Brain Abscess due to *Pasteurella multocida*

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(Received: September 10, 1993)

(Accepted: November 4, 1993)

Key words: *Pasteurella multocida*, brain abscess

Abstract

The patient was a 26-year-old man who complained of headache and vomiting. On examination, there was nothing abnormal, but the edge of the right optic papilla was not clear. His temperature was 38.5°C, pulse 96/min, blood pressure 120/80 mmHg. A space-occupying lesion in his fronto-dextra cupular part was found by CT scanning. He had a 12-year history of chronic purulent otitis. The diagnosis was a brain abscess in the fronto-dextra cupular part. The brain abscess was extracted and *Pasteurella multocida* was isolated from the dark brown pus draining from the abscess. The patient recovered through proper antibiotic therapy based on a sensitivity test. Reports of infections caused by this organism in foreign countries very widely from local infections due to bites and scratches by cats, dogs etc. to general infections such as infections of the respiratory tract, sepsis and meningitis. However, *Pasteurella multocida* brain abscesses are rare.

Pasteurella multocida is a Gram-negative short rod which is best known as part of the mouth flora and as a pathogen causing septicemia in many domestic animals, such as cats, dogs etc.¹⁾. Infection in man results mainly from animal bites or scratches. It has been reported that *Pasteurella multocida* can cause human septicemia, meningitis, respiratory tract infection, conjunctivitis and other infections. We isolated a strain of *Pasteurella multocida* from the pus of a brain abscess following chronic purulent otitis on August 6, 1990.

Case Report

A 26-year-old man was admitted to our hospital on June 7, 1990, with the chief complaints of headache and vomiting. He had a 12-year history of chronic purulent otitis.

The temperature was 38.5°C, pulse 96/min, blood pressure 120/80 mmHg. The results of physical examination were normal, but the edge of the right optic papilla was not clear. A space-occupying lesion in the fronto-dextra cupular part of the patient was found by CT scanning. Routine blood analysis revealed hemoglobin 12.5 g/dl, white blood cell count 9,900/ μ l, bleeding time 1 min and coagulating time 1 min. Liver function tests revealed thymol turbidity test 14.2 U, zinc turbidity test 24 U and positive HBsAg. The diagnosis was a brain abscess in right frontal cupular part.

The brain abscess was extracted on June 8, 1990. It measured 6 × 5 × 4 cm. The pus from the abscess was dark brown and adhesive. But did not have a foul odor. The pus was cultured and *Pasteurella multocida* was found. 200 mg of ampicillin and 30 mg chloramphenicol per Kg per day (intravenously

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guttae) for 14 days (8–21 June, 1990). 5 mg of gentamycin per Kg per day (iv gtt) for 7 days (22–28 June, 1990). 100 mg of ampicillin and 30mg of chloramphenicol per Kg per day (iv gtt) for 15 days (29 June–13 July 1990). The patient recovered through antibiotic therapy based on a sensitivity test and was discharged on July 24.

Isolation and Identification

The pus was streaked on a blood agar plate according to the routine method. After 18–24 hours of incubation at 35°C, round, nonhomolytic, gray colonies, 0.5–1.5 mm in diameter appeared. Gram's stain revealed small Gram-negative rods and flagella staining showed there were no flagella.

The characteristics of the isolate were as follows: positive reactions for oxidase and catalase; absence of growth on MacConkey medium and SS agar an acid butt without gas and an alkaline slant on Kligler iron agar, and fermentation of glucose without gas.

Based on the above characteristics, the organism probably belonged to the genus *Pasteurella* and was tentatively considered to be *Pasteurella multocida* in the light of reference²⁾.

A series of biochemical tests were performed to further identify the organism (Table 1).

In 1981, Oberhofer divided *Pasteurella multocida* into 11 biotypes³⁾. Our isolate was biotype A.

In 1985, Mutters et al. made a taxonomically great change in which the genus *Pasteurella* was extended from 6 species to a total of 11 species, and *Pasteurella multocida* was subdivided into 3 subspecies, *Pasteurella multocida* subsp. *multocida*, *Pasteurella multocida* subsp. *septica* and *Pasteurella multocida* subsp. *gallicida*⁴⁾. The characteristics of the three subspecies are presented in Table 2 and our isolate fell into *Pasteurella multocida* subsp. *multocida*.

The pathogenicity of the isolate was determined by intraperitoneally injecting a white mouse with 0.2 ml of suspension of the organism. The animal died after 24 hours and *Pasteurella multocida* was readily recovered from the heart blood, liver and spleen.

Antibiotic sensitivity was tested by the Kirby-Bauer disc method. The results showed that the isolate was sensitive to penicillin, ampicillin, erythromycin, kanamycin, tetracycline, chloramphenicol, medemycin, gentamicin and methicillin and resistant to vancomycin.

Table 1 Biochemical characteristics of *Pasteurella multocida*

Test	Reaction	Test	Reaction
Hemolysis	—	DNase	—
Oxidase	+	ONPG	—
Catalase	+	Growth on	—
Motility	—	MacConkey	
Indole	+	Acid from :	
MR	—	Glucose	+
VP	—	Lactose	—
Citrate	—	Sucrose	+
Urea	—	Maltose	+
Nitrate	+	Mannitol	+
reduction		Xylose	+
Gelatin	—	Fructose	+
L-lysine	—	Salicin	—
L-arginine	+	Sorbitol	+
Starch	—	Trehalose	+
Esculin	—	Inositol	—

Table 2 Biochemical characteristics of the three subspecies of *Pasteurella multocida*

	Arginine	Indole	Urea	Trehalose	Maltose	Xylose	Arabinose	Mannitol	Sorbitol	Dulcitol
<i>P. multocida</i> subsp. :										
<i>multocida</i>	+	+	—	d	—	d	—	+	+	—
<i>septica</i>	+	+	—	+	—	+	—	+	—	—
<i>gallicida</i>	+	+	—	—	+	d	+	+	+	+

+ ≥90% strains positive ; — ≥90% strains negative ; d : 11–89% strains positive

Discussion

In 1980, Pasteur first isolated the etiological agent of fowl cholera, *Pasteurella multocida*, and characterized it morphologically and biochemically.

The first reported case in a human, a farmer's wife with puerperal fever, was described in 1913 by Brugnattelli, who isolated the rod from the patient's blood and proved it to be *Pasteurella multocida*. In 1930, Kapel and Holm first described *Pasteurella multocida* infection resulting from a cat bite, and from then on there have been increasing numbers of reports of human infections caused by *Pasteurella multocida*, such as bacteremia, septicemia, septicemic arthritis, meningitis, pyencephalus, urinary tract infection, bronchitis, pneumonia and conjunctivitis⁵⁾⁻⁷⁾.

Reports of human brain abscess caused by *Pasteurella multocida* are rare so far, only a few cases world wide and none in China^{5,8,9)}. The present patient had a history of close exposure to cats and dogs since he and his neighbours all had fed those pets. The patient had suffered from chronic purulent otitis and had been getting worse in the past two years, often with secretion of pus.

Pasteurella multocida can be isolated from the digestive and respiratory tracts of cats, dogs, mice, rabbits, cattle, sheep, pigs etc. Rates of carriage of *Pasteurella multocida* in the oral or nasal secretions of the animals are quite high, 70-90% in cats, 50-66% in dogs, 51% in pigs and 14% in Norwegian rats. *Pasteurella multocida* is a pathogen of many species of animals. Human infection most often follows cat and dog bites or scratches. Yet infection also can result from the bites of other animals, including the opossum, rat, lion, rabbit, pig and wolf, and even from the kick of a horse. Therefore, a person who raises cats and dogs etc. should be careful not to be bitten or scratched and exposed to oral secretions as far as possible. Once bitten or scratched by the above animals, the patient should have the local wound treated with antibiotics to prevent infection with *Pasteurella multocida*.

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Pasteurella multocida による脳膿瘍の1例

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(平成5年9月10日受付)

(平成5年11月4日受理)

要 旨

12年間にわたる慢性化膿性中耳炎の26歳の男性が頭痛及び嘔吐にて来院した。頭部CTにて右前頭部に膿瘍を認めた。膿瘍摘出術施行し、膿瘍の培養では *Pasteurella multocida* が摘出された。本

患者は感受性試験に基づいた適切な抗生剤の投与により治癒した。*P. multocida* による感染症は猫や犬にかまれた後の局所の感染から呼吸器感染症、敗血症および髄膜炎があるが、脳膿瘍は珍しく、報告した。