BILIARY ANATOMY ON 3D MRCP USING FREE-BREATHING NAVIGATOR-TRIGGERED PROSPECTIVE ACQUISITION CORRECTION: COMPARISON OF VOLUME-RENDERING AND MAXIMUM-INTENSITY-PROJECTION ALGORITHM

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INTRODUCTION: For post processing techniques of three-dimensional (3D) magnetic resonance cholangiopancreatography (MRCP), maximum-intensity-projection (MIP) has been commonly used because of its handiness (6, 10-12, 17). However, many past reports using computed tomogaraphy have revealed the superiority of volume-rendering (VR) to MIP in evaluating 3D anatomies of various vessels and organs (18-22). Therefore, this study sought to compare VR and MIP as postprocessing techniques of 3D T2-weighted turbo spin-echo (TSE) MRCP using a free-breathing navigator-triggered prospective acquisition correction (PACE) technique (3D-TSE-PACE-MRCP) to define cystic duct variation and biliary branching patterns.

MATERIALS AND METHODS: VR and MIP images of 3D-TSE-PACE-MRCP for 102 patients were retrospectively evaluated. Interpretation of cystic duct variation and biliary branching patterns of each image were recorded independently by two radiologists in a blinded fashion. Interpretation confidence on a five-point scale was compared using the Wilcoxon signed-rank test. The McNemar test was used to compare the accuracies of each reformation with the reference standard obtained by consensus interpretation of both the images and source images.

RESULTS: The reference standard identified all biliary bifurcations and 95 of 102 cystic duct confluences (93.1%). VR findings agreed with the reference standard findings more often than MIP with regard to cystic duct variation (94 [92.2%] vs. 76 [74.5%], $P<.01$) while there was no significant difference for biliary branching patterns (99 [97.1%] vs. 92 [90.2%], $P = .092$). Mean confidence score was significantly higher with VR than MIP with regard to both cystic duct variation and biliary branching patterns (3.7 vs. 2.4; $P<.01$; 4.1 vs. 3.3; $P<.01$).

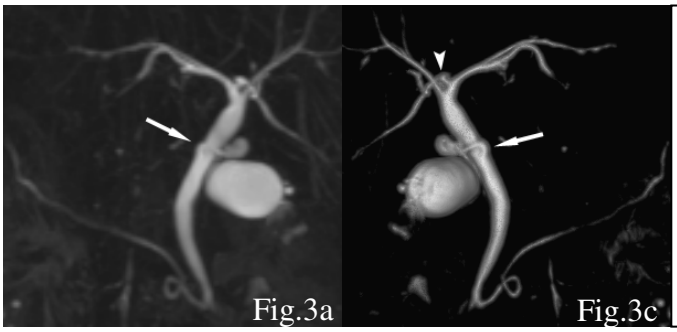

Figure 3. A 53-year-old woman with gallstones; images are from free-breathing navigator-triggered 3D T2-weighted TSE MRCP. **(a)** This MIP image viewed from the dorsal side appears as if the cystic duct (*arrow*) drains into the left posterior side of the middle extrahepatic bile duct from the dorsal side. **(c)** This VR image viewed from the ventral side clearly displays the cystic duct (*arrow*) draining into the left anterior side of the middle extrahepatic bile duct from the ventral side. It also clearly displays a biliary branching anomaly in which the right posterior segment hepatic duct (*arrowhead*) drains into the left hepatic duct.

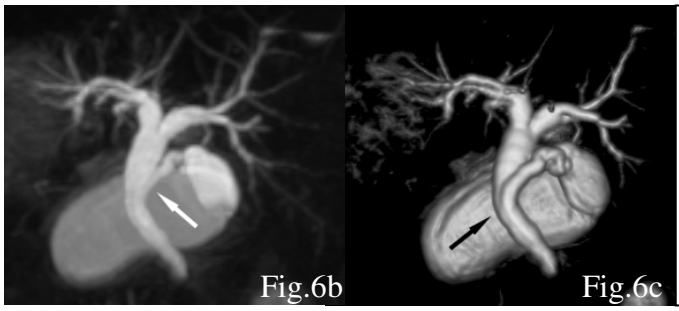

Figure 6. A 27-year-old woman with gallstones; images are from free-breathing navigator-triggered 3D T2-weighted TSE MRCP. **(b)** This MIP image viewed from the left dorsal side rather poorly shows the cystic duct (*arrow*) locates dorsal to the extrahepatic bile duct probably draining from the dorsal side into the middle extrahepatic bile duct. **(c)** This VR image viewed from the left dorsal side (same angle as **(b)**) clearly displays that the cystic duct (*arrow*) drains into the left posterior side of the lower extrahepatic bile duct from the dorsal side.

CONCLUSION: VR reformation of 3D-TSE-PACE-MRCP defines biliary anatomies more accurately than MIP.

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