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Case Report

Magic mushrooms: hope for a ‘cheap high’ resulting in end-stage renal failure

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Key words: *Cortinarius orellanoides*; magic mushrooms; mushroom poisoning; renal failure

Introduction

Ingestion of so-called ‘magic mushrooms’ (*Psilocybe semilanceata* (Fr.) Kumm.) has become a popular form of substance abuse among young people [1–3]. These fungi contain the hallucinogenic agent psilocybin, which resembles LSD in many ways. Distortions of perception are common and usually visual, euphoric, but also dysphoric reactions as well as panic anxiety have been reported. A questionnaire survey among students in Denmark indicated that 9% had had experience with psilocybin-containing mushrooms, which exceeded the use of LSD (3%) [4]. These data suggest that magic mushrooms might be the most commonly used hallucinogenic substance, at least in some countries. In this paper we describe a case of end-stage renal failure due to mushroom intoxication in a young male. The poisoning occurred because the patient had confused toxic fungi of the genus *Cortinarius* with what he had believed to be magic mushrooms.

Case report

A 28-year-old man was admitted because of acute renal failure of unknown origin. During 2 weeks before admission he had been suffering from sickness, nausea, and vomiting. Acute gastritis had been suspected initially; because of lumbar pain he had also been seen as an outpatient by a urologist, who found proteinuria, leukocyturia, and erythrocyturia. After exclusion of urinary-tract infection and renal-stone disease an examination at the Division of Nephrology was

recommended, but the patient appeared a few days later only.

The first clinical investigation presented the young man in a surprisingly good physical condition. However, laboratory tests revealed a serum creatinine of 23 mg/dl, BUN of 170 mg/dl, moderate anaemia, and hyperphosphataemia. The patient underwent haemodialysis immediately. He was dehydrated due to repeated vomiting, but despite sufficient fluid substitution, oligoanuria developed within few hours. The initial medical history gave no explanation for the acute renal failure and both kidneys were found normal in size by ultrasonography. A renal biopsy was performed; histological examination by light-microscopy (Figure 1), immunofluorescence microscopy, and electron-microscopy revealed unchanged glomeruli and rather non-specific tubulointerstitial alterations with pronounced oedema, slight fibrosis, a minimal mononuclear inflammatory infiltrate, and very little acute tubular damage. This only moderate damage was strikingly out of proportion to the complete loss of renal function. After exclusion of common causes of acute interstitial nephritis, after an extensive research in literature, and after detailed questioning of the patient, poisoning with orellanine, a nephrotoxic agent in several fungi of the genus *Cortinarius*, was suspected [5,6]. The patient finally admitted ingestion of magic mushrooms approximately 1 week before the onset of clinical symptoms. When he was confronted with pictures in a mushroom collector’s guide, however, it became apparent in retrospect, that he had confused the hallucinogenic fungi with *Cortinarius orellanoides* Hry. (= *C. speciosissimus* Kühn. & Romagn.). The diagnosis was confirmed by detection of orellanine in renal biopsy material obtained 5 weeks later [Rohrmoser *et al.*, unpublished findings]. This second biopsy showed progression of diffuse interstitial fibrosis and tubular atrophy, but no signs of acute tubular damage (Figure 2). When the diagnosis of mushroom poisoning was established, we performed a therapeutic attempt using probucol, since it had been suggested that the toxicity of orellanine might be due to

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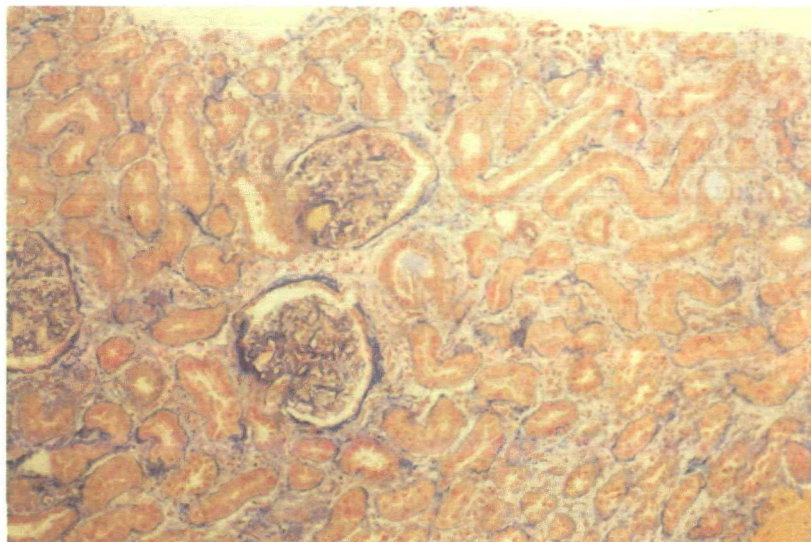


Fig. 1. First renal biopsy.

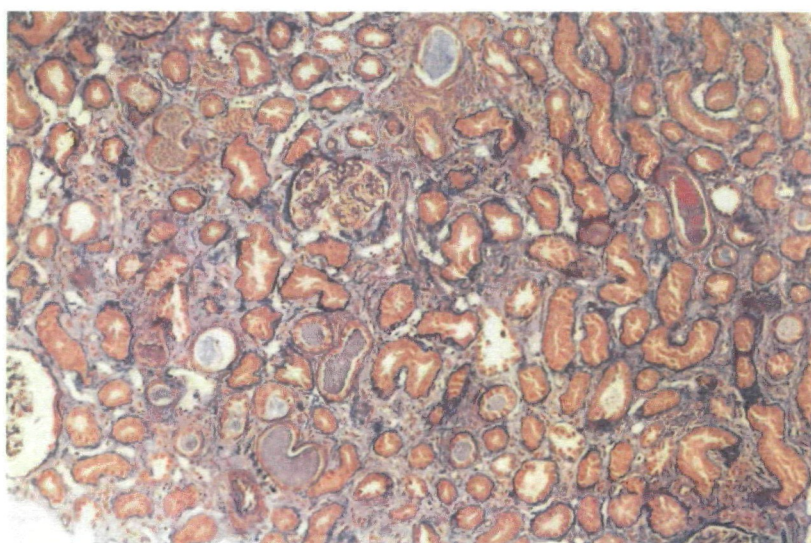


Fig. 2. Second renal biopsy 5 weeks later.

intracellular cyclic redox reactions with the production of free radicals, but recovery of renal function was not achieved in our patient [7]. It is possible, however, that this approach was started too late to prevent irreversible renal damage.

Discussion

Interstitial nephritis after intoxication with fungi of the genus *Cortinarius*, hardly mentioned in medical textbooks, is associated with reversible or irreversible acute renal failure [7,8]. Although its occurrence is rare, collective intoxications have been reported occasionally [9,10]. Poisoning has been mainly described after ingestion of *C. orellanus* (Fr.) Fr. and *C. orellanoides* Hry. Diagnosis might be complicated due to the long latency period (up to 20 days) between

the ingestion and the occurrence of renal failure. Our patient, for instance, did not relate his symptoms to the back-dated mushroom meal. Diagnosis of orellanus syndrome can be confirmed by identification of typical fungal spores in the gastric juice by a mycologist or by detection of the toxic agent orellanine in the serum and in renal biopsy material [11 and Rohrmoser *et al.* unpublished]. Non-specific digestive signs may precede the deterioration of the patient's general condition and lumbar pain is a typical feature. Involvement of the liver is usually not observed, but might occur after ingestion of a mixture with other toxic mushrooms. The incidence of renal failure varies from 30 to 46%, but recovery of renal function has been reported in patients requiring haemodialysis even 6 months after the poisoning [10,12]. Frusemide seems to aggravate renal lesions [13]. Circulating orellanine can be removed by haemodialysis, but the toxin may persist



Fig. 3. Magic mushrooms (*Psilocybe semilanceata* (Fr.) Kumm.)

in the kidney—bound to renal cells—for months [11]. Therefore it could not be ruled out that the poison might be harmful for subsequent renal transplants. In a recent paper, however, five cases of successful renal transplantation after *Cortinarius* intoxication have been reported without evidence for recurrence of interstitial nephritis in the graft after a follow-up of 5–10 years [12]. These data suggest that renal transplantation would be the therapy of choice in the case of irreversible renal failure. Our patient still requires haemodialysis after 12 months and is evaluated for renal transplantation.

Fruit bodies of *Psilocybe semilanceata* are distinguishable from those of *C. orellanus* or *C. orellanoides* by their size, colour, and ecology. Fruit bodies of *Psilocybe semilanceata* are relatively small: cap 0.5–1.5 cm, pale ochraceous-brown or buff yellow when drying, conical with a distinctive sharply pointed umbo; gills (lamellae) dark olive-brown; stipe slender 50–100 × 1–2 mm, pale cream coloured. It grows on manured meadows or directly on dung (Figure 3).

The expanded and bluntly umbonate cap of *Cortinarius orellanoides* (Figure 4) is orange-brown with a diameter of 3–8 cm. The gills are cinnamon-brown, the stipe is concolorous with the cap and sometimes decorated with ochraceous bands. The stipe of the closely related *C. orellanus* is more yellow and without any bands. Both species are mycorrhizal with different trees, growing on acid soil among mosses.

Confusion of magic mushrooms with *C. orellanoides* is possible for inexperienced collectors only. It appears, however, that abusers might not be very critical when collecting mushrooms for a 'cheap high' and some



Fig. 4. Mushrooms of the species *Cortinarius orellanoides* Hry. (= *C. speciosissimus* Kühn. & Romagn.)

authors have already previously expressed their concern about the consequences of possible incorrect fungal identification [2,3]. The patient presented here is, to our knowledge, the first abuser of magic mushrooms who has developed end-stage renal disease due to accidental mushroom misidentification, and now awaits renal transplantation. A similar case with, however, reversible renal failure has been reported recently [14]. This might reflect increasing abuse of psilocybine mushrooms or growing negligence among the addicted population. The risk of mushroom confusion may not be underestimated and should be brought to the minds of magic mushroom abusers. Similarly, general practitioners, nephrologists, and doctors in emergency rooms or in acute psychiatric departments should be aware of the problem.

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