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A CASE SERIES OF PARAQUAT POISONING SURVIVORS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

The rate of suicides in India is among one of the highest in the world (1). Paraquat poisoning is one of the important means of committing suicide. It has a high mortality and no specific antidote, contributing to its mortality. It is classified as a viologen. It is lethal to all mammals. The redox reactions releases the reactive oxygen species, which causes tissue necrosis and multiorgan failure. Though, antioxidants and immunosuppression with steroids and cyclophosphamide are tried , the results were not consistent. Here, the case details of 6 survivors of paraquat poisoning in a tertiary care hospital are presented in this case series.

INTRODUCTION:

The rate of suicides in India is among one of the highest in the world. As per WHO estimates 170000 of deaths are due to suicide in our country, contributing to 3% of mortalities. Majority of them are in the age groups of 15 to 29 years (1). Consumption of pesticides is one of the commonest means of suicide by poisoning, paraquat poisoning being one among them. It has a high mortality and having no specific antidote, contributing to its mortality.

Paraquat dichloride, commonly referred to as "paraquat," is one of the most widely used herbicides (2). It is an important tool for the control of weeds in many agricultural and non-agricultural settings. It is classified as a viologen, a family of redox-active heterocycles. It is toxic (lethal) to human beings and animals due to its redox activity, which produces superoxide anions. It is also linked to the development of Parkinson's disease(3,4) and is banned in several countries. Paraquat is banned in the European Union since 2007(5).

Here we present the case series of 6 patients of paraquat poisoning survivors in a tertiary care hospital.

Case Details

The case sheets of all the patients admitted over a period of 16 months duration with Paraquat poisoning were studied. Total of 35 patients were admitted with Paraquat poisoning. Among them 29 were males and 5 were females, aged between 19 years to 70 years. 24 patients expired, 5 of them left against medical advice, 6 patients survived and were discharged home. This case series describes the clinical details of those survivors.

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CASE 1

A male patient of 24 years age presented with history of consuming Paraquat of about 20 ml. Asymptomatic at presentation. Gastric lavage was done within 3 hours of poison ingestion. On examination there were no oral lesions and other abnormal findings. Blood biochemistry showed a serum creatinine of 1.2 mg/dl at admission and it increased to 2.4 mg/dl at 48hrs of admission. Following a Hemodialysis serum creatinine improved to 0.8mg/dl (72hrs) after admission. Treatment given included Methyl Prednisolone (for 5 Days), N Acetyl Cysteine, Vitamin C. Duration of stay was for 8 days. On follow up at 3 weeks he was asymptomatic and all biochemical parameters within normal range.

CASE 2

A female patient aged 23 years presented to emergency department after consuming Paraquat of 10-15 ml. At presentation there was burning of mouth with erythematous oral mucosa. Gastric lavage was performed within one hour of ingestion of paraquat. Biochemical reports showed serum creatinine / B. Urea- 2.2/57mg/dl (Day 1 of admission) and 3.3/69(Day 2 of admission). She underwent Hemodialysis once. Reports showed serum creatinine/ B. Urea -0.9/22 mgldl. Other investigations were within normal range. The treatment given included Methyl Prednisolone (5days), N Acetyl Cysteine, Vitamin C and other supportive therapy. She was discharged after a hospital stay of 15 days.

CASE 3

A male patient of 35 years with history consuming Paraquat of about 20 ml with history of immediate induced vomiting. Symptoms at presentation were hiccoughs and oral mucosal lesions. He was a known Diabetic patient using Metformin. His abnormal biochemistry were SGOT/SGPT-139/147 IU/L (2^{nd} day), which improved to 28/19 IU/L (8^{th} day) with conservative management with Methyl Prednisolone, N Acetyl Cysteine, Vitamin C as supportive therapy. Blood sugars were monitored and controlled with Insulin. Ultrasonography of the abdomen was normal. Other investigations were normal. He was discharged after stay of 12 days.

CASE 4:

A male patient of 45 years with history consuming Paraquat of about 20-30ml presented with oral erythema, lesions and redness of eyes. Gastric lavage was performed within 3 hours of ingestion of paraquat. All investigations were normal at presentation and on serial follow up. Treatment given was Methyl Prednisolone (5days), N Acetyl Cysteine, Vitamin C and other supportive therapy. He was discharged after stay of 9 days.

CASE 5:

A male patient of 43 years was brought with history consuming Paraquat of unknown quantity mixed with alcohol in altered sensorium. Gastric lavage was done within 3 hours of ingestion of paraquat. All the blood investigations, CT brain were normal. Treatment given was Methyl Prednisolone (5days), N Acetyl Cysteine, Vitamin C, Thiamine and other supportive therapy. Sensorium improved to normal in 48 hours. Serial follow up investigations didn't show any organ failure. He was discharged after stay of 8 days.

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CASE 6:

A male patient of 20 years age presented with history consuming Paraquat of about 250ml and induced vomitings at home. Gastric lavage was performed with in 15minutes.He had erythematous oral cavity. Treatment given was Methyl Prednisolone (5days), N Acetyl Cysteine, Vitamin C and other supportive therapy. Hemodialysis performed once. The follow up investigations were normal. He developed diffuse, multiple ulcerations of oral cavity, which were treated symptomatically. He was discharged after stay of 14 days.

Summary of Case details:

S.no	Sex	Age (years)	Quantity (ml)	Symptoms	Emesis within_hours	Complications	Length of stay (days)
1	M	21	20ml	Nil	3hrs	AKI- HD once	8
2	F	23	10-15ml	Oropharyngeal erythema	1hr	AKI- HD once	15
3	M	35	20ml	Oral ulcers, Hiccoughs, Associated DM	30mts	ALI- resolved	12
4	M	45	20-30ml	Oropharyngeal erythema, ulcerations	3hrs	-NIL	9
5	M	43	Unknown ml+ Alcohol	Altered sensorium	3hrs	-NIL	8
6	M	20	250ml	Vomitings, Oropharyngeal ulcerations	15 mts	AKI- HD once	14

M-Male: F-Female:: AKI-Acute Kidney Injury, ALI-Acute Liver Injury, HD-Hemodialysis

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Discussion

Paraquat is an oxidant that interferes with electron transfer, a process that is common to all life forms. It will undergo redox cycling in vivo to produce superoxide, a major reactive oxygen species (6) that induces tissue necrosis.

Toxicity

Pure paraquat is toxic to mammals, including humans. It is toxic to humans (Category II) by the oral route, moderately toxic (Category III) through the skin, when inhaled and is in the Toxicity Category I (the highest of four levels) for acute inhalation effect (7) , also causes moderate to severe irritation of the eye and skin. The severe inflammation is thought to be caused by the generation of highly reactive oxygen species and nitrite species that results in oxidative stress. The oxidative stress may result in mitochondrial toxicity and the induction of apoptosis and lipid peroxidation which may be responsible for the organ damage(8). Since bipyridyl salts are caustic, the gastrointestinal tract can be severely injured after ingestion of a concentrated solution(9). Death may occur up to 30 days after ingestion.

The main acute systemic effects are pulmonary edema, convulsions, cardiac, renal, and hepatic failure(10). It is available in a 20% solution form and that needs to be diluted before agricultural use. The LD50 in humans is approximately 35 mg/kg, which translates into as little as 10‑15 ml of a 20% solution.

There is no specific clinically proven antidote for paraquat poisoning. The benefits of avoiding free radical injury to lungs with vitamins C and E, pulse steroid therapy and Cyclophosphamide to prevent pulmonary fibrosis were not shown to be consistent(8).

In this scenario, restricted sales in diluted concentrations may help in limiting the complications. Besides, wide spread awareness about mental health issues and depression and early intervention are the need of the hour to prevent the suicides. More robust research is needed for treating the paraquat poisoning effectively and decrease its mortality and morbidity.

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