**Case Report**

**Streptococcus sanguinis meningitis following endoscopic ligation for oesophageal variceal haemorrhage**

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We report a case of acute purulent meningitis caused by *Streptococcus sanguinis* after endoscopic ligation for oesophageal variceal haemorrhage in a cirrhotic patient without preceding symptoms of meningitis. Initial treatment with flomoxef failed. The patient was cured after 20 days of intravenous penicillin G. This uncommon infection due to *S. sanguinis* adds to the long list of infectious complications among patients with oesophageal variceal haemorrhage.

**Introduction**

Viridans streptococci, although a common cause of endocarditis, are rarely associated with bacterial meningitis and account for less than 1% of all cases of purulent meningitis (Carley, 1992). Cases of meningitis due to viridans streptococci have been commonly preceded by neurosurgical procedures such as ventriculoperitoneal shunting, spinal anaesthesia, myelography and trauma (Alba et al., 1994; Baer, 2006; Cantey & Tamma, 2011; Schneeberger et al., 1996; Yaniv & Potasman, 2000); gastrointestinal haemorrhage and manipulation such as endoscopic ligation are rarely reported to be related to meningitis. We report herein a case of *Streptococcus sanguinis* meningitis following endoscopic ligation for oesophageal variceal haemorrhage in a patient with cirrhosis of the liver.

**Case report**

A 79-year-old man was admitted to the hospital with presentations of haematemesis and tarry stools for 1 day. He denied any symptoms of fever, headache, toothache or altered consciousness. The patient had a history of cirrhosis of the liver related to chronic hepatitis C virus infection and alcoholism, which was complicated with oesophageal varices. Endoscopic ligation for haemorrhage of oesophageal varices was performed within 12 h after hospitalization. He reported no further haematemesis but complained of persistent abdominal fullness during the first 3 days of hospitalization. The temperature and blood pressure were normal. Physical examination was only remarkable for the ovoid abdomen without shifting dullness; no abdominal tenderness or rebound tenderness was found. Ultrasonography of the abdomen showed cirrhosis of the liver with minimal ascites. On the 4th day of hospitalization, he began to develop fever and mild headache. A diagnosis of enteric bacterial infection or spontaneous bacterial peritonitis was made, for which antibiotic therapy with flomoxef 1 g every 12 h was begun. The fever persisted and frontal headache progressed in the following 1 week. Computed tomography of the head revealed no abnormalities. Analysis of a cerebrospinal fluid (CSF) specimen obtained by a lumbar puncture revealed 2480 white-blood cells (90% neutrophils and 10% lymphocytes) and 3 red-blood cells per oil-immersion field; and the glucose and protein level was 1 and 325 mg dl⁻¹, respectively. Gram stain of the CSF revealed phagocytosed Gram-positive cocci. The patient was started on intravenous ceftriaxone 2 g every 12 h and penicillin G 3 million units every 4 h, pending the culture results. His fever and headache resolved gradually after switching antibiotics. During the hospital stay, there were no seizures or altered consciousness.

Incomplete haemolytic Gram-positive cocci were observed in the bacterial culture of the CSF specimen. The organism, which was negative for catalase, bile aesculin, growth with NaCl (6.5%) and L-pyroglutamylpeptide hydrolase, was preliminarily reported as a viridans streptococcus. The isolate was further identified as *S. sanguinis* with the use of a rapid ID 32 Strep system (bioMérieux) and BD Phoenix automated microbiology system (Becton Dickinson) PID Panels, with a probability index of 96.4%, T of 0.92 and a confidence value of 99%. Antibiotic susceptibility testing was performed using the disc diffusion method, according to the Clinical and Laboratory Standards Institute interpretive guidelines M100-S22 for *Streptococcus* species.

Abbreviation: CSF, cerebrospinal fluid.
viridans group (CLSI, 2012). This strain was demonstrated to be susceptible to erythromycin, clindamycin, ceftriaxone, vancomycin and levofloxacin. The MIC of penicillin was 0.032 μg ml<sup>-1</sup> as determined by Etest. All four sets of blood cultures in aerobic and anaerobic culture bottles showed no growth.

After the results of culture and antibiotic susceptibility testing were available, ceftriaxone was discontinued and penicillin was continued. Magnetic resonance imaging of the brain did not reveal a brain abscess, and transthoracic echocardiography did not show vulvar vegetation. Dental examination did not show dental caries or periodontal abscess. A follow-up lumbar puncture on the 14th day of penicillin therapy revealed 24 white-blood cells (59% neutrophils and 41% lymphocytes) and 6 red-blood cells per oil-immersion field. The glucose and protein level of the CSF was 40 and 49 mg dl<sup>-1</sup>, respectively. Cultures of the CSF were negative. The patient was discharged after completing a 20-day course of penicillin therapy. No neurological sequelae were observed during the 2-week follow-up after discharge.

**Discussion**

Viridans streptococci are indigenous to the upper respiratory tract, the female genital tract and the gastrointestinal tract, but are most prevalent in the oral cavity. While viridans streptococci are considered to be bacteria of low virulence, they could cause invasive infections such as bacteremia, endocarditis or, uncommonly, meningitis. Viridans streptococcal meningitis is often associated with cranial trauma and neurosurgical procedure; the most common species reported are *Streptococcus mitis* and *Streptococcus salivarius* (Cabellos et al., 1999; Cantey & Tamma, 2011; Carley, 1992; Enting et al., 1997). *S. sanguinis* is more often associated with dental structures (Johnson & Tunkel, 2005), and has also been described as a pathogen of meningitis following a neurosurgical procedure or vacuum extraction (Alba et al., 1994; Berga & Trierweiler, 1980; Heath et al., 1980). In our case, *S. sanguinis* may have survived the compromised host defense system to cause transient bacteremia following oesophageal variceal bleeding and endoscopic manipulation, followed by invasion of the blood–brain barrier.

Penicillin G at a dose of 24 million units per day is the antibiotic of choice for treatment of viridans streptococcal meningitis. The MIC of penicillin for most clinical isolates is 0.1 μg ml<sup>-1</sup> or less, and thus is extremely active (Johnson & Tunkel, 2005). Flomoxef belongs to the cephamycin group and is likely to be active against viridans streptococci (Kuriyama et al., 2002). However, the initial response to flomoxef was not satisfactory, which may be related to poor penetration of flomoxef into the central nervous system. Patients infected by viridans streptococci have usually had a high incidence of focal suppuration and cerebral vasculitis, but had a consistently favourable prognosis (Lu et al., 2001a, 2002; Yaniv & Potasman, 2000). Only the initial consciousness level and the presence of seizures have been reported to be strongly associated with mortality (Lu et al., 2001b). In our case, the patient’s symptoms remitted after 1 week of penicillin G 18 million units per day and he completely recovered after 20 days of penicillin G.

To our knowledge, this is the first documented case of *S. sanguinis* meningitis following upper gastrointestinal bleeding and endoscopic manipulation. If adequate treatment is instituted, the prognosis is likely to be good. *S. sanguinis* should be included in the list of aetiologies of bacterial meningitis and infectious complications in patients with variceal haemorrhage and endoscopic ligation.

**References**


