



Title	Gallbladder torsion showing a "whirl sign" on a multidetector computed tomography scan.
Author(s)	Tajima, Yoshitsugu; Tsuneoka, Noritsugu; Kuroki, Tamotsu; Kanematsu, Takashi
Citation	American Journal of Surgery, 197 (1), pp.e9-e10; 2009
Issue Date	2009-01
URL	http://hdl.handle.net/10069/20852
Right	Copyright (c) 2009 Elsevier Inc. All rights reserved.

This document is downloaded at: 2019-09-20T18:42:52Z

Clinical Images

Gallbladder Torsion Showing a “Whirl Sign” on MDCT

Yoshitsugu Tajima, M.D., Ph.D., Noritsugu Tsuneoka, M.D., Ph.D., Tamotsu Kuroki, M.D., Ph.D., and Takashi Kanematsu M.D., Ph.D.,

Department of Surgery, Nagasaki University Graduate School of Biomedical Sciences, Nagasaki, Japan

Running title: Gallbladder Torsion Showing a “Whirl Sign”

Correspondence to: Yoshitsugu Tajima, M.D., Department of Surgery, Nagasaki University Graduate School of Biomedical Sciences, 1-7-1 Sakamoto, Nagasaki 852-8501, Japan

TEL: 81-95849-7316

FAX: 81-95849-7319

E-mail: ytajima@net.nagasaki-u.ac.jp

Summary

The contrast-enhanced multidetector computed tomography (MDCT) clearly demonstrated the twisted pedicle of the cystic duct and gallbladder mesentery on the right side of the gallbladder, thus showing a “whirl sign”, in an 82-year-old woman who presented with a 5-day history of right upper quadrant pain. The whirl sign on MDCT was highly suggestive of gallbladder torsion and therefore the patient underwent a cholecystectomy, thus resulting in a favorable outcome. This case suggested that the whirl sign on MDCT imaging is a key to the definitive diagnosis of gallbladder torsion.

Key words: gallbladder torsion, preoperative diagnosis, whirl sign, multidetector computed tomography (MDCT)

Abstract

An 82-year-old female presented with a 5-day history of right upper quadrant pain. A physical examination demonstrated a palpable tender mass in the right upper quadrant with Murphy's sign. The contrast-enhanced multidetector computed tomography (MDCT) clearly demonstrated the twisted pedicle of the cystic duct and gallbladder mesentery on the right side of the gallbladder, thus showing a "whirl sign", and a definitive diagnosis of gallbladder torsion was made. The patient underwent a cholecystectomy, resulting in a favorable outcome. The whirl sign on MDCT imaging can therefore be a key to making a definitive diagnosis of gallbladder torsion.

An 82-year-old female presented with a 5-day history of mild right upper quadrant pain. The patient's past medical history included serious angina pectoris treated with coronary artery bypass graft surgery (CABG). She was a thin elderly woman and her height and weight were 140 cm and 41 kg, respectively. On admission, her body temperature was 37.8 °C, pulse was 82/min, and blood pressure was 135/72 mmHg. A physical examination demonstrated a palpable tender mass in the right upper quadrant with Murphy's sign. Laboratory values were all within the normal limits except for an elevated white blood cell count of 16,800 / μ L (3,500-90,00) and C-reactive protein (CRP) of 10.83 mg/dl (< 0.17).

Abdominal ultrasonography (US) showed an enlarged gallbladder with a thickened wall. No calculi were seen in the biliary system. Multidetector computed tomography (MDCT) of the abdomen revealed a distended gallbladder with wall thickening and the accumulation of pericholecystic fluid. Furthermore, the contrast-enhanced MDCT clearly demonstrated a twisted pedicle of the cystic duct and gallbladder mesentery on the right side of the gallbladder, thereby showing a "whirl sign" (**Figure 1**), along with a slightly enhanced gallbladder wall. These findings were consistent with a diagnosis of incomplete torsion of the gallbladder.

After estimating the cardiac functional reserve by means of an ultrasound cardiogram and cardio-angiography, the patient underwent a cholecystectomy on the 9th day of admission. A laparoscopic procedure was initially attempted, but this was converted to an open laparotomy due to severe adhesion between the gallbladder and the surrounding viscera. The gallbladder was hard and strongly distended, but its wall was not gangrenous. A close examination revealed the gallbladder was connected to the liver bed by a short mesentery and rotated around its pedicle in a 180-degree clockwise direction (incomplete torsion). A simple cholecystectomy was performed in the routine

manner and the patient's postoperative course was uneventful.

Comments

Gallbladder torsion is a rare abdominal emergency that was first reported by Wendel¹ in 1898. It is generally due to anatomical variants of the peritoneal attachments between the gallbladder and the liver. Although gallbladder torsion has been described in all age groups, it is common in elderly women, especially those with visceroptosis, with a female to male ratio of 3:1. Two types of torsion have so far been documented: incomplete torsion with a rotation of less than 180°, resulting in recurrent biliary colic, and complete torsion with a greater than 180° rotation, resulting in gangrenous cholecystitis. Because the clinical manifestations of gallbladder torsion are similar to that of other acute abdominal conditions, the preoperative diagnosis of gallbladder torsion remains difficult and a definitive diagnosis is only made at surgery during most cases. Recently, the preoperative diagnosis of gallbladder torsion has been facilitated with the use of US, CT, or magnetic resonance imaging (MRI) techniques. Kitagawa *et al.*² formulated the following criteria for the diagnosis of torsion of the gallbladder; (1) fluid collection between the gallbladder and the liver bed indicates a floating gallbladder, (2) a gallbladder positioned horizontally along its long axis indicates a free-lying gallbladder, and (3) the presence of a well-enhanced cystic duct located on the right side of the gallbladder visualized on CT scan along with signs of inflammation indicates ischemia or necrotic change of the gallbladder. In the present case, MDCT was quite helpful in the diagnostic work-up of gallbladder torsion and for planning the treatment strategy. Specifically, contrast-enhanced MDCT imaging clearly demonstrated a “whirl sign” on the right side of the gallbladder along with a slightly

enhanced gallbladder wall. The whirl sign was initially described by Fisher³ as a CT finding in a case of midgut volvulus, where the center of the whirl sign consisted of the superior mesenteric artery. The gallbladder mesentery is thin and the whirl sign may thus be easiest to visualize when the plane of CT scanning is perpendicular to the axis of twisted gallbladder mesentery, however, this unique sign on a CT examination should be a definitive finding of gallbladder torsion. If the axis of the twisting of the mesentery is not perpendicular to conventional CT scanning, then multiplanar reconstruction images may be useful for accurately identifying the whirl sign.

In conclusion, MDCT provides an excellent image of the anatomic structure and pathologic condition of the gallbladder and the whirl sign on CT imaging can be a key to making a definitive diagnosis of gallbladder torsion.

References

1. Wendel AV. A case of floating gallbladder and kidney complicated by cholelithiasis with perforation of the gallbladder. *Ann Surg* 1898;27:199-202.
2. Kitagawa H, Nakada K, Enami T, Yamaguchi T, Kawaguchi F, Nakada M, Yamate N. Two cases of torsion of the gallbladder diagnosed preoperatively. *J Pediatr Surg*. 1997;32:1567-1569.
3. Fisher JK. Computed tomographic diagnosis of volvulus in intestinal malrotation. *Radiology* 1981;140:145-146.

Figure legend



Figure 1. Multidetector computed tomography (MDCT) of the abdomen with contrast material shows a twisted pedicle of the cystic duct and mesentery presenting with a “whirl sign”