

Streptococcus bovis Meningitis and Hemorrhoids[▽]

Adam Hewitt Smith,¹ Harminder K. Sra,² Sandeep Bawa,³ and Richard Stevens^{4*}

¹45 Commando Royal Marines, RM Condor, Arbroath, Angus DD11 3SP, Scotland¹; ²Department of Surgery, Whittington Hospital, Magdala Avenue, London N19 5NF, United Kingdom²; ³Department of Rheumatology, Gartnavel General Hospital, 1053 Great Western Road, Glasgow G12 0YN, Scotland³; and ⁴Department of Rheumatology, Wycombe General Hospital, Queen Alexandra Road, High Wycombe, Bucks HP11 2TT, United Kingdom⁴

Received 8 December 2009/Returned for modification 9 January 2010/Accepted 20 April 2010

We report a case of *Streptococcus bovis* (*Streptococcus gallolyticus* subsp. *pasteurianus*) meningitis, a rare cause of central nervous system (CNS) infection in an adult, and comment on the importance of investigation of the lower gastrointestinal tract to identify a portal of entry in cases of systemic *Streptococcus bovis* infection.

CASE REPORT

A previously fit 61-year-old woman presented to the hospital Accident and Emergency Department with a 2-day history of headache and malaise. Her headache had become rapidly more intense in the hours preceding admission, waking her from sleep, and was associated with severe neck stiffness, nausea, and vomiting.

On examination, she was febrile (38.9°C), tachycardic (heart rate of 110 beats per min), was clinically mildly dehydrated, and drowsy, but orientated, and had marked meningism. There was no rash. There was no focal neurological abnormality, and fundoscopy was normal. Peripheral blood samples, including cultures, were taken, and treatment with intravenous (i.v.) ceftriaxone, acyclovir, and fluids was started. Urgent brain computed tomography (CT) scanning was normal. A fall in the patient's blood pressure to 90/55 mm Hg prompted her transfer to the hospital's High Dependency Unit, where a lumbar puncture was performed.

Investigations revealed a peripheral blood white cell count of 11.1×10^9 /liter (normal range [NR], 4×10^9 to 10.5×10^9 /liter), a neutrophil count of 9.9×10^9 /liter (NR, 1.7×10^9 to 7.5×10^9 /liter), and a C-reactive protein level of 114 mg/liter (NR, <5 mg/liter). Coagulation and routine serum biochemical screens, including liver function tests, were normal, apart from a mildly prolonged activated partial thromboplastin time (APPT) of 46 s (NR, 22 to 36 s) and an albumin level of 32 g/liter (35 to 50 g/liter). The cerebrospinal fluid (CSF) protein level was 4.02 g/liter (NR, 0.15 to 0.45 g/liter), and the glucose concentration was 2.8 mmol/liter. Unfortunately, no paired serum glucose sample was received in the laboratory. The CSF white cell count was 1,000/mm³ (100% neutrophils), and the red cell count was 250/mm³. Microscopy revealed the presence of intracellular Gram-positive cocci. CSF and peripheral blood cultures were positive for the same Gram-positive coccus, identified as *Streptococcus bovis* by the API 32 Strep profile (bioMérieux, Marcy l'Étoile, France). The isolate was further subspeciesiated by partial sequencing of 16S rRNA

(Health Protection Agency, Centre for Infections, Colindale, London, United Kingdom) as *Streptococcus bovis* biotype II/2 (*Streptococcus gallolyticus* subsp. *pasteurianus*) (2). The isolate proved sensitive to a wide range of antibiotics, including benzylpenicillin (MIC, 0.094 mg/liter), ceftriaxone (MIC, 0.19 mg/liter), amoxicillin, tetracycline, and vancomycin. Further examination of the patient revealed no evidence of other focal sepsis or of endocarditis. Transesophageal echocardiography was normal. Treatment with i.v. ceftriaxone at 2 g twice daily was continued for 10 days. Acyclovir was discontinued.

Further questioning revealed that the patient's periodically painful hemorrhoids had become more symptomatic over the previous 2 weeks, associated with intermittent low-level rectal blood loss on defecation, on a background of longstanding constipation. There had been no recent change in bowel habit or other abdominal symptoms, no weight loss, and no systemic symptoms prior to the onset of headache.

In view of the well-documented association between *S. bovis* bacteremia and colonic pathology, particularly neoplasms, which serve as a portal of entry, investigation of the large intestine was undertaken. Inspection and proctoscopy confirmed congested hemorrhoids with a small healing area of superficial ulceration, which was not swabbed. No local collection or abscess was visible. Flexible sigmoidoscopy demonstrated no rectal or sigmoid colonic lesion, and CT colonography revealed no mucosal lesion in the rest of the large bowel.

Our patient made an excellent recovery complicated only by a mild unilateral 7th cranial nerve palsy, which had nearly completely resolved on review 3 months later. Her hemorrhoids were treated conservatively with stool softeners and advice on the management of her constipation.

Streptococcus bovis (group D non-enterococcal streptococcus) bacteria are a normal part of the bowel flora in 5% to 10% of adults (4, 7). Dissemination is responsible for a range of clinical presentations, including bacteremia and total systemic infections such as endocarditis, accounting for 7% to 14% of cases (10), septic arthritis, and endophthalmitis. *Streptococcus bovis* is a recognized but rare cause of meningitis in children, seen most commonly as a complication of systemic sepsis in neonates, and is an even rarer cause in adults (9). First re-

* Corresponding author. Mailing address: Department of Rheumatology, Wycombe General Hospital, Queen Alexandra Road, High Wycombe, Bucks HP11 2TT, United Kingdom. Phone and fax: 1494526161. E-mail: richard.stevens@buckshosp.nhs.uk.

[▽] Published ahead of print on 26 April 2010.

ported in 1975 (5), only 19 adult cases of *Streptococcus bovis* meningitis have been documented in the literature .

There is a strong link between *Streptococcus bovis* infection and bowel disease. Colonic carcinoma has been reported in up to 50% of patients with *Streptococcus bovis* bacteremia or endocarditis (1, 6, 8, 11). Other colonic conditions have also been described in conjunction with systemic *Streptococcus bovis* infection, including inflammatory colitis, polyps, and diverticulosis. In our patient, it is likely that an ulcerated hemorrhoid provided a pathway for hematogenous dissemination of the organism.

Streptococcus bovis remains the designation in routine clinical use, but phenotypic and molecular genetic techniques now allow the subdivision of *Streptococcus bovis* into *Streptococcus gallolyticus* and *Streptococcus infantarius* and their subspecies. In a recent study (2) of *Streptococcus bovis* blood culture isolates from 58 consecutive patients, which were further characterized by 16S rRNA sequencing, none of the 29% of isolates typed as *Streptococcus gallolyticus* subsp. *pasteurianus* was associated with endocarditis or with identified benign or malignant colonic disease, although the numbers were too small to draw meaningful conclusions about potential subspecies-specific disease associations. In contrast to previous series, colonic carcinoma was identified in only 3 of the 58 affected patients, but 30 had hepato-biliary disease.

Our case illustrates an unusual complication of hemorrhoids and establishes *Streptococcus gallolyticus* subsp. *pasteurianus* as a potential, if rare, cause of meningitis in previously fit adult patients. No malignant or premalignant large bowel lesion was found in our patient, but the link between colonic pathology

and bacterial dissemination makes investigation of the lower gastrointestinal (GI) tract mandatory in patients with *S. bovis* bacteremia or distant focal infection (3).

REFERENCES

1. Alazmi, W., M. Bustamante, C. O'Loughlin, J. Gonzalez, and J. B. Raskin. 2006. The association of *Streptococcus bovis* bacteremia and gastrointestinal diseases: a retrospective analysis. *Dig. Dis. Sci.* **51**:732–736.
2. Beck, M., R. Frodl, and G. Funke. 2008. Comprehensive study of strains of previously designated *Streptococcus bovis* consecutively isolated from human blood cultures and emended description of *Streptococcus gallolyticus* and *Streptococcus infantarius* subsp. coli. *J. Clin. Microbiol.* **46**:2966–2972.
3. Ferrari, A., I. Botrugno, E. Bombelli, T. Dominioni, E. Cavazza, and P. Dionigi. 2008. Colonoscopy is mandatory after *Streptococcus bovis* endocarditis: a lesson still not learned. *World J. Surg. Oncol.* **6**:49.
4. Klein, R. S., R. A. Recco, M. T. Catalano, S. C. Edberg, J. I. Casey, and N. H. Steigbigel. 1977. Association of *Streptococcus bovis* and carcinoma of the colon. *N. Engl. J. Med.* **297**:800–802.
5. Lerner, P. 1975. Meningitis caused by *Streptococcus* in adults. *J. Infect. Dis.* **131**(Suppl.):S9–S16.
6. McCoy, W. C., and J. M. Mason. 1951. Enterococcal endocarditis associated with carcinoma of the sigmoid: report of a case. *J. Med. Assoc. State Ala.* **21**:162–166.
7. Noble, C. J. 1978. Carriage of group D streptococci in the human bowel. *J. Clin. Pathol.* **31**:1182–1186.
8. Ruoff, K. L., S. I. Miller, C. V. Garner, M. J. Ferraro, and S. B. Calderwood. 1989. Bacteraemia with *Streptococcus bovis* and *Streptococcus salivarius*: clinical correlates and more accurate identification of isolates. *J. Clin. Microbiol.* **27**:305–308.
9. Vilarrasa, N., A. Prats, M. Pujol, A. Gason, and P. F. Viladrich. 2002. *Streptococcus bovis* meningitis in a healthy adult patient. *Scand. J. Infect. Dis.* **34**:61–62.
10. Waisberg, J., C. de Oliveira Matheus, and J. Pimenta. 2002. Infectious endocarditis from *Streptococcus bovis* associated with colonic carcinoma: case report and literature review. *Arq. Gastroenterol.* **39**:177–180.
11. Zarkin, B. A., K. D. Lillemoe, J. L. Cameron, P. N. Effron, T. H. Magnuson, and H. A. Pitt. 1990. The triad of *Streptococcus bovis* bacteremia, colonic pathology, and liver disease. *Ann. Surg.* **211**:786–791.