

CLINICAL IMAGES

## Mistaken Mushroom Poisonings



### Report of a Case\*

A 38-year-old man in prior excellent health presented to the emergency department (ED) with severe nausea and vomiting 4 hours after consuming homemade soup containing parts of 4 wild mushrooms he had picked that day (Figure 1). He described the mushrooms as having straight 4-inch stems (stipes) and bright white caps. His vital signs were unremarkable. Supportive therapy with antiemetics and intravenous (IV) fluids was initiated. Baseline laboratory studies included serum

blood urea nitrogen (BUN), 10 mg/dL (3.6 mmol/L), and creatinine, 1.0 mg/dL (88.4  $\mu$ mol/L). His complete blood count, electrolytes, and hepatic transaminases were within normal limits. Because his gastrointestinal symptoms resolved with supportive care and his laboratory studies remained normal, he was discharged from the ED after 8 hours of observation. Five days later, he was readmitted to the ED with a history of anorexia and 8 hours of anuria.

**What is your diagnosis?**

**How would you manage this case?**



**Figure 1.** The mushrooms picked and consumed by the patient. Source: Wikimedia Commons (public domain). Photographer: Sava Krstic.

## Diagnosis

The diagnosis was *Amanita smithiana* mushroom poisoning with reversible acute renal failure after the misidentification (and ingestion) of nephrotoxic *A smithiana* mushrooms (Figure 1) mistaken for look-alike edible North American matsutake or pine mushrooms, *Tricholoma magnivalere*.

The nephrotoxic *A smithiana*, or Smith's Amanita (Figure 1), is often mistaken for the edible and highly sought after North American matsutake or pine mushroom, *T magnivalere*, a frequent export to Japan where it rivals the Asian matsutake mushroom, *T matsutake*, in popularity. Accidental ingestion of *A smithiana* will cause gastrointestinal toxicity within 6 hours followed by acute renal failure within 2 to 6 days.

After the diagnosis has been made, the laboratory biomarkers of renal function should be reassessed, and preparations for temporary hemodialysis should be instituted.

## Follow-Up of the Reported Case

On readmission to the ED, the patient's BUN was 77 mg/dL (27.5 mmol/L), and his creatinine was 14 mg/dL (1237.6  $\mu$ mol/L). A dialysis catheter was inserted for rapid hemodialysis for acute renal failure. After 12 days of inpatient dialysis, his BUN and creatinine returned to normal ranges, and he was discharged from the hospital. His dialysis catheter was removed in the nephrology clinic 4 days later.

## Introduction

Mushroom poisonings are common, but rarely serious or fatal.<sup>1–3</sup> There were more than 25,000 reports of mushroom poisonings worldwide from 1951 to 2002.<sup>3</sup> The greatest risk factor for mushroom poisoning is the misidentification of a poisonous species as edible by amateur mushroom hunters and immigrants.<sup>1–3</sup> There are more than 5000 species of mushrooms. Greater than 2000 species are edible. Only about 100 species have been confirmed as poisonous.<sup>1–3</sup>

In a retrospective epidemiological analysis of mushroom poisonings during a 50-year study period, Diaz<sup>3</sup> described the following results. Reports of fatal and nonfatal mushroom poisonings increased significantly every decade. Some mushrooms formerly described as edible were reclassified later as poisonous. Several new species of poisonous mushrooms were described in the 1990s, including *A smithiana*, *Amanita proxima*, and *Tricholoma equestre*. The most lethal mushroom poisonings continued to follow ingestions of hepatotoxic amanitin-containing mushrooms. These findings were confirmed in subsequent investigations.<sup>1,2,4</sup>

The edible mushroom trade is a \$3 billion per year international industry that is projected to grow to \$5 billion a year by 2019.<sup>5</sup> Europe accounts for the largest market share, followed by China and the United States.<sup>5</sup> The major mushroom-producing nations export tons of mushrooms annually to nations that depend on mushrooms for many traditional, national dishes. For example, the North American matsutake mushroom, *T magnivalere*, now rivals the Asian matsutake mushroom, *Tricholoma matsutake*, as a popular Japanese food import. As a result, there is an increasing risk today of mistaking look-alike poisonous mushroom species as highly prized, edible species either for local and regional sales or for export.

Recently, mushroom gourmets in the Scandinavian countries developed local cooking practices that can partially detoxify some poisonous species by parboiling them, such as false morels, *Gyromitra esculenta*, which closely resemble the edible and highly desirable, common morels, *Morchella esculenta*, in appearance and taste. A grocery store in Helsinki sells packaged, poisonous false morels, *G esculenta*, that rival the more expensive common morels, and could sicken unsuspecting consumers who are unaware of proper preparation procedures (Figure 2).

## Mistaken Mushrooms

In the United States and Europe, the most frequently misidentified look-alike mushroom pairs today include 1) either the poisonous *A smithiana* (Figure 1) in the United States for the North American matsutake, *T magnivalere* (Figure 3), or the poisonous *A proxima* (Figure 4) in Europe for the Asian matsutake, *T matsutake* (Figure 5); 2) the poisonous false morel, *G esculenta* (Figure 6), for the common morel, *M esculenta* (Figure 7), in both the United



**Figure 2.** Packaged, poisonous false morels, *G esculenta*, are popular sale items at this Helsinki grocery and rival the more expensive common morels in sales. Source: Wikimedia Commons (public domain). Photographer: Ilmari Karonen.

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