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Case report

Laparoscopic cholecystectomy using the PINPOINT® Endoscopic Fluorescence Imaging System with intraoperative fluorescent imaging for acute cholecystitis: A case report

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ABSTRACT

We report on a laparoscopic cholecystectomy (LC) for acute cholecystitis (AC) using the bright field/full-color fluorescence laparoscope system PINPOINT® (Novadaq, Mississauga, ON, Canada).

The patient was an 85-year-old man who was diagnosed with moderate AC. Indocyanine green (ICG) was administered just before surgery, and we used only PINPOINT® to perform the LC. The advantage of this procedure is that it can be performed while viewing ICG fluorescence in the cystic duct. Since the gallbladder is imaged with this technique, it is also advantageous from the perspective of deciding at which layer to detach the gallbladder from the liver. The operative time was 81 minutes, and blood loss was 5 ml. There were no perioperative complications, and the patient was discharged on post-operative day 6.

1. Introduction

Agha RA, Fowler AJ, Saetta A, Barai I, Rajmohan S, Orgill DP, for the SCARE Group. The SCARE Statement: Consensus-based surgical case report guidelines. International Journal of Surgery 2016 2016;34:180–186.

Cholecystectomy has been widely accepted as an effective treatment for acute cholecystitis (AC). The Tokyo Guidelines for the management of acute cholangitis and cholecystitis (TG07) were published in 2007 as the world's first guidelines for acute cholangitis and cholecystitis [1]. Updated Tokyo Guidelines (TG13) were published in 2013 [2]. The TG13 recommend laparoscopic cystectomy (LC) for the treatment of mild or moderate AC, and randomized controlled studies have shown benefits of early intervention [3,4].

LC for AC is more difficult to perform than LC for non-AC [5]. Intraoperative cholangiography is necessary to avoid bile duct injury when the identification of a cystic duct and common bile duct is difficult [6]. We reported on intraoperative indocyanine green (ICG) fluorescence cholangiography [7]. In this report, ICG was administered before the LC, and by using PINPOINT®, a bright-field, full-color, near-infrared fluorescence laparoscope, we obtained visualization equal to intraoperative conventional cholangiography. We report on an LC for AC using the PINPOINT® Endoscopic Fluorescence Imaging System, as we could not find previous reports on the technique in this setting.

1.1. Case presentation

An 85-year-old man presented to our hospital with pain in the right hypochondrium that had been present for 2 days. A painful mass was palpated in the right hypochondrium. Blood work showed elevation of white blood cell count (WBC; 22,900/μl), C-reactive protein (CRP; 2.21 mg/dl), and total bilirubin (T-Bil; 1.6 mg/dl). Abdominal computed tomography (CT) showed thickening of the gallbladder wall and surrounding inflammation (Fig. 1). Because no organ failure was detected, we diagnosed moderate AC (Grade II) and performed an emergency operation.

This surgery was approved by the Research Ethics Committee of the International University of Health and Welfare (Approval number 13-B-60).

Just before surgery, 10 ml of ICG 2.5 mg/ml was injected intravenously. LC was performed via four ports. First, a minilaparotomy was performed in the lower abdomen, and a 12-mm trocar was inserted. After CO_2 insufflation (intra-abdominal pressure of 10 mmHg), a 30° oblique-viewing endoscope was inserted. Next, under laparoscopic

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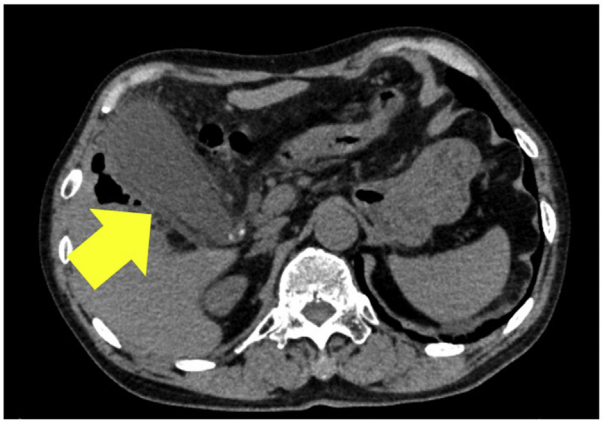

Fig. 1. Abdominal computed tomography showed thickening of the gallbladder wall (arrow) and surrounding inflammation.

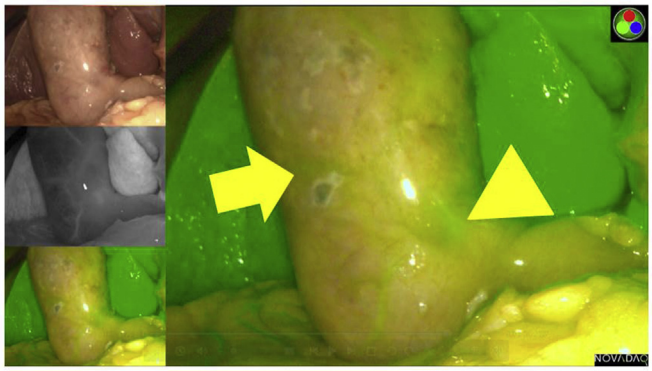

Fig. 2. The gallbladder (arrowhead) and cystic duct (arrow) were imaged in green. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

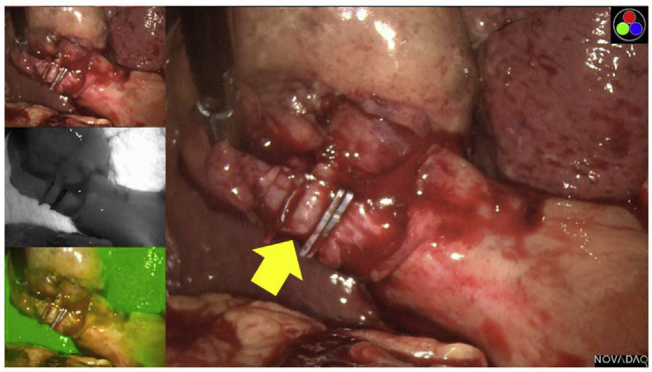

Fig. 3. The cystic duct (arrow) was sealed using an endoscopic clip.

visualization, a 12-mm trocar was inserted approximately 5 cm caudal to the epigastric region, a 5-mm trocar was inserted along the midclavicular line under the right costal arch, and a 5-mm trocar was inserted along the anterior axillary line under the right costal arch. Using PINPOINT®, the gallbladder and cystic duct were imaged in green (Fig. 2). To approach the cystic duct, the peripheral tissue was detached, and the critical view of safety proposed by Strasberg [8] was verified in order to seal the cystic duct using an endoscopic clip. Subsequently, the cystic artery was sealed using an endoscopic clip (Fig. 3). The operative time was 81 minutes, and blood loss was 5 ml. The postoperative course was good, and the patient was discharged on day six after the operation.

2. Discussion

Cholecystectomy has been widely accepted as a treatment for AC. Based on the TG07 and TG13, early intervention is preferred in Japan.

However, the incidence of intraoperative bile duct injury in patients with AC is higher than in those with non-AC [5]. Traditionally, intraoperative cholangiography has been used to prevent bile duct injury [6]. Intraoperative cystography is complicated, and the physician bears the additional burden of having to wear a radiation hazmat suit.

We reported on LC using the PINPOINT® Endoscopic Fluorescence Imaging System with intraoperative fluorescent imaging in a patient with non-AC [7], and applied the technique to LC in a patient with AC in the current report. ICG was administered before surgery, and when we used PINPOINT®, the liver, gall bladder, cystic duct, common bile duct, and the entire operation field appeared green in PINPOINT® mode, the overlay image of the ICG fluorescence and full-color image, making it difficult to perform the operation. We displayed a color image on the main screen, and compared it with a dark field/black and white image on the sub-screen. In this way, we were able to identify a cystic duct with a common bile duct, and we completed the surgery without perioperative complications. This was a characteristic use of PINPOINT®, which allows the perioperative cystography image to be watched simultaneously with a sub-screen.

Three cases were reported only in cholecystectomy using PINPOINT, including this case [9,10]. Konno et al. were using PINPOINT, but the number of cases were not mentioned. In the report by Konno et al. There were 6 cases of acute cholecystitis, but the patient background of cases of acute cholecystitis was unknown.

Two studies were describing the effectiveness of Fluorescent Cholangiography during surgery.

3. Conclusion

The TG13 recommend laparoscopic cystectomy (LC) for the treatment of mild or moderate AC. To avoid complications as much as possible during surgery, I thought that using PINPOINT would be advantageous.

Ethical approval

This study was conducted according to the Declaration of Helsinki and approved (approval number 13-B-60) by the Research Ethics Committee at the International University of Health and Welfare.

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No.

Author contribution

Study conception and design: Nobuhiro Tsutsui, Masashi Yoshida.

Data collection, data analysis, and writing the paper: Nobuhiro Tsutsui.

Critical revision: Yutaka Suzuki.

Supervision: Masaki Kitajima.

Operations: Nobuhiro Tsutsui, Eisaku Ito, Hironori Ohdaira.

Conflicts of interest

No.

Research registration number

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Guarantor

Nobuhiro Tsutsui.

Consent

This patient was properly informed and gave consent for her clinical information to be included in an Elsevier publication.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2018.09.019.

References

[1] M. Hirota, T. Takada, Y. Kawarada, et al., Diagnostic criteria and severity assessment of acute cholecystitis: tokyo Guidelines, J Hepatobiliary Pancreat Surg 14 (2007) 78–82.
[2] T. Takada, S.M. Strasberg, J.S. Solomkin, et al., Tokyo guidelines revision committee. TG13: updated tokyo guidelines for the management of acute cholangitis and cholecystitis, J Hepatobiliary Pancreat Sci 20 (2013) 1–7.
[3] C.M. Lo, C.L. Liu, S.T. Fan, et al., Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis, Ann. Surg. 227 (1998) 461–467.
[4] S.B. Kolla, S. Aggarwal, A. Kumar, et al., Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective randomized trial, Surg. Endosc. 18 (2004) 1323–1327.
[5] A. Cuschieri, F. Dubois, J. Mouiel, et al., The European experience with laparoscopic cholecystectomy, Am. J. Surg. 161 (1991) 385–387.
[6] B. Törnqvist, C. Strömberg, O. Akre, et al., Selective intraoperative cholangiography and risk of bile duct injury during cholecystectomy, Br. J. Surg. 102 (2015) 952–958.
[7] N. Tsutsui, M. Yoshida, M. Kitajima, et al., Laparoscopic cholecystectomy using the PINPOINT endoscopic fluorescence imaging system with intraoperative fluorescent imaging: a case report, Int J Surg Case Rep 21 (2016) 129–132.
[8] S.M. Strasberg, Avoidance of biliary injury during laparoscopic cholecystectomy, J Hepatobiliary Pancreat Surg 9 (2002) 543–547.
[9] Y. Kono, T. Ishizawa, K. Tani, et al., Techniques of fluorescence cholangiography during laparoscopic cholecystectomy for better delineation of the bile duct anatomy, Medicine (Baltim.) 25 (2015) e1005.
[10] J. Bozzay, D. Vicente, E.M. Jessie, et al., Identification of abnormal biliary anatomy utilizing real-time near-infrared cholangiography: a report of two cases, Case Rep Gastrointest Med 2017 (2017) 8628206, https://doi.org/10.1155/2017/8628206 Epub 2017 Apr 27.