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Necrotic Skin Infection by *Sphingomonas Paucimobilis* in Amazonia Region

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Abstract: *Sphingomonas paucimobilis* is an opportunist pathogen bacillus gram-negative aerobic with a rare occurrence. We present a case in an immunocompetent man successfully treated by surgical debridement, purulent drainage and with an associated course of antibiotics. A large necrotic infection, approximately 5 cm x 3 cm, in a 74-year-old man was identified. Empirical antibiotic therapy with ciprofloxacin 400mg EV 12/12 hours, associated with clindamycin 600mg EV 6/6 hours and pain control was done through dipyrone 1gr, tramadol 400 mg. Deep venous thrombosis was prevented through the prescription of enoxaparin 40mg subcutaneous once a day during hospitalization. The case was well illustrated with pictures throughout treatment. Complete healing was achieved after 90 days. Herein, we present a case of cutaneous contamination. The presented case is the third cutaneous contamination case reported in the literature and the first reported case in the Amazonia region in Brazil.

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Keywords: sphingomonas; gram-negative bacterial infection; skin disease; bacterial

INTRODUCTION

S. paucimobilis is an opportunist pathogen bacillus gram-negative aerobic with a rare occurrence. The clinical manifestations vary according to the source of the infection[1,2] and the mortality and morbidity rates are low[3,4], although the bacterial infection can lead to septicemia in newborns and in immunosuppressed patients [1,5].

The first description of the bacteria was made in 1977 by Holmes et al. [6], and the first human infection was reported in 1979[3]. The number of infection cases has been increasing[1] since the first reporting; nevertheless, the cutaneous infection is rare[7] and most of the cases are related to bloodstream infections: bacteremia and septicemia[1,5,7,8]. Herein, we present a case of cutaneous contamination. As far as we know, the presented case is the third cutaneous contamination case reported in the literature and the first case reported in Brazil.

CASE DESCRIPTION

A 74 year-old man residing in the rural area of Sinop city of the state of Mato Grosso located in the south of legal Amazonia in Brazil sought hospital care due to intense pain in a three-day-old necrotic infection (Figure 1A) associated with an abscess in his left leg. A timeline of the follow-up is shown in Figure 1.

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On the first day, 30/11/2017, physical examination demonstrated fever and an ulcerated lesion on the lateral side of the left leg presenting local erythema, edema (tenderness), and fever. Necrotic tissue surrounding the affected area was observed as well. Palpation around the lesion led to the draining of a purulent liquid. No alcoholism, diabetes mellitus, or any other comorbidity was identified.

Antisepsis, asepsis, and a puncture were performed in the surgical room to collect the purulent secretion. An incision was made to facilitate the drainage of the purulent content and debridement of the necrotic skin. The purulent collection was found only in the subcutaneous tissue and was limited posteriorly by the muscle fascia, without any sign of compromise below that. The area was kept open to allow for second intention healing. The collected biological material was sent to the laboratory for an antibiogram and culture analysis. Figure 1B shows the lesion one day after surgery.

Meanwhile, the patient undertook empirical antibiotic therapy with ciprofloxacin 400mg EV 12/12 hours in association with clindamycin 600mg EV 6/6 hours. An antiseptic wound dressing made with cane sugar was applied to the wound. Pain control was done through dipyrone 1gr and tramadol 400 mg (if necessary). Deep venous thrombosis was prevented through the prescription of enoxaparin 40 mg subcutaneous once a day during the period of hospitalization.

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Three days after the procedure, antibiogram results showed sensitivity to all antibiotics tested (Table 1) except for cefoxitin where an intermediary sensitivity was observed. Culture results identified *S. paucimobilis*, a species previously unknown to the authors. Due to the satisfactory evolution of the infection signs and tissue healing, the initial empirically-selected medication was maintained.

The patient remained under EV medication and band-aids were changed and the wound was cleaned with a physiologic solution daily. Day-by-day healing and absence of purulent secretion was observed. After three days of hospitalization, a wound sugar dressing was initiated and sustained until the patient was discharged from hospital care.

Six days after the surgical procedure the patient was discharged from hospital care without signs of infection. The patient was counselled to maintain home occlusive band aids (hydrocolloids) replacing them every 5 to 7 days, and was prescribed oral antibiotics for five days. The patient returned after seven days for verification of tissue healing and absence of infection.

Table 1. Antibiogram Results

Antibiotic	Micro-organism	Category
Amikacin	16	Susceptible
Ampicillin	<=2	Susceptible
Ampicillin/Sulbactam	<=2	Susceptible
Cefepime	<=1	Susceptible
Cefoxitin	16	Intermediate
Ceftazidime	<=1	Susceptible
Ceftriaxone	<=1	Susceptible
Cefuroxime	<=1	Susceptible
Cefuroxime/Axetil	<=1	Susceptible
Ciprofloxacin	<=0.25	Susceptible
Gentamicin	4	Susceptible
Imipenem	<=0.25	Susceptible
Meropenem	1	Susceptible
Piperacillin/Tazobactam	<=4	Susceptible
Tigecycline	<=0.5	Susceptible

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In the 30 day follow up appointment, the absence of purulent secretion was observed as shown in Figure 1C. At this point, the patient was counselled to continue using the same hydrocolloid band aids for an additional 12 days.

A total absence of purulent secretion, proper healing and skin repair could be seen in the 60 day (Figure 1D) and 70 day follow-up appointments (Figure 1E). The patient was observed until the necrotic infection was completely healed as seen in Figure 1F, when the patient was discharged after 90 days of treatment.

DISCUSSION

S. paucimobilis is a strictly aerobic bacillus enzymatically characterized by an oxidative catalase positive and produces yellow pigment. It does not require an optimum environment to grow[4], and prefers a temperature of around 30 degrees Celsius[7]. Morphologically, *S. paucimobilis* presents only one polarized flagellum and low mobility[9] and its external capsule does not have lipopolysaccharides, which contribute to its low virulence[7]. It is capable of activatiing cytokines and interleukins such as TNF, IL-1, and IL-6[2].

In the environment, *S. paucimobilis* can be isolated from water, soil, and water tubules in hospitals and catheters, leading to infection in these settings [4,9-11]. Blood infections and bacteremia are the most common causes of contamination worldwide. Between 2006 and 2008, two cases of hospital infections had been reported in the south region of Brazil[12]. The most common cause has been referred to as contact with water or other contaminated sources[4]. Additionally, alcoholism and diabetes mellitus have been associated with infections[9].

Cutaneous contamination is not common as only two cases have been reported. One case was in an insulin-dependent woman[4] and the other case was in an immunocompetent patient[3]. In both cases, a local trauma occurred before the cutaneous necrotic infections. Likewise, our patient traumatized the affected wound area while going down stairs in a farm shed. Contact with contaminated water[3] and soil [4] was referred to as being the source of cutaneous contamination. A water source and rope trauma were the causes reported in the first case[3]. Table 2 shows the clinical features of human cutaneous infections caused by *S. paucimobilis*.

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Regarding clinical manifestations, erythematous, painful and suppurative[4], enlarged inguinal glands, lack of fever, and a swollen and dull red color area surrounding the necrotic infection[3] were observed in these reported cutaneous infections. Likewise, the clinical manifestation was very similar in our case, where a swollen red area was also observed with signs of local infection, although our patient presented with a fever as well.

Table 2. Clinical features of human cutaneous infection caused by *S. Paucimobilis*

Authors, Year (country)	Area affected	Source	Dressing	Treatment
Peel, MM et al. 1979 (Australia)[3]	Leg	trauma	Eusol and paraffin	Amoxicillin
Reina et al., 1991 (Spain)[4]	Leg	trauma	NR	Amoxicillin, gentamicin
Maffei,THP et al., 2019 (Brazil)*	Leg	trauma	Sugar	Ciprofloxacin, clindamycin

NR, not reported; * the presented report

Two previously reported cases[3,4] of cutaneous infections were treated with amoxicillin[3] and with amoxicillin associated with gentamicin[4]. Differently, in our case, we decided to treat with an empirical combination therapy with clindamycin and ciprofloxacin. This decision was based on the effective activity of clindamycin against *S. aureus*, streptococci, and anaerobes in cases of skin and soft tissue infections[13]. The association between clindamycin and quinolone (ciprofloxacin) have been indicated for decubitus ulcers and diabetic foot[14]. Besides, the combination of clindamycin and ciprofloxacin results in higher bactericidal activity against gram-positive bacteria, mainly *S. aureus*, and *S. pneumoniae*, without compromising the high activity of ciprofloxacin against gram-negative strains[15].

Since its first reporting, *S. paucimobilis* has been reported as sensitive to tetracycline, gentamicin, chloramphenicol, sulfamethoxazole, tobramycin, carbenicilin. Moreover, it had been reported as a resistant to ampicillin, cefalotin, and streptomycin [3]. However, in our case, the antibiogram showed sensitivity to ampicillin (cefalotin and streptomycin were not tested) and presented relative resistance to cefoxitin as shown in

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Table 1. Therefore, there is no consensus regarding a pattern or a tendency of resistance and susceptibility to the antibiotics in the literature.

The use of sugar dressings, the effectiveness of granulated cane and granulated beet sugar have been described as wound cleansers, as previously reported in a pilot study[16]. In the pilot study, there was no bacteria growth where there was a high concentration of sugar dressing. In our case, granulated sugar cane was used during a period when the patient was hospitalized where a daily observation of possible infection signs was made. Differently, eusol and paraffin dressings were used in the first reported case[3]. Easy and cheap access was taken into account in our decision to use sugar instead. When no signs of infection were present, the use of the sugar dressing was discontinued. Following hospital discharge, the patient initiated hydrocolloid bandages.

The prevention of deep venous thrombosis in hospitalized patients is an evidence-based medicine practice widely used. In our case, we used enoxaparin 40mg once a day based on the Caprini Score's recommendations[17].

CLINICAL KEY MESSAGE

This case suggests that an association of clindamycin and ciprofloxacin can be a feasible treatment for *S. paucimobilis* cutaneous infection. Moreover, *S. paucimobilis* cutaneous infection is rare. This case represents the first case reported in America's continent.

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Conflict of interest

There is no conflict of interest related to this article that can be declared by any of the authors.

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