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SOFT TISSUE INFECTION CAUSED BY SHEWANELLA ALGAE: A CASE REPORT

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Abstract: A case of a 70-year-old male patient with a non-healing ulcer over the leg, without any possible indication about the source of the present infection. Wound discharge sent for culture and sensitivity was inoculated on Blood Agar, MacConkey's Agar, and later, on TCBS Agar. Overnight incubation showed Klebsiella pneumoniae and Shewanella algae to be present in the sample. Shewanella algae was identified by conventional methods; identity was subsequently confirmed by an automated system. Antibiotic Susceptibility Testing by Modified Kirby - Bauer Disk Diffusion Method showed sensitivity to all antibiotics tested. This case indicates that awareness should also be extended to unusual pathogens even when isolating organisms from a common condition, and despite favorable sensitivity to routinely used antibiotics, they should be regarded as emerging opportunistic pathogens.

Key Words **– Non-healing ulcer, *Shewanella*, opportunistic pathogen**

I. Introduction:

The Case: A 70-year-old man was admitted to surgical ward with a non-healing ulcer over the lateral aspect of left leg, approximately 30 x 10 cm in size with irregular margins, flat edges, non-necrotic floor which bled on touch. The patient had a history of wandering around aimlessly; he was a known case of senile dementia. He was brought by his relative to the hospital, without any possible information about the source of the present infection. Wound discharge was sent for culture and sensitivity before constituting empirical antibiotic therapy.

II. Materials and Methods:

Discharge from the wound was inoculated on Blood Agar and MacConkey's Agar, and incubated aerobically at 37ºC overnight. Hanging drop preparation was examined to ascertain its motility, and smears from the colonies were stained with Gram's stain and examined to ascertain its morphology. Isolated colonies were then inoculated on Thiosulphate Citrate Bile-salt Sucrose Agar. Biochemical tests for Gram-negative organisms, as well as those for identification of non-fermenters were carried out, they were Indole test, Methyl Red test, Citrate Utilization, Urease Production, Triple Sugar Iron test, Decarboxylation tests, and Hugh-Leifson's Oxidative Fermentative test (Figure 4). Antibiotic Susceptibility was tested by Modified Kirby-Bauer Disk Diffusion Method, and drugs were tested according to CLSI 2020 M-100 manual (Table 1). Identification was subsequently authenticated by VITEK II automated system (bioMérieux, Marcy l'Etoile, France).

III. Results and Discussion

Blood agar showed large circular orange-brown low convex colonies with zone of hemodigestion around them (Figure 1). MacConkey's Agar showed circular non-lactose-fermenting colonies (Figure 2). The colonies showed a positive Catalase and Oxidase test. Hanging drop preparation showed darting motility, and Gram's-stained smears from the colonies showed slender Gram-negative bacilli ranging from 1.5 - 3 µm x 0.5 - 1 µm in size. Thiosulphate Citrate Bile-salt Sucrose (TCBS) Agar showed non sucrose fermenting colonies (Figure 3). Various biochemical tests for Gram-negative organisms, as well as those for identification of non-fermenters were carried out. Indole and Methyl Red tests were negative, Citrate was not utilized, Urease was produced, Triple Sugar Iron medium showed non fermentative pattern with plenty of H_2S, Lysine Decarboxylase and Arginine Dehydrolase were negative, while Ornithine Decarboxylase was positive. Hugh-Leifson's Oxidative Fermentative test showed an Asaccharolytic pattern (Figure 5). Antibiotic Susceptibility Testing was carried out by Modified Kirby - Bauer Disk Diffusion Method. Drugs were applied in accordance with CLSI 2020 M-100 manual (Figure 4). Sensitive pattern was found in all antibiotics tested; classes like Aminoglycosides, Cephalosporins, Penicillin derivatives, Fluoroquinolones, non-ribosomal peptides were tested. Detailed sensitivity pattern is denoted in Table 1.

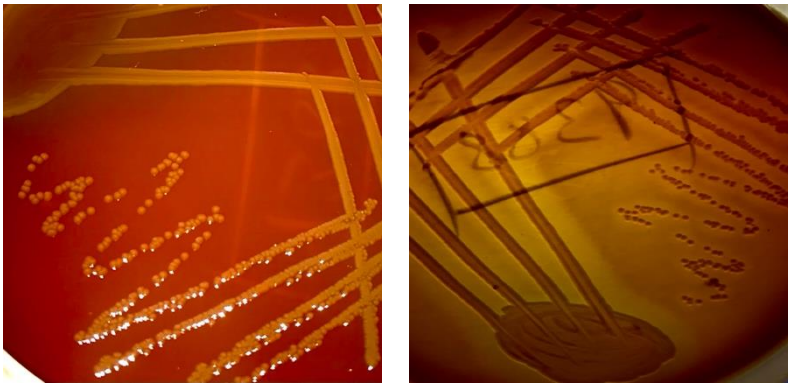


Figure 1: Growth of *Shewanella algae* on Blood agar showing Orange-brown colonies with zone of hemodigestion

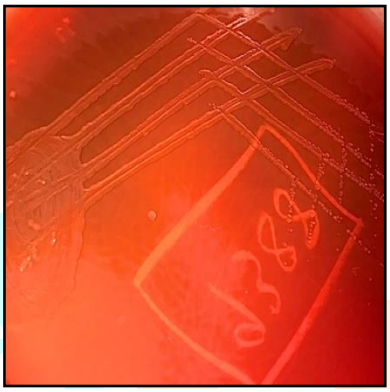


Figure 2: Non-Lactose-Fermenting colonies of *Shewanella algae* on MacConkey's Agar

Figure 3: Non-Sucrose-Fermenting colonies of *Shewanella algae* on TCBS Agar

Figure 4: Antibiotic Sensitivity Pattern of *Shewanella algae*

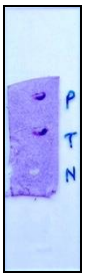
Test	Catalase	Oxidase	Indole	Methyl Red	Citrate Utilization	Urease Production	Triple Sugar Iron Test	Lysine Decarboxylase	Ornithine Decarboxylase	Arginine Dehydrolase	Hugh – Leifson's Oxidative Fermentative Test
Figure											
Result	Positive	Positive	Negative	Negative	Negative	Positive	K/NC with plenty of H_2S	Negative	Positive	Negative	A-saccharolytic

Figure 5: Biochemical Reactions of *Shewanella algae*

Table 1: Showing the antibiotic sensitivity pattern of *Shewanella algae*. The strain encountered in the present case was sensitive to all drugs tested

Drug Class	Drug	Pattern
Aminoglycosides	Amikacin	Sensitive
	Gentamicin	Sensitive
	Tobramycin	Sensitive
β-Lactams	Cefepime	Sensitive
	Cefoperazone	Sensitive
	Cefixime	Sensitive
	Cefotaxime	Sensitive
	Ceftazidime	Sensitive
	Ampicillin	Sensitive
	Piperacillin - Tazobactam	Sensitive
	Imipenem	Sensitive
Fluoroquinolones	Ciprofloxacin	Sensitive
	Norfloxacin	Sensitive
Non-ribosomal peptides	Polymyxin B	Sensitive
	Colistin (MIC)	Sensitive
Others	Cotrimoxazole	Sensitive
	Tetracycline	Sensitive

The genus *Shewanella* consists of two species, *S. putrefaciens* and *S. algae*. Initially they were classified into *Pseudomonas* species, but diverse genetic and metabolic characteristics have resulted their reclassification. *S. algae* is found to be more closely related to human illnesses than *S. putrefaciens.* The reason for the difference in pathogenicity is hypothesized to some hemolytic factors that are expressed by *S. algae* and not *by S. putrefaciens.*

Shewanella algae is said to be a marine pathogen, the natural habitat being water of all types, and fish. Essentially, it causes disease in warm summers of temperate climates. Consequently, it is extremely uncommon for them to be isolated from clinical samples. The rare occurrence of such isolates makes the definition of a reference phenotype very difficult, and unavailability of markers in automated databases caused spurious association of human diseases to *S. Putrefaciens* in the past. *S. algae* has previously been isolated from skin and soft tissue infections like cellulitis, with bacteremia being the most common complication.

IV. Conclusion

This case of infection caused by *S. algae* indicates that unusual pathogens should also be considered, even when isolating organisms from a common condition. Despite the conducive sensitivity to antimicrobials, they both should probably be regarded as emerging opportunistic pathogens, especially in immunosuppressed patients, or patients in extremes of age.

V. References

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