CASE REPORT

Bacteraemia and multiple liver abscesses due to *Fusobacterium nucleatum* in a patient with oropharyngeal malignancy

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SUMMARY

Fusobacterium infections can have a wide clinical spectrum, ranging from mild infections to severe sepsis and abscess formation. This range depends partly on the patient's underlying conditions, such as immunosuppression or malignancy. *Fusobacteria* are commensal rods in the oropharyngeal cavity and digestive tract, but should mucosal barrier disruption occur, in the presence of the above-mentioned predisposing conditions, fusobacteria can spread and cause infections in the soft tissues, liver and so on. An elderly woman was admitted with an altered level of consciousness (lethargy). The ensuing workup revealed a posterior oral cavity tumour (squamous cell carcinoma), *Fusobacterium nucleatum* bacteraemia and liver abscesses. Due to the severe sepsis, the patient was referred to our intensive care unit, but she passed away despite antibiotic treatment.

BACKGROUND

Fusobacteria are anaerobic rods that can be found as normal microflora, that is, commensal bacteria in the respiratory, digestive and genitourinary tracts.¹ Under certain circumstances, such as malignancy, diabetes mellitus, chronic liver disease or immunocompromised individuals, fusobacteria become pathogenic. For instance, Lemierre's syndrome, the most recognisable example of fusobacteria infection,² is caused by *Fusobacterium necrophorum*

Figure 2 Two slides from an abdominal CT scan showing abscesses in the right lobe of the liver (slide A) and in the left lobe of the liver (slide B). Both arrows are indicating the lesions.

after an oral cavity infection, which may lead to secondary septic thrombophlebitis of the internal jugular vein and then colonise deeper tissues such as the lungs.

CASE PRESENTATION

A 92-year-old woman was admitted to our hospital with decreased responsiveness to stimuli. She had been experiencing an altered level of consciousness over the previous 3 days. She was unable to eat or drink by herself, spent the day asleep and could not be fully aroused by her relatives. She had atrial fibrillation and hypertension, and was on apixaban 2.5 mg two times per day, furosemide 40 mg daily and bisoprolol 2.5 mg daily.

On physical examination, she had a fever (38.8°C), heart rate of 106 bpm, respiratory rate of 21 breaths/min, blood pressure of 94/50 mm Hg and oxygen saturation of 86% on room air. On auscultation, heart and lung sounds were normal. However, the oropharyngeal examination revealed a red, irregular mass in the posterior oral cavity and a biopsy was taken. No palpable lymph nodes were noted. The abdominal exam revealed pain on deep palpation of the right hypochondrium. Apart from the altered level of consciousness, the patient did not have any focal or lateralising neurological symptoms.

INVESTIGATIONS

Laboratory tests revealed a white cell count of $21\,100/\mu\text{L}$, with 93% neutrophils and 10% bands, haemoglobin of 129 g/dL and platelet count of $165 \times 10^9/\text{L}$. C reactive protein was 165 mg/dL (normal level: <5 mg/dL). Kidney panel revealed creatinine of 2.2 mg/dL and an estimated glomerular filtration rate of 22 mL/min/1.73 m². Venous

Figure 1 Brain CT scan slide shows the mass in the posterior area of the oral cavity. It spread backwards, destroying the adjacent bones (arrow), and invades the right sphenoid sinus.

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blood gas analysis revealed pH 7.3, pCO₂ 25 mm Hg and bicarbonate 18 mmol/L. Liver panel revealed gamma-glutamyl transpeptidase of 90 U/L (normal range: 5–45 U/L). Bilirubin, lactate dehydrogenase, alanine transaminase and aspartate transaminase were normal. Urinalysis was normal. Samples for blood cultures were drawn.

The chest X-ray showed no abnormalities. Since the patient was lethargic and an oral mass was identified, a brain CT scan was performed (figure 1). It showed an oropharyngeal mass (6×3 cm) spreading upwards, which was causing destruction of the adjacent bones (clivus). The mass invaded the right sphenoid sinus. Subsequent histological examination of the biopsy sample revealed it to be squamous cell carcinoma.

An abdominal CT scan was then performed (figure 2), which revealed two hypodense masses in the liver (measuring 6 and 7 cm in diameter, respectively), with peripheral enhancement after intravenous contrast, which was suggestive of abscesses. Our radiologist performed an ultrasound-guided puncture of the abscess in the right lobe of the liver.

OUTCOME AND FOLLOW-UP

We decided to initiate intravenous fluids and antibiotics (piperacillin/tazobactam 4g every 6 hours). The patient was referred to our intensive care unit for monitoring, but she passed away 24 hours after admission. At that time, blood cultures previously drawn revealed the isolation of *E. nucleatum*. An aspirated sample from the abscess revealed *E. nucleatum* and *Klebsiella pneumoniae*. Both microorganisms were sensitive to piperacillin/tazobactam.

DISCUSSION

The most widely known clinical presentation of fusobacteria infections is Lemierre's syndrome.² However, infections due to fusobacteria cover a wide clinical spectrum, ranging from mild oropharyngeal infections to sepsis and abscess formation.^{3–5}

In terms of clinical manifestations by fusobacteria, predisposing factors such as malignancy, immunosuppression, diabetes mellitus and chronic liver disease play an important role.³ A number of case reports have been published emphasising the importance of these conditions.⁵ Sepsis, bacteraemia and abscess formation are therefore associated with the above-mentioned underlying conditions. The serious nature of our patient's clinical condition and the fatal outcome are probably due to age and malignancy as predisposing factors. In addition to the important role of malignancy, the disruption of the oropharyngeal mucosal barrier caused by the tumour was also involved in the bacteraemia.

Liver abscesses are rarely caused by fusobacteria and are usually polymicrobial.⁶ In our patient, two Gram-negative species were able to be isolated (*Klebsiella* and *Fusobacterium*). Some publications have reported liver abscesses associated with periodontal diseases⁷ and intestinal malignancy.^{8,9} The main risk factor for

liver abscesses is hepatobiliary or colorectal disease, whether malignancies or infections. However, abscessation may occur in the context of haematogenous spread in a systemic infection,⁴ which we hypothesised as the cause of the liver abscesses in our patient.

Antibiotics and percutaneous drainage are usually enough to resolve the infection. Despite the medical management and broad-spectrum antibiotic (piperacillin/tazobactam), the patient's outcome was fatal. Mortality due to fusobacteria is low when proper treatment is provided. The combination of malignancy, liver abscesses and the fact that this was an elderly patient overwhelmed the antibiotic treatment.

Learning points

- ▶ Fusobacteria are anaerobic microorganisms with a wide clinical spectrum. They are commensal, but can become pathogenic if underlying conditions are present.
- ▶ Complicated infections, with abscessation or bacteraemia, are uncommon. With the correct antibiotic treatment and medical or surgical management, a good outcome can be achieved.
- ▶ Underlying conditions play an important role in the development of the disease and in the patient's clinical course.

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