**Mycetoma**

Mycetoma (Madura foot) is a chronic infection of subcutaneous tissues that leads to disfigurement and disability in many parts of the world. It is caused by fungi or higher bacteria, hence it is called eumycetoma or actinomycetoma, respectively.

Eumycetoma is mostly caused by *Madurella mycetomatis*, while Nocardia *spp*. and *Streptomyces somaliensis* are the most common organisms in Actinomycetoma.

The disease occurs in the so-called mycetoma belt that stretches between latitudes of 150 South and 300 North and that includes Sudan, Somalia, India, Mexico, Venezuela and Argentina. Areas where mycetoma prevails are relatively dry with a short rainy season of 4-6 months. In the dry season temperatures are 45-600C during the day, 15-180C at night with relative humidity of 12-18%. ([3](#_ENREF_3))

All ages are affected but most patients present between 20-40 years of age thus affecting the most productive age group. Most patients are farmers or herdsmen; in a recent study however, 30% of patients were students and schoolchildren. The true incidence of mycetoma is not known; in many endemic areas mycetoma occurs in remote areas and many patients lack education or financial means to report to a hospital for treatment; others may fear amputation of the affected limb.

Worldwide most cases occur in Sudan; the Mycetoma Research Centre in Khartoum has more than 6000 patients under treatment.

In a recent field study in a village in the endemic area in central Sudan the prevalence was 8.3/1000 inhabitants; eumycetoma was the third commonest diseases after malaria and schistosomiasis. The disease presentation included the whole spectrum from small nodules to extensive lesions and amputated limbs. Few patients had access to medical treatment; surgery was the rule.

The exact source of the infection is unknown; it is thought to be transmitted through a thorn-prick in areas where people often walk barefoot; the disease may however also affect other parts of the body. To date, the fungus has not been isolated from the soil or other sources. In the endemic villages most cases seemed to occur in the most densely populated part of the village where people live in the same compound as their animals (sheep, goats, dogs, chicken, donkeys) and the ground is covered with animal dung.

Clinical presentation

The typical clinical triad consists of a painless subcutaneous mass, sinus formation and purulent discharge that includes grains. The lesion is usually on the lower limb, involving the foot. From there local spread occurs to lymph nodes and bone; metastatic spread may also occur to other parts of the body. Mycetoma may also occur on the hands, and to a lesser extent on the chest, knee, head and neck and perineum.

60% of patients have concomitant bacterial infection…

Diagnosis

The causative organism may be suspected from the colour of the grains that re typically black in M. mycetomatis, red in S. and yellow in ..

Firm confirmation may be needed as this affects treatment; the organism may be identified by fine needle aspirate and examined by cytology, culture and PCR.

Imaging is useful to assess the extent of the lesion; this is done by plain x-ray, ultrasound, or MRI scan; clearly these techniques are only available to a certain extent in (referral) hospitals.

There is no rapid and reliable diagnostic test for use under field conditions and diagnosis will be mainly clinical; this may be in particular problematic in early lesions.

Treatment

Treatment is basically with antifungals (eumycetoma) or antimicrobials (actinomycetoma), followed by surgery as appropriate. While in actinomycetoma medical treatment is usually satiscactory, in eumycetoma this is not the case. Current antifungals used include ketoconazole and itraconazole; however these need to be given for 12 months. After that the lesion will have reduced in size and better accessible for non-mutilating surgery. However, often the fungus may be cultured from the lesion and the recurrence rate is therefore high. In addition, the cost of treatment is high and many patients drop-out from follow-up early during treatment. All too often over time this leads to amputation of the limb after years of suffering and disability. In remote areas surgery is the primary treatment.

Newer antifungal agents are promising such as voriconazole or isavuconazole; *in vitro* work shows that these antifungals do not seem to be inhibited in their action by melanin produced by the fungus (ref).

Issues in control

1. Assessment of disease burden
2. Health education
3. Advocacy
4. Rapid diagnosis
5. Affordable and safe medical treatment followed by surgery if necessary; explore concomitant antibacterial treatment in eumycetoma
6. Research as to the source of the organism