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Surgical treatment for the excluded bile leakage from Spiegel lobe after right hemihepatectomy: A case report

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ABSTRACT

INRODUCTION: The treatments of excluded bile duct leakage after hepatectomy are not easy and various strategies have been reported, such as surgery, ethanol or fibrin glue injection, and portal vein embolization.
PRESENTATION OF CASE: A 72-year-old man with a surgical history of laparoscopic ileocecal resection for diverticular bleeding was diagnosed as having hepatocellular carcinoma. Right hemihepatectomy was performed, and computed tomography examination on postoperative day 9 showed abdominal fluid collection in the right subphrenic space. Percutaneous intra-abdominal fluid drainage was performed and it was diagnosed as bile leakage. After that it was diagnosed as excluded bile leakage from the Spiegel lobe by drip infusion cholangiographic-computed tomography and endoscopic retrograde cholangiography. To improve this clinical condition, we performed the Spiegel lobe excision on postoperative day 48. The postoperative course was uneventful and the patient was discharged.
DISCUSSION: According to the postoperative examination, it appeared that the bile duct from the Spiegel lobe joined to the right main bile duct or the bile duct of the right posterior section. This bile duct anomaly was not detected preoperatively on imaging examination. It is most likely that the bile duct from the Spiegel lobe was cut when the hepatoduodenal ligament in the hepatic hilum was peeled. To prevent excluded bile leakage, the hepatoduodenal ligament should be carefully peeled and ligated instead of using energy devices.
CONCLUSION: We consider that surgical treatment for postoperative excluded bile leakage is both a quick and reliable procedure in patients with acceptable liver function and anatomical subject.

1. Introduction

Studies on postoperative morbidity following liver surgery have reported the incidences of bile leakages to be in the range of 2.6%–15.6% [1–4]. Bile leakages have serious consequences such as sepsis, liver failure, and prolonged hospitalization; furthermore, they may lead to postoperative death [5]. Nagano et al. [2] classified biliary fistulae into the following four types: type A, minor leakage with only a small amount of bile leakage or an amount that decreases daily; type B, major leakage due to insufficient closure of the bile duct stump; type C, major leakage due to bile duct injury; and type D, major leakage due to bile duct division. Most bile leakages (types A–C) improve on irrigation, drainage, or endoscopic naso–biliary tube drainage; however, excluded segmental bile duct leakage (type D) is rare and difficult to treat [2]. Here we report a case of excluded segmental bile leakage from the Spiegel lobe after right hemihepatectomy, which cured on the excision of the Spiegel lobe. The work has been reported in line with the SCARE criteria [6].

Abbreviations: CT, computed tomography; HCC, hepatocellular carcinoma; POD, on postoperative day; DIC, drip infusion cholangiographic.

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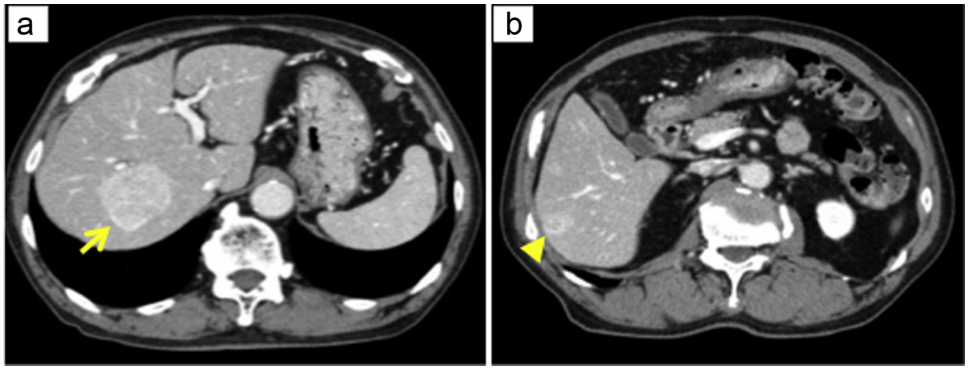

Fig. 1. Finding of preoperative CT. CT showed a 5-cm HCC in segment 7–8 of the liver (*arrow*) (a) and a 2-cm HCC in segment 6 of the liver (*arrowhead*) (b).

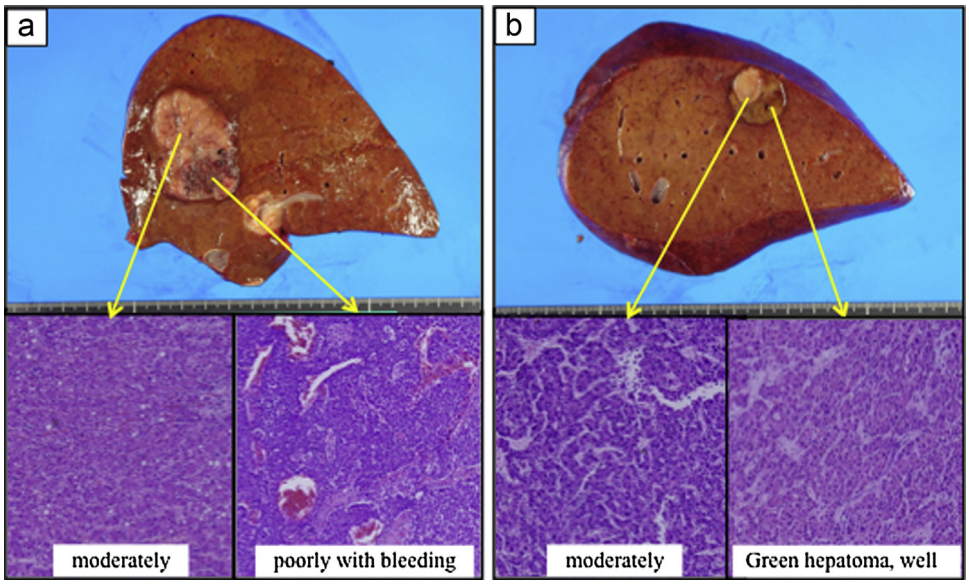

Fig. 2. The macroscopic and pathological findings of two tumors. Both tumors showed nodule-in-nodule appearance. The tumor in segment 7–8 was moderately to poorly differentiated HCC which size was 45 × 45 × 30 mm with invasion to minor branch of hepatic vein (a). The tumor in segment 6 was well to moderately differentiated HCC which size was 20 × 17 × 15 mm (b).

2. Presentation of case

A 72-year-old man visited a neighboring hospital with a chief complaint of melena. It was diagnosed as diverticular bleeding of the ascending colon by colonoscopy. After that clipping by endoscope and blood transfusion were performed, but laparoscopic ileocecal resection was carried out 2 days later because bleeding didn't stop. Although the postoperative course was uneventful, liver tumors were detected by screening of computed tomography (CT) and he was introduced to our hospital.

The patient consumed alcohol daily, leading to an average daily consumption of 360–540 ml of Japanese alcohol drink (an amount equivalent to 66–100 g of pure ethanol) for 35 years. Physical examination was normal and laboratory and clinical data were as follows: hepatitis C virus antibody, hepatitis B surface antigen and antibody were all negative. The liver function was enough preserved. The indocyanine green retention rate at 15 min was 11.2%; On Tc-99m–DTPA–galactosyl–human serum albumin scintigraphy, HH15, a parameter representing the retention of the tracer in the blood, was 0.536; and LHL15, a parameter representing the retention of the tracer in the liver, was 0.924. Liver function was classified as type A using the Child–Pugh scoring system. CT showed early enhancement of two tumors in the segments 7–8 (5 cm) and 6 (2 cm) of the liver, and hepatocellular carcinomas (HCCs) were suspected (Fig. 1a, b).

Right hemihepatectomy was conducted 3 months later from a last operation. After mobilization of right lobe, skeltonization of hepatoduodenal ligament was performed. The right hepatic artery and portal vein were divided after ligation with braided silk, respectively. After that the right hepatic vein was divided with automatic stapling system (ATW35; Ethicon Endo-Surgery, Cincinnati, OH, USA). The right hepatic duct was divided during parenchymal transection. Hepatic resection was performed under intraoperative ultrasound guidance with Pringle's maneuver (hepatic inflow occlusion time 15 min and reperfusion time 5 min). Parenchymal transection was performed using an ultrasonic dissector (CUSA Excel™; Integra Lifesciences Corporation, Plainsboro, NJ) with bipolar electric cautery or saline-linked radiofrequency coagulator (Dissecting Sealer 3.0; TissueLink Medical, Dover, NH). All hepatic veins and Glissons sheaths more than 2 mm in diameter were ligated whenever possible using 2-0 or 3-0 braided silk or a vessel clip. The exposed structures less than 2 mm were dissected using a tissue sealer (Enseal; Ethicon Endo-Surgery, Cincinnati, OH, USA). A bile-leak test, using a biliary tube inserted through the cystic duct, was performed, and we identified small bile leakage sites on the cut liver surface, which were repaired by suturing using 4-0 monofilament synthetic non-absorbable sutures (PROLENE; John-

son & Johnson Corp., Tokyo, Japan). At the end of the operation, a drain was inserted in the right subphrenic space. The operation time was 528 min and intraoperative bleeding was 2140 ml.

The pathological diagnosis of tumors were well to poorly differentiated HCCs which size were 45 × 45 × 30 mm (Fig. 2a) and 20 × 17 × 15 mm (Fig. 2b) with invasion to minor branch of hepatic vein. TNM classification according to International Union Against Cancer (UICC) pTNM Staging System [7] was T2, N0, M0 and stage II. According to Japanese classification [8], it was T4, N0, M0 and stage IVa (Fig. 2a, b).

The postoperative course was as described further. On postoperative day (POD) 3, total bilirubin concentrations in the drainage fluid and serum were routinely analyzed for every patient who underwent hepatic resection. The bile leakage was defined as the total bilirubin concentration in the drainage fluid being at least 3 times that of the bilirubin concentration in the serum [9]. In this case, on POD 3, total bilirubin in the serum was 1.7 mg/dl and in the drainage fluid was 4.4 mg/dl. Therefore, no bile leakage was diagnosed and the abdominal drainage tubes were removed on POD 6. The patient became febrile, and on POD 9, CT examination showed abdominal fluid collection in the area of hepatectomy (Fig. 3). Percutaneous intra-abdominal fluid drainage was performed. Total bilirubin in the serum was 1.0 mg/dl and in the drainage fluid was 6.5 mg/dl. Therefore, we diagnosed postoperative bile leakage. On POD 27, enhanced-CT and drip infusion cholangiographic (DIC)-CT showed bile duct leakage from the Spiegel lobe and that the bile duct and the portal veins of the Spiegel lobe did not run together (Fig. 4a–d). Endoscopic retrograde cholangiography did not clearly show bile leakage (Fig. 5); however, in combination with the DIC-CT examination confirmed excluded segmental bile duct leakage from the Spiegel lobe (Fig. 4c). Conservative therapy was not considered possible. To improve this clinical condition, we performed the Spiegel lobe excision on POD 48. The portal veins to the Spiegel lobe were ligated and as much of the Spiegel lobe including bile duct as possible was removed. The postoperative course was uneventful and the patient was discharged from our hospital 15 days after the reoperation.

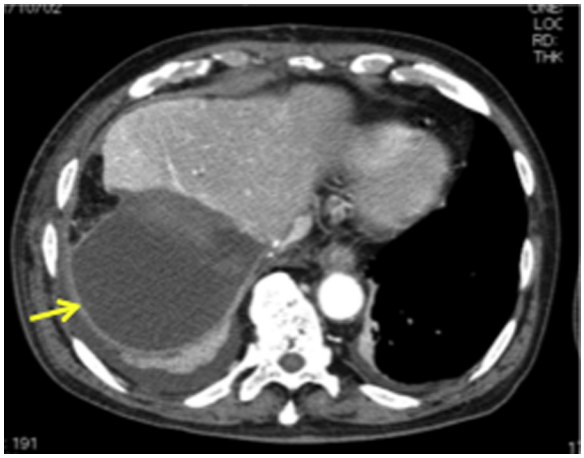

Fig. 3. Finding of CT at postoperative day 9. CT showed the fluid collection in the right subphrenic space (*arrow*).

3. Discussion

Ryu et al. reported that 44% of the bile duct from the Spiegel lobe joined the left main bile duct, 31% joined the right main or posterior bile duct, and that 94% of portal veins to the Spiegel lobe branched from left portal vein [10]. In our case, the bile ducts and portal veins of the Spiegel lobe did not run together. According to the postoperative DIC-CT examination, it appeared that the bile duct from the Spiegel lobe joined to the right main bile duct or the bile duct of the right posterior section. This bile duct anomaly was not detected preoperatively on CT or magnetic resonance imaging. It is most likely that the bile duct from the Spiegel lobe was cut when the hepatoduodenal ligament in the hepatic hilum was peeled. Therefore, to prevent excluded bile leakage, the hepatoduodenal ligament should be carefully peeled and ligated instead of using energy devices.

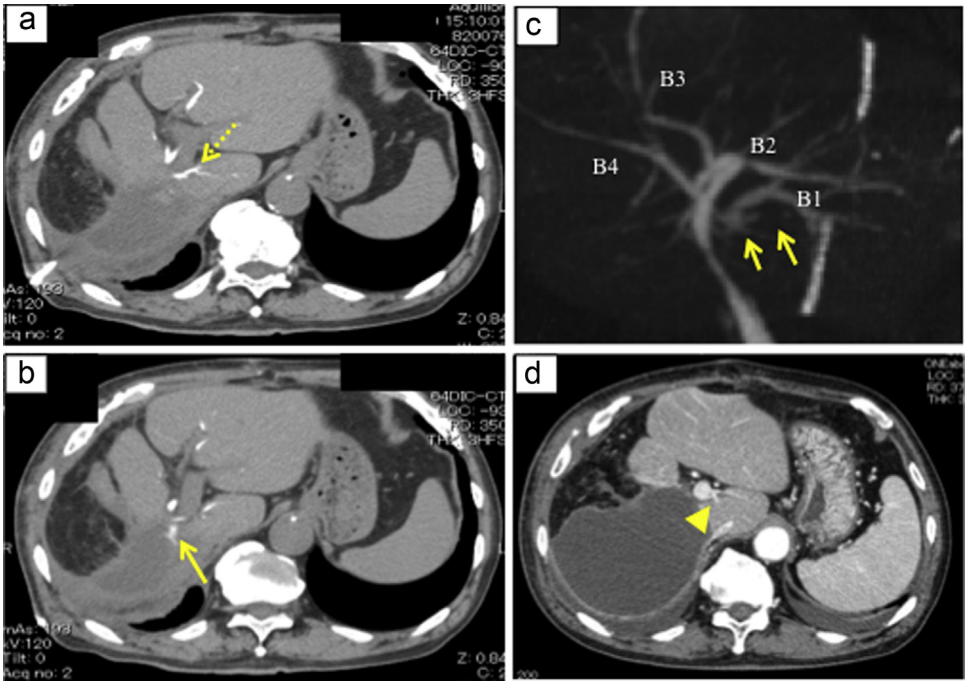

Fig. 4. Findings of DIC-CT (a–c) and enhanced CT of portal phase (d). The DIC-CT showed the bile duct from the Spiegel lobe (*dotted arrow) and* the bile leakage from Spiegel lobe (*arrows*). The enhanced CT showed the portal veins to Spiegel lobe (*arrowhead*). The portal veins in the Spiegel lobe branched from the left first branch.

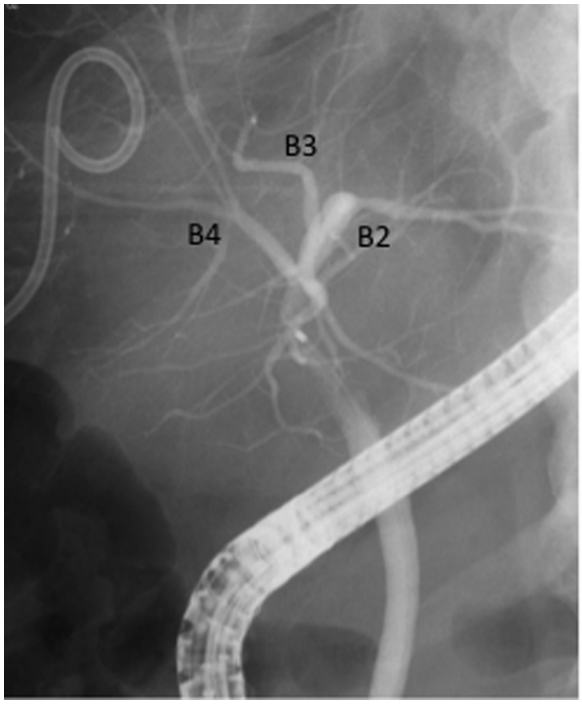

Fig. 5. Finding of endoscopic retrograde cholangiography. No bile leakage from another portion and the bile duct from the Spiegel lobe was not found.

The diagnosis and treatments of excluded bile duct leakage are not easy and a number of strategies have been reported, such as surgery, ethanol or fibrin glue injection, and portal vein embolization. Ethanol or fibrin glue injections into the excluded bile duct are less invasive treatments and have been used with some success [1,11]. Tanaka et al. reported on two cases in which the bile duct leakage was separated from the common bile duct and leakage was cured by sealing the duct with a mixture of fibrin glue and iodized oil [11]. However, such treatments require two criteria: the fistula must be free of infection and output of bile juice must be <50 ml/day. Moreover, using this method, it can take a long time for the leakage to cure and resolution is not guaranteed [1,5]. There have been some reports on successful treatment of bile leakage using portal vein embolization, which induces atrophy of hepatocytes and fibrosis [12,13]; however, other cases have been reported in which portal vein embolization failed to stop the leakage [5]. Endoscopic naso–biliary tube drainage cannot be used for excluded bile duct leakage, as in our case. If the patient's general condition is stable, reoperation is a quick and radically curative method [2,5]; however, it is often difficult due to the presence of dense adhesions [2]. It is possible to cure a bile leakage from a small liver section by simple closure; however, liver excision is the more reliable procedure to cure excluded bile duct leakage.

In our case, the Spiegel lobe represented a different site from the incision area of the first operation; therefore, we did not encounter dense adhesions in the second operation. Fortunately, we quickly and definitively diagnosed excluded bile duct leakage using some examinations, and assumed that surgery produced excellent results with complete resolution of the leakage.

4. Conclusions

There are various therapies were performed for the treatment of excluded bile duct leakage; however, we consider that surgical resection is both a quick and reliable procedure in patients with acceptable liver function.

Competing interests

All authors have no conflict of interest to declare.

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

This research does not require a deliberation by the ethics committee.

Consent

Written informed consent for the operative methods was obtained from the patient, and informed consent was also obtained from the patient for publication of this case report and any accompanying images.

Author contributions

Haruhi Fukuhisa, Kiyokazu Hiwatashi, Masahiko Sakoda, Satoshi Iino, and Shinichi Ueno participated in the first and 2nd operation, acquired and interpreted the data, and drafted the manuscript. Koji Minami, Motoyuki Hashiguchi, Yota Kawasaki acquired and interpreted the data, and drafted the manuscript. Hiroshi Kurahara, Yuko Mataki, Kosei Maemura and Hiroyuki Shinchi performed the investigation and critically revised the manuscript. Shoji Natsugoe supervised the study. All authors read and approved the final manuscript.

Guarantor

Shoji Natsugoe.

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