Fentanyl MRCP improves ductal visualization

S. Kumar[1], S. Agarwal[2], P. Nag[1], S. Sikora[2], R. K. Gupta[1]

[1]Radiodiagnosis, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, UP, India, [2]Surgical Gastroenterology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Introduction: Magnetic resonance cholangio pancreatography (MRCP) has evolved as a primary diagnostic tool in patients with biliary or pancreatic diseases. Many modifications in the technique have been made to improve the MRCP image quality, especially in the non-dilated biliary system. Intravenous (IV) morphine is used in nuclear scintigraphy to improve ductal visualization. Based on the same principle, MRCP with IV morphine has been reported recently with better visualization of the ducts[1]. Morphine acts upon the sphincter of Oddi causing increase in the intraductal pressure and ductal distension. However, the drug is not easily available in certain parts of the world. An alternative agent, fentanyl, an opioid agonist with the similar effects as morphine but safer, has been used in the current study to study whether it has the similar effect on the MRCP imaging.

Methods: Fifteen patients with benign biliary and pancreatic diseases (calculus disease = 6 patients, choledochal cyst = 5 patients, and chronic calcific pancreatitis = 4 patients) underwent evaluation with MRCP before and after intravenous administration of fentanyl (0.5mcg/kg body weight) following informed consent from the patients. There was no history of sphincterotomy in these patients. The studies were performed on a 1.5T MR scanner (Signa Echo Speed, GE, Milwaukee, USA) using a phased array body coil. Single shot fast spin echo sequence was used to generate heavily T2 W coronal images in different axes centered on confluence of the common bile duct. The parameters were repetition time [TR]/Echo time [TE] = 4800msec/1400msec, slab thickness of 30-40mm, field of view= 28-32 cm, matrix=256x224. Post fentanyl images were obtained in same coronal and coronal oblique views at 1, 3, 5 and 10 minutes after its intravenous administration. There were no side effects encountered. The images were analyzed qualitatively and quantitatively for change in signal intensity, and number and diameter of the visualized biliary and pancreatic ducts by two radiologists independently. In case of a disagreement, a consensus was evolved. Qualitative assessment was based on the naked eye evaluation. For quantitative analysis, signal intensity was measured after placing small ROIs of $1mm^2$ to $10mm^2$ on intrahepatic, common hepatic, and common bile ducts, as well as on the main pancreatic duct.

Results: Improved depiction of the confluence of lower CBD with MPD, and common channel were noted in 8 (53.33%) patients (Fig 1A,B). Intrahepatic segmental ducts were better seen in 6 patients (40%).Qualitative improvement in the visualization of the main pancreatic duct was noted in 9 patients (60%) (Fig 2 A,B). Quantitative increase in signal intensity in the ductal system was noted in 13 of the 15 patients studied (86.67%). Maximum improvement was noted at 5 minutes after IV fentanyl. CBD diameter increased by 0.7 to 2.2mm, main pancreatic duct increased by 0.6 to 1 mm and intrahepatic ducts increased by 0.4 – 1 mm.

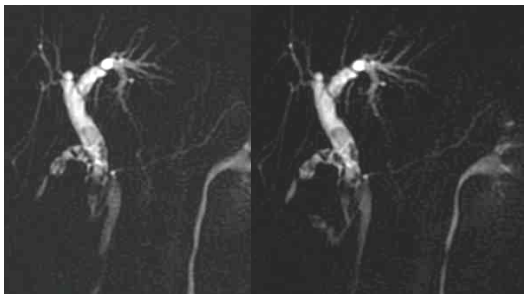

Fig 1. Pre- (A) and post fentanyl (B) coronal oblique MRCP images of a 60-year-old woman with cholelithiasis and choledocholithiasis. Visualization of confluence of CBD and main pancreatic duct and common channel is better seen in image B.

Fig 2. Pre- (A) and post fentanyl (B) MRCP images of a 13-year-old girl with chronic calcific pancreatitis. Distension and increase in signal intensity in the main pancreatic duct as well as CBD is noted in post fentanyl image (B).

Discussion: MRCP with IV fentanyl has shown improved visualization of the pancreatic and biliary ducts both qualitatively and quantitatively in our study, similar to that reported by using IV morphine. Fentanyl is more widely available. The dose of fentanyl used was about one third to half of the usual analgesic dose and hence is safe to use in the MR suite. This small feasibility study has shown encouraging results and has the potential of directing surgery by improving the visible ductal anatomy. However, the clinical utility of fentanyl will have to be assessed in a larger number of patients with biliary or pancreatic diseases.

Reference:

1. Silva AC, Hara AK, Friese JL, Liu PT. Proc. Intl. Soc. Mag. Reson. Med. 11, 2003:413.