**Pasteurella multocida** Meningitis Following Mastoidectomy: A Case Report and Literature Review

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**Abstract**

*Pasteurella multocida* (PM) is part of the normal nasopharyngeal flora of many animals. The most common PM infections occur in soft tissue, secondary to animal contact. Meningitis is rarely associated. An adult female developed chronic right-sided otorrhea and tympanic membrane perforation. Elective mastoidectomy was performed. On the postoperative day 2, the patient experienced a decreased level of consciousness, headache, nausea, and seizures. Cerebrospinal fluid (CSF) analysis revealed low glucose, high protein, and high cellularity. Blood tests were within normal limits, except for high leukocyte count. Two days after the neurological manifestations, bacteria, identified as PM, grew in the aerobic cultures of CSF and preoperative ear swab. The isolate was sensitive to penicillins. She was started on intravenous penicillin G. The patient had a full recovery. On further questioning, she admitted having a dog, which licks on her face frequently.

**Keywords:** Mastoidectomy, meningitis, *Pasteurella multocida*

**Introduction**

*Pasteurella multocida* (PM) is a Gram-negative coccobacillus and facultative anaerobe. It is present in the nasopharyngeal flora of domestic pets.[1] Frequently, PM infections in humans are located in the soft tissue and are associated with animal bites. In rare cases, severe infection, like meningitis, can occur. In this context, it is known that surgical procedures such as mastoidectomy may contribute to meningitis, particularly in a predisposed individual.[1,2] To the authors’ knowledge, only two cases of mastoidectomy followed by PM meningitis have been reported.[3,4] Herein, we report a case of an adult woman who had PM meningitis after mastoidectomy.

**Case Report**

A 51-year-old female patient presented with chronic right-sided otorrhea and ipsilateral tympanic membrane perforation within 2 months of onset. She was admitted for elective mastoidectomy with tympanoplasty. Her medical history included recurrent ear infections with otorrhea through a tympanic perforation. On neurological examination, conductive hearing loss was observed. The left otoscopy was normal, and right otoscopy showed perforated tympanic membrane with tympanosclerosis. There was no evidence of otorrhea, soft-tissue mass, crusting, or desquamated debris. Her comorbid conditions were dyslipidemia, hypertension, and major depressive disorder. She was in use of sertraline, hydrochlorothiazide, enalapril, and simvastatin.

On the postoperative day 2, the patient experienced a decreased level of consciousness, headache, nausea, and seizures presenting with bilateral tonic-clonic movements and impaired awareness. There was no fever or focal neurological signs. Cranial computed tomography scan showed the mastoidectomy and the absence of mass or hematoma [Figure 1]. Cerebrospinal fluid (CSF) analysis revealed low glucose (5 mg/dL), high protein (114 mg/dL), and high cellularity (158/mm³) with 85% of neutrophils. Blood tests, including glucose level (90 mg/dL), were within normal limits, except for high leukocyte count. Two days after the neurological manifestations, bacteria, identified as PM, grew in the aerobic cultures of CSF and preoperative ear swab. The isolate was sensitive to penicillins. She was started on intravenous penicillin G. The patient had a full recovery. On further questioning, she admitted having a dog, which licks on her face frequently.

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Rissardo and Caprara: Pasteurella multocida meningitis

Table 1: Reported cases of Pasteurella multocida meningitis following mastoidectomy

| References       | Sex/age (year-old) | Animal exposure | Antibiotic sensitivity pattern | Treatment                            | Outcome       |
|------------------|--------------------|-----------------|-------------------------------|--------------------------------------|---------------|
| Dammeijer and McCombe | Male/42           | Dogs            | Cefotaxime and penicillin      | IV penicillin G 4mi U, every 6 h     | Full recovery |
| Pond et al.         | Male/56           | Cats and dogs   | Ceftriaxone, ampicillin, and penicillin | IV penicillin G 2mi U, every 4h, for 14 days | Full recovery |
| Present case            | Female/51         | Dog             | Penicillin                    | IV penicillin G 2mi U, every 4h, for 14 days | Full recovery |

IV=Intravenous

Figure 1: Images of computed tomography scan showing the right mastoidectomy, the communication between the right ear and right middle cranial fossa (indicated by the arrow). Coronal (a) and axial (b) views of head computed tomography scan. Axial with brain window (c) and coronal with bone window (d) views of computed tomography scan of the temporal bone

There are only a few case reports of PM meningitis following mastoidectomy. We identified two cases after a review of the English literature, and we compared them with the present case [Table 1].

In the case reported by Dammeijer and McCombe, PM meningitis occurred after a modified radical mastoidectomy due to recurrent cholesteatoma. On the other hand, in the study from Pond et al., PM meningitis was associated with a typanomastoidectomy and removal of the incus and malleus with tympanoplasty performed for chronic otorrhea related to tympanic membrane perforation.

The pathogenesis in PM meningitis following mastoidectomy is probably related with the contiguous spread of the bacteria from a colonized external acoustic meatus, which has contaminated the CSF during the surgery. This hypothesis is based on the preoperative growth of PM in the ear swab, the absence of clinical meningitis signs, and the development of the infection 24 h after the mastoidectomy.

We agree with the statement of Pond et al. and Dammeijer and McCombe that any patient requiring mastoidectomy should be asked about contact with animals, and in the case of a positive answer, a preoperative ear swab is mandatory since it allows early intervention and prevents possible complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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**DISCUSSION**

PM meningitis was first documented in 1925 by Claudius. Since 1950, about 39 cases have been reported in the English literature. In these cases, the infection was generally associated with cranial surgery or trauma, chronic otitis media, and soft-tissue infection with secondary spread. History of recent animal contact was reported in 89% of cases.
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