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Case Report

A Neglected Tropical Disease: Thoracic Actinomycetoma a Succesfull Case Report

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Abstract: Mycetoma is a chronic, granulomatous subcutaneous infection characterized by a triad of inflammation, painless tumour-like lesions and multiple sinuses discharging grains [1]. In Mexico, 97% of mycetomas are caused by bacteria of the order *Actinomycetales,* where *Nocardia brasiliensis* is the most important agent, while in eumycetomas the most important genera are *Madurella spp. and Trematosphaeria spp* [4]. This pathology is more common in men (3:1 to 5:1) between the age of 20 and 40 years, and up to 75% of patients present the injury (being the entry way) in the lower extremity, most commonly in the foot (70%). Other sites include the head, neck, chest, shoulders and arms [6, 7]. The diagnosis of mycetoma is based on clinical presentation, imaging studies and identification of the causative organisms in relevant clinical samples taken from affected tissues using fine-needle aspiration, or surgical biopsy. The diagnosis of mycetoma is based on clinical presentation, imaging studies and identification of the causative organisms in relevant clinical samples taken from affected tissues using fine-needle aspiration, or surgical biopsy. Imaging including X-ray, ultrasound, MRI and CT scan examinations may be required to characterize the spread and extent of disease [3].

Keywords: Mycetoma, actinomycetoma, eumycetoma, tropical disease, neglected disease, granulomatous subcutaneous infection.

INTRODUCTION

Mycetoma is a chronic, granulomatous subcutaneous infection characterized by a triad of inflammation, painless tumour-like lesions and multiple sinuses discharging grains. It is endemic in tropical and subtropical countries and can be caused by either bacteria (actinomycetoma) or fungi (eumycetoma) [1]. Subcutaneous inflammation often extends to involve the skin, deep tissues and even bone tissue leading to deformity of the affected area, disability and loss of function, which can sometimes be fatal [2].

CASE REPORT

A 59-year-old man from a rural area in Etla at Oaxaca, quarry worker. History of long-standing type 2 diabetes mellitus with irregular adherence to treatment, systemic arterial hypertension and chronic kidney disease (KDIGO IIIb).

It started a year and a half ago with a non-suppurative papule in the left dorsal region. Six months ago, an increase in size and a change in color was observed at the injury site. One month later a persistent fever of 39°C was added, accompanied by new pustular lesions in the left posterior region, as well as pain and yellowish discharge (Fig. 1), so he came to our institution where he was evaluated by general surgery who performed a biopsy to rule out oncological process, the report mentions data suggestive of actinomycetes so the opinion of the infectious disese physician was requested.

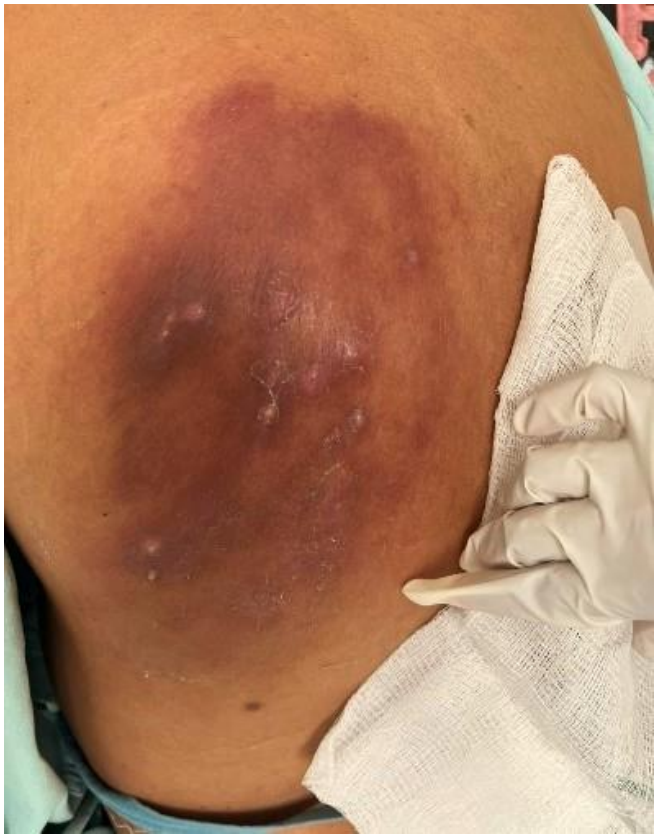

Fig. 1: Back actinomycetoma with nodules and sinuses

Other studies are carried out to assess the extent of the disease and complete the protocol: Labs. 07.05.2023: Hb 11.3, PLT 257 000, WBC 12 900, Cr 2.1 (eGFR 36 ml/min/1.73m2).

Ultrasound 07.06.23: Multiple subcutaneous collections in the left dorsal region with extension to the muscular plane, to be considered abscesses (Fig. 2).

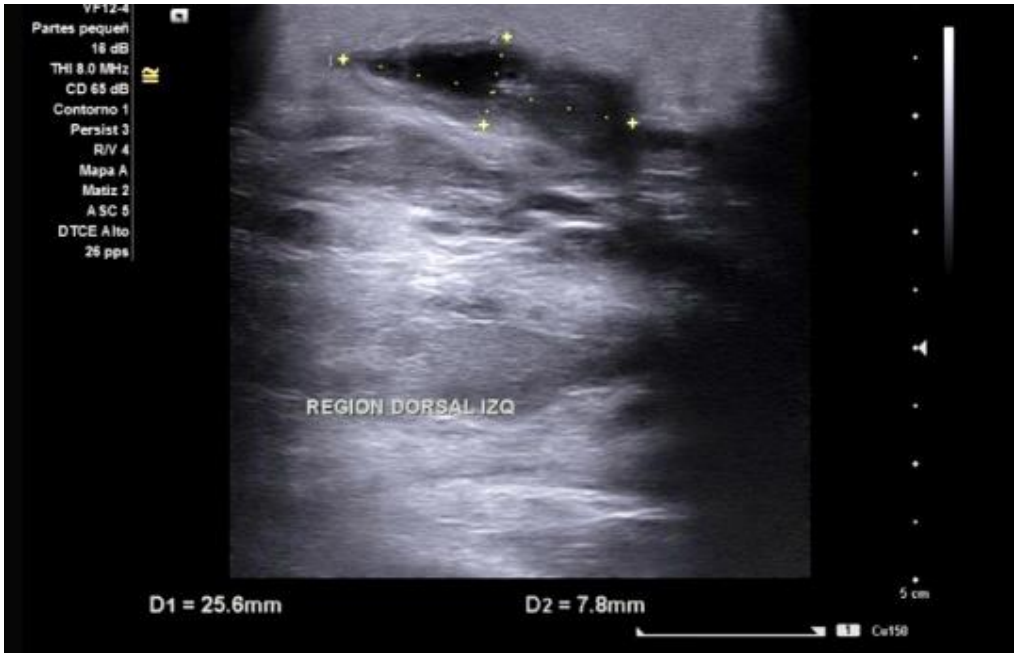

Fig. 2: USG with multiple subcutaneous collections

Secretion culture 07.10.23: Gram: abundant LPM, no bacteria observed / Culture without bacterial development; observations: actinomycotic granules (Fig.3).

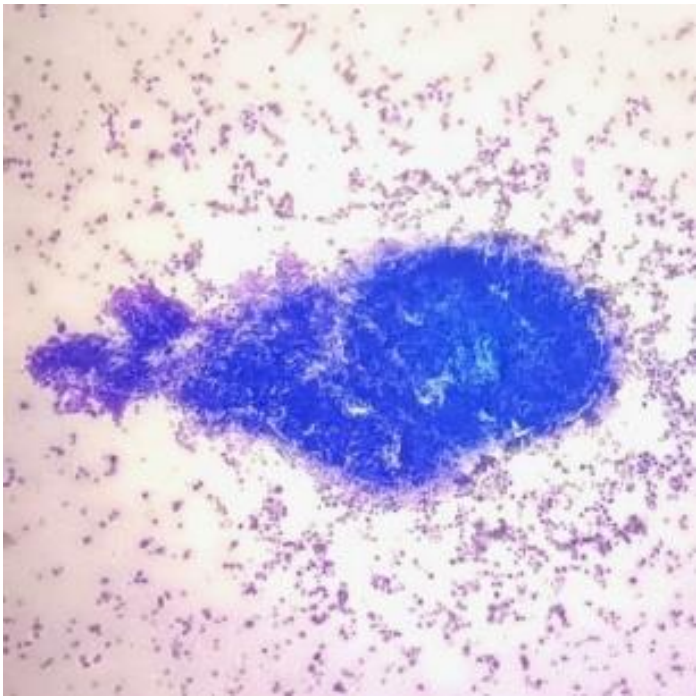

Fig. 3: Actinomycotic granules: presence of filamentous club-shaped bacteria

Official biopsy report is obtained along with histochemistry (Table 1 and Fig 4): Diagnosis: Actinomycetoma associated with granulation tissue and extensive edema // Intense edema and congestion and chronic inflammation.

Table 1: Histochemistry

PAS	Positive
Grocott	Positive
Ziehl-Neelsen	Negative

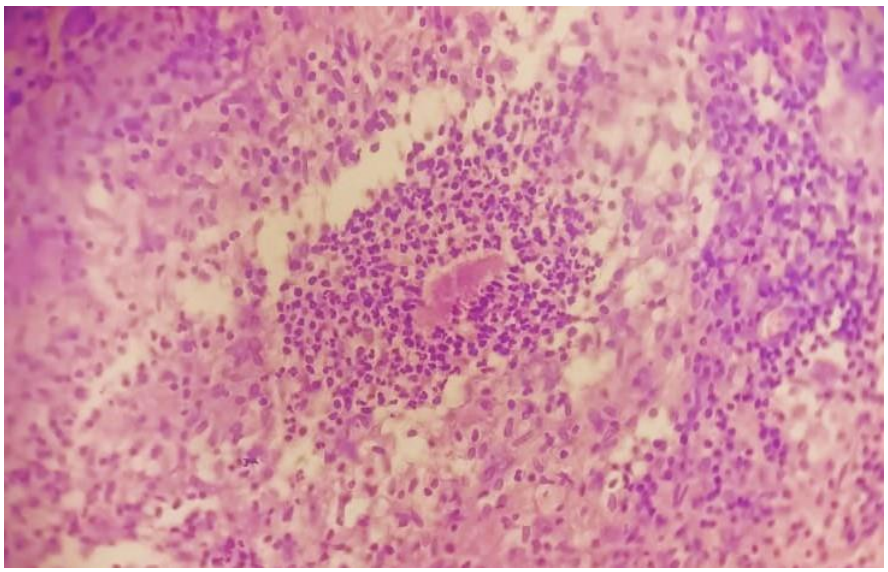

Fig. 4: Skin biopsy, stained with H&E, showing granulomas surrounded by a mixed inflammatory infiltrate comprising lymphocytes, plasma cells, eosinophils, macrophages are seen

A chest CT did not show major affectation. Imipenem 1 gm IV every 8 hours was initiated for along with trimethoprim sulfamethoxazole (TMP-SMX) 160/800 mg IV every 12 hours for 7 days. The patient was discharged, and outpatient treatment continued with TMP-SMX 160/800 mg every 12 hours for 6 months with adecuate evolution (Fig. 5).

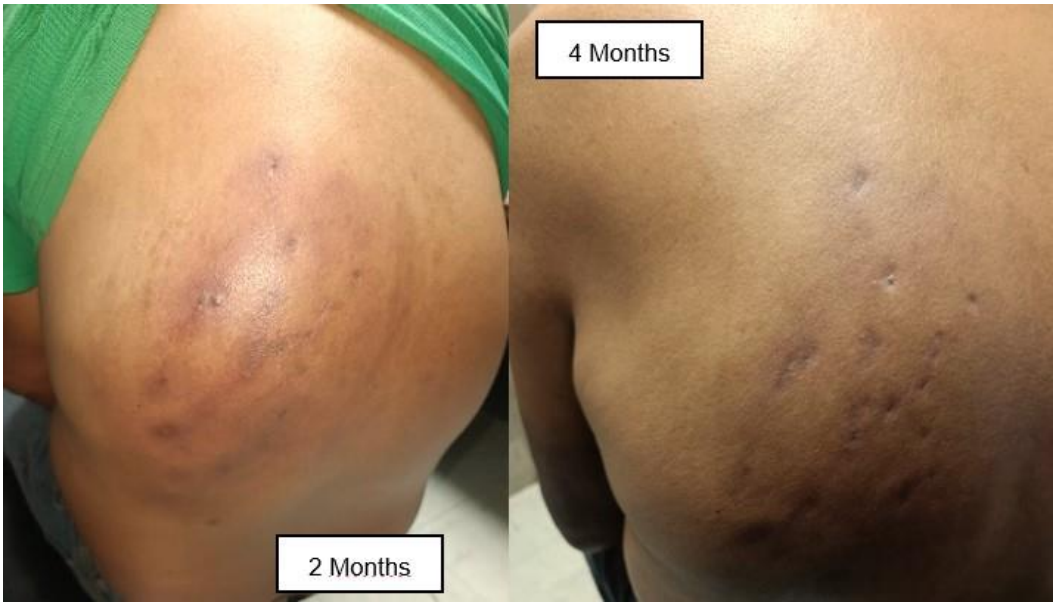

Fig. 5: Thoracic actinomycetoma after 2 and 4 months of treatment

DISCUSSION

Mycetoma is a common neglected tropical disease, reported worldwide but endemic in many tropical and subtropical regions in what is known as the mycetoma belt, which extends from the Americas (Mexico and Venezuela) to Africa (Senegal, Mauritania, Chad, Ethiopia, Sudan and Somalia) and Asia (Yemen, Iran and India), of these, Sudan has the highest reported incidence [2, 3].

In Mexico, 97% of mycetomas are caused by bacteria of the order *Actinomycetales, Nocardia brasiliensis* is the most important agent, while in eumycetomas the most important genera are *Madurella* and *Trematosphaeria* [4].

It is more common in men (3:1 to 5:1) between the age of 20 and 40 years, however, as shown in the review by Fahal *et al.*, the spectrum of presentation is varied and can affect any age [5]. Up to 75% of patients present the injury in the lower extremity, most commonly in the foot, (70%) followed by involvement in the hand. Other sites include the head, neck, chest, shoulders, arms, and although less common, but also described as in the patient presented, in the dorsal region (Fig. 6).

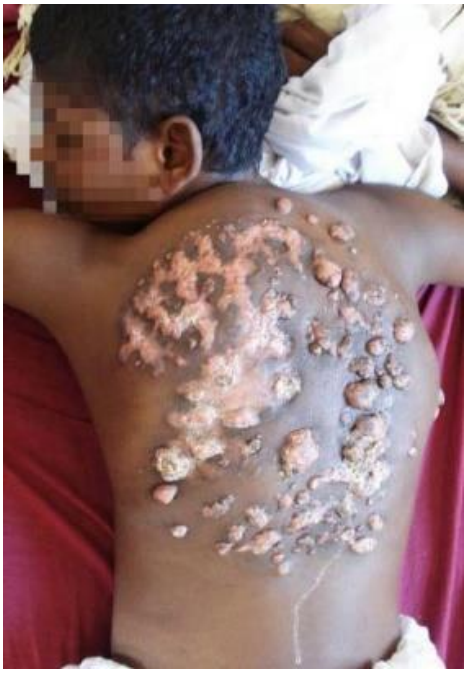

Fig. 6: Massive back actinomycetoma with multiple nodules and sinuses described by Fahal *et al.*, [5]

The incubation period is variable, and the time that may elapse is from 3 months to 9 years before the first medical evaluation [6, 7].

According to what was described by Fahal *et al.*, the rate of onset and progression is faster with actinomycetoma than with eumycetoma; in the latter, the lesion grows slowly with clearly defined margins and remains encapsulated for a long period, while in actinomycetoma the lesion is more inflammatory, more destructive and invades the bone at an earlier period [5].

The organism usually implants after a penetrating injury when doing agricultural work barefoot (which is why the foot condition is common) or due to pre-existing abrasions, however, patients do not always remember the moment of the trauma [6]. Usually, some predisposing condition can be found such as poor general health, diabetes and malnutrition, and this can lead to more invasive diseases and widespread infections, in the case of the patient described in this article, being a carrier of type 2 diabetes mellitus poorly controlled and chronic kidney disease are some of the factors in the host that conditioned the disease.

Complement-dependent chemotaxis has been shown to induce polymorphonuclear leukocytes by fungal and actinomycotic antigens in vitro. In 2017, Relhan *et al*., described three types of immune responses in response to mycetoma grains [6]:

- **Type a:** degranulation of neutrophils and adhesion to the grain surface, leading to gradual disintegration of the grain. Outside the zone of neutrophils there is a zone of granulation tissue containing macrophages, lymphocytes and plasma cells [6].
- **Type b:** Disappearance of neutrophils and arrival of macrophages to clean grains and remains of neutrophils [6].
- **Type c:** It is characterized by the formation of granulomas of epithelioid cells [6].

In order to reach the diagnosis of mycetoma, there are different factors to take into account such as the clinical presentation with imaging studies and mainly, the identification of the causative organisms in relevant clinical samples taken from the affected tissues by fine needle aspiration or surgical biopsy [2, 6]. Siddig *et al.*, recommend ultrasound-guided fine needle aspiration cytology (US-FNAC) for the diagnosis of mycetoma, as it is less invasive than surgical biopsies and can be used in remote rural settings. However, its sensitivity and specificity are highly operator dependent [8]. Microscopy and cytological, histopathological, immunohistochemical and molecular techniques based on the polymerase chain reaction (PCR) are applied to these samples. Imaging examinations including x-ray, ultrasound, MRI, and CT scan may be required to characterize the spread and extent of the disease [2, 6, 9]. In the case mentioned in this review, soft tissue ultrasound and computed tomography were performed.

Treatment of mycetoma includes antimicrobial agents and surgery. As the treatments are different depending on whether it is actinomycetoma or eumycetoma, the doctor must confirm the diagnosis before deciding to start treatment. It is important to educate the patient about the disease to comply with the established treatment for a long period of time.

Actinomycetomas are usually amenable to treatment with antibiotics. Relhan *et al.*, recommend combination antibiotic therapy over monotherapy to prevent the development of drug resistance and eradicate residual infection. The most commonly described regimens for actinomycetoma include streptomycin (14 mg/kg/day intramuscularly), it is administered for the first month (and sometimes three times a week thereafter for several months) plus TMP-SMX (double-strength treatment tablet [160 mg TMP and 800 mg SMX] twice daily) or dapsone (1.5 mg/kg/day twice daily). Amikacin combined with a carbapenem, such as imipenem or meropenem, could also be used in refractory cases [6].

Eumycotic mycetomas usually require combined therapy of medical and surgical treatment. In that same article, Relhan *et al.*, recommend complete surgical excision of the lesion followed by prolonged courses of antifungals as the first line of treatment in eumycotic mycetoma. Of the antifungals, triazoles (itraconazole) are the treatment of choice and a prolonged treatment of 1 to 2 years is usually required, so it is very important to monitor the side effects of the treatment [6].

CONCLUSION

When observing the characteristic triad of mycetoma, the first thing is to identify the causative organism, and depending on the result, indicate the correct treatment. Treating a patient with chronic kidney disease is a therapeutic challenge; however, after obtaining the diagnosis and assessing the extent of the disease with imaging studies, satisfactory results can be obtained with adequate surveillance.

Conflicts of Interest: There are no conflicts of interest.

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