Staphylococcus pseudintermedius: An emerging cause of pyoderma in pet dog owner

Rup Jyoti Chandak[1], Anurag Dadu[2], Nidhi Sharma[3]

From Consultant, Departments of [1]Microbiology, [2]Surgery, [3]Pathology, Sant Parmanand Hospital, New Delhi, India

Correspondence to: Dr. Rup Jyoti Chandak, Department of Microbiology, Sant Parmanand Hospital, 18, Sham Nath Marg, Civil Lines, New Delhi – 110054, India. E-mail: rupjyotichandak@yahoo.com

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ABSTRACT

Staphylococcus pseudintermedius is a part of canine skin and oral flora. It is a bacteria mainly pertaining to veterinary interest. Here, we present the case of a 40-year-old female presented in the surgical department with non-healing pyoderma for 1 year. Culture and sensitivity of the pus drained from the abscess showed *S. pseudintermedius* (methicillin-susceptible) identified by Vitek 2. She was treated by amoxy clavulanic and responded well with no recurrence. The patient owned a pet dog which was apparently healthy. However, her symptomatic duration started very soon after the pet dog was brought into the house. Isolation of the organism from the pet could not be done. *S. pseudintermedius* is an underrecognized zoonotic domestic infection. A proper clinical history and advanced diagnostic technology play a role in the identification of such infections.

Key words: *Pet, Pyoderma, Staphylococcus pseudintermedius, Zoonotic*

Staphylococcus pseudintermedius was first described in 2005 [1]. After this, a formerly described species, *Staphylococcus intermedius* was reclassified based on molecular techniques into a group known as *S. intermedius* group (SIG). It consists of *S. pseudintermedius, S. intermedius*, *and Staphylococcus delphini* [2]. *S. pseudintermedius* is a member of the normal flora of the skin and mouth of dogs. It causes pyoderma, otitis media, wound and urinary tract infections in dogs, cats, and horses. In humans, it spreads mainly through dog exposure and it is known to cause various infections such as bacteremia, brain abscess, pneumonia, ear infections, varicose leg ulcers, infected suture line and infected implantable defibrillator apart from the wound infections [3]. We report a case of pyoderma by *S. pseudintermedius* in a female patient owning a pet dog. To conform to the new classification, all *S. intermedius* reported earlier have been referred as *S. (pseud) intermedius* in this case report.

CASE REPORT

A 47-year-old housewife presented in the surgical outpatient department with wounds in the distal aspect of her fingers of both the hands, predominantly on the right hand for 2–3 weeks. The lesion initially started as a small cut and then slowly progressed to painful swelling. She had no history of trauma. According to the patient, she had similar lesions 1 year back which subsided by the application of an ointment prescribed by her family doctor. She reportedly had not taken any oral/injectable antibiotics. She gave a history of scleroderma for 3 years and was on regular treatment for the same, and her fingers also showed the presence of onychomycosis with signs of healing scleroderma. Informed consent was obtained from the patient for the case report.

The patient was of normal built with no signs of pallor, jaundice, cyanosis, clubbing and malnutrition. Her vitals were within normal limits. Systematic examination revealed no abnormalities. On local examination an abscess was seen on the distal aspects of the right thumb. It was tender and warm. Signs of onychomycosis were seen in and around her finger nails.

The abscess was drained and sent to the laboratory for culture and sensitivity. Other investigations such as chest X-ray and total leukocyte count were normal. The patient was started empirically on amoxicillin-clavulanic acid 650 mg 3 times daily for 7 days. On aerobic culture, white opaque, beta-hemolytic colonies were isolated on 5% Sheep Blood Agar (Fig. 1). Identification and sensitivity were performed by Vitek 2. It was identified as *S. pseudintermedius* with 95% probability.

Sensitivity of the isolate (*S. pseudintermedius*) was as follows: Cefoxitin screen was negative, sensitive to benzyl penicillin (minimum inhibitory concentration [MIC] = 0.12), gentamicin (MIC ≤0.5), ciprofloxacin (MIC ≤0.5), levofloxacin (MIC = 0.5), erythromycin (MIC ≤0.25), clindamycin (MIC ≤0.12), linezolid (MIC = 4), teicoplanin (MIC ≤0.5), vancomycin (MIC ≤0.5), cotrimoxazole (MIC ≤10), and resistant only to tetracycline (MIC ≥16).

To confirm the identification of a rare isolate which is mainly of veterinary interest, a repeat identification and sensitivity were performed by a different person. The results were found similar to the previous report. Considering the interesting biochemical properties

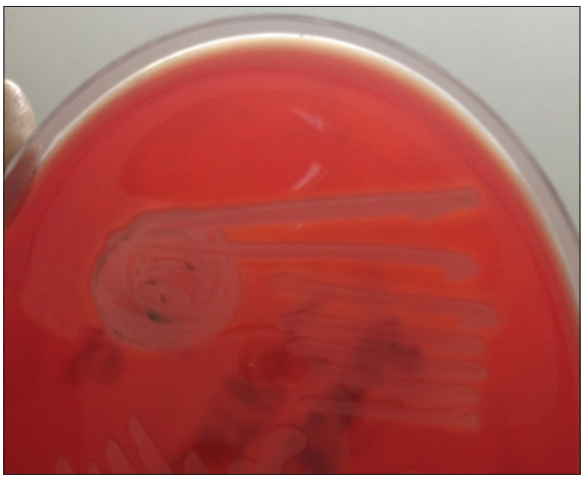

Figure 1: Beta-hemolytic colonies on 5% sheep blood agar plate

of these bacteria, catalase and coagulase tests were performed using standard methods [4]. Colonies from blood agar were positive for catalase and coagulase (tube coagulase) but negative for clumping factor (slide coagulase). by standard methods [4].

At the same time, we had called up the patient and asked for the history of animal contact. The patient reported that she owns a pet dog for 1 year. There was a positive history of licking and biting by the dog during routine pet care, but there was no significant history of illness of the pet nor any skin lesion.

The case was diagnosed as pyoderma due to methicillin-sensitive *S. pseudintermedius* (MSSP). The treatment was continued with amoxicillin-clavulanic acid as it was MSSP. The patient was requested to bring her pet dog in her next visit to the hospital so that samples could be taken from the dog's body and mouth to confirm the source of infection. Unfortunately, the patient did not bring her pet dog in her follow-up visit.

DISCUSSION

S. pseudintermedius is a coagulase-positive organism, yet it possesses characteristics which are different from that present in *Staphylococcus aureus*. It possesses various virulence factors, responsible for the colonization of the host to bacterial nutrition and dissemination. Enzymes such as coagulase, protease, and thermonuclease and toxins such as hemolysins, exfoliative toxins, and enterotoxins are produced by the bacteria. The exfoliative toxin is a virulence factor involved in canine pyoderma because Luk-I produced by the bacteria shows strong leukotoxicity toward various polymorphonuclear cells. *S. pseudointermedius* expresses surface similar to *S. aureus*. *S. pseudintermedius* binds to fibrinogen, fibronectin, and cytokeratin. Staphylococcal protein A is also produced. It is also known to form biofilm [5].

In the present study, the patient was a pet dog owner and she was exposed to the bacteria during routine handling and care of the dog which was apparently healthy with no skin lesions. She had an underlying problem of scleroderma superadded with onychomycosis which might have predisposed her to infection due to the loss of skin integrity. Her symptomatic duration had very well coincided with duration of owning a pet dog. Underlying predisposition conditions such as prostatic carcinoma with a prosthetic device [6], bone marrow transplant [7], and arthroplasty [3] were found in a few other reports too. Whether predisposing factors play a role in such infections is not certain as *S. (pseud) intermedius* colonization is uncommon in humans, even among people with frequent contact with animals [8]. In a study, pet dog owners with deep pyoderma were found to be more often culture positive for *S. pseudintermedius* than those without dog contact and *S. pseudintermedius* strain was the same as their dogs [9]. In this study, the author could not microbiologically prove the pet dog as source of pyoderma in this patient. However, starting of the lesions on the patient's finger soon after the dog was brought into the house clinically proves the canine source of infection in the patient.

The identification of *S. pseudointermedius* in this study was easily and directly done by Vitek 2. Automated methods such as Vitek 2 [3,7]. and MALDI-TOF [5]. have been reported to be a valuable diagnostic innovation in identifying *S. pseudintermedius* in previous reports too. On the contrary, even advanced technologies such as Phoenix and API have been reported to misidentify *S. pseudintermedius* as *S. aureus* [6]. Limitations of the automated systems should also be considered in such cases.

S. pseudointermedius, in this case, was methicillin susceptible. This finding is unique as previous literature has reported methicillin-resistant *S. seudintermedius* (MRSP) [3,6], while susceptibility testing was not performed in the other report [7].

There are few limitations in this case report which should be identified. Isolation of the same isolate in the patient's pet dog if done could have improved the relevance of the study. Confirmation or typing of the isolate by molecular method could not be done. However, to the best of our knowledge, this is the first case in India reporting zoonotic transmission of *S. pseudointermedius* from a pet dog to its owner.

CONCLUSION

S. pseudintermedius is an increasingly common pathogen causing zoonotic infections through household contacts of pets. Microbiologist should vigilantly acquire a history for the presence of pets when they encounter such isolates, especially from skin lesions such as pyoderma and wound infections.

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