

## *Serratia plymuthica* Osteomyelitis following a Motorcycle Accident

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*Serratia plymuthica* was isolated from the sinus tract and from the infected bone in a case of chronic osteomyelitis following an accident of a motorcyclist. This is the second case in which *S. plymuthica* was a significant pathogen. Previously, a case of *S. plymuthica* sepsis associated with infection of a central venous catheter was described.

*Serratia plymuthica* was recently demonstrated to be a significant pathogen in a case of sepsis; the agent could be isolated in blood cultures and from the tip of the central venous catheter (4). Previously, an isolate from a human burn site (1) and five isolates from the respiratory tract (2) with undetermined clinical significance were reported. In this paper we describe a patient with chronic osteomyelitis in which *S. plymuthica* was demonstrated as a pathogen.

In September 1986, an 18-year-old motorcyclist was admitted to the hospital with an open multiple fracture of the distal right femur. The fracture was first treated conservatively, and 1 month later osteosynthesis could be effected. In April 1987, swelling and erythema developed on the medial site of the distal right femur. The infection site was incised. Culture of the secretion yielded *S. plymuthica*. The wound remained open, and three repeat cultures of the fistula secretion yielded the same organism, once with coagulase-negative staphylococci in the minority. A fistulograph showed a connection with the osteosynthesis plate. In the Department of Surgery of the University of Zurich, a tomogram demonstrated an irregularly shaped cavity and extensive periosteal callus in the fracture region. The osteosynthesis plate was ablated, the duct of the fistula was revised, and after a wound excision and drainage, gentamicin spherules were inserted into the operation site. A swab from the operation site revealed *S. plymuthica*. Three weeks after the operation, a swab from the wound revealed *Streptococcus viridans* only. The wound closed without irritation.

After incubation overnight at 37°C on human blood agar, *S. plymuthica* formed greyish, circular, convex, and entire-edged colonies, and it developed an unpleasant odor after 3 days. It produced lactose-fermenting colonies on MacConkey agar with a dry, wrinkled aspect 3 days later. On triple sugar iron agar, the organism produced an acid slant, acid butt, no gas, and no hydrogen sulfide. The negative oxidase reaction, negative motility, negative lysine and ornithine decarboxylase, production of DNase, failure to use adonitol, arabinol, and malonate, and further biochemical testing with the API 20E identification system (Biomérieux) confirmed the identity of the organism as *S. plymuthica*. Positive reactions were observed for *o*-nitrophenyl-galactosidase, acetoin production, and gelatin hydrolysis. Negative reactions were observed for arginine dihydrolase, urease, indole, and tryptophane deaminase. The organism fermented glucose, mannitol, sorbitol, sucrose, melibiose, amygdaline, and arabinose but failed to use inositol, rhamnose, and

citrate. Four isolates showed these biochemical reactions with the API 20E code 1007563. One isolate also used inositol and citrate, with the corresponding API 20E code 1207763.

All five isolates were resistant to cephalothin and colistin but susceptible to amikacin, cefotaxime, ceftriaxone, ceftazidime, chloramphenicol, gentamicin, imipenem, netilmicin, piperacillin, tetracycline, tobramycin, and trimethoprim-sulfamethoxazole as determined by disk diffusion. Four isolates were susceptible to ampicillin, but one produced an intermediate zone diameter. Two isolates were resistant to cefoxitin, and the others were of intermediate susceptibility.

In the present case, *S. plymuthica* was isolated three times as the single agent and once together with coagulase-negative staphylococci in a minority from the sinus tract. However, the diagnostic value of sinus tract cultures in chronic osteomyelitis was demonstrated for *Staphylococcus aureus* but not for other organisms, which should be verified by an appropriate operative culture (5). In our case, the operative culture revealed *S. plymuthica* alone, which demonstrates the pathogenicity of *S. plymuthica*. The origin of the agent is not clear. The habitat of *S. plymuthica* is predominantly water. Among the water isolates of *Serratia* spp., 30% belong to *S. plymuthica* (3). It is possible that the agent was able to enter the wound because of the open nature of the fracture. For the treatment of osteomyelitis, a correct bacteriologic diagnosis is essential. The positive DNase and gelatinase results and resistance to cephalothin and colistin are indicative of *Serratia* species. A cocarde phenomenon, with growth in the immediate proximity of the colistin disk, followed by a clear ring of inhibition, followed in turn by dense growth, was observed, as described for *Serratia*

TABLE 1. Tests distinguishing *S. plymuthica* from other biochemically similar *Serratia* spp.

Test	Result <sup>a</sup> for:			
	Patient's isolate	<i>S. plymuthica</i>	<i>S. ficaria</i>	<i>S. rubidaea</i>
Lysine decarboxylase	—	—	—	v
Ornithine decarboxylase	—	—	—	—
Fermentation of:				
Adonitol	—	—	—	+
L-Arabinose	+	+	+	+
D-Arabitol	—	—	+	(+)
D-Sorbitol	+	v	+	—

<sup>a</sup> Data from reference 2. Symbols: +, 90 to 100% positive; (+), 75 to 89.9% positive; v (variable), 25.1 to 74.9% positive; —, 0 to 10% positive.

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*marcescens* (6). The API 20E is capable of distinguishing *S. plymuthica* from the other *Serratia* species. However, *S. ficaria*, a species biochemically similar to *S. plymuthica*, is not in the data base of the API 20E. Additional tests (Table 1) allow distinction between these two species. The negative arabinol fermentation was indicative of *S. plymuthica*. *S. rubidaea* is integrated in the data base of the API 20E system and can have a code similar to that of *S. plymuthica*, requiring additional discriminating tests (Table 1). This case shows that the clinical relevance of *S. plymuthica*, when the organism is isolated, must be considered.

#### LITERATURE CITED

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