

Clinical Case Report: Amputation Resulting from Dry Gangrene

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Abstract

The present study is a clinical case report on amputation due to dry gangrene. Dry gangrene is caused by reduced blood flow through the arteries, leading to a gradual and progressive condition. In this type of gangrene, the affected tissue becomes dry, hard, and dark, eventually sloughing off. Dry gangrene is often observed in people with arterial blockages, such as arteriosclerosis, and can also be triggered by conditions such as Raynaud's disease or neurological injuries. The disease usually begins in the toes, which are farthest from the circulatory system and have limited blood supply, making it difficult for bacteria to thrive in the necrotic tissue. The condition spreads until it reaches areas with sufficient blood flow to sustain viable tissue. Once the gangrenous tissue is detached, it is either naturally separated or surgically removed. Amputation, the surgical removal of a body part, is a common procedure to address this condition. Disarticulation refers to the removal of a limb at its joint. With advancements in chemotherapy and antibiotics, the treatment of infections and the associated risk of mortality have significantly improved.

Keywords: Amputation, Dry gangrene, Raynaud's disease, Arteriosclerosis, Angiopathy, Scleroderma

Introduction

Dry gangrene occurs when blood flow to tissues is severely restricted or blocked. As a result, the affected area becomes dry, shrinks, and turns black due to arterial obstruction. Commonly, the toes, fingers, hands, feet, and genital regions are affected, but in some cases, even the ear lobes can show signs of this condition. The dark coloration is a result of hemolysis, where red blood cells break down, releasing hemoglobin. The hydrocarbon disulfide produced by bacteria leads to the formation of black iron sulfide in the tissue. Histologically, necrotic lesions can be observed in the affected tissues as they shrink and die [1-10].

Incidence

- **Age:** Most common in individuals aged 50-75 years.
- **Gender:** Approximately 75% of cases are male, and 25% are female.
- **Limb affected:** About 85% of cases involve the lower limbs, and 15% affect the upper limbs.

Causes

Dry gangrene is frequently caused by large vessel diseases such as diabetes mellitus, atherogenesis, and long-term smoking. Smaller vessel diseases, such as those related to immune disorders (vasculitis), connective tissue diseases like scleroderma, infections, brain injury, severe burns, and frostbite can also lead to gangrene.

Symptoms

Patients may experience symptoms including skin bruising, blue discoloration due to circulation problems, black patches, mild discoloration, ulcers, and systemic flu-like symptoms such as hypotension. Other common

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Received: 29 May 2023; Accepted: 05 September 2023

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How to cite this article: Rehna S, Sreenivasulu M, Roby KAC. Clinical Case Report: Amputation Resulting from Dry Gangrene. J Med Sci Interdiscip Res. 2023;3(2):35-8. <https://doi.org/10.51847/pYWrA55NHJ>

symptoms include creaking joints, foul-smelling discharge, pus, or a loss of sensation.

Treatment

- **Medications:** Antibiotics and removal of necrotic tissue.
- **Supportive care:** IV fluids and oxygen therapy.
- **Surgical procedures:** Removal of unhealthy tissue, amputation, skin grafting, and fasciotomy.

The present study is a clinical case report on amputation due to dry gangrene.

Case history

A 45-year-old female patient was admitted to the hospital due to the blackening of both limbs over the past six months. She had been in an accident eight months prior and sought treatment at multiple centers, but the medication was improperly used. Subsequently, both limbs began to darken, and her physician recommended amputation, which she initially rejected. After some time, the patient developed swollen legs and bilateral pain. The physician referred her to a higher medical center for

amputation, but due to an infection, the wound was left unsutured. A month later, the infection recurred, and the wound was sutured. She was prescribed cefoperazone and salbactam for 15 days, followed by ceftriaxone for 20 days. After some time, the pain returned, and after surgery, she was prescribed piperacillin-tazobactam for five days, followed by Meropenem for further treatment.

Tests performed

- Blood culture, CBP, CUE, LFT, RFT, Lipid profile, HbA1c, X-ray, CT of lower limbs, MRI, and lower limb Doppler study were conducted.

Diagnosis

Bilateral lower limb dry gangrene.

Surgery

Bilateral above knee amputation.

A summary of medications administered to the patient during and post-amputation for recovery is presented in **Table 1**.

Table 1. Summary of medications administered to the patient during and post-amputation for recovery.

Treatment	Generic name	Drug class	Duration	Administration route (R.O.A.)	Dosage frequency
Inj Sulbacef	Cefoperazone + salbactam 1.5 gms	Cephalosporin Antibiotics	15 days	Oral	Twice daily (BD)
Inj MVI	Multivitamin	Multivitamin	25 days	Intravenous (IV)	Twice daily (BD)
Inj Xone	Ceftriaxone 1gm	Cephalosporin Antibiotics	20 days	Oral	Twice daily (BD)
Inj Piptaz	Pipercillin + tazobactam 4.5 gms	Penicillin and Beta-lactamase Inhibitors	5 days	Intravenous (IV)	Twice daily (BD)
Inj Meropenem	Meropenem 1 gm	Carbapenem Antibiotics	30 days	Intravenous (IV)	Twice daily (BD)
Pantop	Pantoprazole 40 mg	Proton Pump Inhibitor	45 days	Oral/IV	Twice daily (BD)
Cap Becosules	Multivitamins	Multivitamins	45 days	Oral	Once daily (OD)
Inj Diclo	Diclofenac 50 mg/ml	Non-Steroidal Anti-inflammatory Drugs (NSAID)	20 days	Intramuscular (IM)	Twice daily (BD)
Inj Metrogyl	Metronidazole 500 mg/100 ml	Nitroimidazole Antibiotics	30 days	Intravenous (IV)	Three times daily (TID)
Tab Ultracet	Tramadol + acetaminophen	Non-Opioid Analgesics	As needed	Oral	Twice daily (BD)
Tab Amoxiclav	Amoxicillin + potassium clavulanate	Penicillin Antibiotics	30 days	Oral	Twice daily (BD)

Tab Amlong	Amlodipine	Calcium Channel Blocker	30 days	Oral	Once daily (OD)
Tab Ecosprin	Aspirin	Antiplatelet Drug	30 days	Oral	Once daily (OD)
Tab Ator	Atorvastatin	Statins	30 days	Oral	Once daily (OD)
Tab Copilet	Clopidogrel	Antiplatelet Drug	30 days	Oral	Once daily (OD)

Case summary and treatment plan

A 45-year-old female patient was admitted to the hospital with discoloration and swelling above both knees. She had previously sought treatment at several medical facilities but was eventually referred to our government hospital. Upon admission, the doctors recommended bilateral above-the-knee amputation due to suspected gangrene. A comprehensive physical examination was performed to assess the patient's circulatory health, including checks for peripheral pulse strength and heart function. An electrocardiogram (ECG) was used to assess myocardial health.

To further investigate vascular health, the Ankle-Brachial Index (ABI) was measured via ultrasound of the lower and upper limbs. An ABI between 1 and 1.4 is typical, indicating that the blood flow in the lower limbs is adequate. An ABI of 0.5-0.8 suggests moderate vascular disease, while an ABI under 0.5 indicates severe artery problems. Ultrasound imaging was also utilized to pinpoint areas of vascular obstruction or interruption in veins and arteries.

Additional diagnostic procedures included angiography to map the extent of the gangrene and the areas affected by blocked blood flow. CT imaging with contrast highlighted areas of calcification and vascular blockage. MRI and echocardiography were also considered as non-invasive options for detecting blood flow issues. Blood tests were conducted to monitor renal function, electrolyte levels, and lipid profile, and to check for signs of infection or clotting disorders, such as D-dimer and C-reactive protein levels.

The diagnosis of gangrene varies by its location and cause. In this case, the condition was treated with surgical debridement and amputation. Depending on the severity, treatments may also include embolus removal, arterial surgery, stenting, or balloon angioplasty. Hyperbaric oxygen therapy might also be recommended in conjunction with other treatments to facilitate healing (Figures 1-3).



Figure 1. Amputation of both limbs due to dry gangrene



Figure 2. Infection after amputation



Figure 3. Healing of the amputated wounds after treatment and dressing.

The objectives of amputation for amputees include the removal of all necrotic, infected, and painful tissue, as well as effective treatment of the wound to prevent and manage infections. Additionally, it is essential to ensure

that the stump is appropriately shaped and sized to accommodate a prosthetic.

Post-operative care is crucial for promoting healing. To protect the amputation site and encourage proper recovery, the stump should be rested and wrapped in a pop cast that extends just above the joint closest to the stump area. This helps prevent flexion contractures in the adjacent joint. The cast should remain in place for at least three weeks to ensure optimal healing.

Rigid dressing plays a significant role in reducing edema and post-operative pain, while also protecting the limb. It supports the initial stages of healing and helps shape the stump into a conical form suitable for the prosthetic. In contrast, soft dressing involves covering the stump with a sterile dressing, typically secured with an elastoplastic crepe bandage. This dressing aids in the removal of necrotic tissue and helps to prevent infection.

Conclusion

In conclusion, the patient diagnosed with dry gangrene underwent bilateral above-the-knee amputations and received antibiotics to manage infections. Pain relievers and multivitamin supplements were also administered throughout the recovery process. As clinical pharmacists, it is essential to educate patients about the risks of injuries, particularly those occurring in work or agricultural settings, and to raise public awareness about the importance of proper wound care to prevent long-term disability.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

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