An unusual case of meningitis

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CASE REPORT

Pasteurella multocida is a rare cause of bacterial meningitis. A 56-year-old man with several pets developed a profoundly decreased level of consciousness following left tympanomastoidectomy. Lumbar puncture produced cerebrospinal fluid with the typical findings of meningitis (low glucose, high protein, high leukocytes). Cultures from the cerebrospinal fluid and a swab of the left ear revealed Gram-negative coccobacillus identified as *P. multocida*. The organism was sensitive to ceftriaxone, ampicillin and penicillin, and a 14-day course of intravenous penicillin was used as definitive treatment, resulting in full recovery. Although rare, *P. multocida* should be considered as a potential cause of meningitis in patients with animal exposure, particularly in the setting of recent cranial surgery.

**Key Words:** Pasteurella multocida; Meningitis; Tympanomastoidectomy; Zoonosis

*Pasteurella multocida* is a rare cause of bacterial meningitis. A 56-year-old man developed chronic otorrhea related to left tympanomastoidectomy. His medical history included hypertension, dyslipidemia, gout, polycystic kidney disease and gastroesophageal reflux disease. His surgical history was significant for previous left tympanoplasty and inguinal hernia repair. His medications at the time of admission were rosuvastatin, domperidone, esomeprazole, allopurinol, irbesartan/hydrochlorothiazide and labetalol.

On the first day postoperatively the patient experienced a sudden drop in his level of consciousness accompanied by marked agitation, drop in his level of consciousness, and required intubation. His Glasgow Coma Scale score was 9 (eyes 3, verbal 3, motor 3). There were no focal neurological signs, his pupils were symmetrical but sluggish to react and the fundi appeared normal. His blood glucose level was 9.0 mmol/L. He was subsequently transferred to the intensive care unit. A computed tomography scan of the patient’s head showed no structural abnormalities, no masses and no hematoma. Lumbar puncture was performed and revealed cloudy cerebrospinal fluid (CSF) with an elevated protein level (5.78 g/L), low glucose level (<1.0 mmol/L) and a leukocyte count of 11,974 x 10⁶/L, with 95% neutrophils. Based on these findings, the patient was treated empirically for bacterial meningitis with intravenous (IV) vancomycin, ceftriaxone and dexamethasone pending culture results and sensitivities. Further blood work revealed a blood leukocyte count of 13.8 x 10⁹/L, hemoglobin level of 123 g/L and platelet count of 154 x 10⁹/L. His serum sodium level was 146 mmol/L, potassium level 3.6 mmol/L, chloride level 106 mmol/L, urea level 12.6 mmol/L and creatinine level 190 μmol/L.

Initial Gram stain of the CSF using the cytospin technique revealed abundant polymorphonuclear leukocytes and no organisms. Preliminary reports revealed growth of *Gram*-negative coccobacilli, and at this point metronidazole was also added to the treatment regime until an anaerobic cause was ruled out. Ultimately, the organism was identified from aerobic cultures as *P. multocida* using the Vitek 2 identification system (bioMérieux, USA). Anaerobic cultures were negative. The isolate was sensitive to ceftriaxone, ampicillin and penicillin. Interestingly, a swab of the left ear performed on postoperative day 2 grew the same organism as that cultured from the CSF (growth on chocolate and blood agar; no growth on MacConkey’s or inhibitory mold agar). The empirical antibiotics and dexamethasone were discontinued, and the patient was started on a 14-day course of IV penicillin G at a dose of 2,000,000 units every 4 h. The patient made a rapid recovery from his meningitis, and he was discharged on postoperative day 10 to continue treatment as an outpatient. On further questioning, it was revealed that the patient was the primary caregiver of several pet cats and a dog, although he reported no history of bites. The pets were allowed on the furniture, including his bed, and would occasionally lick his face.

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TABLE 1
A list of cases of Pasteurella multocida meningitis published in the English literature after 1999

<table>
<thead>
<tr>
<th>Author (reference), Year (sex)</th>
<th>Predisposing factors</th>
<th>Animal exposure</th>
<th>Clinical findings</th>
<th>Treatment (duration)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brossier et al (13), 2010</td>
<td>Transethmoidal pituitary adenectomy</td>
<td>Contact with cats</td>
<td>Headache; fever; nuchal rigidity; epistaxis</td>
<td>Cefotaxime and ofloxacin (1 week)</td>
<td>Recovered</td>
</tr>
<tr>
<td>López et al (14), 2013</td>
<td>Chronic sinusitis; defect in lamina cribosa</td>
<td>Pig bite</td>
<td>Headache; vomiting; fever</td>
<td>Ceftriaxone</td>
<td>Recovered</td>
</tr>
<tr>
<td>Kawashima et al (15), 2010</td>
<td>None</td>
<td>Kissing her dog</td>
<td>Headache; fever; nausea; neck stiffness</td>
<td>Meropenem (1 week)</td>
<td>Recovered</td>
</tr>
<tr>
<td>Per et al (16), 2010</td>
<td>Kerion celci on head</td>
<td>Pet rabbit</td>
<td>Headache; weakness; confusion; lethargy; neck stiffness</td>
<td>Cefotaxime, cefazolin, penicillin</td>
<td>Recovered</td>
</tr>
<tr>
<td>Tjen et al (17), 2007</td>
<td>Otitis media</td>
<td>Face licked by pet dog</td>
<td>Headache; vomiting; fever; drowsy; neck stiffness; right-sided paralysis</td>
<td>Chloramphenicol</td>
<td>Recovered</td>
</tr>
<tr>
<td>Tattevin et al (18), 2005</td>
<td>Chronic mastoiditis</td>
<td>Cat bite</td>
<td>Fever; chills; rigors; nuchal rigidity; agitation; decreased responsiveness</td>
<td>Benzylpenicillin (2 weeks)</td>
<td>Recovered</td>
</tr>
<tr>
<td>Jordan et al (19), 2007</td>
<td>Otitis, alcoholism</td>
<td>Dog exposure</td>
<td>Not reported</td>
<td>Iv levofloxacin aztreonam (1 week); oral levofloxacin (18 days)</td>
<td>Recovered</td>
</tr>
<tr>
<td>O’Neill et al (20), 2005</td>
<td>None</td>
<td>Pet cat</td>
<td>Fever; jaundice; decreased level of consciousness; neck stiffness</td>
<td>Cefotaxime cefotaxime (14 days), penicillin (27 days)</td>
<td>Obstructive hydrocephalus requiring shunt and eventual recovery</td>
</tr>
<tr>
<td>Poulik et al (21), 2003</td>
<td>None</td>
<td>Dog scratch</td>
<td>Headache; neck pain; photo-phobia; fever; tachycardia</td>
<td>Penicillin (14 days)</td>
<td>Recovered</td>
</tr>
<tr>
<td>Armstrong et al (22), 2000</td>
<td>None</td>
<td>Pet dog, animal feces indoors</td>
<td>Found dead at home</td>
<td>–</td>
<td>Death</td>
</tr>
</tbody>
</table>

P Female; M Male

DISCUSSION
Meningitis is an uncommon outcome of *P. multocida* infection (3), making *P. multocida* a rare cause of adult bacterial meningitis. Two reviews spanning 1950 to 1999 report only 29 cases published in the English literature during that time period (4,5). Animal contact was a major risk factor, present in 89% of cases, and a history of a bite was much less common, occurring only 15% of the time (4). Previous cranial/facial surgery or skull fracture has been reported as a cause of *P. multocida* meningitis (5-13). Table 1 summarizes adult cases of *P. multocida* meningitis published in the English literature after 1999 (13-22). Animal contact was present in all cases, while only two (20%) reported a history of a bite. One patient had a history of cranial surgery (13).

The current report presents one of only a handful of cases of *P. multocida* meningitis ever documented in the literature from a Canadian site (5,6,9,21,23). The patient developed a severely decreased level of consciousness after tympanomastoidectomy. The patient had the typical CSF findings of bacterial meningitis (low glucose, high protein, high leukocytes). Penicillin is the most commonly used antibiotic to treat *P. multocida* meningitis (4,15), and our patient recovered fully with a course of IV penicillin G. Many of the more recent cases describe treating with third generation cephalosporins (Table 1).

*P. multocida* meningitis has been reported following mastoidectomy (11,12), and the pathogenesis of infection is hypothesized to involve contiguous spread of the organism from a colonized ear canal. Supporting this theory, a swab of our patient’s ear canal grew *P. multocida*. Our patient had experienced chronic otorrhea. Local spread from an adjacent infected site has been proposed as an etiology (4) because chronic otitis media and otorrhea have been found spanning 1950 to 1999 report only 29 cases published in the English literature after 1999 (4,5). Animal contact was a major risk factor, present in 89% of cases, and a history of a bite was much less common, occurring only 15% of the time (4).

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REFERENCES


