JOURNAL OF CLINICAL MICROBIOLOGY, Sept. 1991, p. 2041–2042
0095-1137/91/092041-02$02.00/0

Vol. 29, No. 9

Meningitis Caused by *Psychrobacter immobilis* in an Infant

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Received 19 March 1991/Accepted 14 June 1991

***Psychrobacter immobilis* was isolated from the cerebrospinal fluid (CSF) and blood of a 2-day-old infant who appeared well except for a fever and a full anterior fontanelle. The infant was treated with antibiotics intravenously. After 48 h, he became afebrile and CSF and blood cultures were negative; he was then discharged. After 96 h of incubation, CSF and blood cultures yielded a gram-negative organism, *P. immobilis*. The child was readmitted to the hospital, and the same organism was again isolated from his blood and CSF.**

Psychrobacter immobilis is a recently described, chiefly psychrotrophic, aerobic, gram-negative, nonmotile, oxidase-positive coccobacillus that has been proposed as a member of the family *Neisseriaceae* (5). It has been found mainly in association with fish, poultry, and meat products. Cerebrospinal fluid (CSF) and blood have only rarely been reported as sources of isolation of *P. immobilis* (3). Little is known of the clinical significance of this organism; however, strains have been isolated from a variety of human sources, such as brain tissue, the eye, the urethra, and blood (3, 5). The sources of isolation suggest that this bacterium might be a cause of opportunistic infections. The only clinical description of *P. immobilis* in humans was done recently by Gini (2). We report here the isolation of *P. immobilis* from the blood and CSF of an infant.

A 2-day-old infant boy was brought to the emergency room at the Saipan Community Health Center (Saipan, Marianas Islands, Micronesia) when his parents noted a tactile fever. In the emergency room, a rectal temperature of 39°C was recorded. The infant had been breast-feeding well with no vomiting or diarrhea. No seizurelike activity had been observed. The infant was born in the hospital and his birth history was unremarkable. The family history revealed that the father had been ill with flulike symptoms at the time of the infant's admission. Physical examination showed an alert, vigorous infant with icteric skin, a full but soft anterior fontanelle, and otherwise normal findings. The infant was admitted, and blood, urine, and CSF samples were taken for bacteriologic culture and laboratory examination. The serum bilirubin level (total) was 7.5 mg/dl, serum glucose level was 105 mg/dl, leukocyte count was 12,300/mm^3 (32% segmented neutrophils, 68% lymphocytes), and there were 96,000 platelets per mm^3. CSF analysis revealed 8 leukocytes per mm^3, 3 erythrocytes per mm^3, a glucose level of 55 mg/dl, and a protein level of 54 mg/dl. No organisms were seen by Gram stain.

The patient was given intravenous ampicillin (50 mg/kg of body weight every 8 h) and gentamicin (2.5 mg/kg of body weight every 12 h) pending culture results. He was afebrile after 24 h of hospitalization, and the serum bilirubin level decreased to 3.5 mg/dl. The CSF was centrifuged for 15 min at 1,060 relative centrifugal force, and the sediment was placed on blood agar with a *Staphylococcus* streak, on Columbia-colistin nalidixic agar (CNA), on MacConkey agar, on modified Thayer-Martin (C-Transgrow) (MTM) medium, and into thioglycolate broth. The urine was cultured on a blood agar plate (BAP) and a MacConkey plate and incubated in room air. Blood for culture was placed in one Pedicult bottle and incubated in room air at 35°C. At 24 h, the urine cultures were negative for growth. At 48 h, the blood and CSF cultures were negative for growth, and the infant was discharged after an uneventful hospital stay.

At 96 h, the patient's blood and CSF cultures were reexamined. The CSF BAP was found to contain one greyish, slightly convex colony approximately 2 mm in diameter, while all other plates were negative for growth. The thioglycolate broth also had a fine precipitate. The colony on the BAP grew in the initial area of the CSF inoculum but did not appear to be bordering the *Staphylococcus* streak. Gram stains of the colony on the BAP and of the broth precipitate revealed a gram-negative diplococcus. The colony on the BAP was subcultured again to a BAP and to MacConkey, CNA, and MTM plates, but only the BAP was positive for growth.

The Pedicult bottle was also beginning to show macroscopic signs of growth at 96 h and was found microscopically to contain gram-negative diplococci. The Pedicult bottle was subsequently subcultured to BAPs and to MacConkey, CNA, and MTM plates. Subcultures at 24 and 48 h from the thioglycolate broth and Pedicult bottle failed to grow any bacteria. Therefore, the organism isolated from the CSF BAP was used for all subsequent biochemical testing.

The infant, now 7 days old, was readmitted, and the bacteriologic cultures of the blood and CSF and laboratory examination were repeated. The physical examination upon admission was again remarkable for a full, soft anterior fontanelle but otherwise showed an active, vigorous infant. The leukocyte count and hemoglobin were unremarkable; the serum glucose level was 77 mg/dl. The CSF contained 10 leukocytes per mm^3, 8 erythrocytes per mm^3, a glucose level of 48 mg/dl, and a protein level of 54 mg/dl. Gram-negative diplococci were seen by Gram stain. The patient was given cefotaxime (50 mg/kg of body weight every 8 h) and ampicillin (50 mg/kg of body weight every 6 h) pending culture and antibiotic sensitivity results.

Because we initially thought that this species was *Neisseria gonorrhoeae*, the mother was treated with ceftriaxone intramuscularly upon the infant's readmission. Maternal vaginal and cervical cultures were negative for growth on

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TABLE 1. Characteristics of the *P. immobilis* isolate and the type strain of *P. immobilis*[a]

Test	Case isolate	*P. immobilis* ATCC 43116[T]
Motility	−	−
Gram stain	−	−
Morphology	Cocci, coccoid forms, diplo forms	Coccobacilli, diplo forms
Growth on MacConkey agar	Sparse[b]	+
Growth at		
25°C	+	+
35°C	+	−
42°C	−	−
Catalase	+	+
Oxidase	+	+
Urea, Christensen's	+[b]	+[b]
Indole	−	−
Nitrate reduction	−	+
Nitrite reduction	−	−
Citrate (Simmons)	−	−
Hydrolysis		
Esculin	−	−
Gelatin at 14 days	−	−
Triple sugar iron agar		
Slant	Alkaline	Alkaline
Butt	No change	No change
Acid from (OF base):		
Glucose, xylose, and lactose	+	+
Sucrose and maltose	−	−
Nutrient broth (% NaCl)		
0	+[b]	+[b]
6	+	+
Odor	Roses	−
P. immobilis transformation[c]	+	+

[a] +, positive reaction within 48 h; −, negative reaction.
[b] 3 to 7 days.
[c] See references 4 and 5.

MTM culture plates. Subsequent vaginal and cervical cultures on BAPs failed to reveal the organism that had been isolated in the infant's blood and CSF. At 72 h, both the CSF BAP and the 48-h blind BAP subculture of the Pedicult bottle were positive for growth. The colony morphologies of both new isolates resembled that of the organism isolated from the CSF sample from the first admission, and the Gram stains of both isolates again showed a gram-negative diplococcus. The organism was found by disk diffusion to be sensitive to cephalothin, ampicillin, gentamicin, chloramphenicol, and erythromycin and to be resistant to penicillin. The organism isolated from the CSF BAP was again used for all subsequent testing because growth of the organism subcultured to the BAP from the Pedicult bottle could not be perpetuated.

At 35°C in 10% CO_2 at 24 h, the gram-negative diplococcus isolated at each admission grew on 5% human blood agar (moderately) but only the diplococcus isolated at the second admission grew on MacConkey agar (scantily). The isolates did not grow anaerobically and did not grow on MTM medium, CNA, or salmonella-shigella agar. Growth also occurred at 25°C. The organism was oxidase and catalase positive but was negative for urea, indole, bile esculin, and motility. The triple sugar iron slant was alkaline, and the butt was neutral. It was assumed that the organisms isolated from the CSF on both admissions were the same organism since the biochemical reactions were the same.

The organism could not be further identified at the laboratory in Saipan, Micronesia, and was ultimately referred to the Centers for Disease Control where it was identified as *P. immobilis*. The tests performed (1) and reactions obtained are shown in Table 1. The major cellular fatty acids of the organism were oleic (52%), heptadecanoic (15%), stearic (6%), and decanoic, dodecanoic, 3-hydroxydodecanoic, palmitic, palmitoleic, and heptadecanoic (3 to 5% each), which is consistent with the cellular fatty acid content demonstrated in strains of *P. immobilis* (6). The xylose and urea reactions of this isolate, as well as the transformation assay and the cellular fatty acid profile, are different from those of the *Neisseria* species.

This report is evidence that although there are only a few reports of the isolation of *P. immobilis* from clinical specimens, this organism can cause human infections and its identification may be a problem. It appears that it may be a slow-growing organism and an organism with low virulence, considering the relatively few symptoms and small inflammatory response displayed by this infant. Perhaps misidentification has occurred in the past in other clinical situations, with this organism being confused with either *Moraxella* or *Neisseria* species.

We gratefully acknowledge Robert E. Weaver for assistance with preparation of the manuscript and C. Wayne Moss and Maryam Daneshvar for the cellular fatty acid analysis of the isolate.

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