

Necrotizing Fasciitis of the Soft Tissues of the Right Foot without Microbiology and Imaging: A Case Followed at the General Reference Hospital of Boma in the Democratic Republic of Congo

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How to cite this paper: Ifaka, J.-C.K., Sumbu, A.K., Lelo, D.M., Ndele, A.B., Mayeka, B.B., Vesa, A.L. and Thamba, C.M. (2026) Necrotizing Fasciitis of the Soft Tissues of the Right Foot without Microbiology and Imaging: A Case Followed at the General Reference Hospital of Boma in the Democratic Republic of Congo. *Case Reports in Clinical Medicine*, 15, 120-132. <https://doi.org/10.4236/crcm.2026.153017>

Received: January 22, 2026

Accepted: March 17, 2026

Published: March 20, 2026

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Abstract

Necrotizing fasciitis is a life-threatening medical and surgical emergency. It is a bacterial complication caused by *Streptococcus pyogenes* or a mixture of aerobic and anaerobic bacteria, leading to necrosis of the subcutaneous tissue, which can spread along the fascia and adipose tissue at a rate of 2 to 3 cm/hour. In this paper, we report the case of a 54-year-old patient with no risk factors who presented with a vesicle at the base of the fourth toe of his right foot, which developed into a blister and phlyctenule containing purulent fluid, accompanied by fever, low blood pressure, pain, local heat, and edema in the right foot. The patient took systemic antibiotics and applied topical antibiotics and antiseptics. No bacteriological tests or imaging studies were performed. Necrotizing fasciitis is a soft tissue infection leading to necrosis of the fascia, the early diagnosis of which remains difficult and is based on a combination of clinical and paraclinical findings.

Keywords

Necrotizing Fasciitis, Right Foot, Culture, Imaging Not Performed

1. Introduction

Necrotizing soft tissue infection is a life-threatening medical and surgical emergency [1] [2]. It is a bacterial complication caused by *Streptococcus pyogenes* or a mixture of aerobic and anaerobic bacteria, leading to necrosis of the subcutaneous tissue. There are two subtypes of these infections: Type I, which is generally polymicrobial, and Type II, which is often monomicrobial. It spreads along the fascia and adipose tissue [3] [4] at a speed of 2 to 3 cm/h [5] [6].

Its incidence worldwide is estimated at 0.30 - 15 cases per 100,000 people [7]. In the Democratic Republic of Congo (DRC), it is endemic at the Boma General Reference Hospital (HGR Boma) (Figure 1); with 11.09 cases per 100,000 inhabitants (source: HGR Boma Surgery Department and Central Office of the Boma Urban Health Zone 2023) and a mortality rate ranging from 19% - 49% [8].

Risk factors include surgery, injury, puncture wounds, bites, chickenpox, diabetes, obesity, malnutrition, immunosuppression, smoking, chronic inflammatory diseases, age > 65 or <10, peripheral vascular disease, use of nonsteroidal anti-inflammatory drugs (NSAIDs), and alcoholism. The biological diagnosis of these infections is based on wound swab cultures combined with blood cultures. Technically, it is not surprising that no germs are found due to prior antibiotic use or streptococcal autolysis. Treatment is medical and surgical, based on resuscitation, antibiotic therapy guided by an antibiogram, and debridement of necrotic tissue.

This paper describes the classic progression of necrotizing fasciitis in a case we followed at the Boma Regional Hospital (Figure 1).



Figure 1. Boma General Reference Hospital (HGR Boma).

2. Clinical Case

2.1. Presentation of the Case

54-year-old patient, medical professional with no reported medical history, who consulted 3 days after the onset of his illness for a scabbed wound on the back of his right foot at the base of the fourth toe.

The chronology of events is as follows:

- Three days before his consultation: sensation of itching in his right foot at the base of the fourth toe on the dorsal side during the night of October 4 to 5, 2022. No visible lesions. No treatment received at home.
- The following day, he presented with moderate pain in his right foot, swelling of the right foot, functional impairment of the right lower limb, generalized tingling sensation throughout the body starting from the back of the right foot, a 1 cm diameter blister on the right foot at the base of the fourth toe on the dorsal side, no treatment received at home (**Figure 2** and **Figure 3**).
- Two days later, he presented with: increasingly intense pain radiating to the root of the right lower limb, a 4 cm diameter blister on the right foot at the base of the fourth toe on the dorsal side, no treatment received at home (**Figure 4**).
- Three days later, he presented with: severe physical weakness, profuse sweating, heart palpitations, tachycardia, chills, shock, anorexia, intense thirst, blurred vision, functional impotence of the right lower limb, edema of the right foot, generalized tingling sensation, intense pain in the right lower limb, and a 5 cm phlyctenoma on the right foot at the base of the fourth toe on the dorsal side (**Figure 5**). He decided to take one 500 mg tablet of azithromycin and to scrape the phlyctenoma after disinfecting the skin with hydroalcoholic gel solution, which released 5 ml of purulent fluid. He discovered a wound 5 cm in diameter with a base covered with necrotic tissue, sphacelated fascia, and exposed tendon. He dressed the wound with a compress soaked in hydroalcoholic gel and applied a cream made from a combination of clotrimazole, betamethasone, neomycin sulfate, and chlorocresol. Eight hours later, he reopened the dressing and found a blood clot covering the wound.

He was taking the following medication at home: a combination of paracetamol and tramadol, 2 tablets per day; azithromycin, 500 mg tablet, 1 tablet per day; a combination of norfloxacin and metronidazole, 400 mg tablet, 2 tablets per day; and cloxacillin, 500 mg capsule, 3 capsules twice per day (**Figure 6**).

He takes the following medication at home: Paracetamol/Tramadol combination 2 × 1 tablet per day, Azithromycin 500 mg tablet 1 × 1 tablet per day, Norfloxacin/Metronidazole combination 400 mg tablet 2 × 1 tablet per day, Cloxacillin 500 mg capsule 3 × 2 capsules per day.

- A scab-covered wound (**Figure 7**) is observed during resuscitation and dressing change, which is coated with chlorhexidine.
- The following day, he consulted at the Boma Regional Hospital, where the following was noted: severe physical weakness; fever of 38°C; shock with blood pressure of 80/60 mm Hg and a pulse rate of 120 beats per minute; 17 cm edema extending from the toes to the right ankle (**Figure 7**); erythema on the back of the right foot; heat and intense painful sensitivity in the right foot extending up to the right groin. Vascular examination was unremarkable, with no crepitus on palpation.

Resuscitation was performed and the dressing was changed with chlorhexidine liquid solution, and the treatment started at home was continued for a maximum

of 10 days. The patient was discharged from the hospital the day after resuscitation to be followed up on an outpatient basis until the wound had completely healed.

- On day 4 after consultation: pain in the lower limb had become mild; tingling sensation; edema of the right foot. The wound had become clean with soft tissue regeneration (**Figure 8**); treatment remained the same.
- On day 7 after consultation: appearance of sebaceous gland island in the wound (**Figure 9**).
- On day 8 after consultation: appearance of 2 hairs around the sebaceous gland island (**Figure 10**).
- On day 12 after the consultation: complete resolution of the edema with the appearance of skin folds and the onset of molting. Only the bandage remained in place (**Figure 11** and **Figure 12**).
- On day 25 after the consultation: clear desquamation of the skin, the edges meet, leaving a white border between them (**Figure 13**).
- On day 57 after stripping: complete fusion of the edges, healing is complete (**Figure 14**).
- On day 104, grayish spots were observed on the sole of the affected right foot (**Figure 15**).
- After 24 months, skin considered healthy and uniform began to appear, signaling the clinical end of the patient's wound healing process (**Figure 16**).

2.2. Paraclinical

Table 1. Paraclinical tests requested upon admission: laboratory and imaging.

		Value obtained	Normal value
Leukocyte (White Blood Cell = WBC) en /mm ³		19,000	4500 - 10,000
Leukocyte formula (LF) in %	N	70	50 - 80
	L	25	20 - 40
	B	5	0 - 1
	E	0	1 - 4
	M	0	2 - 10
Sedimentation rate (SR) in mm/h		50	0 - 20
Hemoglobin (Hgb) in g%		12	14 - 18
Fasting blood glucose in mg/dL		96	80 - 126
HIV serology (Alere determine)		Absence of anti-HIV antibodies	
Creatinine level		Not Achieved	
CRP		Not Achieved	
Sodium		Not Achieved	
Bacteriological Culture	Surgical swab	Not Achieved	
	Standard X-ray	Not Achieved	
IMedical imaging	CT scan	Not Achieved	
	Magnetic resonance	Not Achieved	
	Doppler ultrasound	Not Achieved	

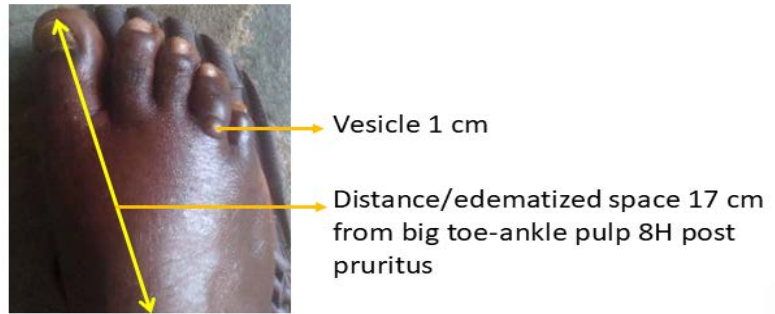


Figure 2. On the morning of the first day after the onset of his illness (October 5, 2022), a vesicle approximately 1 cm in diameter.

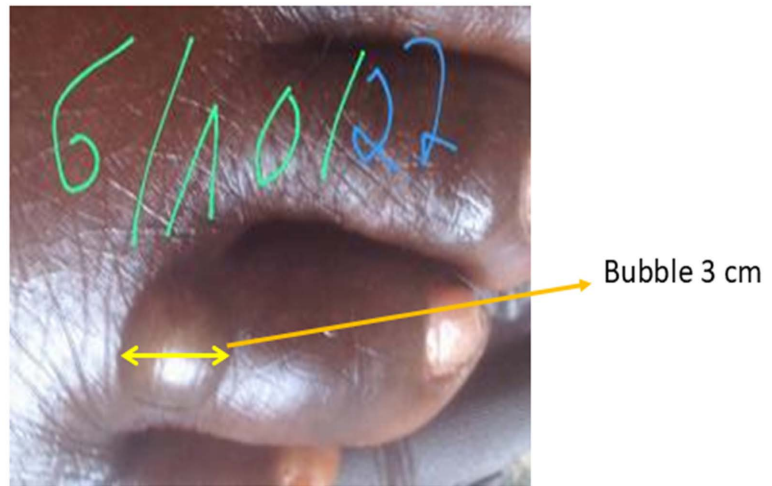


Figure 3. On the morning of the second day after the onset of his illness (October 6, 2022), a vesicle developed into a bubble approximately 3 cm in diameter.

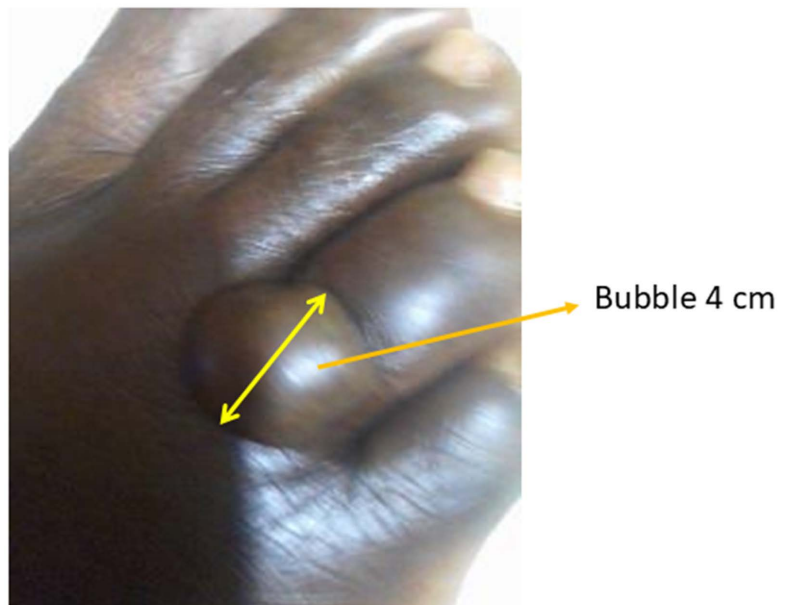


Figure 4. Evolution of the 4 cm blister into a phlycten (October 6, 2022).

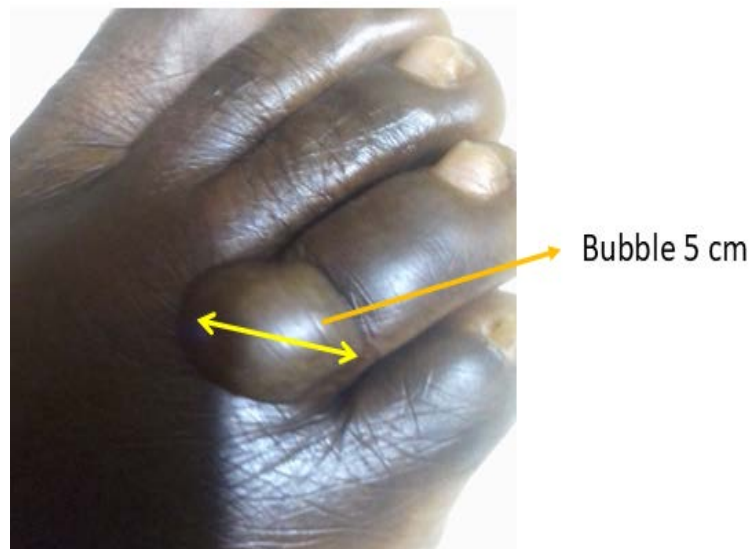


Figure 5. On the morning of the third day after the onset of his illness (October 7, 2022, at 12:30 p.m.), a phlyctenule measuring 5 cm in diameter before rupturing.

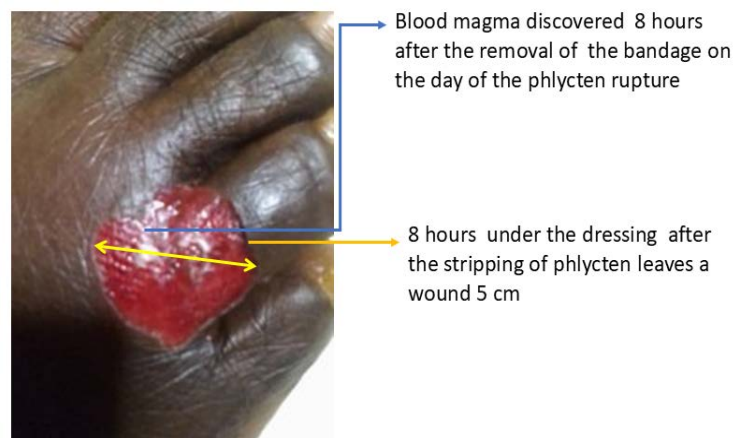


Figure 6. Blister ruptured after 8 hours (October 7, 2022) under a bandage covering a wound 5 cm in diameter covered with a blood clot.



Figure 7. Crust formation one day after phlyctenulum removal (October 8, 2022).

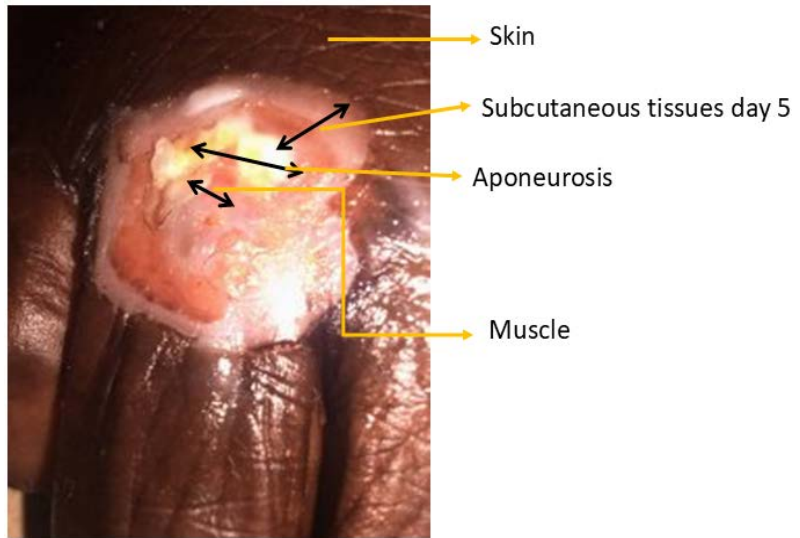


Figure 8. On the fifth day after phlyctenium debridement (October 12, 2022), the appearance of subcutaneous tissue, aponeurosis, and muscle.

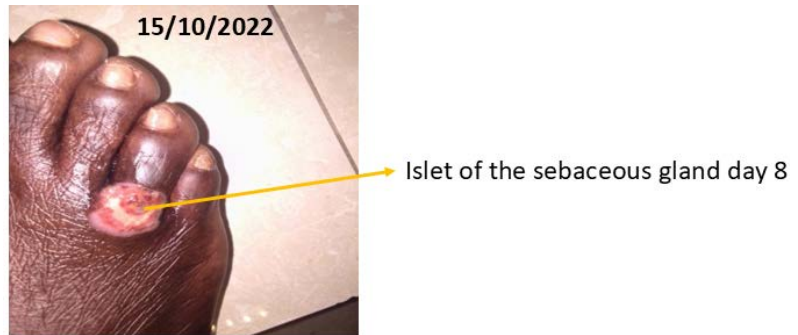


Figure 9. On the eighth day after phlyctenium debridement (October 15, 2022), an island of sebaceous glands appeared at the distal part of the lesion's large diameter.

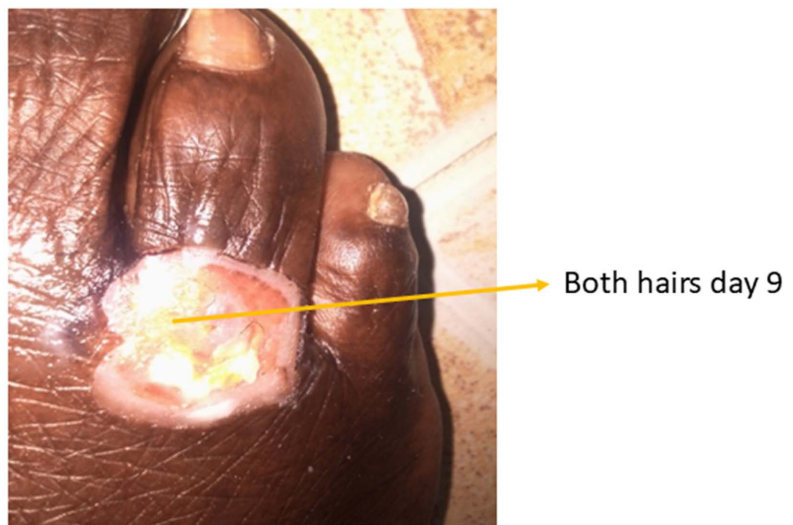


Figure 10. On the 9th day after phlyctenium removal (October 16, 2022), two hairs appeared around the glandular island.

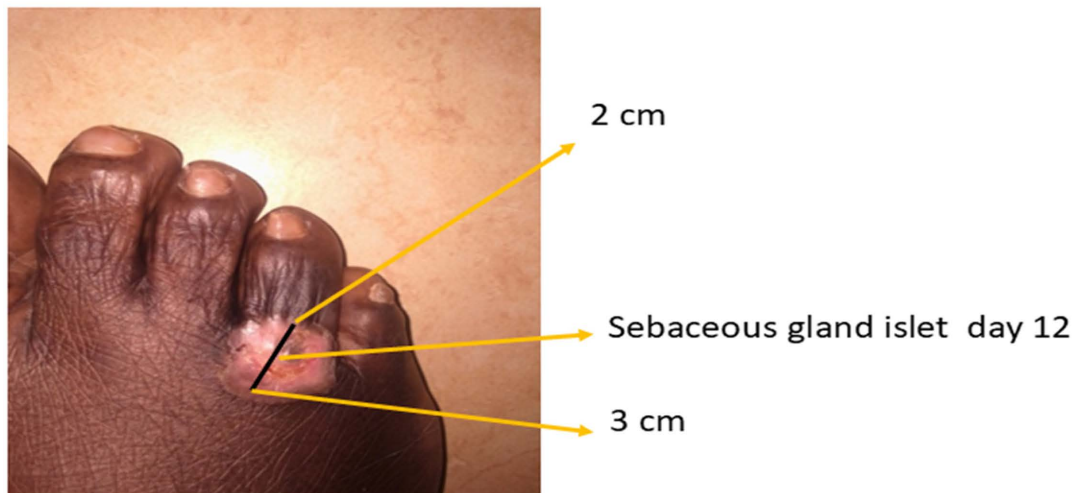


Figure 11. On the 12th day after phlyctenium debridement (October 19, 2022), the skin tissue covering the gland extends centrifugally.

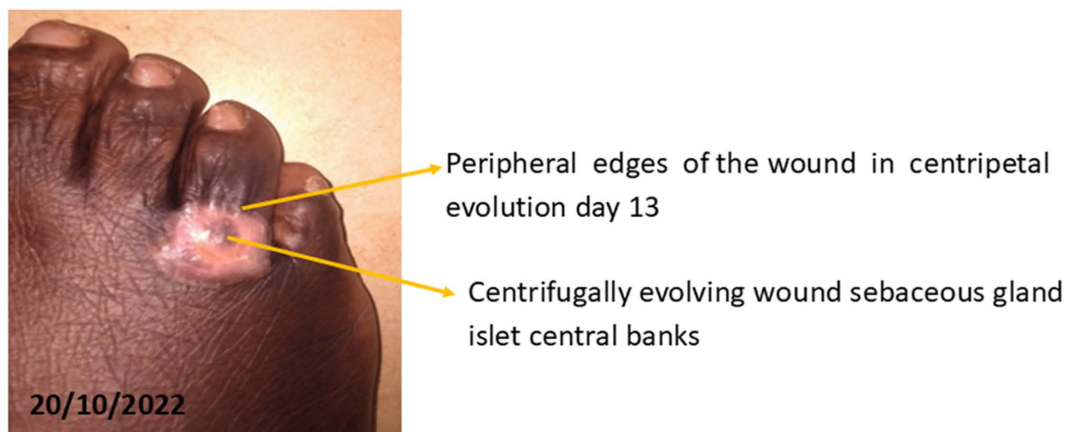


Figure 12. On the third day after phlyctenium removal (October 20, 2022), complete resolution of edema with the appearance of skin folds and the onset of moulting (skin shedding).

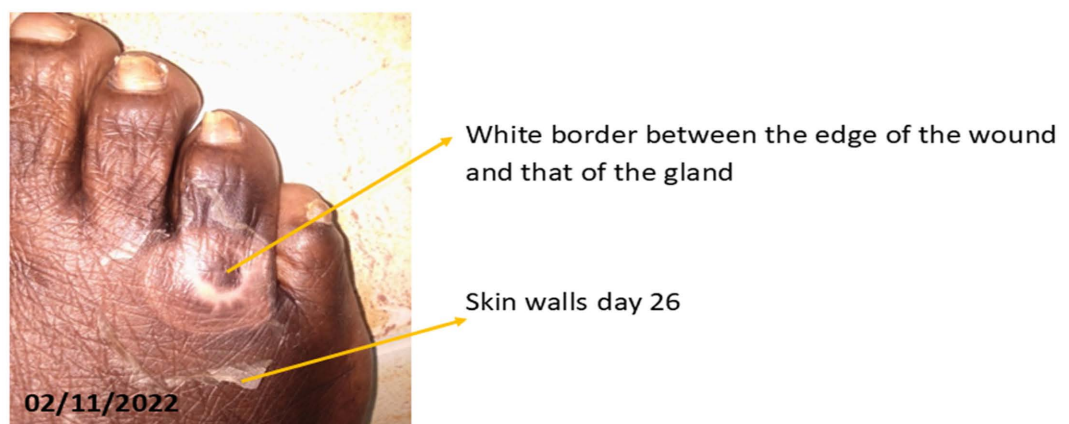


Figure 13. On the 26th day after phlyctenium debridement (November 2, 2022), very obvious desquamation, the distal edge of the sebaceous gland skin meets the edge of the wound (of the 4th toe), leaving a white border between the proximal edge of the wound and that of the gland.



Figure 14. On day 57 (December 3, 2022), There was complete fusion of the edges without any demarcation line except for the outline of the large wound, approximately 5 cm in diameter, with apparently healthy skin and good coloration, which had completely healed after 57 days.

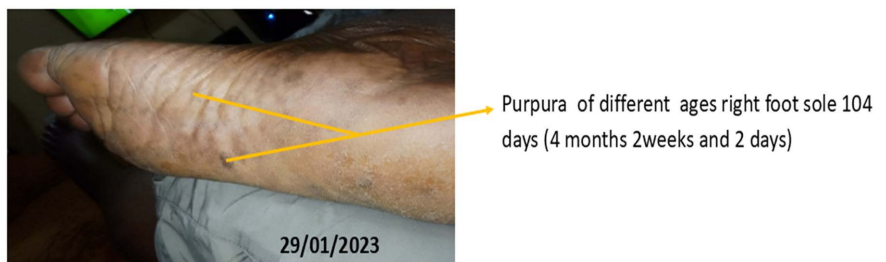


Figure 15. On day 104 (January 29, 2023), grayish spots of varying ages appeared on the sole of the right foot, the affected foot.



Figure 16. At 24 months (October 7, 2022-October 7, 2024), the appearance of skin considered healthy could signal the clinical end of the patient's wound healing process.

3. Discussion

The incidence at HGR Boma is 11.09 cases per 100,000 inhabitants. This correlates with the global incidence, which is 0.15 - 30 cases per 100,000 people.

The clinical diagnosis of necrotizing fasciitis was difficult because the initial symptoms were nonspecific. The main risk factors were: surgery; injury; puncture wound; bite; chickenpox; diabetes; obesity; malnutrition; immunosuppression; al-

cohol, tobacco, and nonsteroidal anti-inflammatory drug (NSAID) use; chronic inflammatory diseases; age > 65 or <10; and peripheral vascular disease.

For the patient in this study, the absence of a reported medical history and the initial lack of signs of skin involvement demonstrated this difficulty in clinical diagnosis [9].

However, the presence of non-specific local and general signs: edema; the presence of vesicles developing into blisters and then phlyctenules filled with purulent fluid; a wound with a base covered with necrotic tissue; a sphacelated fascia; erythema with heat on the right foot; functional impairment of the right lower limb; fever; intense physical asthenia; profuse sweating; heart palpitations; tachycardia; chills; shock; led us to suspect necrotizing fasciitis.

For laboratory tests, laboratory risk indicators for necrotizing fasciitis could help distinguish necrotizing fasciitis from non-necrotizing soft tissue infections, such as C-reactive protein (CRP); white blood cell count; hemoglobin, sodium, creatinine, and blood glucose levels [10] [11].

For our patient, we were unable to obtain the CRP, sodium, and creatinine results (Table 1).

Blood cultures and fine needle aspiration of skin lesions were often sterile due to prior antibiotic use. Cultures from swabs taken from surgical site wounds allowed identification of the bacterial species responsible and selection of an antibiotic appropriate for the antibiogram.

For our patient, it was not possible to perform these tests without first taking antibiotics, either locally or orally (Table 1).

Medical imaging can be helpful, but it is crucial not to delay surgical treatment in highly suspicious cases. These included: standard X-rays, which are sensitive in detecting gas and physical examination [12]; CT scans, which are more effective than radiology in detecting gas but also in observing thickening of the fascia and subcutaneous tissue [13]; magnetic resonance imaging, which has the best sensitivity (93% - 100%) with hyperintense T2-weighted images [14]; and Doppler ultrasound to look for vascular obstruction.

In the case of our patient, he was unable to undergo these examinations due to his personal beliefs (Table 1).

Treatment consists of surgical debridement of all necrotic tissue or areas of necrosis. This immediate radical surgery was associated with increased survival compared to delayed intervention [15]-[17]. The wound must be reassessed frequently, and some authors even advocated reoperation after 24 hours. Surgery was combined with probabilistic parenteral antibiotic therapy, which must cover a wide range of Gram-negative and Gram-positive bacteria, anaerobes, and must take into account the location and the most frequently responsible bacteria while awaiting culture results (For example: for cervical-facial or limb involvement, combinations of amoxicillin clavulanic acid + clindamycin or piperacillin tazobactam + clindamycin remain reasonable empirical choices) [18].

Our patient received this treatment early on, before the phlyctenium was deb-

rided.

In general:

- Azithromycin tablets, which acted on Gram+ cocci (staphylococci and streptococci); Gram+ and Gram– bacilli, certain anaerobes and, after stripping.
- the combination of norfloxacin + metronidazole tablets, which acted on enterobacteria, staphylococci and anaerobes; Cloxacillin capsules, which acted on Gram+ cocci, and
- In loco: hydroalcoholic gel with bactericidal, virucidal, and fungicidal effects, followed by a cream containing clotrimazole, neomycin sulfate, chlorocresol, and betamethasone, which had fungicidal, antibacterial, antiseptic, and anti-inflammatory effects.
- The hydroalcoholic gel had promoted wound cleansing and local vasodilation, which had caused the blood clot to form 8 hours later.

4. Conclusion

Necrotizing fasciitis is a soft tissue infection characterized by necrosis of the deep and superficial fascia. It can be difficult to diagnose, especially given the lack of skin signs at the onset of infection, and requires a combination of clinical and paraclinical evidence.

Authors' Contributions

All authors have contributed, read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Agreements and Acknowledgements

Informed consent obtained and no specific motivation. We assume that being a medical body, it has the ease to take the medications it holds at the slightest alarm. The authors are thankful to all who participated in the study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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