

# The Role of Abdominal CT in the Assessment of the Effectiveness of Gastric Lavage after Pesticide Poisoning

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## Abstract

Pesticide poisoning is one of the most common diseases in the emergency department, characterized by rapid changes in condition, a high misdiagnosis rate, and a poor prognosis. Measures for early removal of poisons are crucial, and gastric lavage is one of the important measures. Regarding the post-gastric lavage effect, abdominal CT scanning has an important application value in the assessment of the gastric lavage effect after pesticide poisoning.

## Keywords

Abdominal CT, Gastric Lavage, Pesticide Poisoning, Assessment

## 1. Introduction

Pesticides are mixtures and preparations of one or more substances, chemically synthesized or derived from biological or other natural substances, that are used to prevent, eliminate, or control substances harmful to agriculture, diseases, insects, grasses, and other harmful organisms in forestry, as well as to regulate the targeting of plants and the growth of insects [1]. The following are some examples of the types of products that can be used in this area: In the context of global warming, pests and diseases are expanding, and the use of pesticides in production is increasing [2]. China is the world's largest producer of pesticides [3]. There are many kinds of pesticides, according to the use, which can be divided into insecticides, acaricides, rodenticides, nematocides, molluscicides, fungicides, herbicides, and plant growth regulators, etc., according to the chemical structure of the different compounds which can be divided into organophosphorus, organochlorine, organonitrogen, organosulfur, and organometallic compounds class

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[4]. According to their different chemical structures, they can be divided into organophosphorus, organochlorine, organonitrogen, organosulfur, and organometallic compounds. Among them, there are six major categories of pesticides that are easy to cause poisoning, which are organophosphorus, carbamates, organochlorine, pyrethroids, herbicides, and rodenticides [5]. The most common is acute organophosphorus pesticide poisoning. The most common cause of acute organophosphorus pesticide poisoning is acute paraquat poisoning [6]. The most common is acute organophosphorus pesticide poisoning, acute paraquat poisoning and according to research data, the prevalence of organophosphorus pesticide poisoning (AOPP) in China accounts for about 20% to 50% of the total number of cases of poisoning, and the morbidity and mortality rate is between 3% and 40% [7]. The death rate is between 3% and 40%. Globally, about 110,000 people die from AOPP poisoning every year [8]. The number of AOPP in China is more than 10,000 per year. China's annual AOPP kills more than 100,000 people [9]. The number of organophosphorus poisonings in China is more than 100,000 per year. After using paraquat (PQ) poisoning, there is still a lack of effective antidotes, and the mortality rate of the disease reaches 50% - 70% [10]. The mortality rate of the disease is 50% - 70%. Acute pesticide poisoning refers to pesticides entering the human body in a short period of time, resulting in poisoning. The cause may be accidental, man-made, or accidental [11]. The reason may be accidental, man-made, or accidental. Acute pesticide poisoning is one of the very common poisonings in the emergency department. Most of the patients are poisoned by oral pesticide. The disease is serious and develops rapidly, easily leading to respiratory, circulatory, multi-organ failure, and other serious complications, and has a high mortality rate. The peak period of death after poisoning is within 24 hours after taking the medicine [12]. It is characterized by rapid changes in disease, a high misdiagnosis rate, and poor prognosis [13]. The disease is characterized by rapid changes in condition, a high misdiagnosis rate, and a poor prognosis.

Currently, clinical approaches to treating patients with acute drug and pesticide poisoning include the use of diaphoresis and gastric lavage [14]. The treatment of acute drug and pesticide poisoning mainly includes the use of diarrhea and stomach washing. For poisoning caused by oral intake, rapid removal of toxic residues in the stomach and intestines is an important step in treatment, and gastric lavage can effectively remove toxic substances absorbed through the digestive tract [15]. Gastric lavage can effectively remove toxic substances absorbed through the digestive tract. In recent years, abdominal CT imaging, as a non-invasive, high-resolution imaging method, has been used to evaluate the effects of gastric lavage after poisoning.

## **2. Characteristics of Gastric Lavage Treatment after Pesticide Poisoning**

Gastric lavage is a common therapeutic operation in the emergency department, and it is the most direct and preferred life-saving measure to prevent further ab-

sorption of poison. This is one of the most widely used and effective methods in the clinic, and it can minimize the absorption of poison during the treatment process to achieve the therapeutic purpose. According to the research results, acute poisoning patients can reduce the death rate by gastric lavage, and it is recommended that poisoned patients undergo gastric lavage as early as possible. Generally, the gastric emptying time is prolonged after taking poison, so gastric lavage should be carried out as soon as possible within 6 hours after taking poison [16] [17]. The gastric emptying time is normally prolonged after taking poison, so gastric lavage should be performed as soon as possible within 6 hours after taking poison. The toxins still cause persistent harm to organs and tissues during gastric lavage treatment, and that gastric lavage is not able to flush out toxic substances that have accumulated in the blood circulation system [18]. The gastric lavage procedure is performed by placing the toxins in the bloodstream. During gastric lavage, the stomach is entered by inserting a gastric tube into the patient's mouth or nasal cavity, and after suctioning out the toxins, a pre-prepared gastric solution is injected to rinse and dilute the stomach contents in order to completely remove the toxins from the stomach [19]. The gastric contents are then rinsed and diluted to completely remove the poison from the stomach. The effect of gastric lavage is closely related to the degree of cooperation of the patient, and some patients cannot tolerate the discomfort of gastric intubation and lavage due to their poor psychological state, which leads to non-cooperation, thus affecting the therapeutic effect [20]. The effect of gastric lavage is related to the degree of patient cooperation. Some patients may face difficulties in performing gastric tube placement, which can lead to increased blood pressure and heart rate, fluctuations in vital signs, and the development of laryngeal edema [21]. According to 69 publications summarized between 2003-01 and 2011-03, AACT and EAPCCT state that gastric lavage may lead to serious complications such as hypoxia, cardiac arrhythmia, laryngospasm, gastrointestinal perforation, fluid and electrolyte abnormalities, aspiration pneumonia, and others [21]. In some patients, there are places where the gastric lavage solution cannot reach, and a single gastric lavage is not sufficient for complete removal of the toxin; however, repeated gastric lavage can result in a poor experience for the patient and a high rate of complications, which is detrimental to prognosis [22]. The complication rate is high, which is not favorable to the prognosis.

### **3. Characteristics of Gastroscopy for Assessing the Effectiveness of Gastric Lavage after Pesticide Poisoning**

The condition of the patient's stomach can be observed in detail through gastroscopy, and the duodenum and complex gastric structures can also be accurately observed. However, after poisoning, some patients may have mental agitation and restlessness; therefore, even after anesthesia intervention, the patient's discomfort caused by the insertion of the gastroscope is still obvious, resulting in relatively poor patient compliance. At this time, the operation is more difficult

to implement smoothly, and at the same time, if there is a situation of food residue in the patient's stomach, it will interfere with the field of view of the gastroscope, and at this time, it is not possible to show the effect of the operation of the gastroscope very well [23]. Gastroscopy is more effective than CT. Compared with CT, gastroscopy has disadvantages in evaluating the effect of gastric lavage, such as its high cost, cumbersome implementation, high degree of patient cooperation, and many complications.

#### **4. CT Principle and Characteristics**

CT, that is, electronic computed tomography scanning. The principle of CT is to scan various parts of the human body through X-ray, and finally convert the scanning information into digital signals, which are transmitted to the computer for display. Then, through the steps of relevant data fluctuation, data transmission, data processing, data display and three-dimensional imaging, the two-dimensional image is converted into three-dimensional image, which has a high-resolution cross-section image. And has the advantages of fast imaging, non-invasive. CT has obvious limitations because it is based on the X-ray imaging principle and involves ionizing radiation, which can cause unquantifiable damage to bone marrow hematopoiesis and individual organs [24] [25] [26]. CT has obvious limitations.

#### **5. Characterization of the Stomach in CT**

The size, shape, and position of the stomach are subject to variation by a number of factors. It is mainly determined by muscle tone and body shape. The size and shape of the surrounding organs are also influential factors. Various types of stomach present different morphologies on supine CT images. The size and morphology of the fundus of the stomach are greatly influenced by the surrounding organs. The tension and body shape of the stomach are more closely related to the morphological changes in the body and sinuses of the stomach. The stomach usually presents a transverse hooked morphology in the supine position, or it may be of other types, such as the transverse type. They present different features on CT images from the common gastric images, mainly a greater change in the morphology of the body sinus region [27]. According to the degree of filling in the stomach, the typing of the gastric wall can usually be divided into three types: 1) poorly dilated: gastric lumen atrophy, thick wall; 2) moderately dilated: gastric lumen dilated, gastric wall shows homogeneity, and the mucous membrane is flattened by injection of antispasmodic agents; 3) fully dilated: gastric lumen is significantly dilated, gastric wall is thin and homogeneous, and the mucous membrane is flattened [28]. The mucosa is flattened. Pesticide use may trigger acute erosive hemorrhagic gastritis, which is characterized by thickening of the gastric wall in a uniform and regular position and edema of the gastric wall, leading to narrowing of the gastric lumen [29]. As can be seen, the stomach is more characterized in CT.

## 6. CT Scan of the Abdomen and Its Role in the Assessment of the Thoroughness of Gastric Lavage

A case report from a CT manifestation of the upper gastrointestinal tract after dichlorvos poisoning showed a high-density shadow of the gastric lumen and its dichlorvos chemical nature of high density; water solubility is small; and it is difficult to be diluted and dispersed by gastric juices when taken orally to the stomach, thus aggregating in the position of gravity, which in turn causes slowing of gastric peristalsis and gastric injury [30]. Another case report showed that organophosphates were not effective in reducing the risk of gastric injury. Another case report showed that organophosphorus pesticides in the gastrointestinal cavity had a large number of high-density shadow [31]. The results of another case report showed a large number of hyperdense shadows of organophosphorus pesticides in the gastrointestinal cavity. There are fewer cases of abdominal CT imaging characteristics of pesticides in the stomach, which need to be continued in the clinical process. Moreover, various types of pesticides have different chemical properties, and there is no relevant literature report on the characteristics of fusion with gastric lavage, but abdominal CT scanning can provide high-resolution abdominal structural images, which can help to observe the condition of the stomach wall, the intestinal wall, and the presence or absence of pesticide residues that have not been removed. In addition, CT scans can check for other complications, such as intestinal obstruction or perforation. These complications may affect the patient's recovery process or even be life-threatening. With an abdominal CT scan, the doctor can detect and manage these complications in time to ensure the safety of the patient.

## 7. Wrap-Up

In summary, abdominal CT scanning has important application value in the assessment of the effect of gastric lavage after pesticide poisoning. It can help doctors accurately assess the effect of gastric lavage, find and deal with complications in time, guide subsequent treatment, and monitor the recovery process of patients. Through the application of abdominal CT scanning, the treatment effect and survival rate of pesticide-poisoning patients can be improved. However, according to China's national conditions and medical situation, in most of the hospitals in the country, patients go to the emergency room for treatment after the cost of all by the patients themselves, so many times the CT examination may have an impact on the patient's own economic situation. And radiation can cause some damage to the human body.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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