In the name of God

Mushroom poisoning

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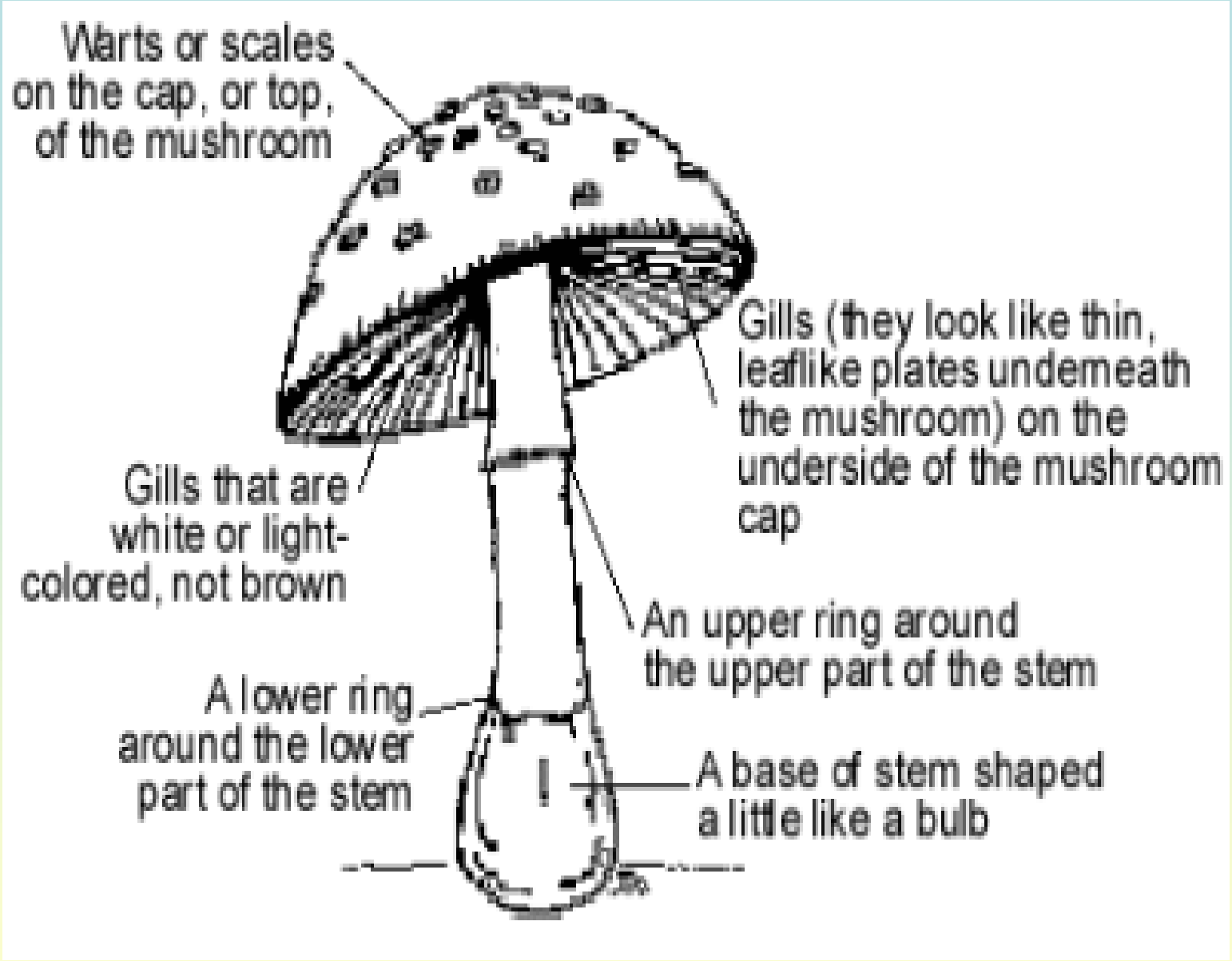
Introduction

Of the thousands of wild mushroom species in the world , 50-100 are potentially toxic and only 32 have been associated with Fatalities.

There are 12 groups of identified mushroom toxins and 14 described clinical symptoms.

Only about 2% of the 5000 U.S mushrooms are poisonous.



Signs that a mushroom may be poisonous









Is it possible to tell if a wild mushroom is poisonous?

You can't tell for sure if a mushroom is poisonous by looking at it, unless you are an expert at identifying mushrooms.

There are no tests to help you tell a poisonous mushroom from a nonpoisonous mushroom.

Introduction

Mushroom poisoning is usually the result of ingestion of wild mushrooms after miss identification of a mushroom as an edible species.

The most common reason for this misidentification is close resemblance in terms of color and general morphology of the toxic mushroom with edible species.

Introduction

***Even very experienced** wild mushroom gatherer are sometimes poisoned by eating toxic species.*

Why?

***Over ½** of the mushroom ingestion occurs in children **<6yr** of age.*

Why?

***Mortality** is **higher** in children.*

Why?

Introduction

To prevent mushroom poisoning , mushroom gatherers need to be very familiar with the mushrooms they intended to collect.

The majority of deadly mushroom poisonings are related to consumption of the genus Amanita.

Amanita phalloides accounts for >90% of all fatalities among the species.

Introduction

Consumption of a single mushroom can lead to death.

Amanita has no characteristic smell or taste and cooking does not destroy the toxin.

Color varies with weather, soil and age of the mushroom.

Types of mushroom poisoning

1- *Monomethyl hydrazine intoxication*

2- *Muscarine poisoning*

3- *Indole intoxication (magic mushrooms)*

4-Amanita poisoning

Clinical manifestation

1. GI

- ***Amanita poisoning***

- ***monomethyl hydrazine***

2. Autonomic N.S

- ***Muscarine poisoning***

3. CNS

- ***Indole intoxication***

- ***Ibotenic acid intoxication***

Monomethyl hydrazine intoxication

Clinical presentation:

Start within 6-24 hrs of ingestion of toxins:

- ***Abdominal pain***
- ***Vomiting***
- ***Diarrhea***
- ***hematochezia***
- ***Seizure and CNS depression***
- ***Cyanosis : why?***

Monomethyl hydrazine intoxication

Hemolysis and Methemoglobinemia (MH) are potential life-threatening complications.

Monomethyl hydrazine intoxication

Management:

1) Fluid therapy

2) Dialysis for MH.

3) pyridoxine hydrochloride(B6):
(25 mg/kg/IV)

4) Methylene blue(1-2mg/kg) IV

5) Blood transfusion

Muscarine poisoning

Clinical manifestations:

The onset of symptoms is rapid within 30 min. to 2 hrs after ingestion, and consists of:

- Diaphoresis
- Excessive lacrimation
- Salivation
- Bradycardia
- Miosis
- Urinary and fecal incontinence

What is the DDx.?

Muscarine poisoning

Respiratory distress due to bronchospasm and secretions is the most serious complication.

The symptoms subside spontaneously within 6-24 hrs.

Atropine sulfate (the specific antidote) is administered IV (0.01 mg/kg/dose, max 2 mg) repeated until the pulmonary symptoms resolve or the patient becomes tachycardic.

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نام و نام خانوادگی	سن	تظاهرات بالینی
1-آمنه کوهکن	14 yr	Miosis
2-حمیدرضا شمشیری	7 yr	Lacrimation
3- فاطمه شمشیری	5 yr	Poor vision
4-مجید صادقی	7 yr	Diaphoresis
5-زهرا شمشیری	3 yr	Salivation
6-نجمه کوهکن	11 yr	Brady cardia Hypotension

Indole intoxication (*magic mushrooms*)

Within 30 min. ***after ingestion, patients experience:***

Euphoria

Hallucinations

Often accompanied by tachycardia

Mydriasis

What is the DDx.?

Indole intoxication (*magic mushrooms*)

- ***Fever and seizures have been seen in children .***
- ***The symptoms usually subside within 6 hr after consumption of mushroom.***
- ***Severely agitated patients may respond to diazepam.***

Amanita poisoning

Amanita poisoning

Cyclopeptide containing mushrooms.

There are more than 15 known cyclopeptides'

The most important ones are:

1- Amatoxine

2- Phallotoxine

3- Alfa- amanitine

Amanita poisoning

Consumption of a single mushroom can lead to death.

The lethal dose is : 0.1mg/kg, a cap of amanita contains about 10-15 mg amatoxin.

Amanita has no characteristic smell or taste and cooking does not destroy the toxin.

Color varies with weather, soil and age of the mushroom.

Amanita poisoning

The most common and dangerous type in the world and IRAN.

Poisoning by species of amanita and galerina account for 95% of the fatalities due to mushroom intoxications.

Phalloidin

Phalloidin* disrupts cell membranes and is *responsible for the initial symptoms of:

Nausea, vomiting and diarrhea exhibited by all patients.

Amanitin

Amanitin inhibits RNA polymerase II activity, interrupts vital structural protein synthesis and leads to subsequent cytolysis of hepatocytes.

Amanitin

About 60% of absorbed amanitin is excreted into the bile and is returned to the liver via the enterohepatic circulation.

Most of the toxins are excreted in urine.

Clinical presentation

Amanita poisoning has four characteristic phases:

1-latent (asymptomatic) phase

(ranges from 6 to 24 hrs).

2- GI phase

3-Latent (silent) hepatic phase

4-Hepatic phase

Clinical presentation

2-Gastrointestinal phase:

Lasts 12 - 24 hr and includes: crampy abdominal pain, nausea, vomiting and watery diarrhea.

Profuse watery diarrhea (cholera like) follows shortly there after and my last 12-24 hrs.

Hematuria may also present.

Often these patients are misdiagnosed as?

Acute GE

Clinical presentation

3) Latent (silent) hepatic phase:

which lasts 24 – 48 hrs when the GI symptoms improve , but laboratory data demonstrate subclinical evidence of liver injury.

Clinical presentation

4) Hepatic phase:

Occurs 48-96 hrs after ingestion when aminotranferase levels continue to rise along with development of coagulopathy and jaundice.

FHF, ARF and multiorgan failure may occur.

Pancreatitis occur in 50% of cases.

Clinical presentation

This stage can progress rapidly and result in hypoglycemia, acidosis and hepatic encephalopathy

Hypoglycemia can be a prognostic factor, patients with hypoglycemia died or underwent LTx .

The main factors associated with poor outcome are severity of coagulopathy and encephalopathy.

Diagnosis

1- Hx

2- FHx

3- Social Hx

4- Laboratory:

Detection of the amanita toxin in the urine by ELISA is the method of choice.

Management

Mushroom poisoning should be reported to the local poison control center or consulted with a toxicologist , poison specialist or mycologist.

Management

1) Presenting cases (patients)

2) Non-presenting cases
(asymptomatic, latent cases)

All cases (suspected or confirmed) of ingestion of amatoxin containing mushroom must be admitted in hospital for management.

Management

1- Supportive care

2- Medical management

3- Surgical management (LTx.)

Medical Management

1-Supportive care

2-Detoxification

3-Hepatocyte amatoxin uptake inhibitors

4- Anti-oxidants

Detoxification

1-*primary detoxification:*

Prevention of GI absorption of the toxin

2-Secondary detoxification:

By forced diuresis with sodium bicarbonate

3-Extracorporeal detoxification:

- ***Hemodialysis***
- ***Hemofiltration***
- ***MARS***
- ***Hemoperfusion***
- ***Plasmapheresis***
- ***Exchange***

primary detoxification

1- Gastric lavage (not recommended)

2 - Syrup of ipecac (not recommended)

3- Activated charcoal (MDAC):

1g/kg/dose (max:50gm) every 4hrs for 4 days.

Medical Management

The most important thing is to prevent absorption of the toxin from the GI tract and to promote elimination from the systemic circulation.

The success of decontamination treatment strongly depends on the time of admission to the hospital.

Medical Management

Patients who are hospitalized and given aggressive support therapy almost immediately after ingestion of amanitin-containing mushrooms have a mortality rate of only 10%, whereas those admitted 60 or more hours after ingestion have a 50-90% mortality rate.

Medical Management

The best therapeutic results are obtained when the detoxification measures take place in the first 36-48 hrs , because significant amounts of toxin are still present in the circulation at this time.

Medical management

Secondary detoxification* by *forced diuresis* *with sodium bicarbonate may eliminate* *60-80%* *of the total urinary amanitin .

The efficacy of this type of management is controversial.

Medical management

3-Hepatovyte amatoxin uptake inhibitors:

1-Silibinin and silymarin:

A- Silibinin , IV: 20 mg/kg/day , for 6 days

or until clinical improvement

B- Silymarin, PO:

Initial dose:50-100mg/kg/dose (max.:2gm),Q8h

If tolerated increase up to:200mg/kg/dose (max.:3g)

for 6 day or until clinical improvement

Silybum marianum (marian thistle)

Medical management

3-Hepatovyte amatoxin uptake inhibitors:

2-PenicillinG,IV:

300/000 - 1/000/000U/kg/day

for 4-5 days or until clinical improvement

If IV silibinin is available , penicillin is not needed.

Medical management

Anti-oxidants:

1-NAC:

IV Infusion over 20 - 21 hrs

(total dose:300mg/kg)

1- Initial dose :150 mg/ kg ,15-60 min

2- 50mg/kg for 4hr

3-100mg /kg /16 hrs

Dilution should be performed in children who weigh < 40 kg

Medical management

Anti-oxidants:

2-Cimetidine :

300 mg IV every 8 hrs until clinical improvement

3-Vitamin C :

3gm/day, IV until clinical improvement

Management

Transport to a specialized center for detoxification or LTx is necessary when laboratory test indicate liver injury.

The only definitive treatment may be LTx once FHF occurs.

LTx

The life-saving role of LTx in FHF secondary to mushroom poisoning should be considered as soon as possible.

With thanks


With thanks
The End

King's Collage criteria for selection of patients with FLF for LTx

1) age < 10 or >40 yr

2) duration of jaundice before onset of hepatic encephalopathy >7 days

3) PT >50 s, INR > 3.5

4) serum bilirubin > 17.5 mg/dL

King's Collage criteria for selection of patients with FLF for LTx include:

Irrespective of the grade of encephalopathy:

PT >100 , INR > 6.5

Medical management

Anti-oxidants:

2-Cimetidine :

***300 mg IV every 8 hrs** until clinical improvement*

3-Vitamin C :

***3gm IV** until clinical improvement*

Extracorporeal detoxification

Several extracorporeal detoxification methods have been used during the last 15 yr:

- **Hemodialysis**
- **Hemofiltration**
- **Hemoperfusion**
- **Plasmapheresis**

Silymarin

Actions:

Antioxidative

Antilipid peroxidative

Antifibrotic

Anti-inflammatory

Membrane stabilizing

Immunomodulatory

and liver regenerating mechanisms.

Plasmapheresis

In the potentially fatal intoxication, for which there is no antidote, plasmapheresis is at least as effective as haemoperfusion in reducing mortality from as high as 30-50% with conventional therapy to <20% .

Management

Supportive care and GI decontamination with activated charcoal suffice the proper management of most cases with mushroom poisoning.

Diagnosis

There is no available blood test to confirm the presence of these toxins, but the diagnosis should be suspected in patients with a history of severe gastrointestinal symptoms (nausea,vomiting, diarrhea, abdominal cramping), which occur within hours to a day of ingestion.

Munich prognostic criteria to predict lethal outcome in mushroom poisoning

1) PT 20% greater than the normal

2) Serum creatinine concentration
   >1.4 mg/dl.

3) Serum bilirubin > 4.6 mg/dL

4) Progressing hepatic encephalopathy

Amanitin

Proximal and distal convoluted tubules of the kidneys and pancreas are the other target organs of the toxin.

Clinical presentation

It appears that the degree of aminotransferase and bilirubin elevation is not helpful in predicting the outcome.

Silymarin

Silymarin is an extract of the milk thistle, Silybum marianum, and is given in doses of 20-50 mg/kg/ day IV.

It inhibits binding of amanitin to the hepatocytes.

Silymarin

Silymarin is orally absorbed and is excreted mainly through bile as sulphates and conjugates.

Silymarin offers good protection in various toxic models of experimental liver diseases in laboratory animals.

Silymarin

Silymarin is reported to have a very good safety profiles.

Silymarin is non toxic even when given at high doses (>1500 mg/day).

Silymarin

Most commonly noted adverse effects were related to GI tract like bloating, dyspepsia, nausea, irregular stool and diarrhea.

It also produces pruritus, headache, exanthema, malaise, asthenia, and vertigo.

Extracorporeal detoxification

Charcoal hemoperfusion and hemodialysis should he performed early.

Extracorporeal detoxification

Amanitin is partially dialyzable and hemodialysis is mostly effective when it is employed in the first few hours of intoxication.

Extracorporeal detoxification

Plasmapheresis for mushroom poisoning is recommended for the late presenting patients instead of hemoperfusion.

Extracorporeal detoxification

Toxin bound to plasma proteins can be eliminated from the systemic circulation by plasmapheresis.

To correct the coagulopathy, fresh frozen plasma can be used as the replacement fluid during plasmapheresis.

Plasmapheresis

In the potentially fatal intoxication, for which there is no antidote, plasmapheresis is at least as effective as haemoperfusion in reducing mortality from as high as 30-50% with conventional therapy to <20% .

Plasmapheresis

The best results are achieved when plasmapheresis is performed within the first 36 h, although the method is also effective when carried out later.

Management

All authors agree that constant monitoring of the hepatic, neurologic and renal function is essential in the critical care management of patients with FLF from toxic mushroom poisoning.

LTx

This is especially important in children because the prognosis in children with amanita phalloides poisoning is poorer than in adults.

FLF caused by mushroom poisoning needs early and aggressive multidisciplinary care.

Management

The only definitive treatment may be liver transplantation once fulminant liver failure occurs.

LTx

The life-saving role of LTx in FLF secondary to mushroom poisoning should be considered as soon as possible.

LTx

LTx is the only treatment in those with worsening hepatic Encephalopathy.

LTx

Once stage III-IV hepatic encephalopathy develops, the chances of survival with medical therapy alone are practically zero.

No extracorporeal treatment could have saved these children's lives at this irreversible stage.

LTx

In the united States, Klein et al. Criteria are often used to recommend LTx in A. phalloides poisoning with any two of the following conditions:

1) **Grade II or higher hepatic encephalopathy**

2) **PT twice normal despite plasma infusion**

LTx

3) **Hypoglycemia** requiring continuous glucose infusion

4) **hyperbilirubinemia** (> 25 mg/dL)

LTx

In Europe where mushroom poisoning occurs more frequently than in the US, other criteria are often used for LTx.