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Title of Abstract: Morphine enhanced 3D T1 Gadoxetate MRCP for pre-transplant living related liver donor evaluation

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Modality: MR

Organ System: GI

Intro: MRCP, a noninvasive imaging technique has been reported to accurately identify biliary abnormalities and variant extra hepatic anatomy comparable to endoscopic retrograde cholangiopancreatography (ERCP), an invasive alternate imaging technique associated with morbidity. However, detection and definition of intrahepatic anatomic anomalies, particularly in the non dilated normal small caliber intrahepatic segmental bile ducts in living related liver donors is often inadequate. Drugs which affect bile secretion and drainage like morphine and glucagon have been proposed to augment MRCP visualization of intrahepatic bile duct anatomy with varying results. We have noticed that after morphine induces sphincter of Oddi spasm, about 30 to 60 minutes is necessary for bile accumulation in the intrahepatic ducts for good distension and visualization. Our routine living related liver transplantation donor imaging now includes injecting low dose morphine sulfate at the time of starting the patient’s intravenous line and obtaining T2 and post Gadoxetate T1 MRCP. In this paper we review our experience with imaging biliary anatomy on T2 and post Gadoxetate T1 MRCP post morphine sulfate comparing to findings in patients without augmentation by morphine sulfate.

Purpose: To assess the utility of morphine sulphate (MS) augmented visualization of segmental intra hepatic bile ducts on T2 and T1 magnetic resonance cholangiopancreatography (MRCP), in preoperative imaging of potential liver donors.

Methods Used: Intra hepatic segmental bile duct branch order visualized on T2 and post gadoxetate (10ml) T1 MRCP were compared in 30 potential liver donors without using morphine and 23 potential liver donors following intravenous low dose morphine sulfate (0.04mg/kg). In all patients 3D coronal T2 MRCP and 30 minutes post gadoxetate injection axial and coronal T1 MRCP images were acquired at 1.5T using body array coil. Morphine patients were injected pre-MRI while establishing intravenous access thereby allowing ~1 hour for biliary distension prior to T1 MRCP. These morphine patients were also imaged at 15 and 45 minutes post gadoxetate to map enhancement kinetics. Intra hepatic biliary branch order visualization, CBD diameter and gallbladder volume and were measured using electronic callipers. Overall image quality was also compared and graded on 4 point scale. Results were compared between patients with and without morphine and in patients with morphine between early and late effect of morphine using student t-test.

Results of Abstract: Patients at 60 minutes post morphine had 3.6 intra hepatic segmental bile duct branch order visualization compared to 3.0 without morphine (p<0.0029). CBD diameter was increased measuring 5.6 mm 60 min post morphine compared to 4.2 mm without morphine (p<0.0009). Overall image quality was also increased measuring 3.4 in patients who received morphine compared to 2.3 in those who did not (p<0.0001). On average, gallbladder volume increased 18ml/hour corresponding to known rate of bile production.

Discussion: Intravenous low dose morphine significantly augments image quality of small calibre intra and extra hepatic bile ducts in T2 and post gadoxetate T1 MRCP. This improves surgical planning and potentially reduces operative time and complications.

Scientific and/or Clinical Significance? Biliary distension with low dose morphine improves visualization of small calibre intrahepatic bile ducts. This improves surgical planning and potentially reduces operative time and complications.

Relationship to existing There is some controversy regarding use of low dose morphine for augmentation of magnetic resonance cholangiopancreatography visualization of intrahepatic bile duct anatomy. Recently, Kropil
work et.al. reported that intravenous administration of low dose morphine does not significantly influence the image quality of biliary system on MRCP. In our current work, we noticed that after morphine induces sphincter of Oddi spasm, about 30 to 60 minutes is necessary for bile accumulation in the intrahepatic ducts for good distension and visualization. Thus, low dose morphine augments bile duct MR imaging and produce high quality MRCP images to demonstrate both extra and intra hepatic bile ducts accurately, especially in normal, small caliber biliary system.

N/A