Magnetic Resonance Cholangiopancreaticography with Esomeprazole: Comparison between Single and Double Oral Dose

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Abstract

Objectives: The aim of this study was to compare patient's Magnetic Resonance Cholangiopancreaticography (MRCP) control images with the same patient's images after taking 40mg or 80mg Esomeprazole, and to define the medication role in improving visualization quality of images.

Patients and Methods: Seventy patients attending gastroenterology clinic at Jordan University Hospital during the period first of January 2007 till the end of December 2007 were in a consecutive manner control images, then either 40 mgs or 80 mgs Esomeprazole was given and images re-obtained compared with control images for each patient.

Results: Improvement of Contrast effect on stomach and duodenum in Esomeprazole single dose group was 72.5% and in double dose group was 78.5%, while image effect of pancreatic duct was the same for single dose Esomeprazole and double dose (60%), and their statistical results were in concordance with no considerable difference, and the image effect of the biliary tree didn't show any significant difference between imaging and statistical results in both groups.

Conclusion: Esomeprazole improves images and gives superior quality of Magnetic Resonance Cholangiopancreaticography especially the contrast effect of duodenum and stomach and image effect of pancreaticobiliary ducts. But images obtained from patients given a double dose showed no significant difference to those patients given a single dose except some advantage is seen in favor of double dose group in improving intrahepatic duct images.

Keywords: M.R.C.P, Esomperazole, Quality.

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Introduction

Magnetic Resonance Cholangiopancreaticography (M.R.C.P) became the modality of choice in the diagnosis of pancreaticobiliary pathologies since Wallner et al. introduced it in 1991. [1] Continuous improvements were reported to achieve better images by using breath holding sequences, respiratory gating techniques, [2] and 3D reconstruction. [3]

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Other studies concentrated on intravenous contrast enhancement [4] or medications, [5-7] however, these techniques have some limitations, but M.R.C.P reached sensitivity of 95 % and specificity of 97%. [8] Gastric and duodenal high signal due to fluid accumulation could not be eliminated by fasting only [9] although negative oral contrast agents, [2] pineapple, [10] and blueberry juices [9, 11] can do the job, however they still can have some problems in patients with incompetent sphincter of Oddi. [12]

Esomeprazole is a pure Proton Pump Inhibitor (P.P.I); it displays a higher antisecretory efficacy compared to other drugs, which results in gastric acid secretion suppression. [13] The recommended dose is 20 to 40 mg daily for 10 days. Half-life of elimination is 1-1.5 hours. Absorption takes place in the small intestine and is completed in 3-6 hours. The systemic bioavailability from a single oral dose is approximately 64% and the peak stimulation time is 6-7 hours. [13]

The aim of this study was to evaluate the effect of single and double dose of Esomeprazole in improving the diagnostic quality of M.R.C.P and to justify if the extra cost will help in better patient diagnosis and care.

Method

Approval was obtained from the research and ethical committees at Jordan University Hospital before the initiation of this study. Informed consent was obtained from each patient before starting the procedure.

A total of seventy patients were referred from the gastroenterology and liver division of the Jordan University Hospital, 33 males (47.14%) and 37 females (52.86%), each of them underwent a baseline control image after 8 hours fasting to reduce unwanted fluid signal from stomach and intestine before he was randomized consecutively for a single dose (40 mg Esomeprazole) or a double dose (80 mg Esomeprazole) and repeat images were obtained 6 to 8 hours after the drug intake.

Group “A” was the single dose group, and group “B” was the double dose group.

Images were acquired using 1.5 Tesla super conducting MR unit (Magnetom vision plus, Siemens medical system). A pre-designed protocol was done. Body phase array coil was used for all sequences which were taken in breath hold. Half Fourrier Single Shot Turbo Spin Echo (HASTE) was conducted. Both thin collimation (multisection technique) and thick collimation of 7cm (single section technique) were performed followed by three dimensional reconstruction (MIP images) for MRCP. [14]

Image Analysis

M.R.C.P images were reviewed independently by two consultant radiologists experienced in M.R.C.P, followed by consensus to resolve any difference in interpretation. The images were assessed for contrast effect and image effect. Contrast effect (elimination or suppression of signal from stomach and duodenum) is considered positive if secretions decreased, negative if increased, and same if unchanged. Image effect (conspicuousness) is defined as the extent to which the diagnostic quality of the image of the gallbladder, ampulla and confluence, proximal common bile duct, distal common bile duct, intrahepatic duct, and pancreatic duct was improved. [10] Better visualization is considered (positive), worse visualization is considered (negative), and unchanged considered the same. The outcome was scored by interpreters based on criteria used in several M.R.C.P trials. [15, 16]

Statistical Analysis

Statistical analysis tests were performed using a statistical software package SPSS version 10. The results were presented as frequencies (N) and percentages (%). The relationship between groups A and B with the image analysis results were assessed by chi-square test. The null hypothesis was rejected at the 5% level (p less than or equal to 0.05).

Results

Statistical results concerning contrast effect for the signal from stomach showed that positive analysis for single and double dose groups was equal (80%), while the result of contrast effect for the signal from duodenum showed that positive analysis for signal in group A (65.7%) and was slightly less compared with group B (77.1%).

Concerning image effect, for the signal from pancreatic duct, the same value was seen (60%) in both groups while the result of image effect in both groups A and B for distal common bile duct (60% and 62.8%), proximal common bile duct (57.2% and 65.7%), gallbladder (54.3% and 57.1%), and ampulla and confluence (42.9% and 54.3%), respectively, but intrahepatic duct results showed that positive analysis for group A (48.6%) is less compared to group B (62.8%).

Discussion

Many reports discussed M.R.C.P pitfalls and showed that the main cause was residual food and fluid in the upper G.I tract, [10,11]while other studies showed a reduction in the number of equivocal M.R.C.P studies by using negative oral contrast agent [17] or Blueberry and Pineapple juices which statistically improved contrast and image effect of M.R.C.P. [9-11] Many studies concerning the preoperative effect of H2 Receptor Antagonist (H2RA) and some of the Proton Pump Inhibitors (P.P.Is) other than Esomeprazole in decreasing volume and reducing gastric acidity were conducted by anesthetists. [18-20] In reviewing the English literature, no study was conducted on the effect of P.P.I on M.R.C.P while there was only one paper reported by Bowes et al concerning the effect of Histamine H2 antagonist (Ranitidine) on M.R.C.P and they concluded that Ranitidine is a cheap and effective agent to decrease signal from upper gastrointestinal tract and improve visualization of biliary tree. [21]

Our study showed that contrast and image effect of M.R.C.P has improved significantly after the administration of Esomeprazole in both groups (A+B) and its use is beneficial for obtaining better results.

Our result showed that Esomeprazole improves MRCP images and both groups (A+B) had better images after Esomeprazole than before in positive cases.

A contrast effect has improved in single dose patients in 72.9% and in double dose 78.9% (average 75.7%), while image effect 53.8% and 60.5% (average 57.15%), respectively giving slight advantage for the double dose over the single dose but which was not statistically significant that can justify the double price of the 80 mg dose in which group A showed contrast effect and image effect in the same (14.3% and 24.28%) and negative (12.85% and 14.26%) cases, respectively, while group B showed in the same (14.3% and 25.73%) and in negative (7.15% and 13.8%) cases.

Concerning improvement of contrast effect, single dose Esomeprazole reduces gastric secretions in 80% of cases and duodenal secretions in 65.7%, while those values for double dose Esomeprazole were 80% and 72.1%, respectively. Double dose and single dose had the same results in visualization of pancreatic duct (60%), while biliary tree visualization in both groups A+B had improved in this order CBD (61.5%), gallbladder (55.7%), and ampulla and confluence(48.6%), except for some advantage of double dose results (62.8%) compared to single dose (48.6%) in showing the intrahepatic biliary ducts which can be of value in cases where clarifying of intrahepatic ducts is of importance especially for surgeons and interventional radiologists or revealing congenital anomalies (Table 1).

In reviewing patients with the same results (Table 1), analysis showed no significant change noted in image effect, contrast effect showed less cases (7.15%) in double dose results than in single dose (12.85%) while patients with negative results showed nearly equal percentage.

Table (1): Comparison of imaging and statistical results for single and double dose of Esomeprazole

Group			*Esomeprazole Single dose (A) N=35 N (%)*	*Esomeprazole Double dose (B) N=35 N (%)*	*Chi-Square*	*P value*
Contrast Effect	***Signal from stomach***	*Positive*	*28(80%)*	*28 (80%)*	*1.167*	*0.558*
		Same	*3(8.6%)*	*5(14.3%)*	*df=2*	
		Negative	*4(11.4%)*	*2(5.7%)*		
	Signal from Duodenum	*Positive*	*23(65.7%)*	*27(77.1%)*	*1.153*	*0.562*
		Same	*7(20%)*	*5(14.3%)*	*df=2*	
		Negative	*5(14.3%)*	*3(8.6%)*		
Image Effect	***Gallbladder***	*Positive*	*19(54.3%)*	*20(57.1%)*	*1.207*	*0.547*
		*Same**	*10(28.6%)*	*12(34.3%)*		
		Negative	*6(17.1%)*	*3(8.6%)*		
	Ampulla's and confluence	*Positive*	*15(42.9%)*	*19(54.3%)*	*0.938*	*0.626*
		Same	*12(34.3%)*	*10(28.6%)*	*df=2*	
		Negative	*8(22.8%)*	*6(17.1%)*		
	Proximal C.B.D	*Positive*	*20(57.2%)*	*23(65.7%)*	*0.0140*	*0.993*
		Same	*11(31.4%)*	*7(20%)*	*df=2*	
		Negative	*4(11.4%)*	*5(14.3%)*		
	Distal C.B.D	*Positive*	*21(60%)*	*22(62.8%)*	*0.0759*	*0.963*
		Same	*10 (28.6%)*	*9(25.7%)*	*df=2*	
		Negative	*4(11.4%)*	*4(11.5%)*		
	Intrahepatic duct	*Positive*	*17(48.6%)*	*22(62.8%)*	*1.532*	*0.465*
		Same	*13(37.1%)*	*10(28.6%)*	*df=2*	
		Negative	*5(14.3%)*	*3(8.6%)*		
	Pancreatic duct	*Positive*	*21(60%)*	*21(60%)*	*0.144*	*0.931*
		Same	*7(20%)*	*6(17.2%)*	*df=2*	
		Negative	*7(20%)*	*8(22.8%)*		

**** Including cholecystectomy patients (3; single dose (A), 9; double dose (B)).***

Figure A:

Figure B

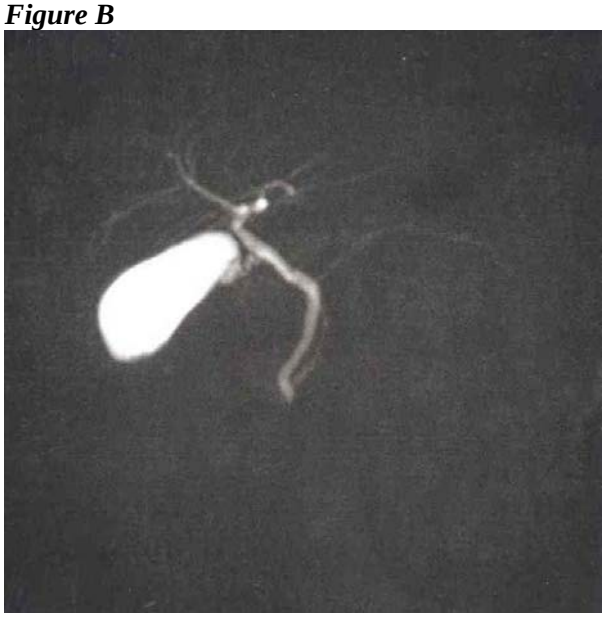

Figure 1 (A+B): M.R.C.P Images taken before (A) and after single oral dose of Esomeprazole (B).

Figure A ***Figure B***

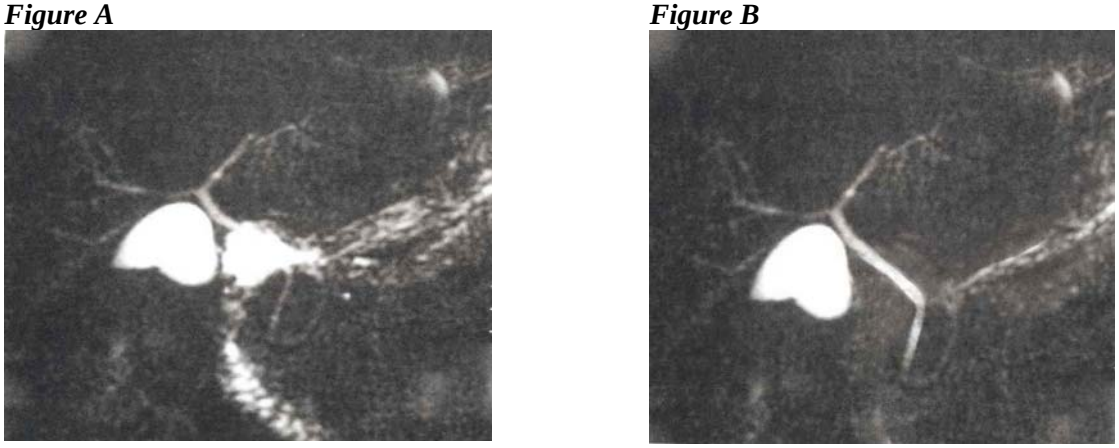

Figure 2(A+B):M.R.C.P Images taken before (A) and after double oral dose of Esomewprazole (B).

Conclusion

Esomeprazole improves images and gives superior quality of Magnetic Resonance Cholangiopancreaticography results especially the contrast effect of duodenum and stomach and image effect of pancreaticobiliary ducts. But images obtained from patients given a double dose showed no significant difference to those patients given a single dose except some advantage is seen in favor of double dose group in improving intrahepatic duct images.

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تصوير الرنين المغناطيسي للقنوات المرارية و البنكرياسية مع دواء ايزومبرازول عن طريق الفم: مقارنه بين الجرعة العادية و الجرعة المضاعفة من الدواء

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الملخص

الهدف: الهدف من هذه الدراسة هو تقييم الفائدة من استخدام جرعة مضاعفة من دواء الايزومبرازول مقارنة بالجرعة العادية في تحسين رؤية القنوات المرارية والبنكرياسية عند تصويرها بالرنين المغناطيسي.

الطريقة: تم عمل الدراسة على سبعين مريضاً قبل اعطائهم دواء الايزومبرازول وبعده، وكان نصفهم قد أعطي الجرعة العادية (40 ملغم) والنصف الاخر اعطي الجرعة المضاعفة (80 ملغم)، ثم تم تقييم صور الرنين المغناطيسي للقنوات المرارية والبنكرياسية.

النتائج: كان هنالك تحسن في جميع الصور التي مع الايزومبرازول، فقد كان هناك نقص في السوائل في المعدة والاثني عشر عند المرضى بنسبة 72.5% للجرعة العادية و78.5% للجرعة المضاعفة، بينما كان تحسن القنوات البنكرياسية متشابهاً (60%) في كلتا الجرعتين وحتى في التحليل الاحصائي ولا فرق يذكر في تحسن رؤية القنوات المرارية في الصور او التحليل الاحصائي بين الجرعة العادية والمضاعفة.

الخلاصة: ان عقار الايزومبرازول سواء بجرعة عادية او مضاعفة يحسن نوعية صور الرنين المغناطيسي للقنوات المرارية والبنكرياسية خاصة في تقليل الافرازات في المعدة و الاثني عشر، ويوضح صور القنوات البنكرياسية، باستثناء القنوات المرارية داخل الكبد، ولا فرق بين الجرعة المضاعفة والجرعه العادية في تحسين نوعية الصور للقنوات المرارية.

الكلمات الداله: تصوير الرنين المغناطيسي للقنوات المرارية والبنكرياسية، الايزومبرازول، النوعية، الأردن.