

# Cutaneous Protothecosis

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## CASE SUMMARY

### History

A 79-year-old housewife presented with fever and a tender erythematous rash on her left upper limb. The lesion started as an abrasion on her left forearm two weeks prior to presentation and slowly enlarged to involve the upper arm.

She suffered from psoriasis for more than 20 years, and had been controlled with topical treatment alone. Although her psoriasis had been in remission for the past two years, she continued to apply topical steroid

cream on her limbs intermittently. She had no history of diabetes mellitus and was not on any long term medication. She did not keep any plants at home.

### Physical examination

On examination, there was a low grade fever. An extensive, well-defined, erythematous plaque with scaling and erosion was noted over the left upper arm and forearm, involving both the flexor and extensor aspects (Figure 1). Marked cutaneous steroid-induced atrophy was noted over all four limbs due to prolonged use of potent topical steroids. There was no lymphadenopathy or hepatosplenomegaly.

### Progress

Blood biochemistry was unremarkable. Wound swab from the lesion grew methicillin-sensitive *Staphylococcus aureus*. Her skin lesion did not respond to systemic antibiotics including cloxacillin, wound dressing and topical fucidin cream.



Figure 1: Erythematous plaque with scaling and erosion over the left forearm

## Investigations

Skin biopsy showed a mixed dermal inflammatory infiltrate with a modest amount of giant cells (Figure 2). Periodic acid-Schiff and Grocott methanamine silver stains demonstrated the presence of spherical spores and morula-like sporangia, both freely in tissue and within giant cells (Figure 3). A diagnosis of cutaneous protothecosis was made. Tissue was also sent for culture, but failed to grow any bacteria, fungi, prototheca or mycobacteria.

## Management

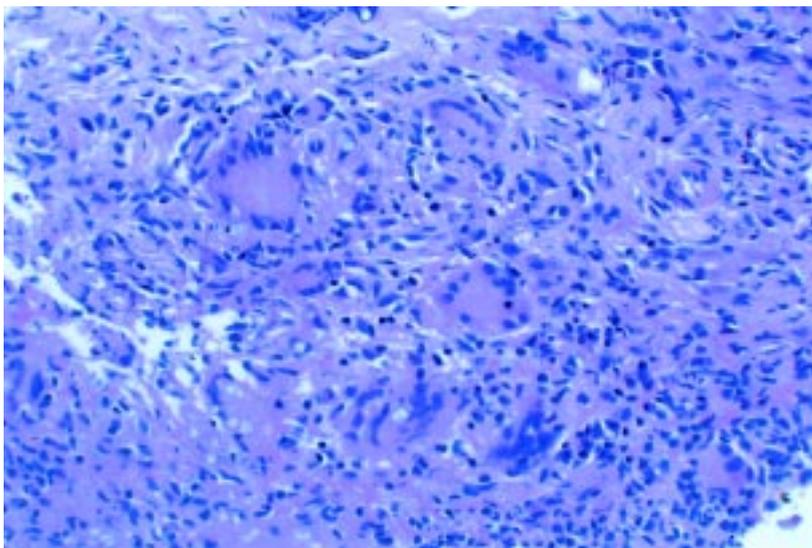
The patient was started on oral itraconazole 100mg twice daily. Dramatic improvement was noted within

two weeks of starting treatment. The lesion subsequently resolved completely.

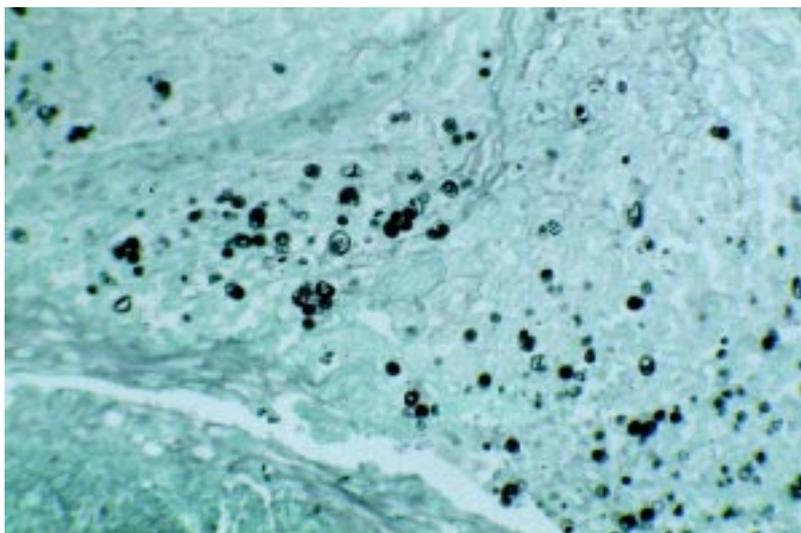
## REVIEW ON PROTOTHECOSIS

Prototheca is a unicellular, aerobic, achlorophyllic algae. It is ubiquitous in nature and can be found in the slime flux of trees, sewage, soil, lakes, ponds and marine water. It can also be found on dogs, cats, cattle and even in cow's milk.<sup>1</sup>

Three species of prototheca are recognised: *P. wickerhamii*, *P. zopfii* and *P. stagnora*. The first two



**Figure 2: High power view showing a mixed dermal inflammatory infiltrate with a modest number of multinucleated giant cells. (By courtesy of Dr. R. Chow, SYPPI)**



**Figure 3: Typical morula-like sporangia as demonstrated by Grocott stain. (By courtesy of Dr. R. Chow, SYPPI)**

types are known to cause human infection, with *P. wickerhamii* being the more common human pathogen. Infection follows traumatic inoculation.

### Clinical features

Human infection can present in different forms:

- 1) **Cutaneous**  
Cutaneous lesions can present as papulonodules, verrucous plaque with scaling, induration and superficial erosion. At least fifty per cent of the reported cases have immunosuppression caused by either local or systemic factors.<sup>2</sup>
- 2) **Olecranon bursitis**  
This is mainly reported in immunocompetent patients.
- 3) **Systemic disseminated infection**  
In severely immunosuppressed patients, for example, AIDS, post-renal transplantation, or those with defective neutrophil functions, 3 disseminated infection can occur causing meningitis or pneumonia.
- 4) **Mucosal**  
There is a case report of a patient on prolonged endotracheal intubation that developed a nasopharyngeal mass with ulceration. Biopsy and culture confirmed the diagnosis.<sup>2</sup>

### Histology

Histology of the lesion can vary from minimal dermal infiltration to a suppurative granulomatous reaction. The diagnosis depends on the demonstration of typical spores forming a characteristic morula-like sporangia. The spores stain positively with periodic acid-Schiff and methanamine silver stain.

### Culture

Prototheca grows readily in standard Sabouraud's dextrose agar at 30°C within 48 hours, giving milky white yeast-like colonies. It is important to note that cycloheximide, which is sometimes added to the agar to inhibit the growth of saprophytic fungi, can also suppress the growth of prototheca species. Sugar

assimilation tests can be used to distinguish between the different species of prototheca.

### Treatment

There is no standardized treatment for human protothecosis. In localized disease, local excision may be adequate. Various drugs have been reported to be useful. These include amphotericin B with or without tetracycline,<sup>4</sup> ketoconazole,<sup>5</sup> itraconazole,<sup>6</sup> or fluconazole.<sup>7</sup> The problem is that the dosage or the duration of therapy necessary to eradicate the infection has not been established. 5-flucytosine has been demonstrated to be ineffective in human protothecosis.

#### **Learning points:**

**At least 50% of the reported cases of cutaneous protothecosis have immunosuppression caused by either local or systemic factors.**

### References

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