ANSWERING REVIEWERS

March 11, 2014

Dear Editor,

Please find enclosed the edited manuscript in Word format (file name: 8905-edited.doc).

Title: Three-dimensional imaging identified the accessory bile duct in a patient with cholangiocarcinoma

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The manuscript has been improved according to the suggestions of the reviewers:

1 Format has been updated

2 Revisions have been made according to the suggestions of the reviewer

(1) *What is the mechanism and equipment of fusion-3D images created from preoperative MDCT and MRCP images?*

We thank the reviewer for this comment. We used the Synapse Vincent medical imaging system (Fujifilm Medical, Tokyo), which was developed specifically for three-dimensional visualisation and virtual resection of the liver. This software offers standardised computation of liver anatomy functions and volumetric risk analysis based on two-dimensional CT imaging. We have extended the application of this system to biliary-pancreatic surgery. As reported in Oshiro's paper (the second author of our paper), we developed a novel method for the creation of 3D-MDCT fusion images combined with 3D MRCP images (Reference 15, Oshiro Y, et al. Clin Imaging 2013; 37: 772-774). This fusion 3D technique consists of the following four steps. We first combined heavily T2-weighted MRCP images with axial thin-slice 3D-T1-turbo field echo (TFE) images. Second, we combined the thin TFE images with thin MDCT axial images. Third, we superimposed MRCP data onto the axial MDCT images. Fourth, we checked the anatomical landmark. For more information on the mechanism and equipment associated with the 3D fused image acquisition, please refer to Reference 15 in the manuscript.

The accessory bile duct was not found in CT and MRCP, but it was shown on fusion image of CT and MRCP. What is the reason? Usually, MRCP can show 3D cholangiopancreatography.

We thank the reviewer for this comment. Indeed, MRCP enabled us to obtain detailed information on the bile duct before surgery. We certainly were able to detect the accessory bile duct (arrowhead) behind the dilated CBD retrospectively in Figure 2. However, in our case, it is unfortunate that we were not able detect it preoperatively. Generally speaking, with the use of

MRCP alone, it is impossible to identify the position of the bile duct relative to the positions of vascular components, such as the hepatic artery and portal vein, and the parenchymal organs, such as the pancreas and liver. However, this novel fusion-3D imaging technique enabled us to detect the accessory bile duct without difficulty.

We changed the sentence in the legend for the Figure 2 as follows.

From

Figure 2　Magnetic resonance cholangiopancreatography. The accessory bile duct was not detectable preoperatively (arrowhead).

To

Figure 2　Magnetic resonance cholangiopancreatography. The common and intrahepatic bile ducts were dilated. It was impossible to detect the accessory bile duct preoperatively (arrowhead).

(2) *The description and images of Figure 3 makes confusion. The quality of image of Figure 3 is not good enough. What does radiologic intervention mean? Does it mean tubography through a biliary drainage (PTBD) tube or an abdominal drain tube? How can the images of the injured site of the bile duct be produced from tubography through the abdominal drain tube? Generally, the injured or leak site of bile duct is shown from tubography through a biliary drainage (PTBD) tube. Are white arrowhead on Figure A and black arrow on Figure B the same? The signs of arrow or arrowhead had better be uniform on Figure 3A and 3B.*

We thank the reviewer for this comment regarding the confusion associated with Figure 3. In Figure 3, we used "radiologic intervention" to mean tubography through a biliary drainage (PTBD) tube or an abdominal drain tube. At first, because we had suspected bile leakage from biliojejunostomy, we initially performed tubography through the biliary drainage tube. However, bile leakage was not observed, so we suspected that the bile duct injury existed. Next, we performed tubography through the abdominal drainage tube, which produced the images of the injured site of the bile duct on the liver side and the probable caudate bile duct. Therefore, we concluded that bile leakage was likely due to the bile duct injury of the caudate bile duct.

In accordance with the reviewer's comment, we changed "radiologic intervention" to "tubography" on page 4, line 9-10 and in Figure 3. Furthermore, in order to be consistent between Figure 3A and 3B, we have changed "white arrowhead" to "black arrow" in Figure 3A.

Furthermore, we changed the sentence in the legend of Fig. 3B as follows.

From

B: Postoperative radiological intervention from abdominal drainage tube (black arrow) was performed, which produced the images of the injured site of the bile duct (white arrowhead) and the intrahepatic bile duct (black arrowhead). The biliary drainage tube is shown (white arrow).

To

B: Postoperative tubography through the abdominal drainage tube (black arrow) was performed, which produced the images of the injured site of the probable caudate bile duct (white arrowhead) and the other intrahepatic bile duct (black arrowheads). The biliary drainage tube is shown (white arrow).

(3) *What is the difference of Figure 4A and 4B? The accessory bile duct is not found on Figure 4A.*

We thank the reviewer for this comment regarding the confusion associated with Figure 4. Figure 4A is the 3D image view from the front side of the patient. We were not able to observe the accessory bile duct, as it is hidden by the dilated CBD in Fig. 4A. Figure 4B is the 3D image view from the right side of the patient. We were obviously able to observe the accessory bile duct in Fig. 4B. This 3D image clearly enabled us to detect the injured accessory bile duct from the caudate lobe. Accordingly, we intended to clarify the advantage of our novel 3D fusion imaging technique that we can easily observe the relative bile duct position against a peripheral organ from an appropriate angle.

We changed the sentence in the legend of Fig. 4A as follows.

From

A: The red colour represents the arteries, the blue represents the veins and the portal vein, the green represents the biliary duct, and the turquoise represents the pancreatic duct.

To

A: 3D image view from the front side of the patient. The red colour represents the arteries, the blue represents the veins and the portal vein, the green represents the biliary duct, and the turquoise represents the pancreatic duct. We were able to observe that the common and intrahepatic bile ducts were dilated.

We changed the sentence in the legend of Fig. 4B as follows.

From

B: 3D image from the patient's right side. The accessory bile duct from the caudate lobe connecting to the intrapancreatic bile duct (arrowhead) was easily recognizable. The cystic duct (arrow) has branched from the middle bile duct.

To

B: From the 3D image view from the patient's right side, the accessory bile duct from the caudate lobe connecting to the intrapancreatic bile duct (arrowhead) was easily recognisable. The cystic duct (arrow) has branched from the middle bile duct. We were able to determine

that the injured site was the accessory bile duct from the caudate lobe.

(4) *When do you recommend the fusion-3D images be performed? Are you performing fusion-3D images routinely after this case?*

We appreciate the reviewer's comment. After this case, we are performing the fusion-3D images routinely for preoperative assessment in hepatobiliary and pancreatic surgery. The fusion-3D images enable us to easily recognise the relative positions of the bile duct with vascular components, such as the hepatic artery and portal vein, and the parenchymal organs, such as the pancreas and liver. We would recommend this method for preoperative assessment in hepatobiliary and pancreatic surgery.

(5) *'Inferior cholangiocarcinoma' may be informal. Extrahepatic cholangiocarcinoma or distal CBD cancer would be better description.*

We thank the reviewer for this comment. In accordance with the reviewer's suggestion, we have changed "inferior cholangiocarcinoma" to "extrahepatic cholangiocarcinoma" on page 2, lines 10-11; page 2, line 24; page 3, line 23; page 4, line 3; and page 6, line 10-11, as well as in Table 1.

Thank you again for publishing our manuscript in the *World Journal of Gastroenterology*.

Sincerely yours,

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