

***Shewanella putrefaciens* : a rare microbial agent associated with a non-healing ulcer in a leprosy patient**

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Female aged 55 years presented with signs and symptoms of borderline lepromatous leprosy and presence of a non-healing ulcer and multiple haemorrhagic blisters over dorsum of both feet. Discharge from the various lesions was subjected to microbiological examination and an unusual organism *Shewanella putrefaciens* was isolated which was sensitive to most routine antibiotics. Patient responded well to cephadroxil therapy with uneventful and complete healing of ulcer and blisters.

Key words : Leprosy, Non-healing ulcer, *Shewanella putrefaciens*

Introduction

The genus *Shewanella* comprises several gram negative species of bacteria widely distributed in the marine and freshwater environment. The genus plays an important role in the turnover of organic matter by means of anaerobic respiration. The name *Shewanella putrefaciens* was given by MacDonell and Colwell in 1985. It is the only nonfermentative gram negative rod that produces hydrogen sulphide. It was first isolated from butter and was originally described under the epithet of *Achromobacter putrefaciens* (Debois et al 1975, Ziemke et al 1998). Since then it has been isolated from a wide variety of clinical specimens including blood, skin, infections of the soft tissues, biliary tract, peritonium and pleural cavities (Chen et al 1997). We report here a case

where the organism was isolated from the ulcer of a leprosy patient.

Case Report

A 55 years old female daily wage worker, clinically and histologically diagnosed as a case of borderline lepromatous leprosy in January 2007, presented a year later (in January 2008) with multiple, varying sized blisters over dorsum of both feet and a single non-healing ulcer over dorsum of left foot of approximately 20-25 days duration (Figure 1). On examination of the feet, there was altered sensation over tips of both toes along with black discoloration of overlying skin. Multiple blisters of variable sizes ranging in diameter from 1-3 cm were present over dorsum of both feet. A single ulcer (4 cm x 3 cm) with foul smelling discharge was present over dorsum of left foot.

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Figure 1: Clinical presentation of patient showing a non-healing ulcer and blisters.

History revealed that multidrug therapy (MDT) with dapsone, rifampicin and clofazimine was started in January 2007 but left it after a period of two months.

Discharge from ulcer and blister fluid was subjected to microbiological examination (Gram's stain, culture and antibiotic sensitivity). Gram smear prepared from ulcer swab showed many Gram-negative bacilli, occasional Gram-positive cocci and bacilli and numerous polymorphonuclear leucocytes in various stages of degeneration. Gram's stain from blister fluid showed only Gram-negative bacilli and polymorphonuclear cells.

Samples from ulcer and blisters were inoculated on nutrient agar, nutrient agar with 6% sodium chloride, blood agar and MacConkeys agar. Colony characteristics in various inoculated

Table 1: Morphology and differentiating characters of isolated organisms

Morphology	Motility	Catalase	Oxidase
Pleomorphic, Gram-negative rods, non-capsulated, non-sporing	Actively motile	(+)	(+)

Table 2: Biochemical test results of isolated organisms

Test	Result
Indole	(-)
Methyl red	(+)
Voges-Proskauer	(-)
Citrate	(+)
Urease	(+)
Triple sugar iron agar	K/K/H ₂ S
Nitrate reduction	(+)
Glucose fermentation	(-)
Lactose fermentation	(-)
Sucrose fermentation	(-)
Mannitol fermentation	(-)
Lysine decarboxylase	(-)
Arginine decarboxylase	(-)
Ornithine decarboxylase	(+)

K : Alkaline reaction

media were as follows:

- Nutrient agar and nutrient agar with 6% sodium chloride : Pure growth of mucoid, greenish brown colonies.
- Blood agar : Pure growth of grey, opaque, nonhaemolytic colonies, 2-4 mm in diameter with entire edges.
- MacConkey agar : Pure growth of mucoid, non-lactose fermenting colonies with entire edges and greenish brown pigment.

Morphological and biochemical characteristics of Gram-negative rods are shown in Table 1 and Table 2. The organism was identified as *Shewanella putrefaciens* based on following characteristics :

- Gram negative actively motile rods.
- Oxidase and catalase positivity.
- Urease positivity and abundant hydrogen sulphide production.
- Abundant growth on 6% sodium chloride incorporated in nutrient agar.

Antibiotic sensitivity test was carried out by Kirby-Bauer disc diffusion method. The organism was sensitive to cefotaxime, cefepime, genta-



Figure 2: Formation of granulation tissue after chemotherapy and debridement.

micin, ciprofloxacin, amikacin, cephadroxil, cotrimoxazole, tetracyclin and cefuroxime.

Patient was treated with oral cephadroxil tablets 500 mg bid for 7 days along with MDT for leprosy. At the end of one week, the ulcer had healed completely (Figure 2) and all blisters had disappeared. Patient was referred to nearby primary health centre for continuation of leprosy treatment.

Discussion

Recognition of *Shewanella putrefaciens* species has been hampered by the lack of a clear classification system and by considerable confusion in its nomenclature. This microorganism is generally benign and often produces colonization of the superficial mucosa and damaged skin. The psychrophilic nature of this organism adapts it for multiplication in the cooler devitalized tissues of the lower limbs. Skin biopsy was not performed in this case and therefore, active invasion of tissue could not be ascertained. However, excellent response to appropriate antibiotic regimen (cephadroxil) is a pointer to invasive infection by the organism. There are reports of *S. putrefaciens* isolation from various parts of the world and this organism is associated with a wide clinical spectrum. Most published articles on the subject of *Shewanella* species fail to mention whether the

organism was a contaminant or was actually the causative agent (Debois et al 1975, Vandepitte and Debois 1978, Chen et al 1997, Yohe et al 1997, Jorens et al 2004).

In India, Dhawan et al (1998) reported isolation of *S. putrefaciens* from a patient of rheumatic heart disease with infective endocarditis. Other species of *Shewanella* have also been reported from India (Mukhopadhyay et al 2007). *S. putrefaciens* has long been considered merely a colonising rather than an active infective agent, therefore, it is suggested that this organism should be regarded as an emerging opportunistic pathogen.

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