

# Molecular adsorbent recirculating system in dealing with maternal *Amanita* poisoning during the second pregnancy trimester: a case report

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**BACKGROUND:** A 27-year-old woman in her 20th week of pregnancy was hospitalized because of food poisoning caused by *Amanita phalloides*.

**METHODS:** Previously extracorporeal purification treatments with 2 times of hemodialysis plus hemoperfusion and a high volume therapeutic plasma exchange (PE) in addition to intensive medication during the first 8 days failed to improve hepatic encephalopathy (HE) and liver function but developed deep coma with severe blood chemistry and signs of threatened abortion.

**RESULTS:** Treatments with intermittent molecular adsorbent recirculating system (MARS) for 3 times resulted in an immediate improvement of liver function and clinical symptoms including HE and threatened abortion until her fully recovery. When the life-threatening maternal illness was cured gestation went on until premature birth at the 36th week of pregnancy, and the infant underwent an undisturbed development.

**CONCLUSION:** MARS method appears to be an optimal therapy for patients with acute liver failure secondary to cytotoxic mushroom poisoning during pregnancy.

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**KEY WORDS:** molecular adsorbent recirculating system; *Amanita*; mushroom poisoning; pregnancy

## Introduction

**A** *manita phalloides*-type mushroom poisoning is well recognized to cause acute liver injury and even death; but maternal poisoning is rare. Optimal therapy or abortion in this critical situation remains controversial.<sup>[1]</sup>

An innovated blood purification system named molecular adsorbent recirculating system (MARS) is theoretically used to increase the rate of toxin elimination that minimizes the toxic exposure to highly susceptible hepatocytes and embryo, stabilizes homeostasis, and creates a "bridge" off severe episode in recovery, thus avoiding the possibility of induced abortion during acute phase of poisoning in pregnancy.<sup>[2,3]</sup>

## Case report

A 27-year-old woman suffered from mushroom poisoning due to *Amanita phalloides* at her 20-week gestation in March 2002. Two hours after ingestion, she presented gastroenteric troubles as frequent vomiting and diarrhea and was transferred to our department because of progressive jaundice and neurologic abnormalities on the second day. Her jaundice and hepatic encephalopathy as well as increased levels of aspartate and alanine aminotransferase, and decreased levels of prothrombin and fibrinogen indicated a moderate poisoning.

Because of the progression towards acute liver failure due to intoxication, intravenous hydration, forced diuresis, and administration of glutathione, tiopronin, hydrocortisone, vitamin K, and fresh frozen plasma were prescribed. Additionally, extracorporeal detoxification or hemodialysis plus hemoperfusion was performed daily during hospitalization, which did neither alleviate hepatic encephalopathy (HE) (grade 1-2) nor improve liver function. On the fifth day after hospitalization, 2500 ml of therapeutic plasma exchange (PE) was given but her liver function and HE (grade 3-4) worsened with uterus contraction and wide opening of the uterine

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**Table.** Laboratory results and grades of hepatic encephalopathy pre- and post-MARS treatment

Treatment	ALT (IU/L)	AST (IU/L)	LDH (IU/L)	TBIL ( $\mu\text{mol/L}$ )	PTA (%)	FIB (mg/dL)	HE (grade)
Before	3600	2503	1216	92	18	72.7	3-4
After	452	485	258	43	110	182	0
Normal range	0-40	0-40	100-240	1.7-17.1	70-120	200-400	0

ALT; alanine aminotransferase; AST; aspartate aminotransferase; LDH; lactate dehydrogenase; TBIL; total bilirubin; PTA; prothrombin activity; FIB; fibrinogen; HE; hepatic encephalopathy.

orifice, indicating a threatened abortion.

With peak blood chemistry and deep hepatic coma, the patient underwent 3 courses of albumin dialysis using MARS (MARS monitor, Teraklin AG, Rostock, Germany) intermittently starting from the eighth day after hospitalization. Her exasperate liver function was immediately reversed and clinical symptoms improved. After the first MARS treatment, uterus contraction alleviated; the second treatment improved HE from grade 4 to 3; and the third treatment made her consciousness fully recovered, while uterus contraction stopped and the osmium of the uterus resumed.

The treatment with MARS was well tolerable to the patient. Twenty-one days after admission she was discharged with normal liver function and a normal fetus (Table).

At the 36th week of pregnancy, she gave birth to a healthy but slight underweight baby. The birth and development of the infant (now 7 months age) proceeded uneventfully.

## Discussion

Poisoning by *Amanita phalloides* and related species is associated with severe morbidity and a high mortality rate due to acute liver failure. The main causative agents of intoxication are amatoxins and phallotoxins, whose pathological mechanisms include inhibiting DNA dependent RNA Polymerase II or B and the synthesis of messenger RNA in hepatocytes, and stimulating the polymerization of actin filaments. The main target organ for example the liver is characterized by fatty degeneration, acute toxic dystrophy, and centrilobular necrosis.<sup>[3-5]</sup>

Maternal poisonings are rare, and the frequently polarized debate is concerned with decisions of abortion at this critical situation. Some scientists reported that abortion is not necessarily indicated for maternal poisoning caused by *Amanita phalloides*, even in the first trimester of pregnancy.<sup>[6]</sup> Although the statistical power to detect teratogenic effects during the first trimester is limited, maternal poisoning may definitely have led to intrauterine growth retardation.<sup>[7]</sup>

Our patient presented with acute hepatic failure secondary to *Amanita phalloides* in the second trimester of pregnancy, her critical condition was aggravated most severely at day 8 even after intensive management inclu-

ding hemodiaperfusion and plasma exchange. The presented data of blood chemistry and clinical symptoms such as hepatic coma and signs of threatened abortion indicated not simply whether termination of pregnancy though not due to the teratosis or fetus damage, but severely the response of life-saving for the gravida. Thus the consideration of abortion we suppose is based on laboratory data and clinical conditions after early effective therapy during the acute phase.

Therapeutic options of extracorporeal elimination employed to treat mushroom intoxication, such as hemodiaperfusion, plasmapheresis often failed to act properly since neither hemodialysis nor hemoperfusion contributed to the clearance of relevant toxins.<sup>[8,9]</sup>

The albumin dialysis using MARS, which is innovative from conventional extracorporeal techniques such as hemodialysis, hemoperfusion, plasma exchange or even hybrid methods, has been successfully applied to a wide variety of patients with hepatic failure. It mimicks the blood detoxifying function of hepatocytes by using the unique features of the natural carrier of albumin in humans, ensuring the highest selective detoxification mechanism based on facilitated diffusion and adsorption or any kind of plasma pheresis. Moreover, MARS method is advantageous because of its high biocompatibility in management of fluid, electrolyte and acid-base balance, mainly rehydration and restoration of the mineral balance.<sup>[2]</sup> Our patient was benefited largely from the timely intervention of MARS treatment with a resultant inspiring turning point on her critical course until recovery.

This observation indicated that MARS can be applied as an optimal therapy for patients with acute liver failure secondary to cytotoxic mushroom poisoning, and if the acute phase of poisoning is not managed effectively, maternal *Amanita* poisoning may be an indication for induced abortion despite severe fetal damage might not occur in the second trimester of pregnancy.

## Competing interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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