is formed by a central necrotic area surrounded by an external wall (collagen, granulation tissue, macrophages, gliosis). It accounts for 1-2% of brain occupying space lesions in western countries and 8% in developing countries. They are frequent in adults while in only 15-30% of the cases, they involve patients younger than 15 years old [3]. The commonly identified predisposing risk are underlying disease such as infection with the Human Immunodeficiency Virus (HIV), a history of treatment with immunosuppressive drugs, disruption of the natural protective barriers surrounding the brain (eg, due to surgery, trauma, mastoiditis, sinusitis, or dental infection), or a systemic source of infection (eg, endocarditis or bacteremia). Additionally, congenital heart disease, meningitis, and certain procedures such as esophageal dilatation are also associated with multiple abscesses in brain parenchyma [4].

Bacteria enter the liver from the enterohepatic circulation and cause liver abscesses, then access the pulmonary circulatory system and invade remote sites [5]. The most common localization of a pyogenic abscess in the brain is the supratentorial region, in the subcortical white matter, especially, if they come from hematogeneous spread of a distant infection. Abscesses secondary to middle ear otitis are typically located in

the temporal lobe or in the cerebellum. Evolution to brain abscess consists in the following stages:

- Early cerebritis (from the 1st to the 3rd day), characterized by an inflammatory response with predominance of polymorphonuclear leukocytes.
- Late cerebritis (from the 4th to the 9th day). The immune response is mediated by lymphocytes and macrophages; central necrosis formation starts with peripheral neoangiogenesis and presence of fibroblasts; the neoformed vessels have no blood-brain barrier.
- Early encapsulation (from the 10th to the 13th day), in which there is formation of surrounding peripheral wall with central necrosis.
- Late capsule stage (from the 14th day), characterized by a mature encapsulate brain abscess with a wide central necrotic area.

MRI shows pyogenic abscess as a round or oval-shaped mass with a central area of suppurative necrosis and a peripheral capsule. The central necrotic area is hypointense to the cerebral white matter on T1-weighted and hyperintense on T2-weighted images. These features are not always present. The external capsule appears as a complete hypointense on T2-weighted and hyperintense on T1-weighted images rim. The short T1 and T2 of the rim seem to be due respectively to the presence of collagen fibres and to macrophages releasing free radicals with a paramagnetic effect. The surrounding vasogenic oedema appears hypointense on T1-weighted and hyperintense on T2-weighted images [3].

## CASE

A 65 years old man, with a medical history of Type 2 Diabetes treated with Metformin presented to our Emergency Department with a history of 2 days of confusion and complained of chest pain. On arrival, patient's Blood Pressure was 100/60 mmHg, PR: 80/min, RR: 20/min, SpO<sub>2</sub>: 95%, T°: 36° Celsius. He was confused and bradypsychic. Physical examination showed mucosal dryness and right periorbital cellulitis. The patient was fully awake and no neurological deficit was detected.

Chest X-ray was normal. Arrival laboratory showed WBC: 10960/mm<sup>3</sup> (Neutrophils: 90%), slightly lowered Sodium and Potassium, Creatinine: 1.2 mg/dL, BUN: 72 mg/dL, Blood glucose: 266 mg/dL. Total bilirubin: 2.8 mg/dL (Direct bilirubin: 79%), Alkaline phosphatase: 298 UI/L. Ampicillin/Sulbactam had been administered due to the previously mentioned periorbital infection and the presence of Leukocytes in urine which suggested urinary tract infection.

After three days from his arrival, there was a rise of his body temperature to 38.7°C, high airways secretion, a rise in WBC, platelet count to 46000/mm<sup>3</sup> and radiographic evidence of pneumonia, reason why Clarithromycin was added to the previously installed treatment. At this point, the patient remained

clinically stable and no decrease in his consciousness level was noticed.

One week after his hospitalization, despite treatment and even though laboratory tests tended to improve, the patient turned drowsy. Acid-Base state analysis shows respiratory acidosis and metabolic alkalosis. New laboratory and images tests were performed. Treatment was changed to Piperacillin/Tazobactam and Vancomycin.

Chest CT scan showed alveolar infiltrate in Upper right lobe and interstitial in the Upper left lobe. There was also scarce bilateral pleural effusion. Abdominal CT scan with contrast showed a 74 x 75 mm size abscess in de V segment of the liver, (Figure 1). Metronidazol is added to treatment. Brain CT scan showed no abnormalities.

Non contrast Brain MRI revealed multiple focal images with enhanced signal in FLAIR and a cortical/subcortical, bi-hemispherical and supra and infratentorial. Some of them presented restriction in DWI. Restrictive intra-ventricular content is also observed in slope areas (pyoventriculitis) and periventricular hyper-intensity in T2/FLAIR predominant in occipital extensions (Figure 2 [A, B, C]).

CSF analysis showed: White cells 212 /mm<sup>3</sup>, Mon: 91%, PMN: 9%, Red cells: Isolated, Glucose: 24 mg/dL, Proteins: 4.88 g/L, pH: 7.77, Lactic acid: 10.1 mmol/L, Appearance: Yellow, clear.

Anti HSV 1 IgG: Positive 1/320, Anti HSV 1 IgM: Negative, Anti HSV 2 IgG: positive 1/160, Anti HSV 2 IgM: Negative, Anti CMV IgG: 1203 U/mL.

Urine culture: *Klebsiella Pneumoniae*

Blood cultures Shows *Klebsiella Pneumoniae* Resistant to Ampicilin.

Ocular culture Results: #1 *Candida Glabrata*, #2 *Klebsiella Pneumoniae*

CSF Culture showed No germs growth. It's remarkable that the patient was already on antibiotic treatment at the time of the lumbar puncture because of the urinary tract infection and the liver abscess.

Echocardiogram: Concentric hypertrophy, mild enlargement of the left atrium, Diastolic dysfunction I, pulmonary hypertension.

Liver abscess percutaneous puncture and culture is performed, awaiting for results at the time this article is being written.

The patient is transferred to Intensive Care Unit due to the severity of his condition, received Oro-tracheal intubation and vasopressor drugs where he worsens and he eventually deceases.

## DISCUSSION

Multiple brain abscesses is a life threatening condition,

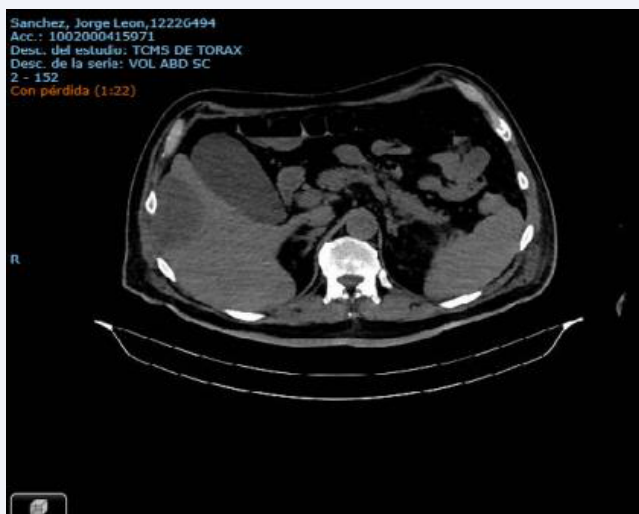


Figure 1 Contrasted abdominal CT scan. V liver segment abscess.

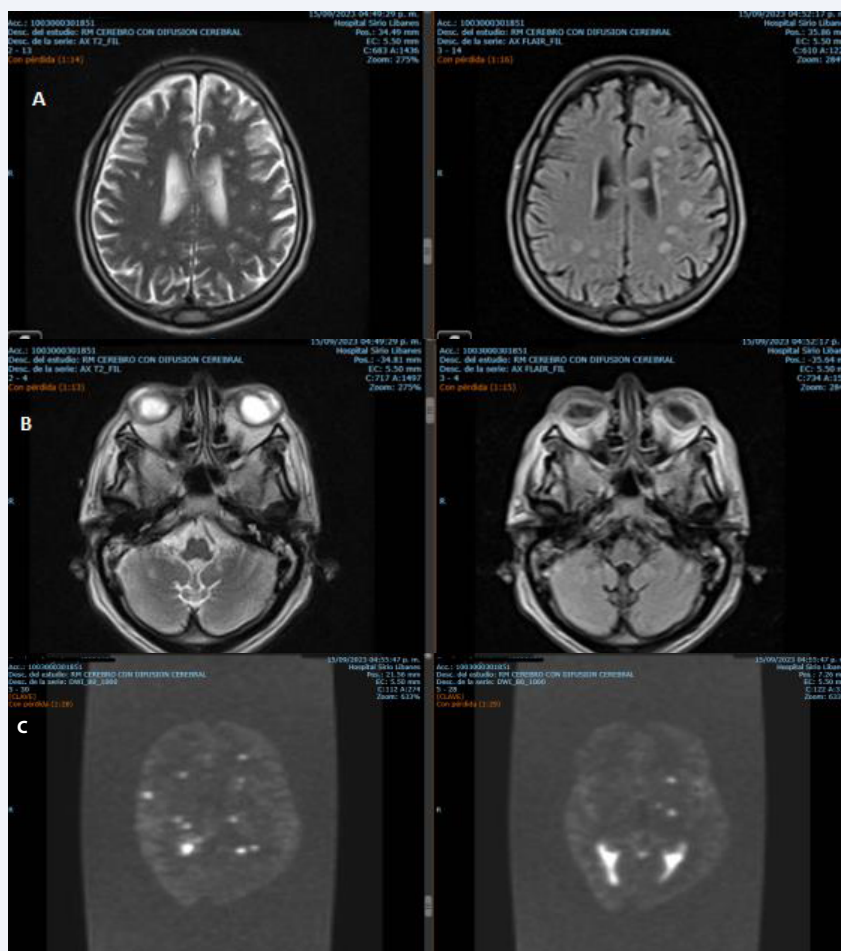


Figure 2 A and B: Brain MRI. Transverse plane T2- weighted and FLAIR showing multiple focal with enhanced signal images, bilateral, supra and infratentorial distribution. C: Brain MRI. Multiple focal images with restriction in DWI. Restrictive intra-ventricular fluid observed in slope areas (pyoventriculitis).

which challenges physicians clinical skills. We present a patient that arrived to the ED of our Hospital with confusion and bradypsychia, whose evolution progressively worsened and finally deceased due to septic shock despite treatment with broad spectrum antibiotics and drainage of the liver abscess. Different laboratories and imaging techniques were performed, finding a liver abscess, a bilateral lung infection, endophthalmitis and multiple focal brain abscesses and pyoventriculitis. Ocular secretion, Urine and Blood cultures showed infection by *Klebsiella pneumoniae*. No right to left shunt was found, but only transthoracic echocardiogram had been performed due to the clinical and hemodynamic instability of the patient.

*K. pneumoniae* is known for being involved in nosocomial infections. In the United States, Europe, Argentina, and Australia it has been observed that hospital-acquired *K. pneumoniae* infections predominate, with community-acquired bacteremia being caused by urinary tract infection, vascular catheter infection, and cholangitis. Classic community-acquired pneumonia is no longer an important entity in these regions. In South Africa, pneumonia (especially in alcoholics) continues to be an important community-acquired infection. In Taiwan distinctive infections such as liver abscess, endophthalmitis, and meningitis have emerged as an important public health issue [6].

## CONCLUSIONS

*Klebsiella pneumoniae* infections are usually seen as Hospital-acquired. When it comes to liver abscess in immunocompromised patients it's necessary to take account of *K. pneumoniae* and the possibility of a Community-acquired illness. Multiple brain

abscesses in the context of a *K. pneumoniae* invasive syndrome is a severe clinical condition which may lead to patient's death. Therefore, it is imperative to suspect of this presentation when the early stage of the disease sprouts.

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