Isolation of *Carnobacterium piscicola* from Human Pus – Case Report

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ABSTRACT. *Carnobacterium piscicola* was first described in 1984. These bacteria are often isolated from fish afflicted with bacterial infections. To date, there has been no reported isolation of this bacterium from human specimens. We report here the isolation of *C. piscicola* from the pus following traumatic amputation of the right hand in the wrist of a 35-year-old man. The traumatic amputation occurred with an industrial water sawmill. The identity of the human strain was determined biochemically, by 16S rDNA sequence similarity and by fatty-acid methyl-ester profile from bacterial cell.

*Carnobacterium piscicola* was first described and called *Lactobacillus piscicola* in 1984 by Hiu *et al.* (1984). The bacterium was isolated from fish infections, most frequently from salmonoids. It causes infections most frequently identified as lactobacillosis. On the basis of a comparative study involving certain *Lactobacillus* species frequently seen in poultry and also including *L. piscicola*, Collins *et al.* (1987) proposed reclassification of *L. piscicola* to the new species *C. piscicola*. Lactic acid bacilli were to date isolated as *C. piscicola* from brown bullhead, striped bass, channel catfish (Baya *et al.* 1992) and salmonoids (Staller *et al.* 1992; Stoffels *et al.* 1992). Reported here is the first isolation of this bacterium from a human, obtained from the pus from traumatic amputation of the right hand in the wrist of a 35-year-old man in Šumperk working with a water sawmill.

**Case report.** A man working with a water sawmill was brought to the surgical department of the Municipal Hospital in Šumperk following the loss of his right arm at the wrist. The amputated hand was not brought along as it was crushed. The arm stump was polluted. The patient lost approximately 1 L of blood. Immediately after necessary preparations the injured right upper extremity was revised at the operating theater. The amputation was completed in general anesthesia at the carpometacarpal joint. The thumb metacarpus was dilacerated and it was of no use. The nervus medianus was sharply shortened. Suture was performed after leveling. Antibiotic medication in the post-surgery stage included cefuroxim (Zinacef; 3 × 1.5 g per d, intravenous), and also raetronidazol (Avrazor; 3 × 1 g per d). The stump was revised on the 6th day after the initial surgery. The entire forearm and arm showed paste-like swelling. Muscles and necrotic tissue were excised from the remaining thanar and hypothenar. Incisions were made in the forearm distal dorsum and drains were introduced with hydrogen peroxide irrigation. An abscess was evacuated from the wound. A pus sample was collected for bacterial cultivation and to establish sensitivity to antibiotics. No signs of crepitation or lymphadenitis were found. The patient was secured via central veins, through vena subclavia. Parenteral feeding was applied to the patient; his temperature was around 38 °C.

Considering a potential development of anaerobic infection the patient was moved to the Municipal Hospital in Ostrava-Fifejdy five days later. The stump showed defects on the sides with serumpurulent secretion and oozing pus. Tissues on the stump were soft and saturated. Incision with minimum sections; erythrocytes – 4.5, leukocytes – 14.7. The patient was exposed to hyperbaric oxygenation in a hyperbaric chamber (overpressure 0.2–0.3 MPa, 20 times daily/2 h) and clindamycin (Dalacin) was administered (3 × 300 mg daily), together with Reparil i.v., Tramal i.v.

**Histological examination of bioptic specimen.** The skin with subcutis showed disperse chronic inflammatory infiltration into lower corium. Striated musculature showed locally significant trophic changes.
to necroses. The presence of a chronic-inflammatory infiltrate was identified. No significant changes on the nerve-vascular bundle were found.

With daily dressings the wounds on the stump gradually calmed. A month later the patient was sent to a prosthetics specialist who recommended amputation of the right arm in the middle part of the forearm for a "biohand" prosthesis. After the amputation the wound has healed smoothly and the patient was discharged.

**Bacteriological examination of pus.** *Serratia marcescens* was isolated from the pus. Quantitative susceptibility to antimicrobial agents was determined by broth microdilution using the standardized methods described by the *National Committee for Clinical Laboratory Standards* (1998). This strain was susceptible (MIC in mg/L) to ampicillin (4), ampicillin/sulbactam (2), cotrimoxazol (4), ofloxacin (0.125), gentamicin (0.50), amikacin (1) and aztreonam (0.25). It was resistant to cefuroxim (32) and colistin (64).

In addition to the relatively common find of *S. marcescens*, a white, relatively large nonhemolytic colony of Gram-positive rods was isolated from sheep blood agar plate (3–5 mm in diameter) after 2 d of cultivation (Fig. 1). This isolated strain grew better when incubated at room temperature (22 °C). The isolated organism did not grow on MacConkey agar.

General description of the isolate: Gram-positive rods, facultatively anaerobic; fermentation products from glucose were lactic acid and some acetic acid; motility – negative; spore formation – negative; catalase – negative; gas from glucose – negative. Configuration of lactic acid – L(+)-, meso-2,6-diaminopimelic acid in cell hydrolyzate – positive, peptidoglycan type – nd (A 1 γ, m-Dpm-direct) were determined in the *German Collection of Microorganisms and Cell Cultures* (DSMZ – Deutsche Sammlung für Mikroorganismen und Zellkulturen, GmbH, Braunschweig, Germany).

Initial conventional biochemical tests performed on the API 50 CHL-miniAPI (*bioMérieux*, France) yielded a profile of 99.5 % identity (confidence index, T = 0.41) resulting in a profile of *Carnobacterium piscicola*. The isolated strain was tested for the presence of fatty-acid methyl-esters in the Sherlock System (*MIDI*, USA) using the TSBA database, version 4.0. The strain was identified as the only one related strain with similarity index 0.065, signifying a possible identification (Table I). The differences between mean fatty acid composition of the standard *C. piscicola* and our isolate can be caused by slightly different cultivation conditions (extended cultivation – 2 d) because of insufficient growth on standard medium; expressed lower value of the similarity index could also mean an atypical strain.

For confirmation, the isolated strain was examined in DSMZ for sequence similarity of 16S rDNA. Determination of partial sequences of the most variable region revealed 100 % agreement with *C. piscicola*.

Quantitative susceptibility to antimicrobial agents was determined by broth microdilution using the standardized methods described by the *National Committee for Clinical Laboratory Standards* (1998). The strain was susceptible (in terms of MIC) to penicillin (0.5), ampicillin (0.25), ampicillin/sulbactam (0.25), piperacillin (4), piperacillin/tazobactam (2), tetracycline (0.063), ciprofloxacin (1), meropenem (0.063), teicoplanin (0.25), erythromycin (0.063), vancomycin (1) and chloramphenicol (4). It was resistant to gentamicin (8), cefuroxim (>16), cefepim (>16), ceftazidim (>16), cefotaxim (>16), cefozopran (32), cefoperazone/sulbactam (32), cefotaxim (>16), ceftizoxim (>16), netilmicin (16), colimycin (64), clindamycin (>16), amikacin (16), isepamicin (64), aztreonam (64) and metronidazole (>32).