ORIGINAL RESEARCH

Evaluation of the Effects of Multiplane Reconstruction Technology with Multi-slice Spiral CT in the Etiological Diagnosis of Acute Intestinal Obstruction

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ABSTRACT

Objective • To analyze the effects of multiplane reconstruction (MPR) technology with multi-slice spiral CT (MSCT) in the etiological diagnosis of acute intestinal obstruction (AIO). Obtaining clear images is of great help in determining the type and etiology of AIO, and doctors can quickly develop treatment plans to improve prognosis and efficacy.

Methods • The clinical data of patients with suspected AIO admitted to our hospital from May 2020 to May 2022 were retrospectively selected as the observation objects. All patients underwent MSCT-MPR examination. Four imaging physicians were divided into two groups. One group underwent MSCT image evaluation for diagnosis, and the other group underwent MSCT-MPR image evaluation for examination. The diagnostic confidence scores of physicians for two imaging techniques were compared. Surgery and pathological enteroscopy were taken as the standard, and then patients were divided into the AIO group (n=75) and the suspected AIO group (n=5). The sensitivity, specificity, and coincidence rate of simple MSCT examination and MSCT-MPR examination in the diagnosis of AIO were detected by the four-grid table method, and the positive predictive values of MSCT-MPR in the diagnosis of AIO infarction location, etiology, type, and degree were evaluated.

Results • Among the 80 subjects in this experiment, the sensitivity and specificity of simple MSCT examination in the diagnosis of AIO were 90.67% and 60.00%, respectively, and the accuracy was 88.75%; the sensitivity and specificity of MSCT-MPR examination in the diagnosis of AIO were 93.33% and 80.00%, respectively, and the accuracy was 92.50%; there was no significant difference in the accuracy of the diagnosis of AIO between the two examination methods ($P > .05$). The diagnostic score levels of physicians in the MSCT-MPR group were significantly higher than those in the simple MSCT group ($P < .05$). Among the 75 patients diagnosed as AIO in this experiment, the incidence of ileum, jejunum, and sigmoid colon was higher. The positive predictive values of the ileum, jejunum, sigmoid colon, duodenum, cecal ascending colon, descending colon, transverse colon and rectum of AIO infarction sites diagnosed by MSCT-MPR were 86.36%, 80.00%, 87.50%, 85.71%, 85.71%, 85.71%, 60.00%, and 100.00%, respectively and the total positive predictive value of infarction site was 84.00%. Among the 75 patients diagnosed as AIO in this experiment, the positive predictive values of intestinal pathological lesions, extraintestinal lesions, and intestinal lesions of AIO infarction causes diagnosed by MSCT-MPR were 92.59%, 85.29% and 100.00%, respectively, and the total positive predictive value of infarction causes was 90.70%. The positive predictive values of MSCT-MPR in the diagnosis of complete AIO and incomplete AIO were 94.00% and 84.00%, respectively, and the total positive predictive value of infarction degree was 90.67%; the positive predictive values of MSCT-MPR in the diagnosis of simple AIO and strangulated AIO were 92.31% and 82.61% respectively, and the total positive predictive value of infarction type was 89.33%.

Conclusion • The accuracy difference between simple MSCT and MSCT mpr in AIO diagnosis is not significant, but MSCT mpr can improve the diagnostic information of readers. MPR can serve as an important supplement to MSCT in the diagnosis of AIO. MSCT-MPR has a high positive predictive value in determining the location, etiology, type, and degree of AIO, improving the diagnostic ability of disease etiology. MSCT-MPR helps doctors quickly assess the patient's condition and provides effective basis for formulating clinical treatment plans, which is worth promoting and applying. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

Acute intestinal obstruction (AIO), as one of the most common types of acute abdomen in the emergency department, accounts for about 15% - 20% of the total number of acute abdomens.[1,2] Previous studies have believed that AIO has a complex etiology and diverse progress. If it is not treated in time and effectively, it is very easy to induce serious complications and even death.[3,4] Therefore, early, correct, and timely diagnosing AIO, evaluating patients' infarction location and cause, and identifying the lesions can select the best treatment, rapidly relieve the obstructive symptoms, and improve the prognosis of patients. Imaging technology is currently the most commonly used method for diagnosing AIO in clinical practice. Through imaging diagnostic analysis, the patient's condition of intestinal obstruction can be understood, and timely treatment measures can be taken, which has important promoting significance for controlling the patient's condition. X-ray, ultrasound, CT and other imaging techniques are commonly used in clinical diagnosis. Although X-ray is the preferred method for clinical diagnosis of intestinal obstruction, it has diagnostic deficiencies in the qualitative and localization of obstruction, and its diagnostic value for gallstone intestinal obstruction is relatively low; Although B-ultrasound can display ectopic stones and

gallbladder deformation, its resolution is low and cannot display the fistula opening. Multi-slice spiral CT (MSCT) has the advantages of fast scanning speed, rich imaging modes, high temporal resolution, and high spatial resolution, which can obtain dynamic enhanced scanning images for a rapid bolus of contrast agent combing with a high-pressure syringe, which can more intuitively and accurately evaluate lesions.[5,6] Multiplane Reconstruction Technology (MPR) can superimpose all axial images according to the scanning range and reconstruct the scanned tissues in coronal, sagittal, and arbitrary angles and a single scan can obtain images from various angles, which can evaluate the lesion changes in multiple directions and angles, and more intuitively show the changes in the spatial structure of the lesions and the surrounding tissues of the lesions,[7,8] which may help improve the diagnosis of AIO etiology. MSCT-MPR has unique techniques for three-dimensional reconstruction and image post-processing. Its cross-sectional images are clear, with minimal interference from the outer layer structure, and multiplane reconstruction. It can intuitively and stereoscopically display the spatial relationship between the lesion and the whole image and surrounding tissues. While making a clear diagnosis, it can also clarify the shape, position, size, etc. of the stones, significantly improving the diagnostic rate of intestinal obstruction and having high value in qualitative diagnosis of intestinal obstruction. This experiment retrospectively selected the clinical data of patients with suspected AIO admitted to our hospital from May 2020 to May 2022 as the observation objects, aiming to analyze the effects of MSCT-MPR in the etiological diagnosis of AIO.

DATA AND METHODS

General data

The clinical data of patients with suspected AIO admitted to our hospital from May 2020 to May 2022 were retrospectively selected as the observation objects.

Inclusion criteria: (1) Patients with complete clinical data and confirmed as AIO by surgery or pathological colonoscopy; (2) The patients' ages ranged from 18 to 65 years old; (3) The patients and his family members were informed and had good compliance, could cooperate with the examination and treatment, and signed the informed consent.

Exclusion criteria: (1) Patients with previous gastrointestinal surgery; (2) Patients who were complicated with severe dysfunction of important organs; (3) Patients who were allergic to iodine; (4) Patients with neurological or psychiatric disorders.

Surgery and pathological colonoscopy were taken as standard, and patients were divided into the AIO group (n = 75) and the suspected AIO group (n = 5). There were 75 cases in the AIO group, including 40 males and 35 females, with an average age of (56.12 ± 6.86) years, and the average time from onset to examination was (4.81 ± 0.45) days. There were 5 cases in the suspected AIO group, including 3 males and 2 females, with an average age of (56.00 ± 6.12) years, and the average time from onset to examination was (4.80 ± 0.54) days. There was no significant difference in age, gender, or time from onset to examination between the groups ($P > .05$), which was comparable. This study was approved by the Ethics Committee of Hebei Chengde Medical College Affiliated Hospital. See Table 1.

Table 1. Analysis of general data of the two groups [n(%) ($\bar{x} \pm s$)]

Grouping	n	Age (years)	Gender		Time from onset to examination (d)
			male	female	
AIO group	75	56.12 ± 6.86	40 (53.33)	35 (46.67)	4.81 ± 0.45
Suspected AIO group	5	56.00 ± 6.12	3 (60.00)	2 (40.00)	4.80 ± 0.54
x^2/t		0.038	0.084		0.860
P value		.970	.772		.929

Methods

MSCT examination: The 64-layer Ge light speed VCT machine was used for the MSCT examination. MSCT parameters: current: 200mA, tube voltage: 120kV, interlayer spacing: 5mm, layer thickness: 5mm. When detecting the obstructed area, a thin layer with a thickness of 3.0mm and a spacing of 2.5mm is used for detection. The contrast agent iopromide 370mg/ml was injected intravenously in front of the elbow with a high-pressure syringe at a rate of 3.5ml/s and a dose of 80ml. The enhanced images of patients in arterial, equilibrium, and delayed phases were obtained at 25-30s, 60-65s and 90-95s after injection, respectively. During the arterial phase, the tumor with multiple blood supply is enhanced, while the normal liver has no or mild enhancement. The tumor forms a significant contrast with normal liver tissue, which is conducive to the detection of multiple blood supply tumors. The contrast agent starts to leave the liver during the equilibrium period, and the liver density decreases, which can determine the hemodynamic characteristics of the tumor. The delay period can determine the hemodynamic characteristics of tumors and contrast agent retention. The patients were instructed to breathe quietly and hold their breath, and then, they were scanned from the top of the diaphragm to the pubic symphysis, and the scan was completed at one time.

Observation indicators

Image processing: Transfer volume scanning data to the ADW4.2 workstation, perform image processing on the original cross-sectional thin layer image, such as MPR, surface reconstruction method (CPR), sliding thin layer block maximum density projection (sts mip), etc., to obtain the region of interest (ROI). Compared to simple MSCT, MSCT mpr can reconstruct cross-sectional images and obtain MPR image results from different angles. Select four radiologists and randomly divide them into two groups. One group received a simple MSCT cross-sectional image evaluation for diagnosis, while the other group received a combination of MSCT mpr cross-sectional and multi plane reconstruction image evaluation for examination. To ensure diagnostic accuracy, when two doctors diagnose the same patient differently, further consultations are conducted to determine the final diagnostic result. Surgical and pathological

colonoscopy are considered as standards. Compare the compliance rates of two methods for diagnosing AIO. Evaluate the positive predictive value of MSCT MPR for the location, etiology, type, and severity of AIO infarction.

Information score: The score range was 1-5 points, including 5 points for definitely existing AIO, 4 points for possibly existing AIO, 3 points for uncertain AIO, 2 points for possibly not having AIO, and 1 point for definitely not having AIO. The information scores evaluated by doctors in the two ways were compared. The higher the score, the more mature the imaging technology is, and the higher the efficiency of diagnosing AIO.

Statistical methods

SPSS20.0 software was used to analyze experimental data. The age, confidence score, time from onset to examination and other measurement data were expressed in the form of ($\bar{x} \pm s$), the data were in line with normal distribution, and a t test was used. The data of gender, etiology, and infarction location were expressed in the form of (%), and χ^2 test was used. Four-grid table method was used to detect the sensitivity, specificity and coincidence rate of simple MSCT examination and MSCT-MPR examination in the diagnosis of AIO and evaluate the positive predictive values of MSCT-MPR examination in the diagnosis of AIO infarction location, etiology, type, and degree. The statistical results were statistically significant with $P < .05$.

RESULTS

Comparison of the coincidence rate of the two examination methods in the diagnosis of AIO

Among the 80 subjects in this experiment, the sensitivity and specificity of simple MSCT examination in the diagnosis of AIO were 90.67% and 60.00%, respectively, and the accuracy was 88.75%; the sensitivity and specificity of MSCT-MPR examination in the diagnosis of AIO were 93.33% and 80.00%, respectively, and the accuracy was 92.50%; there was no significant difference in the accuracy of the diagnosis of AIO between the two examination methods ($P > .05$). See Tables 2 and 3 and Figures 1 and 2.

Comparison of diagnostic confidence scores of physicians of the two examination methods

The diagnostic score levels of physicians in MSCT-MPR group were significantly higher than those in the simple MSCT group, and the difference was statistically significant ($P < .05$). See Table 4 and Figure 3.

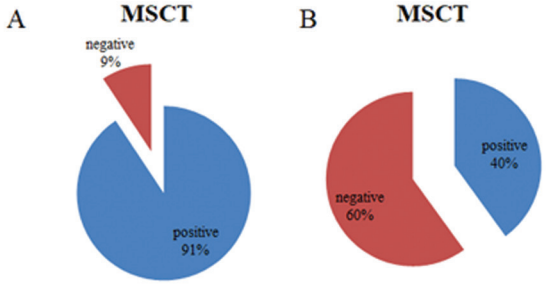
Evaluation of the coincidence rate of MSCT-MPR in the diagnosis of the infarction location of AIO

Among the 75 patients diagnosed as AIO in this experiment, the incidence of ileum, jejunum, and sigmoid colon was higher. The positive predictive values of the ileum, jejunum, sigmoid colon, duodenum, cecal ascending colon, descending colon, transverse colon, and rectum of AIO infarction site diagnosed by MSCT-MPR were 86.36%, 80.00%, 87.50%, 85.71%, 85.71%, 85.71%, 60.00% and 100.00%, respectively. The total positive predictive value of infarction site was 84.00%. See Table 5 and Figure 4.

Table 2. Evaluation of coincidence rate of simple MSCT in the diagnosis of AIO [n (%)]

Grouping	Case	Surgery and colonoscopy		Sensitivity	Specificity	Coincidence rate
		Positive	Negative			
MSCT examination	Positive	68 (85.00)	2 (2.50)	90.67%	60%	88.75%
	Negative	7 (8.75)	3 (3.75)			
Total		75 (93.75)	5 (6.25)			

Figure 1. Evaluation of coincidence rate of simple MSCT examination in diagnosis of AIO

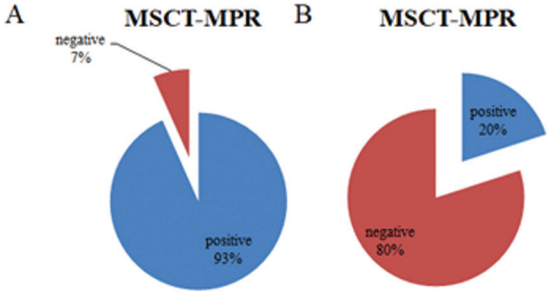


Note: A is the coincidence rate of simple MSCT examination in the diagnosis of AIO in patients with AIO; B is the coincidence rate of simple MSCT examination in the diagnosis of AIO in patients with suspected AIO

Table 3. Evaluation of coincidence rate of MSCT-MPR examination in the diagnosis of AIO [n (%)]

Grouping	Case	Surgery and colonoscopy		Sensitivity	Specificity	Coincidence rate
		Positive	Negative			
MSCT-MPR examination	Positive	70 (87.50)	1 (1.25)	93.33%	80%	92.50%
	Negative	5 (6.25)	4 (5.00)			
Total		75 (93.75)	5 (6.25)			

Figure 2. Evaluation of the coincidence rate of MSCT-MPR examination in the diagnosis of AIO

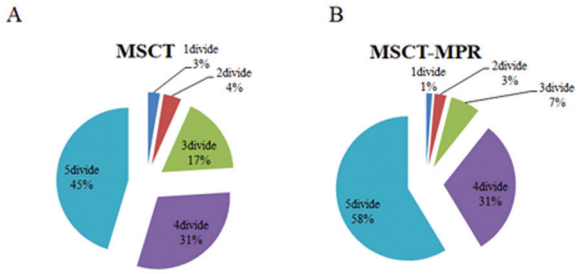


Note: A is the coincidence rate of MSCT-MPR examination in the diagnosis of AIO in patients with AIO; B is the coincidence rate of MSCT-MPR in diagnosing AIO in patients with suspected AIO

Table 4. Comparison of diagnostic confidence scores of physicians of the two examination methods [n(%) ($\bar{x} \pm s$)]

Grouping	n	1 point	2 points	3 points	4 points	5 points	Confidence score
Simple MSCT group	75	2 (2.67)	3 (4.00)	13 (17.33)	23 (30.67)	34 (45.33)	4.14 ± 1.02
MSCT-MPR group	75	1 (1.33)	2 (2.67)	5 (6.67)	23 (30.67)	44 (58.67)	4.43 ± 0.84
t/χ^2		5.338					2.017
P value		.149					.045

Figure 3. Evaluation of the confidence scores of simple MSCT and MSCT-MPR in the diagnosis of AIO

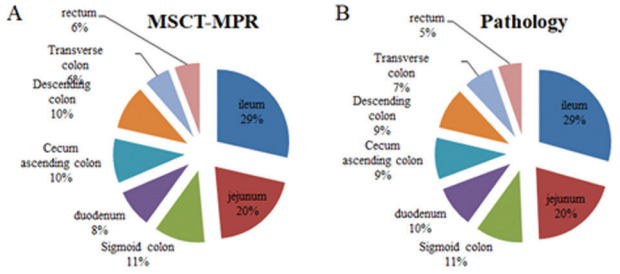


Note: A is the evaluation of the confidence scores of simple MSCT in the diagnosis of AIO; B is the evaluation of the confidence scores of MSCT-MPR in the diagnosis of AIO

Table 5. Evaluation of the coincidence rate of MSCT-MPR in the diagnosis of the infarction sites of AIO [n (%)]

Infarction site	MSCT-MPR (n)	Surgery and colonoscopy (n)	Unanimous	Inconsistent	Positive predictive value
Ileum	20	22	19	3	86.36%
Jejunum	14	15	12	3	80%
Sigmoid colon	8	8	7	1	87.50%
Duodenum	6	7	6	1	85.71%
Cecal Ascending colon	7	7	6	1	85.71%
Descending colon	7	7	6	1	85.71%
Transverse colon	4	5	3	2	60%
Rectum	4	4	4	0	100%
Total	70	75	63	12	84%

Figure 4. Evaluation of MSCT-MPR in the diagnosis of infarction sites of AIO

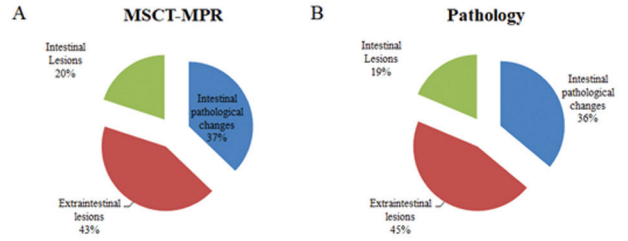


Note: A is the distribution of infarction sites in the diagnosis of AIO by MSCT-MPR; B is the distribution of infarction sites in the diagnosis of AIO by surgery and colonoscopy.

Table 6. Evaluation of coincidence rate of MSCT-MPR in diagnosis of etiology pf infarction of AIO [n (%)]

Causes of infarction		MSCT-MPR (n)	Surgery and colonoscopy (n)	Unanimous	Inconsistent	Positive predictive value
Intestinal pathological lesions	Tumour	22	23	21	2	92.59%
	Hematoma	1	1	1	0	
	Crohn	1	1	1	0	
	Infectious diseases	2	2	2	0	
Extraintestinal lesions	Adhesion	7	8	6	2	85.29%
	Extraintestinal tumor compression	4	4	4	0	
	Abdominal cocoon	2	2	2	0	
	Angiogenic lesions	3	4	3	1	
	Internal and external hernia	6	7	6	1	
	Intestinal volvulus	5	6	5	1	
	Primary intussusception	2	2	2	0	
	Paralytic ileus	1	1	1	0	
Intestinal lesions	Gallstone ileus	6	6	6	0	100%
	Fecal stone ileus	7	7	7	0	
	Foreign body ileus	1	1	1	0	
Total		70	75	68	7	90.70%

Figure 5. Evaluation of MSCT-MPR in the diagnosis of the etiology of infarction of AIO

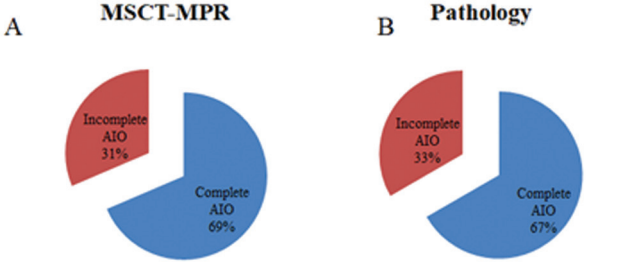


Note: A is the distribution of infarction etiology diagnosed by MSCT-MPR for AIO; B is the distribution of infarction etiology diagnosed by surgery and colonoscopy for AIO

Table 7. Evaluation of the coincidence rate of MSCT-MPR in the diagnosis of the degree and type of infarction of AIO [n (%)]

Disease indicators		MSCT-MPR (n)	Surgery and colonoscopy (n)	Unanimous	Inconsistent	Positive predictive value
Degree of obstruction	Full AIO	48	50	47	3	94%
	Incomplete AIO	22	25	21	4	84%
Total		70	75	68	7	90.67%
Obstruction type	Simple AIO	50	52	48	4	92.31%
	Strangulated AIO	20	23	19	4	82.61%
Total		70	75	67	8	89.33%

Figure 6. Evaluation of MSCT-MPR on the degree of infarction in the diagnosis of AIO



Note: A is the distribution of the degree of infarction in the diagnosis of AIO by MSCT-MPR; B is the distribution of the degree of infarction diagnosed by surgery and colonoscopy for AIO

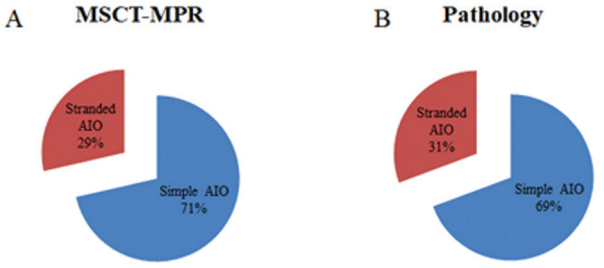
Evaluation of the coincidence rate of MSCT-MPR in the diagnosis of the etiology of infarction of AIO

Among the 75 patients with AIO diagnosed in this experiment, the proportions of intestinal pathological lesions, extraintestinal lesions, and intestinal lesions were 36.00%, 45.33%, and 18.67%, respectively. The positive predictive values of MSCT-MPR in the diagnosis of AIO infarction causes were 92.59%, 85.29%, and 100%, respectively, and the total positive predictive value of infarction causes was 90.70%. See Table 6 and Figure 5.

Evaluation of the coincidence rate of MSCT-MPR in the diagnosis of degree and type of infarction in AIO

Among the 75 patients diagnosed as AIO in this experiment, the proportions of complete AIO and incomplete AIO were 66.67% and 33.33%, respectively, and the proportions of simple AIO and strangulated AIO were 69.33% and 30.67% respectively. The positive predictive values of MSCT-MPR in the diagnosis of complete AIO and incomplete AIO were

Figure 7. Evaluation of MSCT-MPR on the etiology of infarction in the diagnosis of AIO



Note: A is the distribution of infarction types diagnosed by MSCT-MPR for AIO; B is the distribution of infarction types diagnosed by surgery and colonoscopy for AIO

94.00% and 84.00%, respectively, and the total positive predictive value of infarction degree was 90.67%; the positive predictive values of MSCT-MPR in the diagnosis of simple AIO and strangulated AIO were 92.31% and 82.61% respectively, and the total positive predictive value of infarction type was 89.33%. See Table 7, Figures 6 and 7.

DISCUSSION

AIO has the characteristics of acute onset and complex and changeable condition, which can lead to intestinal blood circulation disorder in a short time, even perforation and shock, resulting in the death of patients.[9,10] Previous statistics showed that when AIO patients had blood supply disorders, the mortality rate could be as high as 10%-35%. AIO mostly occurs in the small and/or large intestine. Small intestinal obstruction accounts for about 50% - 80%, which is mainly caused by adhesion, and about 20% - 30% of patients need surgical intervention.[11,12] Colorectal obstruction accounts for about 10% - 15%, which is mainly induced by tumors, and considering that it may form a closed loop, most patients need surgical treatment.[13,14] Early diagnosis of AIO and analysis of the causes of AIO can make treatment plans; patients can be treated as soon as possible to reduce the risk of disease deterioration, which is helpful to improve the prognosis of patients.

MSCT is a kind of CT examination, a relatively common imaging technology for diagnosing AIO. It can collect volume data without distance, and the spatial resolution and density resolution are very good, which is very sensitive to gas and liquid in the abdominal cavity and also has the advantages of short scanning time, dynamic scanning, noninvasive operation, etc., and it can clearly show the abnormal parts of the intestine and mesentery, accurately diagnose AIO and display the obstruction site.[15,16] At present, MSCT is widely used in the diagnosis of gastrointestinal diseases such as colitis, proctitis, and esophageal cancer. Wang j et al [17] believed that MSCT and barium meal examination can clearly show the imaging characteristics of esophageal cancer and provide a reliable imaging basis for preoperative diagnosis; the combination of the two can effectively improve the accuracy of early diagnosis of esophageal cancer. Xiao j et al[18] have believed that the MSCT manifestations of chronic radiation colitis and proctitis are related to some characteristics such as telangiectasia and mucosal congestion. Combined with the history and clinical manifestations of radiotherapy, MSCT examination conducted at the same time may effectively diagnose radiation colitis and proctitis. MSCT has a certain value in diagnosing chronic radiation colitis and proctitis. MPR is based on cross-sectional images, processing different plane sections and reconstituting to build a three-dimensional anatomical structure. It can observe the location, circumference, length of the obstruction point and the relationship between the lesions and the surrounding tissues from multiple directions and the display effect has little difference with surgical findings, which is helpful to quickly lock the infarction site, diagnose AIO and evaluate the degree of infarction.[19,20] In this experiment, there was no statistically significant difference in the accuracy of diagnosing AIO between the two examination methods in 80 subjects, indicating that there is little difference in the efficacy of simple MSCT and MSCT-MPR in diagnosing AIO. However, this study found that the diagnostic score levels of physicians of the MSCT-MPR group were significantly higher than those of the simple MSCT group, indicating that MSCT-MPR can greatly improve the confidence of physicians in diagnosis, reduce the time of disease discussion and improve the diagnostic efficiency, which is helpful to quickly formulate treatment plans and give effective treatment, and can help improve the treatment effects. Analyzing the reasons, the principle of MSCT-MPR is to reconstruct cross-sectional images, which can not only visually display the position, size, shape, echo of the obstructed mass or mass, as well as the abnormal situation of the proximal intestinal wall and lumen of the obstruction, but also roughly display the invasion of colon cancer tumors on the surrounding intestinal lumen, organs, and tissues. After image reconstruction, it can effectively eliminate the adverse effects of tissue overlap on diagnostic results, thereby reducing diagnostic uncertainty and accelerating decision-making and treatment initiation. Although MSCT can also effectively diagnose AIO. However, MSCT-MPR has unique advantages in diagnosing the location, severity, and etiology of intestinal obstruction.

The diagnosis of AIO mainly includes three parts: the location of infarction, the cause of infarction, and the degree of infarction.[21,22] The causes of infarction are complex and diverse, including tumor, hematoma, infectious disease, extraintestinal tumor compression, vasogenic lesions, primary intussusception, foreign body intestinal obstruction, etc., so early diagnosis of the etiology of AIO can help to quickly formulate effective and reasonable treatment plans, strive for effective treatment in the fastest time and improve the treatment effects, delay the further deterioration of the disease and reduce the mortality.[23,24] MSCT-MPR can construct three-dimensional anatomical structure images, observe and evaluate AIO lesions from multiple directions, and quickly and accurately determine the cause of infarction by observing the characteristics of the transitional zone.[25,26] The etiology is generally divided into intestinal

pathological lesions, extraintestinal lesions, and intestinal lesions. Extraintestinal lesions mainly show adhesive cord strips, which can be accurately judged by observing the infarction site and the relationship between the intestinal tube and the abdominal wall.[27] Intestinal lesions often include cholelithic intestinal obstruction and fecal stone intestinal obstruction. Cholelithic intestinal obstruction can be judged by observing the gallbladder, biliary tract gas, and stones. Fecal stone intestinal obstruction can show proximal intestinal dilatation, cylindrical or quasi-cylindrical lesions in the intestinal lumen of the transitional area, etc.[28,29] Intestinal pathological lesions mainly include tumors, foreign bodies, and so on, which can be quickly judged by observing the effusion and gas accumulation in the dilated bowel.[30] In this experiment, the positive predictive values of MSCT-MPR in the diagnosis of causes of infarction AIO were 92.59%, 85.29%, and 100.00%, respectively, and the total positive predictive value of the causes of infarction was 90.70%. It shows that MSCT-MPR is highly accurate in judging the etiology of AIO. In addition, the total positive predictive value of MSCT-MPR in diagnosing the infarction sites of AIO was 84.00%. The positive predictive values of MSCT-MPR in the diagnosis of complete AIO and incomplete AIO were 94.00% and 84.00%, respectively, and the total positive predictive value of infarction degree was 90.67%; the positive predictive values of MSCT-MPR in the diagnosis of simple AIO and strangulated AIO was 92.31% and 82.61% respectively, and the total positive predictive value of infarction type was 89.33%. It shows that MSCT-MPR has high accuracy in diagnosing the location, degree, and type of infarction of AIO, and it can help to quickly select treatment options and improve the prognosis of patients. Imaging diagnosis plays an auxiliary role. Traditional examinations, such as gastrointestinal imaging and X-ray films, are limited due to various reasons, including low resolution, long examination time, or cumbersome preparation before examination. However, MSCT-MPR optimizes these shortcomings, with high resolution, fast scanning speed, and rich imaging technology. It plays an important role in the diagnosis of symptoms and lesion location in patients with acute intestinal obstruction, can determine the cause of the disease as early as possible, help physicians formulate treatment plans as soon as possible, and prevent further deterioration of the condition. The causes of acute intestinal obstruction include intussusception, intestinal adhesions, tumors, volvulus, etc. It is possible to judge and analyze acute intestinal obstruction caused by different causes, in order to determine treatment plans as early as possible and achieve a good prognosis for patients.

There are still some shortcomings in this study. Firstly, the number of subjects included in this study is not large enough to fully evaluate the actual situation of a large sample. Secondly, in this study, the arterial phase, balance phase, and delay phase were selected for image acquisition during MSCT scanning. The main consideration was to reduce the acquisition time, and more periods could be selected for image acquisition in the future. Analyze whether collecting more images is beneficial for image reconstruction and improving image quality.

CONCLUSION

In conclusion, there is little difference in the accuracy of diagnosing AIO between simple MSCT and MSCT-MPR, but MSCT-MPR can improve the diagnostic information of image readers. MPR can be an important supplement to MSCT in diagnosing AIO. The positive predictive values of MSCT-MPR in judging the location, cause, type, and degree of AIO are at high levels, which is helpful for physicians to early judge and guide the treatment plan and improve the treatment effects.

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