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# Analysis of Clinical Limitations of Plain Abdominal CT scan in Diagnosing Gastrointestinal Diseases in Primary Medical Institutions

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**Abstract:** *Objective:* To explore the application value and limitations of abdominal CT scans in the clinical diagnosis of gastrointestinal diseases in primary medical institutions. *Methods:* 2,300 patients who underwent abdominal CT scans in our hospital in 2025 were selected as the research subjects, and the preliminary diagnostic results of CT scans of all patients were counted. Then, the comprehensive clinical diagnosis results were used as the gold standard to analyze the accuracy, misdiagnosis rate and missed diagnosis rate of abdominal CT scans in diagnosing gastrointestinal diseases. *Results:* A total of 1,682 cases of various gastrointestinal diseases were detected by abdominal CT scans in 2,300 patients, and 618 patients had normal imaging findings. Based on the clinical comprehensive diagnosis results, the overall accuracy of abdominal CT scans in diagnosing gastrointestinal diseases was 74.32%, the missed diagnosis rate was 18.55%, and the misdiagnosis rate was 7.13%. *Conclusion:* Abdominal CT scans in primary medical institutions have basic diagnostic value for moderate to severe organic gastrointestinal lesions. However, affected by examination methods, equipment conditions and lesion characteristics, there are obvious limitations in clinical application and cannot fully meet the needs for precise diagnosis of gastrointestinal diseases.

**Keywords:** Primary medical institutions; Abdominal CT scan; Gastrointestinal diseases; Diagnostic limitations; Clinical application

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## 1. Introduction

Gastrointestinal diseases are clinically high-risk digestive system diseases. The types of lesions include inflammation, ulcers, polyps, tumors, and functional lesions. The clinical symptoms of various lesions are highly overlapping. Accurate diagnosis cannot be achieved simply by relying on patient symptoms and physical examination. Imaging examination is the core auxiliary method for the screening and diagnosis of gastrointestinal diseases. Abdominal CT examination has become a common method for screening

abdominal lesions in primary medical institutions due to its convenient operation, fast scanning speed, and wide application range [1]. Primary medical institutions are responsible for the core work of basic diagnosis and treatment, preliminary disease screening, and referral and triage for residents within their jurisdiction. Abdominal CT scan is a non-invasive examination method that can visually display the shape, structure and abnormal lesions of abdominal organs, and plays a basic role in the preliminary screening of gastrointestinal diseases [2]. However, the configuration of imaging examination equipment in primary medical institutions is limited. In clinical practice, simple abdominal CT scan mode is mostly used, and the number of enhanced CT examinations is very small. At the same time, most examinations focus on upper abdominal scans, and scan coverage of the middle and lower abdomen is insufficient. Such objective conditions will directly affect the diagnostic effect of gastrointestinal diseases [3]. At this stage, most clinical research focuses on the diagnostic value of precise examinations such as enhanced CT and gastrointestinal endoscopy in large hospitals. There is little specific analysis on the diagnosis of gastrointestinal diseases using plain abdominal CT scans in primary medical institutions, and there is a lack of systematic summary of the advantages and shortcomings of its clinical application. This study selected the clinical examination data of 2,300 patients with abdominal CT scans in our hospital in 2025, statistically analyzed the diagnostic results and analyzed the diagnostic accuracy, in order to explore the clinical advantages and limitations of abdominal CT scans in the diagnosis of gastrointestinal diseases in primary medical institutions.

## 2. Materials and methods

### 2.1. General information

2,300 patients who underwent abdominal CT scans admitted to our hospital in 2025 were selected as the research subjects. The patients were aged 18 to 82 years old, with an average age of (49.63 ± 10.25) years. There were 1,216 males and 1,084 females.

### 2.2. Method

All enrolled patients underwent abdominal plain scan using our hospital's 40-slice spiral CT equipment. Before the examination, the patients were informed to remove metallic foreign bodies in the abdomen and keep fasting for 4 to 6 hours. The patients were instructed to take a supine position. The scanning parameters were set to 120 kV tube voltage, 200 to 250 mA tube current, 1mm layer thickness, and 1mm layer spacing. The scanning range is determined based on the patient's clinical symptoms. Most patients complete a full upper abdominal scan, while a few patients only receive a partial scan of the middle and lower abdomen. All scanned images were independently reviewed and diagnosed by five experienced imaging physicians in our hospital, who recorded the preliminary diagnostic results. In case of disagreement in diagnosis, the final CT diagnostic conclusion was reached through joint review and discussion. All patients subsequently completed a comprehensive clinical diagnosis based on gastroenteroscopy, laboratory examinations, clinical symptoms and follow-up results. The clinical comprehensive diagnosis results were used as the gold standard to compare and analyze the diagnostic effects of abdominal CT plain scans. The number of detected cases, missed diagnoses and misdiagnosed cases of various gastrointestinal diseases were counted, and the diagnostic accuracy, missed diagnosis rate and misdiagnosis rate were calculated. All patients in this study did not undergo complex imaging post-processing operations, and only relied on conventional plain scan images to complete diagnosis. Only 3 of the 2,300 patients throughout the year received enhanced CT

examinations, and less than 300 patients completed simple middle and lower abdominal scans.

### 2.3. Observation indicators

(1) Statistics of the diagnostic results of abdominal CT scans of 2,300 patients were carried out, and the number of detected cases of various gastrointestinal diseases and the number of normal imaging cases were classified and counted.

(2) Based on the clinical comprehensive diagnosis results as the standard, analyze the overall accuracy, missed diagnosis rate, misdiagnosis rate and diagnostic compliance of abdominal CT plain scan in diagnosing gastrointestinal diseases.

### 2.4. Statistical methods

Data were analyzed using SPSS22.0. Count data percentages are presented by row $\chi^2$ test. $p < 0.05$ represents significant difference.

## 3. Results

### 3.1. Distribution of diagnostic results of abdominal CT scans of patients

Abdominal CT scans were performed on 2,300 patients, and 1,682 cases of various gastrointestinal diseases were detected, and 618 cases had no abnormal imaging manifestations. The specific distribution of the number of detected cases of various diseases is shown in **Table 1**.

**Table 1.** Distribution of diagnostic results of abdominal CT scans of patients [n (%)]

| Lesion type | (n) | Proportion (%) |
|---|---|---|
| Chronic gastritis | 526 | 22.87 |
| Acute gastroenteritis | 318 | 13.83 |
| Gastric ulcer | 207 | 9.00 |
| Duodenal ulcer | 152 | 6.61 |
| Colon polyps | 124 | 5.39 |
| Intestinal obstruction | 89 | 3.87 |
| Flatulence | 106 | 4.61 |
| Gastrointestinal bleeding (suspected) | 78 | 3.39 |
| Gastrointestinal tumors (suspected) | 82 | 3.57 |
| No abnormal performance | 618 | 26.87 |
| Total | 2300 | 100.00 |

### 3.2. Analysis of diagnostic accuracy of abdominal CT scan

Taking the clinical comprehensive diagnosis results as the gold standard, among 2,300 patients, the CT plain scan diagnostic results were consistent with the clinical comprehensive diagnosis in 1,709 cases, 164 cases were misdiagnosed, and 427 cases were missed. The overall diagnostic accuracy rate was 74.32%, the misdiagnosis rate was 7.13%, and the missed diagnosis rate was 18.55%. (**Table 2**)

**Table 2.** Statistical results of diagnostic accuracy of abdominal CT plain scan [n (%)]

| Diagnostic indicators | n | Proportion (%) |
|---|---|---|
| Accurate diagnosis | 1709 | 74.32 |
| Misdiagnosis | 164 | 7.13 |
| Missed diagnosis | 427 | 18.55 |
| Total | 2300 | 100.00 |

## 4. Discussions

Digestive system and gastrointestinal diseases are one of the most common diseases seen in primary outpatient clinics. The disease classification is complex and the clinical symptoms are highly homogeneous. Typical symptoms such as abdominal pain, bloating, and diarrhea can appear simultaneously in inflammation, ulcers, hyperplasia, tumors, and functional lesions. It is difficult to achieve accurate diagnosis by relying solely on clinical consultation and physical examination, which will directly affect the quality of the preliminary diagnosis and treatment plan at the primary level. As a non-invasive and efficient auxiliary diagnostic method, imaging examination is the core basis for the primary screening of gastrointestinal diseases at the grassroots level. Among them, abdominal CT scan has become the preferred method for screening abdominal and gastrointestinal diseases in our hospital and most grassroots medical institutions due to its core characteristics of high popularity of equipment, simple examination process, non-invasiveness, and wide audience coverage [4]. Based on the clinical data of 2,300 large samples this time, it can be seen that simple abdominal CT scan has irreplaceable basic application value in the screening of gastrointestinal diseases at the grassroots level. However, it is also limited by the shortcomings of grassroots equipment conditions, examination modes, scanning ranges and imaging technology. This examination method has unavoidable clinical defects, and the diagnostic accuracy cannot be compared with special examination methods such as enhanced CT and gastroenteroscopy in higher-level hospitals. There is significant room for improvement in overall diagnostic efficiency. Based on the 74.32% diagnostic accuracy rate, 18.55% missed diagnosis rate, and 7.13% misdiagnosis rate obtained in this study, this study conducted a detailed analysis from three aspects: clinical application advantages, core limitations, and clinical application suggestions.

The use of abdominal CT scans to diagnose gastrointestinal diseases in primary medical institutions has clear clinical application advantages, which is also the key reason why this examination method can be used as the core method of primary screening for a long time. Data from this study show that CT scans are more suitable for diagnosing structural and organic gastrointestinal lesions. Among the detected lesions, the diagnostic accuracy of intestinal obstruction, severe gastrointestinal inflammation, mid-to-late gastrointestinal tumors, and obvious flatulence is relatively high. The reason is that such lesions will directly change the thickness of the gastrointestinal tract wall, the overall shape of the organs, and the density of intra-abdominal tissue. Characteristic image changes will appear in plain CT scan images. Imaging doctors can quickly determine the type and scope of lesions through intuitive image differences, and can quickly identify severe gastrointestinal lesions that endanger the patient's health, buying time for emergency treatment and clinical intervention. At the same time, abdominal CT scan is non-invasive and non-invasive, and will not cause secondary damage to the gastrointestinal mucosa of patients. It is suitable for the elderly, frail groups and special patients who cannot tolerate invasive gastrointestinal endoscopy, and covers a wider range of people. For primary medical institutions, the large patient base in the jurisdiction, the rapid turnover of outpatient

clinics, the short time-consuming CT scan, and the characteristics of batch examination can effectively complete the preliminary screening of gastrointestinal lesions in a large range of people, effectively make up for the shortcomings of diagnosis and treatment due to insufficient gastrointestinal endoscopy equipment and shortage of endoscopist resources at the grassroots level, achieve preliminary screening of severe gastrointestinal diseases, and avoid medical risks caused by serious missed diagnosis and misdiagnosis [5,6].

Combined with the misdiagnosis and missed diagnosis data in this study, it is clear that simple abdominal CT scan at the grassroots level has very prominent clinical limitations in diagnosing gastrointestinal diseases, which is also the core reason why the overall diagnostic accuracy cannot be further improved. First of all, there are inherent shortcomings in the examination technology itself. Ordinary plain CT scans can only identify lesions through differences in tissue density and morphology. There is no tissue-specific identification function, and the ability to identify early gastrointestinal lesions and superficial mucosal lesions is extremely low. Most of the missed cases in this study were mild chronic gastritis, superficial enteritis, micropolyps and early superficial ulcers. These lesions only have slight congestion, edema or damage to the gastrointestinal mucosal surface and do not change the overall morphology and tissue density of the gastrointestinal tract. Plain CT scan images cannot capture such subtle imaging changes, resulting in a large number of missed cases. This is the main factor why the missed diagnosis rate in this study is as high as 18.55%. Secondly, there are obvious flaws in the scanning range of primary examinations. Combined with the baseline data of this study, it can be seen that among the 2,300 abdominal examination patients, the vast majority only received upper abdominal scans, and only less than 300 patients completed special scans of the middle and lower abdomen. Middle and lower abdominal gastrointestinal tissues such as the colon and rectum are high-incidence sites for polyps, inflammation, and early tumors. Incomplete coverage of the scanning range directly leads to large blind areas in the screening of middle and lower abdominal gastrointestinal lesions, which greatly increases the probability of missed diagnosis of such lesions. Finally, the insufficient identification ability of plain scan images can easily lead to misdiagnosis. The plain scan imaging manifestations of benign and malignant lesions, inflammatory lesions and proliferative lesions in the gastrointestinal tract are highly overlapping and have no obvious differentiated features. In addition, only 3 patients in our hospital received enhanced CT examinations throughout the year. There are almost no enhanced scans to assist in identification. The nature of the lesions cannot be distinguished by the characteristics of the blood supply of the lesions, resulting in misdiagnosis in some cases of suspected tumors and suspected bleeding, resulting in a misdiagnosis rate of 7.13%.

In addition to the diagnostic shortcomings of organic lesions, abdominal CT scan has no diagnostic value at all for functional gastrointestinal diseases. This is also an important limitation that is easily overlooked in grassroots clinical application. Most clinical patients with gastrointestinal discomfort do not have organic structural damage, but only show functional abnormalities such as gastrointestinal motility disorders and intestinal flora imbalance. The CT images of these patients do not show any abnormal changes. Among the 618 patients with normal imaging manifestations in this study, a large proportion of patients were diagnosed with functional gastrointestinal disease through comprehensive clinical diagnosis. Relying solely on CT scans cannot provide any effective basis for the diagnosis of such diseases, and it is easy to cause deviations in clinical judgment. At the same time, the technical system of primary-level imaging diagnosis and treatment is not perfect. The equipment can only complete basic plain scan imaging. It lacks the support of refined post-processing technologies such as multi-plane reconstruction and three-dimensional reconstruction. Imaging

doctors can only rely on original two-dimensional image readings and cannot observe the fine structure of lesions from multiple angles and levels. The ability to identify lesions with hidden locations and atypical shapes has dropped significantly. This further widens the diagnostic gap between primary-level CT plain scans and precise imaging examinations in higher-level hospitals, and cannot meet the needs for refined and individualized diagnosis and treatment of gastrointestinal diseases [7,8].

## 5. Conclusion

In summary, based on the results of this study, primary medical institutions need to accurately define the clinical scope of abdominal CT plain scans, give full play to its advantages in rapid preliminary screening, and at the same time target suspected lesions, tiny lesions, lesions of unclear nature and patients whose symptoms are inconsistent with the imaging results detected by plain scans. For cases, the referral mechanism is promptly activated to guide patients to receive specialized and accurate examinations such as enhanced CT and gastrointestinal endoscopy, and multi-level diagnosis and treatment are used to make up for the diagnostic shortcomings of simple CT scans, thereby effectively improving the overall diagnosis of gastrointestinal diseases at the grassroots level and reducing the risk of diagnosis and treatment caused by missed diagnosis and misdiagnosis.

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## Disclosure statement

The author declares no conflict of interest.

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