European Journal of Radiology 84 (2015) 1835–1842

Contents lists available at ScienceDirect

European Journal of Radiology

journal homepage: www.elsevier.com/locate/ejrad

Comparative analysis of MDCT and MRI in diagnosing chronic gallstone perforation and ileus

Xinmei Liang, Wei Li, Binghui Zhao*, Lin Zhang, Yingsheng Cheng*

Department of Radiology, Shanghai Tenth People's Hospital, Tongji University, Shanghai 200072, China

ARTICLE INFO

Article history:
Received 29 January 2015
Received in revised form 2 June 2015
Accepted 10 June 2015

Keywords:
Gallstones
Gallbladder perforation
Ileus
CT
Magnetic resonance imaging

ABSTRACT

Object: To evaluate MDCT and MRI in identifying chronic gallstone perforation (GSP) and ileus, even the risk factors prior to perforation.
Methods: Twenty-three cases of gallstone ileus (GSI) and three cases of calculus gallbladder–choledochus perforation were scanned by MDCT before treatment. Meanwhile, twelve patients received two-view abdominal X-ray film and eight patients received MRI examination. All images were analyzed respectively and blindly to the results of surgery or interventional endoscopy, besides five cases of MDCT and one case of MRI images scanned before GSP were analyzed comparatively.
Results: MDCT could identify 100.0% of intestinal obstruction and pneumobilia of GSI, it had not statistical difference with abdominal X-ray film. But MDCT could differenciate and precisely locate 88.5% of the ectopic stone, higher than that of abdominal X-ray film (50%), p value < 0.05, moreover it presented cholecystitis, edema or discontinuous walls of gallbladder and intestine and bilio-enteral fistula (26.9%). MRI and MRCP could precisely visualize the fistula (100%) and the ruptured bile duct. Abnormal edema or thin gallbladder wall, large stone size (>2 cm) and incarceration in the neck of gallbladder, the blurring fat line between gallbladder and duodenum were considered main risk signs prior to GSP.
Conclusion: MDCT is being considered as an effective and reliable technique to identify GSP and GSI early, however MRI and MRCP will aid to differentiate the complex GSP. It will be a considerable prospective for MDCT and MRI to estimate the risk factors prior to gallbladder perforation.

1. Introduction

Chronic gallstone perforation (GSP) is type III of gallbladder perforation (GBP), less frequent but severe complication of chronic gallstone cholecystitis and mainly in elder people 60 years old. The median portion was about 10.1% (0–48.1%) of GBP and the median mortality rate was about 10.8%, as reported, gallstone ileus (GSI) was the most frequent acute abdomen followed by gallstone digestive tract perforation [1,2]. Many literatures emphasized that early diagnosis and effective treatment could decrease its complex complication and mortality rate [3,4].

Computed tomography, especially multi-detector CT (MDCT), had been regarded as an effective non-invasive imaging technology to diagnose GSP and GSI, due to its high resolution, two dimensional axial imaging and three dimensional visualization, which could directly show the signs of abnormal ectopic stone, ileus, even the fistulae and other secondary signs, for example, the biliary pneumatosis, edema wall of gallbladder or intestine and other related complications. It is showed that MDCT has the broad prospective in early diagnosing chronic GSP and GSI and guiding the prompt treatment. However, it is still difficult to solve the lower sensitivity in detecting the fistulae or bile duct rupture and it was rare to be reported to estimate the latent risk prior to GSP [5–9].

In our study, the admirable perspective of MDCT and MRI in identifying early chronic GSP and GSI was comparatively studied. And the risk signs of MDCT and MRI prior to GSP were also analyzed.

2. Materials and methods

2.1. Patients

From January 2009 to June 2014, twenty-six patients with GSP including 23 cases of GSI and 3 cases of calculous gallbladder-choledochous perforation (CGCP) were retrospectively reviewed, which were proven with surgery or interventional endoscopy

* Corresponding authors.
E-mail addresses: binghuizhao@163.com (B. Zhao), cjr.chengysh@vip.163.com (Y. Cheng).

http://dx.doi.org/10.1016/j.ejrad.2015.06.009
0720-048X/

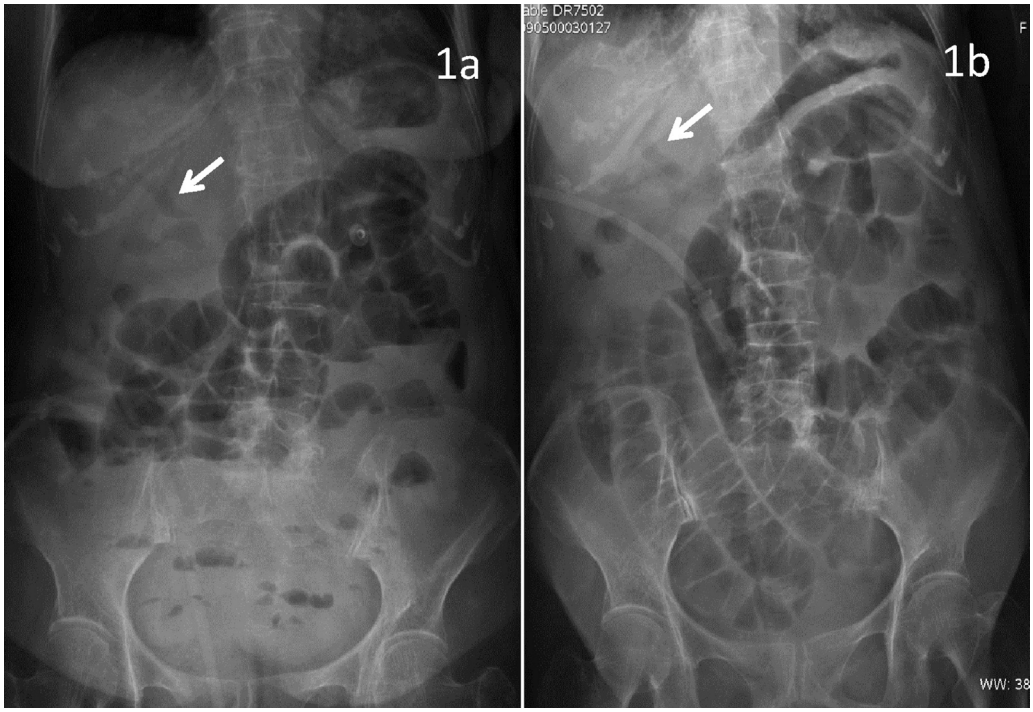

Fig. 1. Plain abdominal radiogram of standing position (1a) and flat lying position (1b) showed low SBO and pneumobilia (white arrow), however, the ectopic gallstone was not visualized assuredly.

in Shanghai Tenth People's Hospital, Tongji University. All cases were scanned by MDCT in 2–24 h when patients presented acute abdomen. Meanwhile, 12 cases were examined by two-view X-ray abdomen film, and 8 cases were examined by MRI in 36 h. Among of them, six patients were ever scanned by MDCT (5 cases) and MRI (1 case) before GSP, the interval was from one to seventeen months.

All patients included 9 male and 17 female, age ranged 39–89 years old (year), mean age 75.3 ± 12.6 year. All patients presented

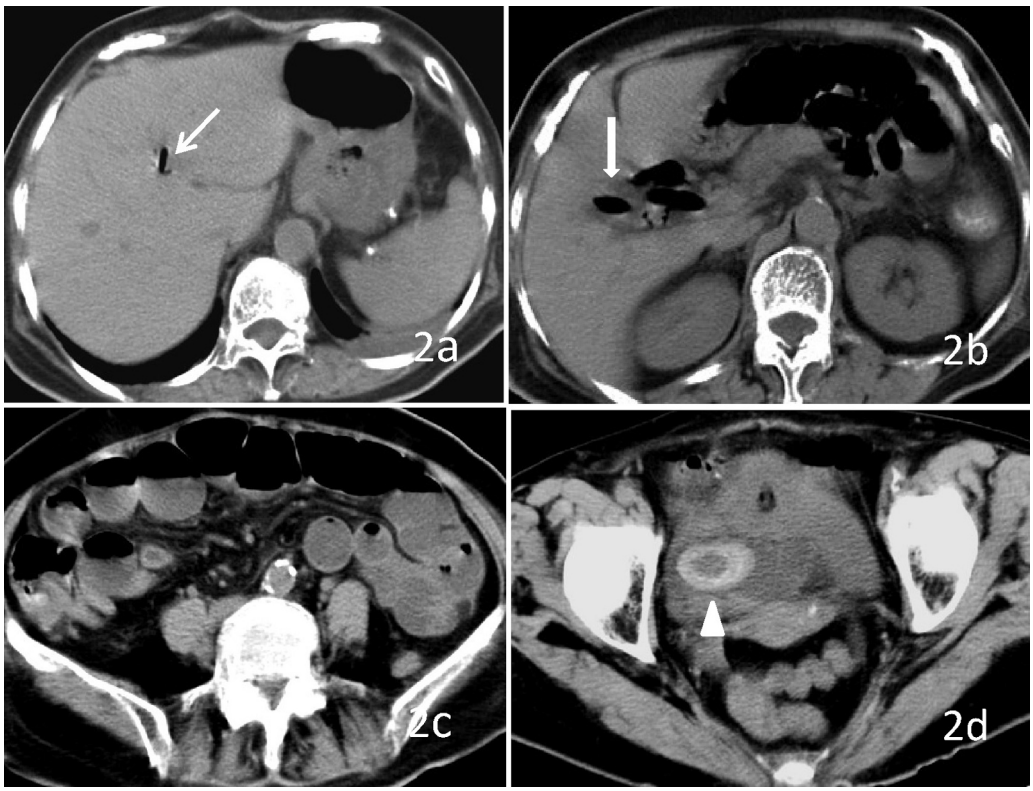

Fig. 2. The same case as the Fig. 1. MDCT showed pneumatosis in the bile duct lumen (2a) and gallbladder cavity (2b), low SBO (2c), and ectopic gallstone in ileum cavity (2d). The Rigler's triad was better visualized by MDCT than abdominial X-ray film in identifying ectopic stone and gallbladder abnormality.