The Value of MDCT Scans in Differentiation between Benign and Malignant Gallbladder Wall Thickening

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Objective: *To evaluate the value of MDCT in differentiation of gallbladder carcinoma from other benign conditions in patients with thickened gallbladder wall.*
Material and Method: *MDCT of 125 patients, 18 gallbladder carcinomas and 107 other benign conditions were retrospectively reviewed. Various direct and indirect CT findings of benign and malignant gallbladder diseases were evaluated. Differences in CT findings between benign and malignancy were calculated using Chi-square test and odds ratio. Additionally, the wall enhancement pattern was evaluated and categorized into five types, according to the presence of striation, thickness of the outer and inner layers, and degree of enhancement of each layer compared with that of normal liver parenchyma. The diagnostic performance of enhancement pattern analysis on MDCT was analyzed.*
Results: *Five direct and five indirect CT findings including wall irregularity, focal wall thickening, discontinuous mucosa, submucosal edema, polypoid mass, direct invasion to adjacent organ, biliary obstruction, regional and paraaortic lymphadenopathy and distant metastasis show significant differences between benign and malignancy. The thickened gallbladder wall with one-layer heterogeneous enhancement (type 1) was significantly associated with malignancy. By using type 1 enhancement pattern as the predictor for malignancy, the sensitivity, specificity, and accuracy of MDCT for detection of malignancy was 78%, 94% and 92%, respectively.*
Conclusion: *MDCT is a reliable diagnostic method for differentiating between benign and malignant thickened gallbladder wall. Focal and irregular wall thickening are two direct signs that most associated with malignancy. Moreover, the one-layer heterogeneous enhancement of gallbladder wall is suggestive of malignancy.*

Keywords: *Gallbladder carcinoma, Gallbladder wall thickening*

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Gallbladder carcinoma is the sixth most common gastrointestinal tract malignancy in the United states[1]. In Thailand, the estimated incidence rate of gallbladder carcinoma and extrahepatic bile duct malignancies during 1995-1997 was 1.6 and 2.4 per 100,000 among males and females, respectively[2].

Gallbladder carcinoma may appear as a mass completely replacing the gallbladder (40-65%), an intraluminal polypoid lesion (15-25%), or a focal or diffuse asymmetric gallbladder wall thickening (20-30%)[1]. Unfortunately, gallbladder wall thickening is one of the most common abnormal incidental findings on radiologic examination. This finding is nonspecific and can be seen in many benign gallbladder conditions, such as acute cholecystitis and chronic cholecystitis, xanthogranulomatous cholecystitis, adenomyomatosis. Moreover, thickened gallbladder wall can be secondary to extracholecystic conditions such as hepatitis, heart failure, hypoalbuminemia and acute severe pyelonephritis, to name a few[3,4]. Most benign gallbladder diseases are managed by laparoscopic cholecystectomy, simple cholecystectomy, or conservative treatments. On the contrary, laparoscopic cholecystectomy is contraindicated in gallbladder carcinomas due to the risk of tract seeding[5-8]. The curative surgery for most gallbladder carcinomas is radical resection, which includes cholecystectomy with resection of adjacent liver segments and lymph nodes[3,4]. Therefore, the accurate preoperative differentiation between gallbladder carcinoma and other benign conditions is important.

MDCT scan is one of the most useful investigative methods in evaluating the patients with abdominal conditions. Given the high spatial

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resolution of MDCT, the gallbladder wall and wall enhancement pattern can be evaluated in great anatomical detail. On contrast-enhanced CT, the normal gallbladder wall is usually perceptible as a thin enhancing rim of soft tissue density. Although its thickness depends on the degree of gallbladder distention, 3 mm is generally regarded as the upper limit of normal finding(7).

The purpose of the present study was to evaluate the value of MDCT in differentiation of gallbladder carcinoma from other benign conditions in patients with thickened gallbladder wall.

Material and Method

This retrospective study was conducted with approval from Siriraj Hospital institutional review board.

Patients

Between January 2005 and December 2008, 2,815 patients underwent cholecystectomy at Siriraj Hospital. Additionally, the authors included eight patients that had histological diagnosis of gallbladder carcinoma, diagnosed by biopsy during open laparotomy during the same period.

Among 2,823 patients, 434 patients had preoperative MDCT examinations available on the picture archiving and communications system (PACS). Three hundred nine patients were excluded from the present study due to one of the following reasons, the interval between the MDCT examination and surgery exceed 90 days (n = 55), patients had undergone cholecystectomy due to the conditions other than gallbladder disease (for example, the patients that underwent hepatectomy for hepatocellular carcinoma or Whipple's operation for periampullary carcinoma) (n = 160), the presence of gallbladder replacing mass on MDCT (n = 5), or maximal gallbladder wall thickness was less than 3 mm (n = 89). Finally, the remaining 125 patients were included in the present study.

Of these 125 cases, the pathological diagnosis were gallbladder carcinoma in 18 patients (11 men, 7 women, mean age 64.61 years, range 29-90 years) and others benign conditions in 107 patients (60 men, 47 women, mean age 61.47 years, range 30-93 years). Among 107 patients with benign gallbladder conditions, 45 had complicated cholecystitis, 50 had chronic cholecystitis, seven had xanthogranulomatous cholecystitis, and five had adenomyomatosis. The mean interval time between the MDCT examination and surgery were 20.22 and 23.26 days for gallbladder carcinoma group and for the benign conditions group, respectively.

CT technique

All MDCT examinations were performed with one of the following MDCT scanners; a Lightspeed VCT (GE Healthcare) (n = 120); or a Somatom (Siemens) (n = 5). Each patient received 100 ml of nonionic intravenous contrast material at a rate of 3-5 ml/s using an automatic power injector. Non-contrast and portovenous phase (80 seconds after contrast injection) MDCT images were obtained during full inspiration. Image reconstructions were performed with 1.25-1.5 mm slice thickness.

Image interpretation

MDCT images were reviewed by consensus between two radiologists who had been working in the body imaging section for 5 and 10 years. The reviewers were aware of the present study design and that patients had a diagnosis of either gallbladder cancer or other benign gallbladder conditions, however, they had no knowledge of the clinical and final pathological diagnosis.

First, the greatest gallbladder wall thickness was measured with electronic calipers at a PACs workstation. All patients had a gallbladder wall thickening of greater than 3 mm, which is a previously established criterion for an abnormally thickened gallbladder wall(7).

Second, the thickened wall was evaluated for regularity (*i.e.*, smooth vs. irregularity), distribution (*i.e.*, focal vs. diffuse) and presence or absence of the following direct CT findings, discontinuous mucosal enhancement, submucosal edema, cystic space within thickened wall, calcified wall, polypoid mass, pericholecystic fluid, and pericholecystic fat stranding. Submucosal edema was defined as a ''halo'' of low-attenuation surrounding the enhancing mucosa. This can be distinguished from pericholecystic fluid by demonstrating small enhancing punctate structures within the edematous wall(7). The cystic space within the thickened wall was characterized by intramural hypoattenuated nodule in the thickened gallbladder wall(9-11).

Third, reviewers determined the presence or absence of indirect CT signs of malignancy, including direct invasion to liver and adjacent organs, biliary obstruction by a gallbladder lesion, regional lymphadenopathy, paraaortic lymphadenopathy and distant metastasis. A lymphadenopathy is determined by its short axis greater than 1 cm[12,13].

Lastly, the enhancement pattern of the gallbladder wall was classified into five types, according to the presence of striation, thickness of the outer and inner layers, and the degree of enhancement of each layer compared with that of normal liver parenchyma. These enhancement patterns of gallbladder wall were first introduced by Kim et al[14]. The diagnostic algorithm of the enhancement pattern is summarized in Fig. 1.

Statistical analysis

All quantitative data, including the patients' age, interval between CT examination and operation, and maximal gallbladder wall thickness, were reported as the mean $\pm$ standard deviation (SD). Comparison among these data between groups was accomplished by unpaired t-test.

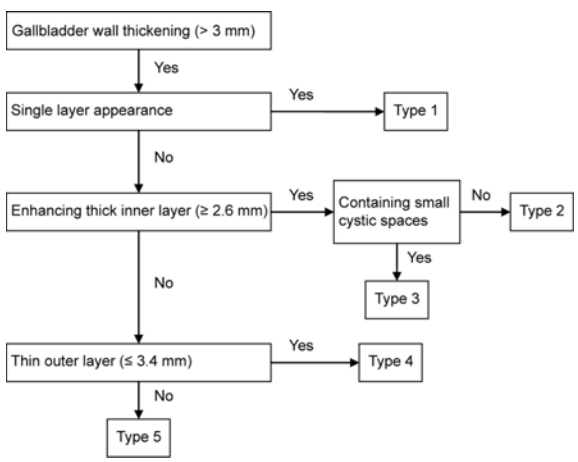

Fig. 1 Diagram illustrates a diagnostic algorithm of the enhancement pattern (adapted from Kim et al, 2008[14]. Enhancement was classified as one of five patterns: type 1 was a one-layer pattern, and types 2-5 were two-layer patterns. Type 1 pattern was a heterogeneously enhancing one-layer gallbladder wall or indistinguishable layering of the gallbladder wall; type 2, strongly enhancing thick inner layer ($\geq$ 2.6 mm) and weakly enhancing or nonenhancing thin outer layer ($\leq$ 3.4 mm); type 3, borderline enhancement and thickness of the inner layer with small cystic spaces and nonenhancing outer layer; type 4, weakly enhancing thin inner outer layer; type 4, weakly enhancing thin inner layer and nonenhancing thin outer layer; and type 5, weakly enhancing thin inner layer and nonenhancing thick outer layer

Each direct and indirect CT signs were compared between benign and malignancy by using Chi-square test. A p-values less than 0.05 were considered statistically significant differences. Odds ratios with 95% confidence interval of each signs were obtained. Statistical analysis was performed using a statistical software package (SPSS, version 11.5).

The correlation between wall enhancement patterns and the final diagnosis were analyzed. The diagnostic performance of wall enhancement pattern using one-layer heterogeneous enhancement (type 1) as the predictor for malignancy was analyzed and displayed by sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy.

Results

In the present study, gallbladder carcinoma more frequently manifest as gallbladder wall thickening (13 of 18, 72.22%) than intraluminal polypoid mass (5 of 18, 27.78%). Mean gallbladder wall thickness of gallbladder carcinoma (13.66 $\pm$ 12.17 mm) is significantly greater than in benign conditions (6.68 $\pm$ 2.79 mm) ($p < 0.01$).

By using the wall thickness of greater than 6.5 mm as a cut-off value for diagnosis of gallbladder carcinoma, the sensitivity and specificity were 77.8% and 59.8%, respectively.

The MDCT findings of gallbladder carcinomas and other benign gallbladder conditions were compared and summarized in Table 1 and 2.

Among nine direct signs, the presence of wall irregularity, focal wall thickening, discontinuous mucosa, polypoid mass, and the absence of submucosal edema were significantly associated with gallbladder carcinoma rather than benign conditions ($p \leq 0.01$), whereas the presence of cystic space within the gallbladder wall, calcified wall, pericholecystic fat stranding and pericholecystic fluid did not show significant differences between two groups.

Of 15 patients who demonstrated cystic spaces within thickened gallbladder wall, four patients have adenomyomatosis, three had complicated cholecystitis, two had xanthogranulomatous cholecystitis, six had chronic cholecystitis, and none had gallbladder carcinoma.

All indirect CT findings including the presence of direct invasion to liver, distant metastasis, biliary obstruction from gallbladder lesion, regional and paraaortic lymphadenopathy showed statistical significant differences between benign and malignancy.

Table 1. The comparison between MDCT findings of gallbladder carcinomas and benign gallbladder conditions - Direct signs

Direct signs	Gallbladder cancer (n = 18)	Benign gallbladder conditions (n = 107)	Odds ratio (95%confidence interval)	p-value
	Present (%)	Present (%)		
Irregular wall thickening	15 (83.3)	28 (26.2)	14.1 (3.8-52.6)	0.000*
Focal wall thickening	13 (72.2)	17 (15.9)	13.8 (4.3-43.7)	0.000*
Discontinuous mucosa	11 (61.1)	24 (22.4)	5.4 (1.9-15.5)	0.001*
Submucosal edema	4 (22.2)	75 (70.1)	0.1 (0.03-0.4)	0.000*
Cystic space within GB wall	0	15 (14.0)	N/A	0.125
Calcified wall	0	5 (4.7)	N/A	1.000
Polypoid mass	5 (27.8)	1 (0.9)	40.8 (4.4-376.5)	0.000*
Pericholecystic fat stranding	11 (61.1)	60 (56.1)	1.2 (0.4-3.4)	0.690
Pericholecystic fluid	2 (11.1)	33 (30.8)	0.3 (0.06-1.3)	0.085

* Significant difference (statistical significance threshold: $p < 0.05$)

Table 2. The comparison between MDCT findings of gallbladder carcinomas and benign gallbladder conditions - Indirect sign

Indirect sign	Gallbladder cancer (n = 18)	Benign gallbladder conditions (n = 107)	Odds ratio (95%confidence interval)	p-value
	Present (%)	Present (%)		
Direct invasion to liver and other organs	9 (50.0)	1 (0.9)	106.0 (12-933.2)	0.000*
Biliary obstruction	11 (61.1)	2 (1.9)	82.5 (15.2-447)	0.000*
Regional lymphadenopathy	17 (94.4)	24 (22.4)	58.8 (7.4-464.6)	0.000*
Paraaortic lymphadenopathy	7 (38.9)	1 (0.9)	67.5 (7.6-599.9)	0.000*
Distant metastasis	5 (27.8)	0	N/A	0.000*

* Significant difference (statistical significance threshold: $p < 0.05$)

Biliary obstruction was more common in patients with gallbladder carcinoma (11/18, 61.1%) than in patients with benign gallbladder conditions (2/107, 1.9%) ($p < 0.01$) (Table 2).

Regional lymphadenopathy was seen in 17 of 18 patients (94%) with gallbladder carcinoma, while it was seen in 24 of 107 patients (22%) with benign gallbladder conditions ($p < 0.01$). Seven patients (39%) with gallbladder carcinoma demonstrated enlarged paraaortic lymph nodes, whereas all except one patient (0.9%) with benign gallbladder disease showed no paraaortic lymphadenopathy ($p < 0.01$) (Table 2). The correlation of wall enhancement patterns and the final diagnosis are summarized in Table 3. A typical example of each enhancement pattern is demonstrated in Fig. 2. According to the present results, type1 enhancement pattern was mostly associated with malignancy while type 2 was nonspecific and type 3, 4, 5 were more associated with benign conditions. The selective analysis of type 1 enhancement pattern in differentiation of benign and malignancy showed 78% and 94% sensitivity and specificity. The PPV, NPV and accuracy were 70%, 96% and 92%, respectively.

Discussion

Gallbladder carcinoma usually manifests as right upper quadrant pain simulating the other benign inflammatory conditions of the gallbladder. Approximately one-third of gallbladder carcinomas present as focal or diffuse gallbladder wall thickening on imaging studies[4,13], however, this finding is nonspecific and commonly seen in other benign conditions[4,7]. An accurate differentiation between these two groups is very important for treatment planning.

Regarding the gallbladder wall thickness, the authors found that gallbladder carcinomas tended to have a thicker wall (13.66 $\pm$ 12.17 mm) than the

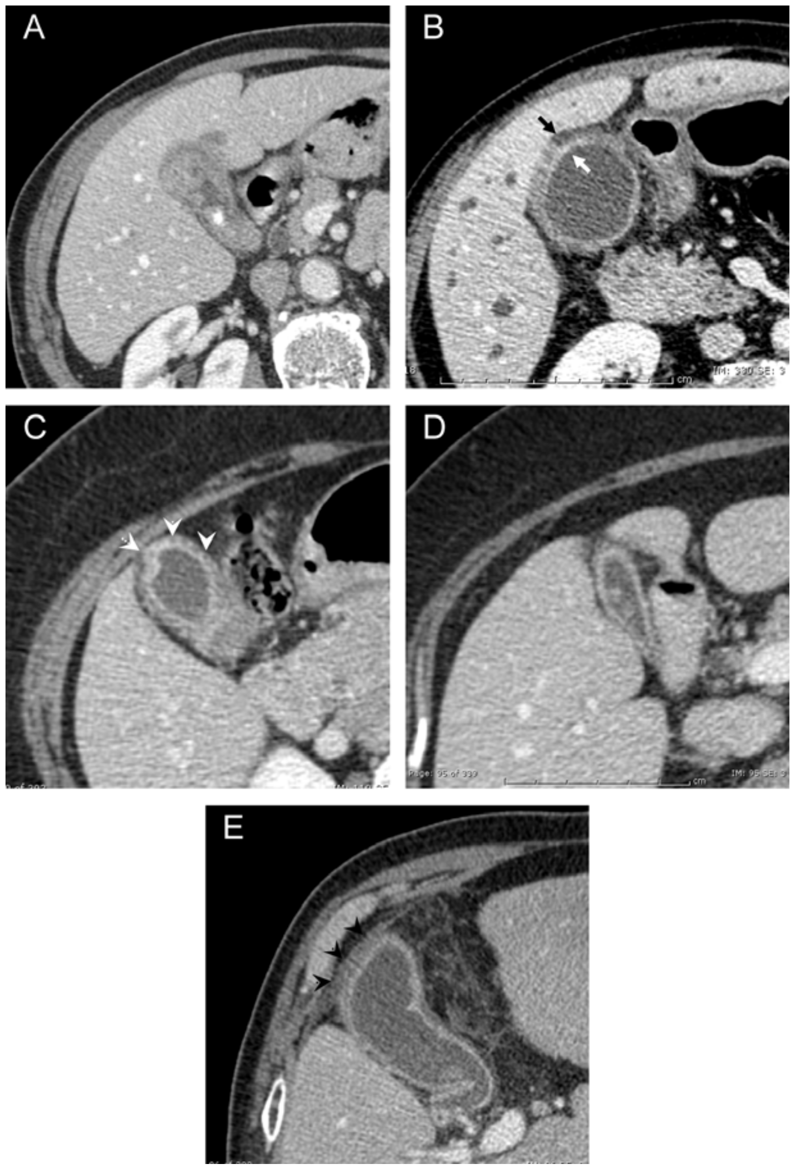

Fig. 2 Five enhancement patterns of gallbladder wall thickening on portovenous phase; A) Type 1; 78-year-old man with gallbladder carcinoma, moderately differentiated adenocarcinoma. Contrast-enhanced CT scan shows focal irregular gallbladder wall thickening with single layer heterogeneous enhancement. Gallstone is also noted. B) Type 2; A 70-year-old man with gallbladder carcinoma, moderately differentiated adenocarcinoma. Contrast-enhanced CT scan shows smooth gallbladder wall thickening with double layer appearance. Strongly enhancing thick inner layer ($\geq$ 2.6 mm) (white arrow) and weakly enhancing thin outer layer ($\leq$ 3.4 mm) (black arrow) are demonstrated. Dilatation of intrahepatic bile ducts is also noted. C) Type 3; 51-year-old woman with chronic cholecystitis with focal adenomatous hyperplasia. Contrast-enhanced reveals diffuse gallbladder wall thickening with multiple small intramural cystic spaces (white arrowhead). Borderline enhancement and thickness of the inner layer with non enhancing outer layer are demonstrated. D) Type 4; 65-year-old female with chronic cholecystitis. Contrast-enhanced CT scan shows weak enhancement of thin inner layer and non enhancing outer layer. Gallstones are also noted. E) Type 5; 78-year-old with acute suppurative cholecystitis, Axial enhanced CT scan revealed gallbladder wall thickening with a weakly enhancing thin inner layer with non enhancing thick outer layer (black arrowhead). Gallstone at gallbladder neck is seen. Pericholecystic fat stranding and pericholecystic fluid are shown

Table 3. Correlation of wall enhancement patterns and pathological diagnoses of gallbladder diseases

Enhancement pattern	Number of patients (%)					Total
	Gallbladder carcinoma	Complicated cholecystitis	XGC*	Adeno-myomatosis	Chronic cholecystitis	
Type 1	14	2	3	0	1	20
Type 2	3	3	1	0	6	13
Type 3	0	3	1	4	6	14
Type 4	0	5	0	0	17	22
Type 5	1	32	2	1	20	56
Total	18	45	7	5	50	125

* Xanthogranulomatous cholecystitis

benign conditions (6.68 $\pm$ 2.79 mm). However, the wide range of standard deviation results in a considerable overlap between benign and malignancy.

Several studies have reported useful radiographic signs to differentiate gallbladder carcinoma from benign conditions, including irregular and focal wall thickening, discontinuous mucosal enhancement, submucosal edema, cystic space within thickened wall, calcified wall, gallstone, polypoid mass, pericholecystic fluid and pericholecystic fat stranding(7,10,15-17). Among those signs, the authors found that irregular and focal wall thickening offer the highest values for predicting malignancy (odd ratio = 13.8-14.1).

Similar to the prior studies(10,11,16), the authors found that the presence of submucosal edema and cystic space within thickened gallbladder wall favors a benign conditions. The former represents an area of inflammatory cells and fluid accumulation in response to inflammatory process(15,16) whereas the latter represents either dilated Rokitansky-Aschoff sinus in adenomyomatosis or xanthogranuloma in xanthogranulomatous cholecystitis(9-11). All patients (n = 15) with cystic spaces within thickened gallbladder wall in the present series had benign gallbladder diseases, including four of five patients with adenomyomatosis, three of 45 patients with complicated cholecystitis, two of seven patients with xanthogranulomatous cholecystitis and six of 50 patients with chronic cholecystitis. This CT finding was not seen in any cases of gallbladder carcinoma.

The present results show that pericholecystic fat stranding and pericholecystic fluid are not useful signs for differentiation between benign and malignancy, since it did not differ statistically significantly in either conditions. These observations are similar to several prior studies(10,16,17).

The associated indirect CT findings suggestive of malignancy include direct invasion to liver and adjacent organs, biliary obstruction, regional and paraaortic lymphadenopathy and distant metastasis(12,16-18). Among these indirect signs, regional lymphadenopathy is by far the most common findings associated with gallbladder carcinomas in the present series (94.4%), followed by biliary obstruction (61.1%) and direct invasion to other organs (50%). In contrast, regional lymphadenopathy and biliary obstruction were seen in only 22.4% and 1.9% of benign cases, respectively. The direct invasion to adjacent organs is seen in one xanthogranulomatous cholecystitis patient (0.9%) in whom the extension of inflammatory process into the liver mimic tumor invasion (Fig. 3).

Recently, Kim et al analyzed the enhancement patterns of thickened gallbladder wall on MDCT in order to differentiate gallbladder cancer from benign gallbladder conditions(14). The authors classified wall enhancement into five patterns as described in Fig. 1. They found that about half of the patients with gallbladder carcinoma showed strongly enhancing thick inner wall with weakly enhancing thin outer layer (type 2) and 35% manifested as heterogeneous enhancing one-layer gallbladder wall (type 1), while most benign gallbladder conditions showed weak or borderline enhancing thin inner layer, non-enhancing outer layer with or without small cystic spaces within the wall (type 3, 4 or 5). Besides, most of type 2 wall enhancements in their series are gallbladder carcinoma, hence, they proposed that type 2 wall enhancement indicates a malignancy rather than benign disease.

Unlike their results, most gallbladder carcinomas in the present series manifested as type 1

(14/18, 78%), followed by type 2 (3/18, 17%). One patient showed type 5 wall-enhancement (Fig. 4). In the present series, the majority of type 2 wall enhancement had chronic cholecystitis (6/13, 46%) (Fig. 5), while three patients (23%) had gallbladder carcinoma and four remaining patients (31%) have other benign gallbladder conditions.

Based on the present results, type 2 wall enhancement is not specific for malignancy. The discrepancy between the present results and theirs is likely due to the large difference in number of patients in each group. The present study population consisted of a considerably higher proportion of chronic cholecystitis compared to those of Kim et al study. As a result, the authors encountered more cases of chronic cholecystitis associated with type 2 wall enhancement. Considering that the incidence of chronic cholecystitis in the general population predominantly outnumbers gallbladder carcinoma, this may lead to high false-positive rate if gallbladder carcinoma is diagnosed based on type 2 wall enhancement. However, the authors support Kim's observation that type 1 wall enhancement favors a malignancy, whereas type 3, 4, 5 are suggestive of benign conditions.

By using type 1 wall enhancement to differentiate benign and malignancy, the authors achieve sensitivity, specificity, and NPV of 78%, 94%, and 96%, respectively. Since some benign conditions of gallbladder can be managed with conservative treatment, or with less invasive surgical techniques such as laparoscopic cholecystectomy, whereas gallbladder carcinomas usually need more extensive surgical approaches. The high NPV of type 1 enhancement pattern in the diagnosis of gallbladder carcinoma could help physicians in treatment and surgical planning. Therefore, the authors believe that classification of gallbladder wall enhancement is a simple systematic method that could facilitate the differentiation between malignancy and benign gallbladder diseases.

The present study has several limitations. First, this is a retrospective study. Even though the reviewers were blinded to the final diagnosis, they were aware of the study design, and may sensitize toward the diagnoses of malignancy. Second, there are a small number of patients with gallbladder carcinoma due to the rarity of the disease. Furthermore, many patients with advanced inoperable disease are not included in the present study due to the lack of pathological diagnosis. Consequently, the total cases of gallbladder

Fig. 3 38-year-old man with xanthogranulomatous cholecystitis. The axial (a) and sagittal-oblique (b) CT scans reveal asymmetrical irregular gallbladder wall thickening with heterogeneous enhancement, type 1 enhancement pattern. Extension of the inflammatory process into adjacent liver was seen (black arrow)

Fig. 4 66-year-old man with gallbladder carcinoma, moderately differentiated adenocarcinoma. The axial (A) and coronal (B) enhanced CT scans showed irregular gallbladder wall thickening with weakly enhancing thin inner layer and non enhancing thick outer layer (white arrow), type 5 enhancement pattern. The disruption of gallbladder mucosa is noted (white arrowhead)

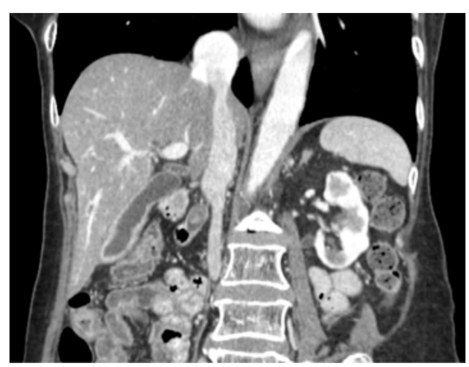

Fig. 5 47-year-old woman with chronic cholecystitis. Coronal oblique enhanced CT scan shows smooth gallbladder wall thickening with strong enhancing thick inner layer and weakly enhancing thin outer layer, type 2 enhancement pattern

carcinoma enrolled in this present study may be underestimated. Finally, some benign conditions such as adenomyomatosis may be underreported by pathologists because this condition is considered a benign finding.

Conclusion

MDCT is a reliable diagnostic method for differentiating between benign and malignant thickened gallbladder wall. Focal and irregular wall thickening are two direct CT signs that are most associated with malignancy. Moreover, the one-layer heterogeneous enhancement of gallbladder wall is highly suggestive of malignancy.

Potential conflicts of interest

None.

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ความแตกต่างของภาพคอมพิวเตอร์สแกนชนิดมัลติดีเทคเตอร์ในผู้ป่วยมะเร็งถุงน้ำดีเปรียบเทียบกับโรคถุงน้ำดีอื่น ๆ ในผู้ป่วยที่มีผนังถุงน้ำดีหนาตัว

รณิษฐา ทองดี, พนิตพงศ์ มารุ่งโรจน์, วรรณวรางค์ สุทธิคีรี

วัตถุประสงค์*: เพื่อศึกษาลักษณะภาพเอกซเรย์คอมพิวเตอร์ชนิดมัลติดีเทคเตอร์ของผู้ป่วยโรคมะเร็งถุงน้ำดีเปรียบเทียบกับโรคถุงน้ำดีอื่น ๆ ที่ไม่ใช่มะเร็ง ในกลุ่มผู้ป่วยที่มีผนังของถุงน้ำดีหนาตัว*

วัสดุและวิธีการ*: โดยการศึกษารวบรวมข้อมูลและแปลผลภาพคอมพิวเตอร์สแกนชนิดมัลติดีเทคเตอร์ของผู้ป่วยที่มีผนังถุงน้ำดีหนา และได้รับการวินิจฉัยเป็นโรคมะเร็งถุงน้ำดีจำนวน 18 ราย และเป็นโรคถุงน้ำดีอื่นที่ไม่ใช่มะเร็งจำนวน 107 ราย ที่ได้รับการรักษาในโรงพยาบาลศิริราช ระหว่างเดือน มกราคม พ.ศ. 2548 ถึงเดือน ธันวาคม พ.ศ. 2551 และวิเคราะห์ความแตกต่างของลักษณะภาพคอมพิวเตอร์สแกนระหว่างผู้ป่วยทั้งสองกลุ่ม*

ผลการศึกษา*: พบว่าคอมพิวเตอร์สแกนที่มีลักษณะของผนังถุงน้ำดีหนาตัวขรุขระ ไม่สม่ำเสมอ มีความไม่ต่อเนื่องของเยื่อบุผิว หรือ เป็นก้อนเนื้อ มักพบในมะเร็งถุงน้ำดีได้บ่อยกว่าโรคถุงน้ำดีอื่น ๆ ที่ไม่ใช่มะเร็งอย่างมีนัยสำคัญทางสถิติ ในขณะที่ลักษณะที่มีการบวมของเนื้อเยื่อใต้เยื่อบุผิวจะพบในโรคถุงน้ำดีอื่น ๆ ที่ไม่ใช่มะเร็งได้มากกว่า ลักษณะทางอ้อมอื่น ๆ ที่พบร่วมกับโรคมะเร็งถุงน้ำดีได้บ่อยอย่างมีนัยสำคัญทางสถิติคือ การพบมีการลุกลามของโรคไปยังอวัยวะข้างเคียง มีต่อมน้ำเหลืองเฉพาะที่โต และมีการกระจายของโรคไปยังอวัยวะอื่น นอกจากนั้นลักษณะของผนังถุงน้ำดีหลังฉีดสารทึบรังสีที่เป็นแบบผนังหนาชั้นเดียวและมีสีไม่สม่ำเสมอ มีความจำเพาะ 94 เปอร์เซ็นต์ ต่อโรคมะเร็งถุงน้ำดี มีความไว 78 เปอร์เซ็นต์ และความแม่นยำ 92 เปอร์เซ็นต์ ในการแยกโรคมะเร็งถุงน้ำดีออกจากโรคถุงน้ำดีอื่น ๆ ที่ไม่ใช่มะเร็ง*

สรุป*: รูปร่างของผนังถุงน้ำดีที่หนาตัวและลักษณะของผนังถุงน้ำดีหลังฉีดสารทึบรังสีที่เห็นจากการตรวจคอมพิวเตอร์สแกนชนิดมัลติดีเทคเตอร์สามารถใช้ช่วยแยกโรคมะเร็งถุงน้ำดีออกจากโรคถุงน้ำดีชนิดอื่น ๆ ที่ไม่ใช่มะเร็งได้ดี*