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"Toxic Threads: Unravelling The History, Clinical Impact, And Cutting-Edge Approaches To Paraquat Poisoning Diagnosis And Management – A Case Study Of Suicide Attempt And Toxicological Intervention"

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Abstract:

This case presents a 35-year-old man who ingested paraquat, a toxic herbicide, in a suicide attempt following the recent loss of a close family member. He presented with acute onset of nausea, vomiting, severe abdominal pain, shortness of breath, and worsening respiratory distress. Physical examination revealed signs of severe respiratory compromise, including cyanosis, labored breathing, and decreased breath sounds bilaterally. Laboratory results indicated kidney dysfunction, and imaging showed early signs of pulmonary edema. Paraquat poisoning was suspected based on these findings, and the patient is under close monitoring for respiratory failure, renal dysfunction, and multi-organ involvement. Management includes supportive care such as oxygen therapy, intravenous fluids, and consultation with a toxicologist for additional therapeutic guidance.

Keywords: Paraquat poisoning, suicide attempt, Acute respiratory distress**,** Pulmonary edema**,** Kidney dysfunction**,** toxicology**,** supportive care

Introduction:

Paraquat poisoning has been a significant issue since the herbicide's introduction in the 1960s. Widely used in agriculture to control weeds, paraquat is highly toxic, and even small amounts can be fatal if ingested, primarily affecting the lungs and other vital organs. Throughout the 1970s and 1980s, reports of paraquat poisoning, including accidental ingestion and suicides, raised alarms about its dangers. Over time, environmental and health concerns, particularly its link to Parkinson's disease, gained attention. In the 2000s, studies highlighted its neurotoxic effects, leading to increased regulation and bans in several countries, including the European Union, though it remains legal and widely used in some parts of the

world. The continued scrutiny of paraquat underscores its persistent risks to both human health and the environment.

Paraquat is known for its acute toxicity, where even small amounts, such as 1-2 teaspoons, can be fatal if ingested, primarily due to lung damage and respiratory failure, along with severe organ harm to the liver and kidneys. In the 1970s and 1980s, reports of poisoning became more frequent, typically involving accidental ingestion, suicides, or accidental exposure during application, raising concerns about its dangers. During the 1980s and 1990s, high-profile cases in agricultural communities, where workers were exposed to paraquat without proper protective gear, brought further attention to the chemical's risks. These exposures were linked to long-term health problems, particularly Parkinson's disease, due to its neurotoxic effects.

Case presentation:

The patient is a 35-year-old man with no significant medical comorbidities, including no history of hypertension or diabetes. He presents with acute onset of nausea, vomiting, and severe abdominal pain following the ingestion of a toxic substance. The patient reports that he consumed paraquat, a herbicide, in an attempt to end her life following the recent loss of a close family member. He describes feeling overwhelmed by grief and hopelessness after the death of his partner two weeks ago. Since the incident, he has experienced worsening shortness of breath and difficulty breathing, which prompted him to seek immediate medical attention. On physical examination, the patient is noted to be in severe respiratory distress, with labored breathing and cyanosis. The abdominal exam reveals mild tenderness, but there is no obvious peritonitis. Chest auscultation shows decreased breath sounds in both lung fields, and the patient’s oxygen saturation is critically low. Laboratory results reveal signs of kidney dysfunction, with elevated creatinine and BUN levels. Imaging studies confirm early signs of pulmonary edema. These findings are consistent with paraquat poisoning, and the patient is being closely monitored for respiratory failure, renal dysfunction, and multi-organ involvement. The treatment plan involves supportive care, including oxygen therapy and intravenous fluids, while consulting a toxicologist for further management options.

Diagnostic Workshop:

Paraquat poisoning can lead to a variety of clinical symptoms that manifest in different stages, depending on the timing of exposure and severity of the poisoning. Based on the patient's presentation and laboratory findings, here are the key clinical symptoms associated with paraquat poisoning:

1. **Acute Gastrointestinal Symptoms**:

- **Nausea and Vomiting**: The patient initially experienced acute nausea and vomiting following ingestion, which is a common early symptom of paraquat toxicity. Patient had a history of 8 episodes of vomiting in 4 hours and the vomit is exhibits in coffee grounded.
- **Abdominal Pain**: Mild tenderness in the abdomen was noted on physical examination.

2. **Respiratory Symptoms**:

- **Shortness of Breath**: The patient reported worsening shortness of breath, which is a hallmark of pulmonary toxicity due to paraquat. Ingestion of paraquat can cause severe damage to the lungs, leading to pulmonary edema, fibrosis, and respiratory failure.
- **Decreased Breath Sounds**: On chest auscultation, the decreased breath sounds in both lung fields are concerning for the development of pulmonary edema

3. **Renal Dysfunction**:

- **Elevated Creatinine and BUN**: Laboratory results showed elevated blood urea nitrogen (BUN) and creatinine levels, indicating kidney dysfunction. Paraquat toxicity can lead to renal failure due to the systemic distribution of the toxin and direct nephrotoxic effects.

4. **Systemic Symptoms of Toxicity**:

- **Severe Respiratory Distress**: This is a life-threatening feature of paraquat poisoning. It may be accompanied by symptoms of acute respiratory distress syndrome (ARDS), which can develop rapidly after paraquat ingestion.
- **Multi-Organ Involvement**: The clinical scenario suggests early signs of multi-organ involvement, particularly the lungs and kidneys. As paraquat is a potent toxin, it can cause progressive organ failure if not treated promptly and aggressively.

5. **Psychiatric Symptoms**:

- **Grief and Hopelessness**: The patient's recent loss of a close family member and feelings of grief and hopelessness likely contributed to the suicide attempt by paraquat ingestion. Depression and psychological distress can be significant factors in individuals who attempt self-harm through toxic substance ingestion.

Figure 1: patients exhibits the signs of oropharyngeal ulceration on tongue, buccal mucosa.

Chest ultrasound:

- **B-line Artifacts (or Lung Rockets)**: These are vertical artifacts seen in the lung fields due to interstitial edema and are a typical sign of **pulmonary edema**.
- **Consolidation**: Early signs of consolidation or **lung injury** may appear as **hypoechoic areas** on ultrasound, suggesting areas of tissue damage or fluid accumulation.
- **Pleural Effusion**: Severe pulmonary damage from paraquat poisoning may lead to pleural effusions (fluid accumulation in the pleural space), which can be seen on chest ultrasound. It appears as **anechoic (dark)** areas surrounding the lungs.

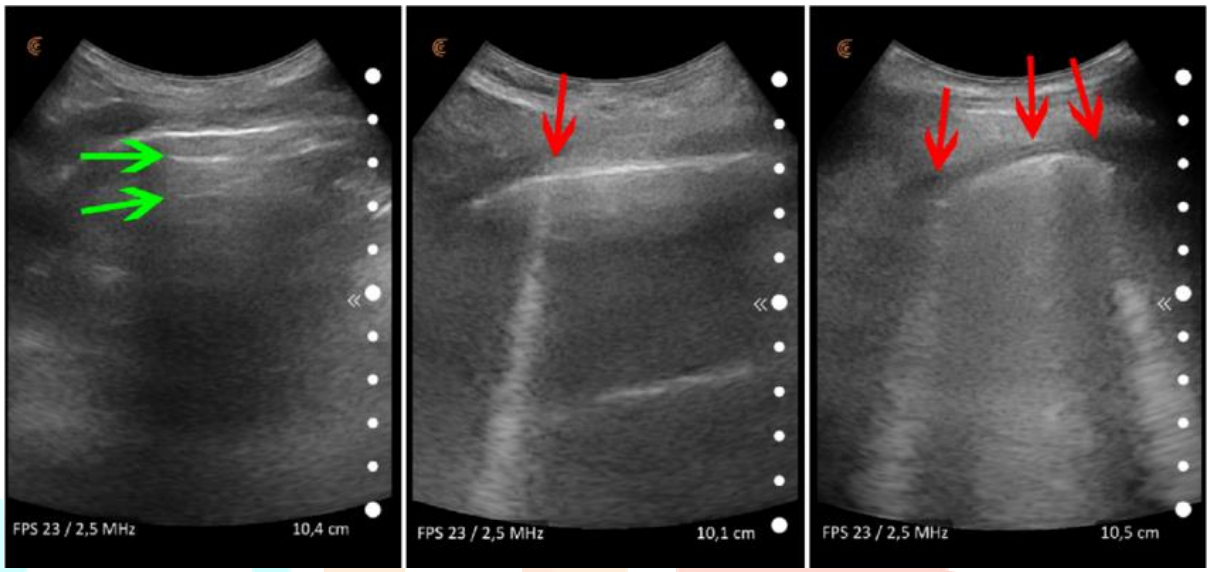

Figure 2: Acoustic artifacts in lung ultrasound: A-lines (horizontal artifacts indicated by the green arrows) are the reverberation of the pleural line and suggest that the lung is aerated. B-lines are vertical artifacts (indicated by the red arrows) that suggest a progressive decrease of lung aeration as the number of B-lines increases.

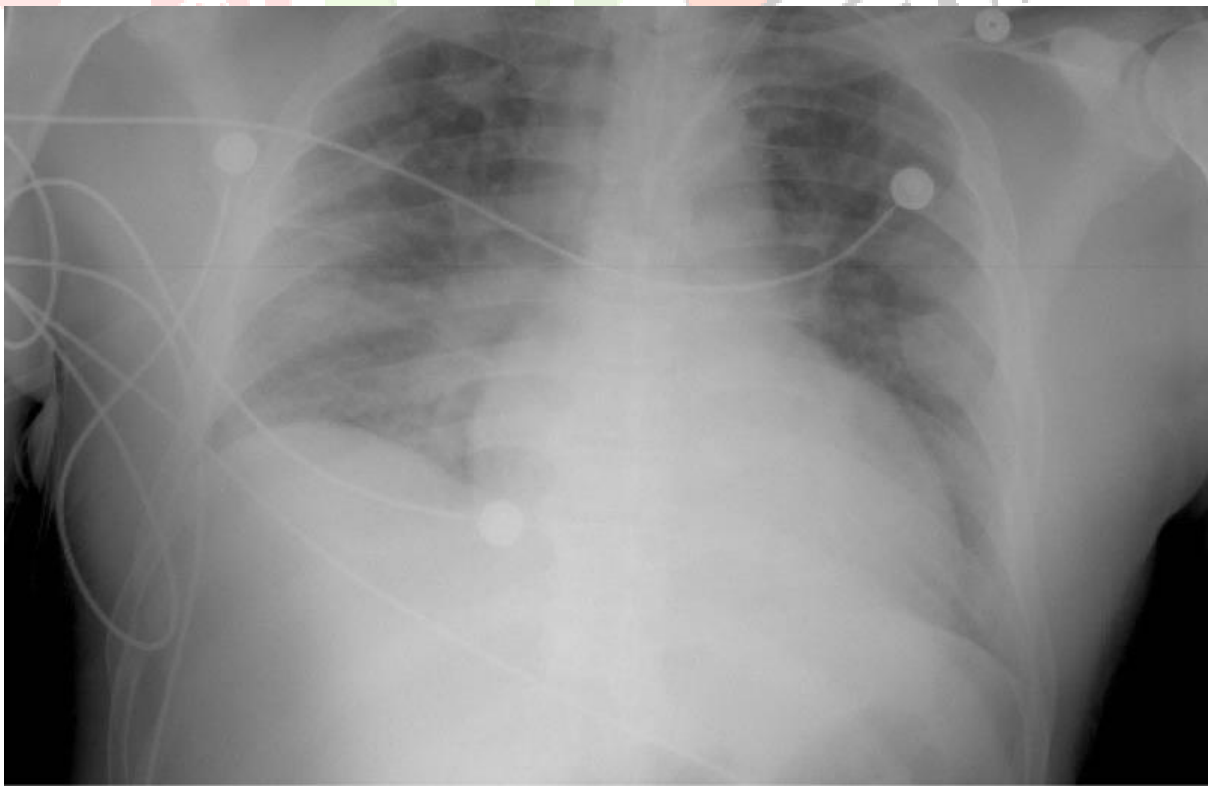

Figure 3: Shows that pulmonary edema

Electro Cardio Gram

In this the **ECG** may show various findings depending on the degree of toxicity, the patient's condition such as **respiratory distress**, **renal dysfunction**, and **electrolyte imbalances**, and complications that arise. The changes seen on an ECG are generally **secondary** to systemic effects, including **hypoxia**, **electrolyte disturbances**, and **cardiac stress**. Below are the possible **ECG findings** in a patient with paraquat poisoning:

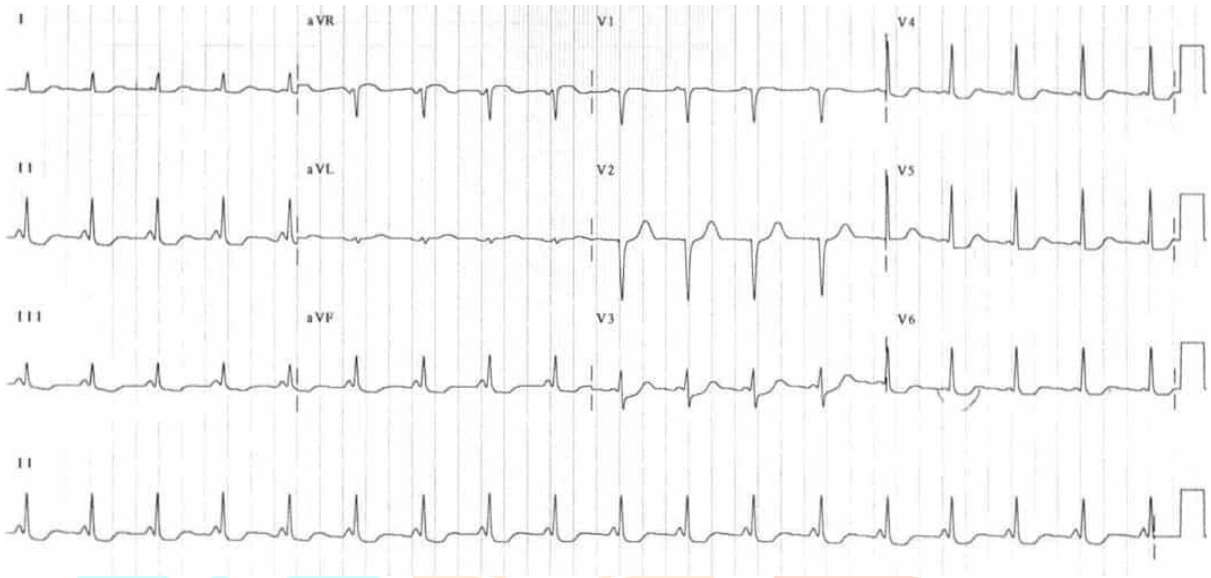

Figure 4: shows arrhythmia and prolonged QR interval

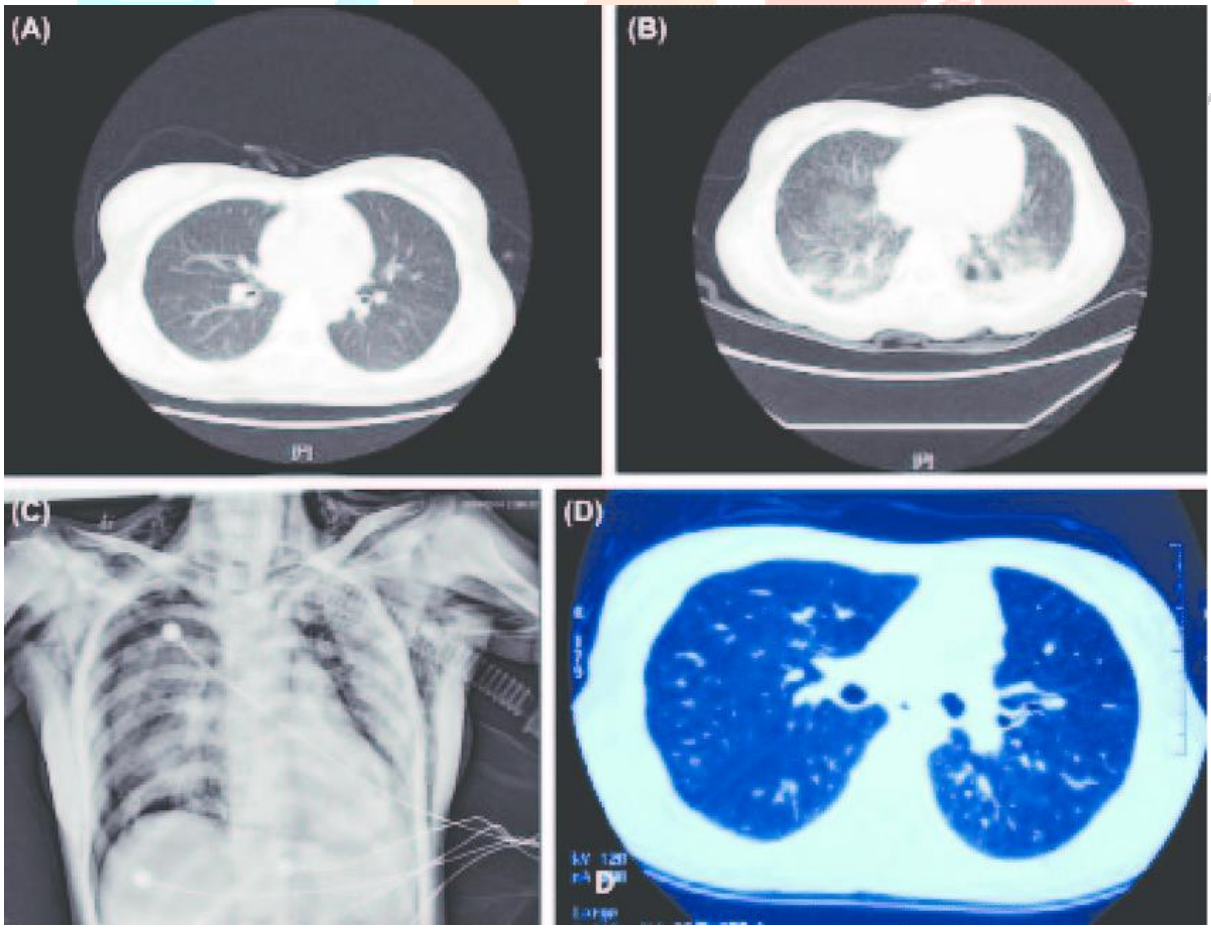

Figure 5: Imaging (A) The 5th day after paraquat poisoning: increased interstitial markings in bilateral lungs. (B) The 21th day after paraquat poisoning: multiple exudations in bilateral lungs, with an expansion of the pulmonary consolidation. (C) The 34th day after paraquat poisoning: pneumothorax of both lungs. (D) HRCT at the 1-year follow-up after lung transplantation.

Figure 6: HRCT shows pneumonitis

Abdominal Ultrasound (USG):

- **Mild Tenderness on Palpation**: The patient may show mild abdominal tenderness, but USG typically shows **non-specific** findings. There may be no obvious
- **Renal Abnormalities**: If the patient has developed **renal dysfunction** (which is common in paraquat poisoning), there may be signs of **acute kidney injury (AKI)** on ultrasound, such as:
- **Enlarged Kidneys**: The kidneys may appear enlarged due to **edema** or **inflammatory changes** in the renal tissue.
- **Hyperechoic Renal Cortex**: This can suggest **acute tubular necrosis (ATN)** or early renal injury.
- **Decreased Renal Cortical Medullary Differentiation**: In severe renal dysfunction, the medullary region of the kidneys may be less distinct from the cortical region, indicating impaired kidney function.
- **Fluid Collections**: If the paraquat ingestion is severe, abdominal USG might reveal fluid collections, but this is more commonly associated with secondary complications like **gastrointestinal perforation**, which is less likely in paraquat toxicit

Management:

The management of **paraquat poisoning** is **complex** and requires prompt, aggressive, and multidisciplinary care. There is no **antidote** for paraquat, and treatment focuses on **supportive care** and preventing **progressive organ damage**. Below is the general procedure for managing paraquat poisoning:

1. Initial Assessment

- **Airway, Breathing, Circulation (ABC)**: Prioritize stabilizing the patient's **airway**, **breathing**, and **circulation**. Administer **oxygen** if the patient is hypoxic, and consider **intubation** and **mechanical ventilation** in cases of severe respiratory distress.
- **Toxicological History**: Confirm the ingestion of paraquat, including the amount ingested, time of ingestion, and any pre-existing medical conditions (e.g., renal or cardiovascular disease).

2. Decontamination (If Within 1 Hour of Ingestion)

- **Gastric Decontamination**: **Activated Charcoal**: If ingestion occurred within the last hour and the patient is **conscious and alert**, **activated charcoal** (1g/kg body weight) may be given to limit further absorption. However, its use is debated and may not be very effective for **paraquat**, as it binds poorly to paraquat.

Procedure

An adsorbent of 1 gm/kg was administered, and the patient was discharged from a local hospital after six days. He has had a fever and cough since then, but no shortness of breath, orthopnea, chest, or stomach pain. She w as transported to our hospital one week later, at 21.00 hourHis oxygen saturation on room air was 40%, her pulse rate was 78 beats per minute, his respiratory rate was 28 beats per minute, and blood pressure was 100/6 0 mmHg. The respiratory examination revealed bilateral crepitation. Patient was given O2 via 60% venturi, an d hissaturation increased to 95%.Laboratory testing revealed leukocytosis, neutrophilia, increased ESR, and m etabolic acidosis, with normal renal and liver function. He was transferred to the intensive care unit (ICU) on t he second day due to increased respiratory distress. Empirical antibiotic therapy began with 4.5 gm of piperac illintazobactam administered intravenously and was continued every 8 hours. Vitamin E and C were administe red as antioxidant treatment on the same day. N Acetyl cysteine 600 mg, a detoxifying agent, was administ ered orally three times per day beginning on the second day.On the third day, He was intubated and placed on a mechanical ventilator due to her persistent hypoxia. Midazolam and Morphine were started on the same d ay and continued for one week. He was treated with oral cyclophosphamide 50 mg once daily from the third to the twelfth day, and the steroid dexamethasone 4 mg i.v. 6 hourly began on the sixth day and was discontinue d after one week. He was treated with linezolid and piperacillintazobactam after developing ventilatorassociate d pneumonia (VAP). Piperacillintazobactam was replaced with cefoperazonesulbactum based on the culture an d sensitivity of endotracheal aspirate, which yielded Klebsiella pneumoniae and Acinetobacter species

3. Supportive Care

- **Oxygen Therapy**: Provide **high-flow oxygen** to ensure adequate oxygenation. In cases of severe respiratory distress or **acute respiratory failure** (due to pulmonary edema or ARDS), **mechanical ventilation** may be necessary.
- **Fluid Management**: Administer **intravenous fluids** to maintain blood pressure, correct dehydration, and support kidney function. Caution is required to avoid **fluid overload**, which can worsen pulmonary edema.
- **Cardiac Monitoring**: Given the risk of **arrhythmias** (e.g., tachycardia, bradycardia, or even ventricular arrhythmias), continuous **ECG monitoring** is necessary to manage electrolyte disturbances and detect any life-threatening arrhythmias.

4. Specific Treatments for Organ Support

Pulmonary Care:

- **Mechanical Ventilation**: In severe cases of pulmonary edema or ARDS, **intubation** and **mechanical ventilation** may be required.
- **Positive Pressure Ventilation**: This may help improve oxygenation, but care must be taken to avoid **barotrauma** and further damage to the lungs.
- **Diuretics**: Diuretics like **furosemide** may be used cautiously in the presence of **pulmonary edema**, but only under careful monitoring of fluid balance and renal function.
- **Renal Support**:
- **Renal Dysfunction**: If the patient develops acute kidney injury (AKI), which is common in paraquat poisoning, manage with **intravenous fluids** and **electrolyte correction**.
- **Dialysis**: **Hemodialysis** or **peritoneal dialysis** may be considered if there is **severe renal failure**. Dialysis is controversial in paraquat poisoning but may help in cases of severe toxicity with **life-threatening complications**.

5. Monitoring and Symptom Management

- **Close Monitoring**: Monitor the patient closely for the development of **pulmonary edema**, **respiratory failure**, **renal failure**, and **cardiac arrhythmias**.
- **Serial Chest X-rays**: Monitor for the development of **pulmonary edema** and **pleural effusions**.
- **Electrolyte Management**: Regularly check **serum electrolytes** (e.g., potassium, calcium, and magnesium) to prevent or treat any **electrolyte disturbances**.

- **Renal Monitoring**: Regular monitoring of **renal function** (creatinine, BUN) and **urine output** is necessary to assess for the development of **renal failure**.

6. Psychiatric Support

- Since the ingestion was **suicidal**, it is essential to **assess and treat** the patient's **psychiatric condition** after the acute crisis. Consultation with a **psychiatrist** or **psychologist** is necessary for **mental health support** and **suicide prevention**.

Post care:

Post-care management for paraquat poisoning focuses on monitoring and supporting the patient's recovery from acute organ damage, particularly pulmonary, renal, and cardiac complications. Ongoing respiratory monitoring is crucial, as patients may experience persistent pulmonary edema or fibrosis, requiring long-term oxygen therapy and pulmonary rehabilitation. Renal function should be regularly assessed, with close monitoring for chronic kidney disease and potential dialysis needs. Cardiac care is necessary if arrhythmias or myocardial damage occur, and electrolyte levels must be corrected. Psychiatric support is essential, given the suicidal nature of the poisoning, involving mental health assessments and therapy to address grief, depression, and prevent future suicide attempts. Nutritional support, including enteral or parenteral nutrition, helps prevent malnutrition, especially in patients who have been critically ill. Long-term follow-up with pulmonologists, nephrologists, and cardiologists is important to manage any chronic effects. Education and counseling for both the patient and family are vital for mental health recovery, lifestyle adjustments, and adherence to follow-up care.

Discussion :

Paraquat poisoning remains a serious medical emergency due to its high toxicity and lack of a specific antidote. It primarily affects the **lungs**, **kidneys**, and **heart**, leading to potentially **life-threatening** complications, including **pulmonary edema**, **acute kidney injury (AKI)**, and **arrhythmias**. The initial management revolves around **rapid stabilization**, decontamination, and supportive care, with **oxygen therapy**, **mechanical ventilation** (if required), and **intravenous fluids** playing central roles in stabilizing the patient.

One of the most challenging aspects of paraquat poisoning is the **pulmonary damage**, which often progresses to **acute respiratory distress syndrome (ARDS)** and **pulmonary fibrosis**. Despite supportive measures, patients may face **long-term respiratory complications** that require continued oxygen therapy and rehabilitation. The management of **renal dysfunction** is also critical, as paraquat-induced **nephrotoxicity** can rapidly lead to **renal failure**. **Dialysis** may be considered in cases of severe renal damage, but its benefit remains debated. The **cardiovascular complications**, particularly **arrhythmias**, often arise due to **electrolyte disturbances** (such as **hyperkalemia**) and require careful monitoring and correction.

In the **post-care phase**, the emphasis shifts to preventing further organ damage and managing any long-term sequelae. **Pulmonary rehabilitation** is vital for patients who develop chronic pulmonary issues like **fibrosis** or **COPD**, with regular follow-up chest X-rays and **pulmonary function tests** to assess lung recovery. **Renal follow-up** is essential for patients who experience **chronic kidney disease**, with the goal of preventing further deterioration and managing potential dialysis needs. **Cardiac monitoring** should continue, especially in cases where arrhythmias were present during the acute phase.

The **psychiatric aspect** of care is crucial, given that the poisoning was **suicidal** in nature. Comprehensive **mental health support**, including **psychotherapy** and medication for **depression** or **grief**, is necessary to address the **underlying psychological trauma**. Providing **emotional support** for both the patient and family members is integral to recovery, as **grief** and **mental health crises** can exacerbate physical health complications and relapse into suicidal ideation.

Finally, post-care education and **family counseling** play a central role in the long-term management of paraquat poisoning. This includes educating the patient and family about the **chronic effects of poisoning**, the importance of **adherence to follow-up care**, and ensuring that the patient has a **strong support network** to prevent future mental health crises.

Conclusion:

In conclusion, the management of paraquat poisoning requires a multi-faceted approach that combines **immediate toxicological intervention**, **acute medical care**, and **long-term monitoring** to address the **organ-specific damage** and the **psychosocial aspects** of recovery. Early intervention, combined with continuous post-care support, can significantly improve patient outcomes and reduce the long-term impact of this devastating poisoning.

1) Kim, Jin-Won, and Do-Soon Kim. "Paraquat: Toxicology and Impacts of Its Ban on Human Health and Agriculture." *Weed Science*, vol. 68, no. 3, May 2020, pp. 208–13. *Cambridge University Press*, https://doi.org/10.1017/wsc.2019.70.
2) Delirrad, Mohammad, et al. "Clinical Features and Prognosis of Paraquat Poisoning: A Review of 41 Cases." *International Journal of Clinical and Experimental Medicine*, vol. 8, no. 5, May 2015, pp. 8122–28. *PubMed* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4509324/.
3) Ravichandran, R., et al. "Paraquat Poisoning: A Retrospective Study of 55 Patients From a Tertiary Care Center in Southern India." *Indian Journal of Critical Care Medicine : Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine*, vol. 24, no. 3, Mar. 2020, pp. 155–59. *PubMed Central*, https://doi.org/10.5005/jp-journals-10071-23369.
4) Dambal, Archana, et al. "Reasons for Under-Reporting of Paraquat Poisoning in India." *The National Medical Journal of India*, vol. 34, no. 3, 2021, pp. 138–42. *PubMed*, https://doi.org/10.25259/NMJI_383_19.