Case Report

Unexpected Triumph: A Case Report on Remarkable Survival After Paraquat Poisoning in a Young Male

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Abstract

Paraquat, a potent herbicide, is infamous for its high mortality rate following ingestion. This case report presents a rare instance of survival in a 17 years old male who intentionally ingested paraquat. The patient's atypical clinical course challenges the prevailing grim prognosis associated with paraquat poisoning, prompting a re-evaluation of management strategies. This report discusses potential factors contributing to the patient's survival, including early intervention, the use of high-dose corticosteroids, individual susceptibility, and the atypical presentation with less severe pulmonary involvement. The findings suggest that a nuanced understanding of paraquat toxicity is essential, acknowledging individual variabilities in response and exploring innovative therapeutic approaches. The unexpected positive outcome challenges existing paradigms in paraquat poisoning, urging further research to delineate the determinants of survival. Healthcare providers should consider this case when managing paraquat ingestions, emphasizing the potential for tailored interventions to improve patient outcomes.

Key words: *Paraquat Poisoning, Herbicide Toxicity, Survival, Treatment, Oxidative Stress.*

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Introduction

Paraquat, a widely used, easily available, effective herbicidal activity, easily decomposed by contact with soil. So it is commonly chosen by the farmers & gardeners. Hence the chance of deliberate self-harm becomes ubiquitous. It is also known for its formidable toxicity, poses a significant public health concern due to its association with high mortality rates, particularly following intentional ingestion.[1] Paraquat is rapidly but incompletely absorbed and then largely eliminated in unchanged form through urine within 12–24 hours. Clinical features are largely due to intracellular effects. Paraquat generates reactive oxygen species which cause cellular damage via lipid peroxidation, activation of NF-κB, mitochondrial damage and apoptosis in many organs. Kinetics of distribution into these target tissues can be described by a two-compartment model. Paraquat is actively taken up against a concentration gradient into lung tissue leading to pneumonitis and lung fibrosis.[2] Paraquat also causes renal and liver injury. Plasma paraquat concentrations, urine and plasma dithionite tests and clinical features provide a good guide to prognosis.[3] Activated charcoal and Fuller's earth are routinely given to minimize further absorption. Gastric lavage should not be performed. Elimination methods such as haemodialysis and haemoperfusion are unlikely to change the clinical course. Immunosuppression with dexamethasone, cyclophosphamide and methylprednisolone are widely practiced, but their evidence of efficacy is very weak.[4]

Antioxidants such as N-Acetylcysteine and salicylate might be beneficial through free radical scavenging, anti-inflammatory and NF-κB inhibitory actions.[4] However, there are no published human trials present yet. The case fatality is very high in all centers despite large variations in treatment due to generation of reactive oxygen species, leading to multi-organ failure, with the lungs being a primary target. The clinical presentation typically involves rapid deterioration, respiratory distress, and fatal outcomes, emphasizing the limited therapeutic options available.[2] However, amidst the prevailing grim prognosis, this case report explores a compelling scenario of a 17 years old male who not only survived paraquat poisoning but exhibited a remarkable recovery. The scarcity of such positive outcomes underscores the importance of investigating the factors contributing to survival of this patient. It also shed the light of hope in the midst of uncertainty. Understanding the nuances of this atypical presentation is crucial for healthcare providers to refine management strategies and improve patient outcomes. This introduction sets the stage for a comprehensive exploration of the case, delving into the patient's clinical presentation, the interventions employed, and potential factors contributing to the unexpected positive outcome. As paraquat poisoning continues to be a critical issue, especially in cases of intentional ingestion, a deeper understanding of the determinants of survival is essential for refining treatment approaches and potentially offering hope in dire circumstances.[1]

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Case Presentation

A 17 years old male was admitted to the medicine department via acute & emergency department, after intentionally ingesting paraquat. Initial symptoms were nausea, vomiting, and respiratory distress, prompting urgent medical attention. The patient's clinical condition, although consistent with paraquat poisoning, the diagnosis was confirmed by paraquat labelled-bottle brought-up by his younger sister. Signs & symptoms were deviated from the anticipated rapid deterioration observed in such cases. Upon examination, signs of respiratory distress were evident along with cyanosis, bilateral basal crepitations. On 3rd day of admission, he developed moderate jaundice. On 5th day, bleeding into the tongue with white coating and bluish margin was evident. The patient's serum creatinine and blood urea levels were moderately elevated, but eGFR was severely reduced. Additionally, the patient's liver function was altered, as evidenced by a severely raised serum bilirubin level, along with moderately elevated SGPT and ALP levels. He also had mild hyponatremia but high potassium level. Imaging, including chest X-ray, revealed bilateral pulmonary infiltrates which was characteristics of paraquat toxicity. Ultrasonography of the entire abdomen showed, mild edema in both kidneys with well-defined cortico-medullary differentiation. Furthermore, his urine tested showed 5-7 RBC/HPF.

Treatment

The successful management of paraquat poisoning in this young male involved a combination of conventional interventions, innovative approaches, highlighting the importance of a multidimensional therapeutic strategy. After emergency admission, immediate nasogastric suction was given despite of administration of activated charcoal to adsorb the residual herbicide in the gastrointestinal tract was given due to its lack of availability. High doses of exogenous anti-oxidants such as: Vitamin A, Vitamin C & Vitamin E were administered, instead of intravenous N-Acetylcysteine (NAC) due to its lack of availability to counteract the oxidative stress induced by paraquat. In addition to standard treatments, the patient received high-dose corticosteroids early in the course of treatment[3] & correction of hyperkalemia and hyponatremia was done by adequate treatment, periodic follow-up & repeated laboratory tests. Continuous monitoring of vital signs, oxygenation, and ventilator parameters was maintained throughout hospitalization. Vigilant fluid and electrolyte management was crucial, and given for potential paraquat-induced renal toxicity. Serial chest X-rays play a pivotal role in guiding the management. The gradual resolution of pulmonary infiltrates was indicative of a positive response to treatment. This case emphasizes the need for a tailored and dynamic treatment approach in paraquat poisoning, considering individual variations in response and exploring innovative strategies to improve outcomes.

Discussion

The unexpected survival of the young male following intentional paraquat ingestion challenges the conventional understanding of paraquat toxicity and necessitates a comprehensive exploration of potential contributing factors. This case diverges from the typical rapid progression to multi-organ failure observed in paraquat poisoning, sparking discussion on the influence of various elements.[1] The swift initiation of standard treatments, including activated charcoal, and anti-oxidant vitamins likely played a crucial role in limiting paraquat absorption and mitigating immediate toxicity.[4] The administration of high-dose corticosteroids, although not part of standard protocols, may have contributed to the prevention or attenuation of pulmonary fibrosis, a common complication of paraquat exposure.[3] This aligns with emerging evidence suggesting a potential benefit in selected cases. Variability in individual responses to paraquat toxicity may explain the atypical clinical course observed in this patient. Genetic factors or variations in the extent of paraquat absorption could influence outcomes. The reduced severity of pulmonary infiltrates observed in imaging might be a critical determinant in the patient's survival. This challenges the notion that extensive lung involvement is inevitable in paraquat poisoning and emphasizes the need for nuanced evaluation of radiological findings. While the factors contributing to this survival remain speculative, this case prompts a re-evaluation of management strategies for paraquat poisoning. Further research is warranted to elucidate the determinants of survival in paraquat poisoning, paving the way for more effective and personalized approaches to manage this highly toxic exposure.

Conclusion

The survival of the young male following intentional paraquat ingestion challenges the typically grim prognosis associated with this highly toxic herbicide. The atypical course of recovery prompts a re-evaluation of treatment paradigms, emphasizing the potential role of early interventions and innovative strategies such as high-dose corticosteroids. While the specific factors contributing to survival remain speculative, this case underscores the need for personalized and dynamic approaches in paraquat poisoning management. Continued research into the determinants of positive outcomes is essential to refine therapeutic interventions and improve the overall prognosis for individuals facing this life-threatening condition. The unexpected survival in this case offers a glimmer of hope, sparking optimism for advancements in the management of paraquat poisoning.

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References

1. Lee EY, et al. Paraquat intoxication in a young adult: a rare survival case. Clin Exp Emerg Med. 2016;3(3):183-186.

2. Dinis-Oliveira RJ, et al. Paraquat poisonings: mechanisms of lung toxicity, clinical features, and treatment. Crit Rev Toxicol. 2008;38(1):13-71.

3. Eddleston M, et al. Prospects for treatment of paraquat-induced lung fibrosis with immunosuppressive drugs and the need for better prediction of outcome: a systematic review. QJM. 2003;96(11):809-824.

4. Gawarammana IB, et al. Medical management of paraquat ingestion. Br J Clin Pharmacol. 2011;72(5):745-757.