Diagnosis of Bowel Obstruction: Added Value of Multiplanar Reformations from Multidetector CT in Comparison with Axial Planes Alone

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Objective: *To retrospectively assess the benefit of multiplanar reformations from multidetector CT for diagnosis of bowel obstruction in comparison with axial planes alone.*
Material and Method: *Between October 2008 and May 2010, included the consecutive 75 patients/76 CT studies who underwent multidetector CT at Siriraj Hospital to rule out bowel obstruction. Fifty-seven patients of 58 studies confirmed the final diagnosis of bowel obstruction by surgical proof or obstructive symptoms relief from conservative treatments; divided into 25 small bowel and 33 large bowel obstructions. Two independent readers, blinded to diagnosis, interpreted for bowel obstruction firstly using axial slices alone, then immediately scoring MPR images including axial, coronal, sagittal, and oblique reformations from the same study. Confidence score was applied. In case of radiological diagnosis of bowel obstruction, the findings of transition point, cause, severity, and complication were also evaluated.*
Results: *CT diagnosis of bowel obstruction was made 54 on axial image alones and 55 on axial image plus MPR, leading to the sensitivity of 93.1% and specificity of 77.8% on the axial scans alone and the sensitivity of 94.8% and specificity of 72.2% on the axial plus MPR, respectively. The axial plus MPR images helped correct diagnosis and increased confidence score in one case of low grade, small bowel obstruction. Accuracy in diagnosis of between large bowel obstruction and small bowel obstruction was 90% and 88.5% on axial scans alone and 90% and 92.3% on axial plus MPR scans, respectively.*
Conclusion: *The axial scan CT is an appropriate modality for the patients suspected bowel obstruction. The authors encourage using MPR as the adjunct tool to the axial images, especially in the case suspected small bowel obstruction. MPR help increasing diagnostic confidence and confirming the findings found on axial image.*

Keywords: *Bowel obstruction, Multiplanar reformations (MPR)*

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Bowel obstruction is a common emergency surgical condition in patients presented with acute abdomen. With the fact that small bowel obstruction accounts for approximately 20% of all acute surgical admissions[1]. The etiologies of small bowel and large bowel obstruction are various, including extrinsic, intrinsic, or intraluminal causes. The extrinsic lesions are the most common cause among the small bowel obstruction group such as adhesion, hernia, or carcinomatosis peritoneii. Conversely, the most common cause of large bowel obstruction group is intrinsic lesion such as tumor and inflammatory disease. Furthermore, the assessment of bowel obstruction can be classified according to the degree and the severity of the obstruction such as complete or incomplete obstruction, simple or closed loop or strangulated obstruction.

The diagnosis of bowel obstruction is usually made on clinical signs, patient history, laboratory, and radiological findings. Early diagnosis of bowel obstruction is crucial. It could suggest the initial management and the appropriate therapy to the patients, either surgical or conservative treatment. Early diagnosis of this condition is also critical in preventing complications, particularly perforation and bowel strangulation, which have high mortality rate. Therefore, the radiological investigations play an important role for confirming the diagnosis of bowel obstruction. Moreover, the information obtained from radiological findings may determine transition zone, causes, severity, and complication of the obstruction. Better decision-making can be achieved

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when more information is available, enhancing management.

Generally, conventional abdominal radiography is the preferred initial examination in determining the presence of obstruction, though the accuracy yielded only about 46 to 80%[2]. Fluoroscopic studies with Barium enteral contrast such as enteroclysis examination or GI follow through study or Barium enema can be helpful to determine the diagnosis and grading severity of obstruction; however, it may be inappropriate to evaluate in the setting of high grade or complete obstruction or bowel obstruction with complications (strangulation or perforation). While, the currently available computed tomography has proven to be an excellent way for evaluation of bowel obstruction, CT has become a widely used modality for diagnosis, as well as for the cause, severity, and transition point of obstruction with the reported sensitivity, specificity and accuracy for detecting high-grade small bowel obstruction about 94%, 96% and 95%, respectively[3]. However, the overall sensitivity, specificity and accuracy of CT in determining overall obstruction; combination of both high grade and low grade were lower about 63%, 78%, and 66%, respectively

With the multidetector CT scanner (MDCT), it is now possible to scan the entire abdomen and pelvis at a nearly isotropic resolution, the resultant reformations in any desired plane (multiplanar reformations) will be similar in spatial resolution to those in the axial plane[4]. These multiplanar reformations (MPR) are considered the new diagnostic tool and provide greater diagnostic confidence for radiologists compared with standard axial images[5].

Several studies demonstrated that multiplanar reformations increase confidence in detection of bowel obstruction, transition zone, and causes of the obstruction compared with axial images alone[4,6-8]. However, the sensitivity, specificity, and accuracy reported from those studies were not significantly improved as the result of high competency of the radiologists in determining the sensitivity, specificity, and accuracy of the axial images alone. The authors aimed to observe this convincing, useful diagnostic tool, especially applicable to Siriraj Hospital, and whether it has improved patient care.

The purpose of the present study was to assess retrospectively the benefit of multiplanar reformations from multidetector CT for diagnosis of bowel obstruction in comparison with axial planes alone.

Material and Method

Patients and diagnosis

The retrospective study was approved by the Ethic Committee of Siriraj Hospital with a waiver of informed consent. Between October 2008 and May 2010, the data and CT images of the consecutive 83 patients presented with abdominal pain and underwent CT in Siriraj hospital to rule out bowel obstruction, were collected. The bowel obstruction was explored with 64-slice MDCT scanner (Lightspeed GE CT scan or Somatom Dual source CT scan) according to the institutional protocol of whole abdomen in pre-contrast and post-contrast phases. The medical records, surgical reports, or pathological reports were reviewed to establish the diagnosis. The diagnosis of the bowel obstruction was confirmed by the surgical proof or obstructive symptoms relief by the specific conservative treatments such as bowel rest and nasogastric tube insertion. The patients were excluded if they had incomplete or inadequate data of medical records, surgical reports or pathological reports to confirm presence or absence of bowel obstruction (n = 4). The other four patients were also excluded because they had relief clinical symptoms by other means, which is not the treatment for bowel obstruction. Of the 84 patients with suspected bowel obstruction who underwent CT scanning, 75 patients of 76 CT studies were included; 41 were male and 34 were female and the mean patient age was 57.76 year.

Scanning

Scanning was performed according to the routine whole abdomen protocol of Siriraj Hospital, from the dome of the diaphragm to the pubic symphysis with two 64 slide-MDCT scanners (Lightspeed VCT; GE Healthcare and Somatom definition CT scanner; Siemens). Patients were required to receive intravenous contrast agent at an injection rate of 2 cc/sec. Enteral contrasts were not actually required but decided individually according to clinician's judgment. Imaging was performed during the portovenous phase with a slice thickness of 0.5 mm and then with a reconstructed in the thickness of 1.25-1.5 mm. The exposure parameters for the CT scans were 120 kVp and 250-300 mAs for both the GE LightSpeed and Siemens scanners. Images were transferred to a picture archiving and communication system (PACS) for detailed review and the MPR (multiplanar reformations) were performed at the reviewing room.

Image assessment

The studies were reviewed by two independent readers specializing 1 and 5 years in abdominal imaging and blinded to medical, surgical reports and pathologic reports. First, they were asked to review using axial slices alone to determine presence of bowel obstruction and then immediately scoring MPR images including axial, coronal, sagittal and oblique reformations from the same study to re-evaluate presence of bowel obstruction afterward. The impressions from axial images were fresh in mind.

CT diagnosis of bowel obstruction was made if there was a discrepancy between the caliber of proximal and distal bowel loops with identification of a transition zone between distended and collapsed loops[9,10]. The small bowel feces sign on computed tomography images, which is the appearance of particulate material mixed with gas bubbles within the dilated small bowel loops proximal to an obstruction, was also indicative of small bowel obstruction[11].

On the other side, a non-obstructive bowel dilatation was suggested in the case of non-continuous proximal bowel dilatation, absence of a transition zone or nearly complete gas filling and the presence of considerable intraluminal contents in all bowel segments[9,12].

For both axial and MPR images, confidence scores were applied for each with the scales as followed; 1) definitely absent, 2) probably absent, 3) cannot determine, 4) probably present, and 5) definitely present.

In case of radiological diagnosis of bowel obstruction, the findings of transition point, cause, severity, and complication were also evaluated.

Statistical analysis

The SPSS statistical software (version 11.5) was used for the statistical evaluation. The sensitivity, specificity, and accuracy for diagnosis of bowel obstruction between axial scans and axial scans plus MPR were determined. The accuracy in discrimination into large bowel obstruction, small bowel obstruction, and absence of obstruction among each group of the axial scans alone and axial scans plus MPR was evaluated by using McNemar-Bowker test for 3x3 tables. A p-value <0.05 was considered statistically significant. The mean confidence ratings of presence and absence of bowel obstruction were evaluated by using Wilcoxon signed rank test. Agreement of the findings among readers was decided by consensus.

Results

General data

Patients

Of the 84 patients with suspected bowel obstruction underwent CT scanning, 75 patients of 76 CT studies were included. Forty-one were male with the mean age about 56.93 years (ranging from 1-92 years old) and 34 were female with the mean age about 58.76 years (ranging from 29-84 years old).

The final diagnosis of bowel obstruction

The diagnosis of bowel obstruction confirmed by surgical proof or obstructive symptoms relief by conservative treatment were found in 57 patients of 58 studies (76%), which were 31 male and 26 female. The mean patient age was 59.61 (ranging from 1-92 years old) and 59.65 (ranging from 29-84 years old) for male and female patient groups, respectively. Absence of obstruction was determined in 18 patients of 18 studies. The 58 studies were classified into 25 small bowel obstruction (43.1%) and 33 large bowel obstruction (56.9%).

- ***Small bowel obstruction*** (n = 25)

Location of transitional zone was indicated at duodenum (n = 1, 4%), Jejunum (n = 6, 24%), Ileum (n = 15, 60%), and Terminal ileum (n = 3, 25%).

Presence of small bowel feces sign was detected in five cases (20%).

The most common cause of small bowel obstruction in this study was adhesion (n = 11, 44%). The others causes of obstruction were extrinsic neoplasm such as carcinomatosis peritonii or adjacent organ invasion (n = 8, 32%), intussusceptions (n = 2, 8%), primary small bowel neoplasm (n = 2, 8%), internal hernia (n = 1, 4%), and miscellaneous (n = 1, 4%).

Severity was classified into two groups, high grade and low grade. There were 22 studies (88%) of high grade and three studies of low grade (12%).

No complication such as strangulation was reported.

- ***Large bowel obstruction*** (n = 33)

Location of transitional zone was at caecum (n = 1, 3%), ascending colon (n = 5, 15.2%), transverse colon (n = 6, 18.2%), descending colon (n = 5, 15.2%), sigmoid colon (n = 13, 39.4%) and rectum (n = 3, 9.1%).

Presence of small bowel feces sign was detected in 15 cases (45.5%).

The most common cause of large bowel obstruction in the present study was intrinsic neoplasm such as adenocarcinoma or lymphoma (n = 21, 63%). The others causes of obstruction were extrinsic neoplasm such as carcinomatosis peritoneii or adjacent organ invasion (n = 5, 15%), inflammatory lesion such as diverticulitis or colitis (n = 2, 6%), adhesion (n = 2, 6%), volvulus (n = 1, 3%), intraluminal cause (n = 1, 3%), and miscellaneous (n = 1, 3%).

Severity was detected in 30 studies (90.9%) of high grade and three studies of low grade (9.1%).

No complication such as strangulation was reported.

Diagnosis of bowel obstruction with MDCT

Of 57 patients with 58 studies with the final diagnosis of bowel obstruction confirmed by surgical proof or obstructive symptoms relief by conservative treatment (33 large bowel and 25 small bowel obstruction), CT diagnosis of bowel obstruction was correctly determined 54 of 58 studies from axial image alones and 55 of 58 studies from group of axial image plus MPR. These lead to the sensitivity of 93.1% and specificity of 77.8% on the axial scans alone. On the axial plus MPR images yielded the sensitivity of 94.8% and specificity of 72.2%. The accuracy, positive predictive value (PPV) and negative predictive value (NPV) of the axial images alone were 86.8%, 89.7%, and 77.8%, respectively. The accuracy, PPV and NPV of the axial images plus MPR group were 86.8%, 88.3%, and 81.3%, respectively (Table 1, 2).

Confidence score for diagnosis of bowel obstruction

For the final diagnosis of bowel obstruction, the confidence scores for diagnosis of bowel obstruction were shown in Table 3. The readers had more confidence for the axial plus MPR scans in the presence of bowel obstruction than axial scans alone, even though it was a substantial improvement of confidence between these two groups. In the setting of absence of obstruction, the reader misread confidence of one case from probably absent to present probably obstruction on the axial plus MPR scans (Table 4).

Accuracy in diagnosis of large bowel obstruction and small bowel obstruction

The result of accuracy in diagnosis of large bowel obstruction and small bowel obstruction with axial scans alone was 90% and 88.5%, respectively. In axial plus MPR scans, the accuracy was 90% and 92.3% for large bowel obstruction and small bowel obstruction, respectively. The discrimination among groups of large bowel obstruction and small bowel obstruction on both axial and axial plus MPR images found no statistically significant (Table 5).

Table 1. Sensitivity and specificity for diagnosis of bowel obstruction

Bowel obstruction			
Axial alone (%)		Axial plus MPR (%)	
Sensitivity	Specitivity	Sensitivity	Specitivity
93.1	77.8	94.8	72.2

MPR = multiplanar reformation

Table 2. The accuracy, PPV and NPV for diagnosis of bowel obstruction

	Axial alone (%)	Axial plus MPR (%)
Accuracy	86.8	86.8
PPV	89.7	88.3
NPV	77.8	81.3

PPV = positive predictive value; NPV = negative predictive value

Table 3. Confidence scores in 58 studies with bowel obstruction

Confidence	Axial alone	Axial plus MPR
1	2	2
2	1	1
3	1	0
4	6	7
5	48	48

Table 4. Confidence scores in 18 studies without bowel obstruction

Confidence	Axial alone	Axial plus MPR
1	10	10
2	4	3
3	0	0
4	2	3
5	2	2

Table 5. Accuracy for diagnosis of large bowel obstruction and small bowel obstruction

Axial alone		Axial plus MPR	
Large bowel	Small bowel	Large bowel	Small bowel
90.0%	88.5%	90.0%	92.3%

Discussion

For the past few decades, computed tomography has become widely used as an excellent tool for evaluation of bowel obstruction. The additional ability to demonstrate the transition zone, cause, degree and severity of obstruction makes CT superior than others modality for suggesting specific and appropriate management to the patients[13]. Recently, multiplanar reformations have been introduced in using as adjunct to axial scans interpretation. Several studies documented the benefits of this new diagnostic tool in various clinical applications including abdominal imaging. The reported potential value of the MPR were described for diagnosis of staging of pancreatic cancer, gastric cancer and rectal cancer as well as acute appendicitis[14-17]. In addition, in the setting of bowel obstruction, utilizing of MPR has been studies in variable ways. Caoili[5] suggested that MPR was useful for defining small bowel obstruction and Jaffe[6] found that the addition of coronal reformation to the axial scans in the evaluation of patients suspected small bowel obstruction significantly increased the confidence levels. The study of Hodel[4] suggested that MPR can increase both accuracy and confidence in identifying location of the transition zone. However, the increasing inaccuracy was not significant owing to the high accuracy of axial images alone.

The known sensitivity for high grade, small bowel obstruction is range from 90 to 96%. The reported overall CT sensitivity in detecting both high grade and low grade appears less, at 48 to 67%. The present revealed the high sensitivity of 93.1% in detecting bowel obstruction in combination with high and low grade obstruction on the axial scans alone, which appeared more impressive than those reported studies. In the present study, however, the authors had more preferential numbers of high-grade obstruction (Table 1).

The present, the axial plus MPR images helped correct diagnosis in one case of small bowel obstruction that was low-grade obstruction. In that case, the patient had partial small bowel obstruction from recurrent adenocarcinoma of colon which showed mildly dilated small bowel loops (about 3.6 cm in maximal caliber) and no obvious transition point on axial alone CT. After applying MPR, the discrepancy between bowel loops and transition points were more clearly demonstrated on the other planes despite subtle bowel dilatation (Fig. 1).

Even though the reported sensitivity in this study did not increase impressively, about 94.8% from 93.1% of axial scans alone, the overall accuracy did not considerably improve with the additional MPR images because the radiologists are skillful in the interpretation of axial images alone. However, in the sub-analysis, the accuracy in groups of small bowel obstruction showed an increase from 88.5% in axial scans alone to 92.3% in axial plus MPR scans (Table 5).

With that result, the authors believe that MPR may have a promising role in diagnosis of low grade, small bowel obstruction, especially in the case with complex anatomy or the obstruction due to adhesion or subtle peritoneal seeding that is difficult to identify mass compression. On the contrary, MPR may not yield more benefit for large bowel obstruction because it readily depicts the abnormality from the axial scans by its specific location, less complex course and relative large calibers.

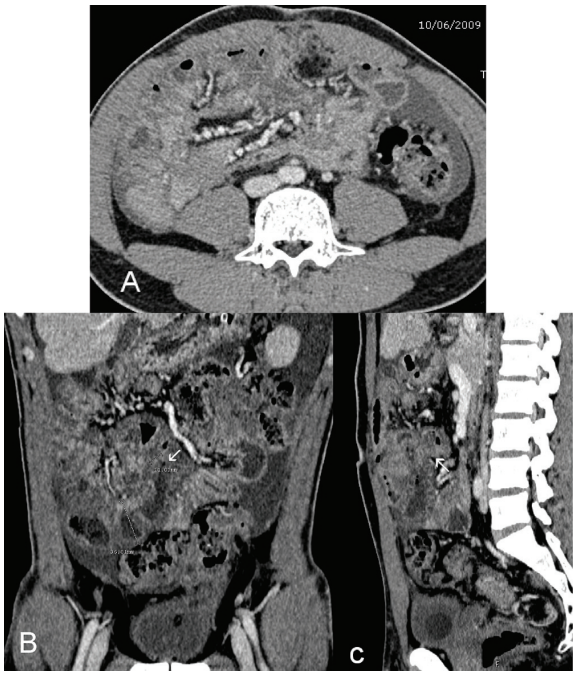

Fig. 1 CT scan in a 29-year old man with history colonic cancer at hepatic flexure S/P right half-colectomy and adjuvant chemotherapy presented with vomiting. (A) Axial CT scan shows ascites and very difficult to determine obstruction; confidence score: 3. (B) Coronal CT and (C) sagittal CT scans improved depicting the transition point, dilated and collapsed small bowel loops. Confidence score rated as 4. The patient had partial small bowel obstruction and was treated conservatively.

In addition, the authors reported high sensitivity of axial scan alone in this study. The present results also support that the axial scans CT is an excellent modality for diagnosis of bowel obstruction.

There were three false negative cases that MPR did not help correct the diagnosis, which was composed of one case of small bowel and two cases of large bowel. One of which was a 71-year-old man with known rectal lymphoma who presented with constipation. On the CT images, there was a rectal mass and no evidence of bowel loop discrepancy or proximal bowel loop dilatation (measured less than 6 cm in caliber). In fact, with lymphoma, although the bowel lumen may be narrowed, obstruction is uncommon. In combination with history of rectal lymphoma and CT findings. However, the bowel obstructive condition in this patient could not be suggested by imaging. Clinical status would be a better indicative way (Fig. 2). In addition, it demonstrated the two false negative cases, which were treated conservatively and documented of partial obstruction in medical record, despite no definite bowel loops discrepancy on CT and confidence scores 1 (definitely absent). This denoted that the obstructive condition was reported by clinical evidence (Fig. 3).

As reported by Jaffe(6) and Hodel(4), MPR increased the confidence levels in evaluation small bowel obstruction and locating transition point. The authors supported those by the data of this study that the axial plus MPR scans can give more confidence in the presence of bowel obstruction in one patient with small bowel obstruction (Table 3). The readers had changed confidence levels from "undetermined" on the axial images to "probably present" obstruction on axial plus MPR images and yielded the correct diagnosis, because the discrepancy between bowel loops and transition points were more clearly demonstrated on the other planes (Fig. 1).

On the contrary, the authors showed that MPR could misread confidence in one case in the setting of absent a small bowel obstruction (Table 4). The reader misread "probably present" obstruction on the axial plus MPR scans because of more obvious jejunal dilatation seen on coronal plane (about 3.9 cm in maximal diameter). Actually, this patient had the diagnosis of bowel ileus due to hypoalbuminemia (Fig. 4). No impression of the confidence among the large bowel groups was observed.

According to the mentioned results, the authors observed that MPR may be valuable in increasing diagnostic accuracy and confidence,

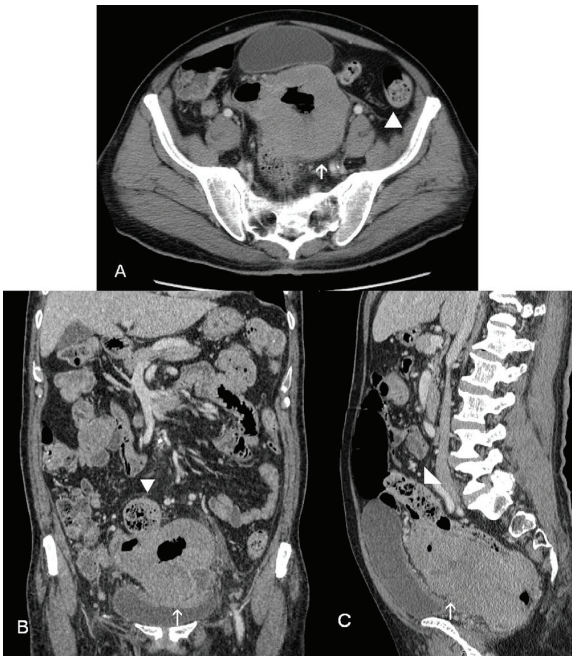

Fig. 2 False negative case in 71-year-old man with known rectal lymphoma presented with constipation. (A) Axial CT (B) coronal CT and (C) sagittal scans show rectal mass (arrow) and no evidence of bowel loop discrepancy or proximal bowel loop dilatation (measured less than 6 cm in caliber) (confidence scores of both scan were 2) (arrow head; sigmoid colon). The patient had clinical status of large bowel obstruction and underwent sigmoid loop colostomy.

Fig. 3 False negative case in a 75-year-old woman with no known underlying disease presenting with clinical gut obstruction. On the axial CT scan (A), demonstrate evidence of gallstone pancreatitis and the coronal CT scan (B) show diffuse small bowel and large bowel dilatation without definite bowel loops discrepancy (Confidence scores of both scan were 1). In this patient, the gallstone pancreatitis and partial small bowel obstruction were documented in medical record.

especially for small bowel evaluation, but not for the large bowel. However, false positive interpretation by this diagnostic tool should be kept in mind.

In conclusion, although these results showed that MPR did not impressively increase performance in diagnosis of bowel obstruction, the authors believe that they are still valuable. The reason is that MPR, especially coronal images, displays as the whole perspectives of bowel orientation, which give an idea as a roadmap to the surgeons for planning appropriate treatment (Fig. 5, 6). Moreover, coronal images could display the whole, large bowel courses within only single section. The authors also believe that MPR may be more useful for young radiologists with limited experience. MPR images at least help those radiologists to confirm the abnormality found on axial images and give them more confidence for achieving definite diagnosis. Another observation from this study is that MPR may have promising role in diagnosis of low grade, small bowel obstruction, which has been reported low sensitivity. Further study in MPR evaluation of low grade, small bowel obstruction is interesting issue.

There were many limitations in the present study. First, the study was limited by its retrospective nature. Second, the number of patients was rather small for statistical analysis. Third, the patients with bowel obstruction can be treated in either surgical or conservative ways, which became another important limitation in our study. Not all the patients had surgical proof of an obstructive condition but were convinced by clinical evidence of bowel obstruction. Fourth, the CT diagnosis of bowel obstruction does not depend on only a single sign, but also is based on a combination of multiple findings including a discrepancy between the bowel loops, identification of transition zone as well as a presence of small bowel feces sign. Fifth, the evaluation of MPR images was done immediately

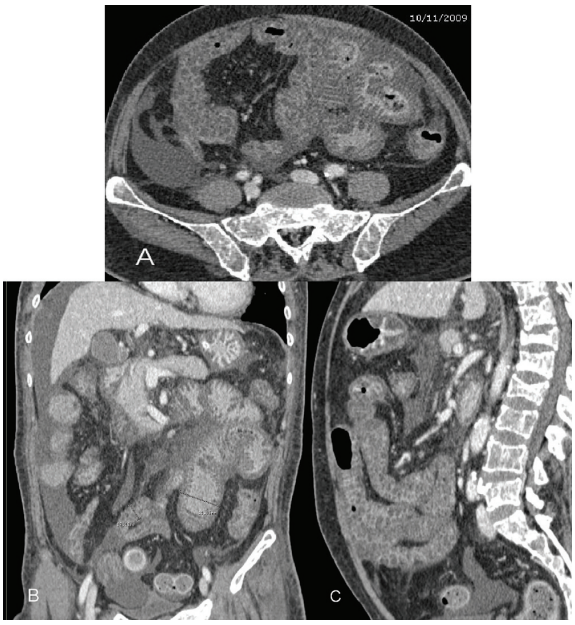

Fig. 4 CT scan in a 56-year old man with underlying multiple myeloma receiving chemotherapy was sent to rule out gut obstruction. (A) Axial CT scan shows diffuse dilated and smooth thickened bowel loops; confidence score: 2. (B) Coronal CT and (C) sagittal CT scans depict orientation of thickened jejunal and ileal loops, mimicking bowel loops discrepancy. The transition point is actually unclear. The reader misread and gave confidence score rated as 4. The bowel dilatation in this patient resulted from hypoalbuminemia state. His symptom improved after receiving intravenous human albumin treatment.

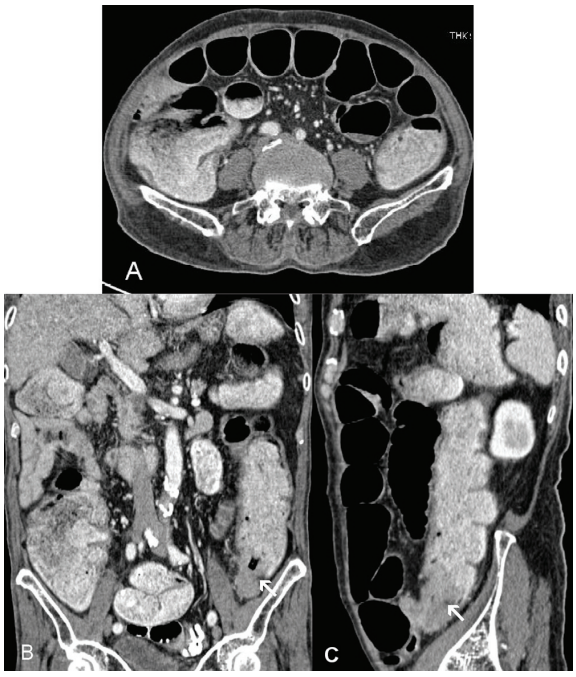

Fig. 5 CT scan in a 79 year old man with history of vomiting and constipation. (A) Axial CT scan demonstrates diffuse dilated large bowel and small bowel loops which the obstructed mass located in descending colon (not shown); confidence score: 5. (B) Coronal CT scan clearly demonstrates transition point at the distal descending colon with evidence of proximal large bowel loop dilatation; confidence score 5. (C) Sagittal CT scan shows another view that clearly defined obstructive point. The pathological report of this mass demonstrated adenocarcinoma.

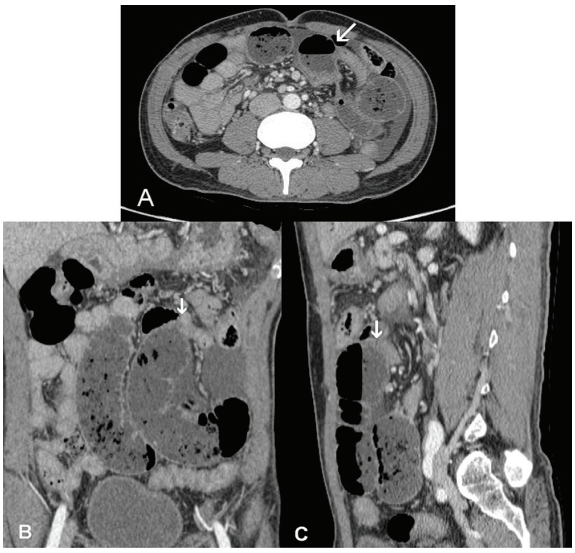

Fig. 6 CT scan in a 50-year old patient with history of CA ampulla S/P Whipple operation and chemotherapy presented with clinical gut obstruction. (A) Axial CT scan shows obviously dilated proximal jejunum and distal collapsed small bowel loops without definite mass at the point of obstruction; confidence score: 5. (B) Coronal CT scan demonstrates nicely C-shaped fluid filled loops, suggesting closed loop obstruction; confidence score 5. (C) Sagittal CT scan also confirms the transition point without definite mass. The patient found close loop jejunal obstruction from adhesion, confirmed surgically.

after assessment of axial images, which may bias the findings and confidence. However, this was exactly what we perform in routine practice. Last, the findings and diagnosis were decided by consensus between two readers. No interobserver variability is assessed in this study.

Conclusion

The axial scan CT is an appropriate modality for the patients suspected bowel obstruction because of high sensitivity, specificity, and accuracy. Even with the result of substantial improvement, the authors still encouraged using MPR as the adjunct tool to the axial images, especially in the case of suspected small bowel obstruction. As a result, MPR helps increasing diagnostic confidence and confirming the findings found on axial image. Nevertheless, those would benefit patient care.

Potential conflicts of interest

None.

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การศึกษาประโยชน์ที่ได้เพิ่มขึ้นในการวินิจฉัยภาวะลำไส้อุดกั้นจากการสร้างภาพการตรวจช่องท้องในแนวแกนต่าง ๆ ด้วยเครื่องเอกซเรย์คอมพิวเตอร์ชนิดมัลติดีเทคเตอร์เมื่อเปรียบเทียบกับภาพการตรวจแนวตัดขวางเพียงอย่างเดียว

ชนิกานต์ แก้วปลั่ง, วรรณวรางค์ ตีรสมิทธ์, วรปารี สุวรรณฤกษ์

วัตถุประสงค์: *เพื่อศึกษาประโยชน์ที่ได้เพิ่มขึ้นในการวินิจฉัยภาวะลำไส้อุดกั้นจากการสร้างภาพการตรวจช่องท้องในแนวแกนต่าง ๆ ด้วยเครื่องเอกซเรย์คอมพิวเตอร์ชนิดมัลติดีเทคเตอร์เมื่อเปรียบเทียบกับภาพการตรวจแนวตัดขวางเพียงอย่างเดียว*

วัสดุและวิธีการ: *เป็นการศึกษาย้อนหลังระหว่างเดือนตุลาคม พศ. 2551 ถึง เดือนพฤษภาคม พศ. 2553 โดยทำการศึกษาในผู้ป่วย 75 ราย (76 การตรวจ) ที่เข้ารับการตรวจเอกซเรย์คอมพิวเตอร์ชนิดมัลติดีเทคเตอร์ เพื่อค้นหาภาวะลำไส้อุดกั้น ในจำนวนนี้มีผู้ป่วย 57 ราย (58 การตรวจ) ตรวจพบว่ามีภาวะลำไส้อุดกั้นจริงโดยวินิจฉัยจากการผ่าตัด หรือ มีอาการดีขึ้นหลังจากได้รับการรักษาแบบประคับประคอง ในกลุ่มนี้จำแนกเป็นลำไส้เล็กอุดกั้นจำนวน 25 กรณี และลำไส้ใหญ่อุดกั้นจำนวน 33 กรณี โดยรังสีแพทย์สองคน ซึ่งไม่ทราบการวินิจฉัยจะทำการแปลผลภาพการตรวจเอกซเรย์คอมพิวเตอร์ในแนวตัดขวางเพียงอย่างเดียวก่อน หลังจากนั้นจึงสร้างภาพการตรวจช่องท้องในแนวแกนต่าง ๆ แล้วแปลผลซ้ำอีกครั้งหนึ่ง โดยรังสีแพทย์จะต้องให้การวินิจฉัยและคะแนนความมั่นใจในกรณีที่ให้การวินิจฉัยว่ามีภาวะลำไส้อุดกั้นจะต้องระบุตำแหน่งที่อุดกั้น สาเหตุ ความรุนแรง และภาวะแทรกซ้อนด้วย*

ผลการศึกษา: *จากการศึกษาพบว่าการตรวจเอกซเรย์คอมพิวเตอร์ในแนวตัดขวางเพียงอย่างเดียวสามารถให้การวินิจฉัยภาวะลำไส้อุดกั้นได้ 54 กรณี และเพิ่มขึ้นเป็น 55 กรณี เมื่อแปลผลร่วมกับการสร้างภาพการตรวจช่องท้องในแนวแกนต่าง ๆ ทำให้การแปลผลโดยใช้ภาพแนวตัดขวางเพียงอย่างเดียวมีค่าความไวที่ 93.1% และความจำเพาะที่ 77.8% ในขณะที่เมื่อแปลผลร่วมกับภาพการตรวจในแนวแกนต่าง ๆ มีค่าความไวที่ 94.8% และความจำเพาะที่ 72.2% โดยพบว่าการแปลผลภาพการตรวจในแนวตัดขวางร่วมกับแนวแกนต่าง ๆ ช่วยให้การวินิจฉัยมีความแม่นยำ และความมั่นใจเพิ่มขึ้นในกรณีของผู้ป่วยรายหนึ่งที่มีภาวะลำไส้เล็กอุดกั้นที่ไม่รุนแรง ความแม่นยำในการวินิจฉัยภาวะลำไส้ใหญ่และลำไส้เล็กอุดกั้นอยู่ที่ 90% และ 88.5% ตามลำดับ สำหรับการแปลผลด้วยภาพแนวตัดขวางเพียงอย่างเดียว และเมื่อแปลผลร่วมกับการสร้างภาพการตรวจช่องท้องในแนวแกนต่าง ๆ จะมีค่าความแม่นยำอยู่ที่ 90% สำหรับภาวะลำไส้ใหญ่อุดกั้น และ 92.3% สำหรับภาวะลำไส้เล็กอุดกั้น*

สรุป: *การตรวจเอกซเรย์คอมพิวเตอร์ในแนวตัดขวางเป็นการตรวจที่เหมาะสมสำหรับผู้ป่วยที่สงสัยภาวะลำไส้อุดกั้น อย่างไรก็ตาม การแปลผลร่วมกับภาพการตรวจในแนวแกนต่าง ๆ จะช่วยเพิ่มความแม่นยำและเสริมความมั่นใจในการวินิจฉัยมากขึ้น โดยเฉพาะในกรณีที่สงสัยภาวะลำไส้เล็กอุดกั้น*