How to Use the Latest Image Analysis Functions in the Field of Hepato-Biliary-Pancreatic Surgery:

Novel 3D Simulation Fusion with MRCP

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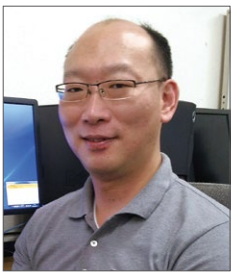

Introduction

Determination of the appropriate surgical methods for treating diseases of the hepatobiliary system, requires extensive understanding of the relationship between the anatomy of the hepatic hilus and lesions in individual patients. The visualization of the bile ducts can hardly be extracted on multi-detector row CT (MDCT). Using direct cholangiography with CT, in which CT scans are taken after infusing a contrast agent through a percutaneous transhepatic biliary drainage (PTBD) tube or an endoscopic nasobiliary drainage (ENBD) tube, or 3D cholangiography using drip infusion cholecystocholangiography CT (DIC-CT) has been reported to be useful for surgical simulation for diseases of the biliary system.[1-3] However, some problems, including side effects to contract agents (e.g., anaphylactic shock), cholangitis, and radiation exposure, have been indicated; therefore, the development of a new modality is anticipated.

Recently, a new 3D simulation using fusion of MRI and CT images, which was previously unfeasible, has become possible through image registration of normalized mutual information applicable to two different modalities. We use this technique to perform preoperative simulation in patients undergoing surgery of the biliary system. In this article, we present a case of a patient with gallbladder cancer that was surgically resected in our department.

Using the newly developed MRI fusion method, we could construct 3D models of the portal veins, the hepatic arteries, the hepatic veins, and the bile ducts and perform the simulation as opposed to using a direct cholangiography with CT or DIC-CT. It is difficult to obtain a superimposed image with 100% image registration taken by various modalities. The crucial aspect of this new fu