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A prospective comparative study of detection of colonic polyposis by magnetic resonance colonography versus conventional colonoscopy

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ABSTRACT

Background: Colorectal cancer mostly arises from adenomatous polyp and the transition time to convert into carcinoma is around ten years. As the progress to adenocarcinoma is a slow process so, early detection and endoscope resection is claimed to be effective in decreasing incidence and mortality by colorectal cancer. MR colonography is a non-invasive method for evaluating entire colon. It can detect precancerous lesion, cancer and staging. It is non-invasive tool for screening. Acceptability of the patient is better for MR colonography.

Methods: Present study is a prospective comparative evaluation of magnetic resonance colonography verses colonoscopy conducted in the Department of Radiology, Konaseema Institute of Medical Science, and other establishments from August 2015 to January 2018. The sample size was calculated to be 112. Specificity, sensitivity and predictive value were calculated by medical statistical software.

Results: For all size of tumours, sensitivity was 85.71%, specificity was 92.85%, positive predictive value was 92.30%, negative predictive value was 86.66% and accuracy was 94.34%. The positive predictive value was 90.00% negative predictive value was 92.68% and accuracy was 92.16%. For 1 mm to 4 mm size of polyp the sensitive was 28.57%, specificity was 92.31%, positive predictive value was 66.67%, negative predictive value was 70.59% and accuracy was 70%.

Conclusions: In present study we have found that there was male predominance in patient and gastrointestinal bleeding was common clinical presentation. We have also observed that all size of poly MR colonography as having sensitivity and specificity around 90% but MR colonography is highly sensitive and specific for polyp size above 8mm but it is less sensitive for size below 4 mm.

Keywords: Colonic polyposis, Magnetic resonance colonography, Conventional colonoscopy

INTRODUCTION

Over all, cancer is the second leading cause of death globally. It is responsible for 9.6 million deaths in 2018. Colorectal cancer is the third most common cancers (1.80 million cases). Colorectal cancer is considered to be most preventable but least prevented type of cancer. A screeching programme for early detection of rectal polyp and change life style has reduced the burden of this disease. Colorectal cancer mostly arises from adenomatous polyp and the transition time to convert into

carcinoma is around ten years. As the progress to adenocarcinoma is a slow process so, early detection and endoscope resection is claimed to be effective in decreasing incidence and mortality by colorectal cancer.^{3,4} Colonoscopy is considered as gold standard for screening of colorectal cancer, but its success depends upon skill of endoscopist. This technique is invasive and is associated with clinically important complication like bleeding and/or peforation.⁵ Virtual colonoscopy has developed as practical clinical technique it consists of MR, CT and PET or CT images with work station

elaboration to visualise colon as likely as traditional colonoscopy that allow exploration of colonic lumen and possible pathology.^{6,7} MR colonography is a non-invasive method for evaluating entire colon. It can detect precancerous lesion, cancer and staging. It is noninvasive tool for screening. Acceptability of the patient is better for MR colonography. 8,9 Various studies have been conducted regarding comparison of MR colonography with conventional colonoscopy and some study has reported that MR colonography is similar to colonoscopy in detecting end luminal lesion. Pappalardo et al, Hartman et al have reported that MR colonography has high accuracy for defecting colorectal polyp larger than 5 mm. 10,11 Present study has been aimed to evaluate the specificity, sensitivity positive predictive value and negative predictive value of MRI colonography.

METHODS

Present study is a prospective comparative evaluation of magnetic resonance colonography versus colonoscopy conducted in the Department of Radiology Konaseema Institute of Medical Science, and other establishments from August 2015 to January 2018.

Inclusion criteria

Patients with both the sex group were included whose age >25 years and with colonographic evaluation or colonoscopy symptoms.

Exclusion criteria

Patients who had contra indication for use of MR, claustrophobia and allergic to contrast.

Before start of this study, a written informed consent was taken from all patients. This study is approved by the institutional ethics committee.

Sample size

Sample size was calculated by using sample size calculator. We used data from previous studies, for incidence and prevalence of colonic polyp and, assuming power of study 80% and error 0.05%, the sample size was calculated to be $112.^{9,10}$

Study method

A detailed history of the patient was taken, i.e., family history, duration and type of symptom. All patients were clinically evaluated. After that patient were subjected to bowel preparation. Bowel preparation was done in the evening using wet method with peglec (electrolyte, containing polyethylene glycol) purgative. ¹² After bowel preparation and overnight fasting MRI colonography was

performed by using MRI (Philps 1.5 tesla, SL. No 22158). An intestinal tube was inserted into return, 2 ml inj scopolamine was injected to decrease bowel movement, and bowel was distended by 1.5 to 2 litres of lukewarm water to contrast bowel lumen. The fast imaging with study state (true FISP) precession sequence was used for real time acquisition of fast gradient echo images for monitoring complete filling and distension of large intestine. Two flex surface coils was used in combination to ensure the coverage of pelvis and abdomen. Bright lumen MR colonography (as it differentiates the bowel wall and lumen and pathology arises from bowel wall can be visualized) was obtained by acquiring T2- weighted images in conjunction with a transverse and coronal True FISP sequence. A 3D True FISP data set of the abdomen encompassing the entire colon and axial section and both prone and supine position was collected with following parameters, Flip angle 70%, Flow 400 mm × 400 mm voxal size 1 mm TR: 4.45 mg TE: 2.23 ms. After completion of procedure enema bag was placed on the floor for facilitating empty of colon. The process was completed in 20 min and 3D data set was subsequently processed. The image future was characterized by mixture of both T1 and T2 contrast, by creating a bright signal of colon which is homogenous and filled with water.

Directed visualisation of polyp as a mucosal projection and its biopsy was taken by conventional colonoscopy also. The gastroenterologist was blinded to the finding of MR Colonography. For this we used olympus as colonoscope type Q 1502 S.No 2102118.

Statistical analysis

Microsoft excel sheet was used for collection and tabulation of data. For analysis of data SPSS version16 software was used. Specificity, sensitivity and predictive value were calculated by medical statistical software.

RESULTS

During the study period of two year five month around one hundred twelve patients were included for this study as per inclusion and exclusion criteria.

As per Table 1, mean age of the patients was 57.20±16.60 yrs. The sex ratio was 20 female and 80 male so there was male predominance. Regarding indication for colonoscopy the gastro intestinal bleeding in 46 (41.0%) patients, pain abdomen in 28 patients (25%), screening 18 (16.00%) and others were 24 (21.42%). Regarding site of lesions, 6 (11.53%) patients have polyp in ascending colon, 2 (3.8%) patients have polyp in hepatic flexure, colon, 5 (9.6%) patients have polyp in transverse colon, 2 (3.8%) patients have legion in deseeding colon, 4 (26.92%) lesion in signed colon and 6 (11.5%) patients have lesion in rectum.

Table 1: Demography and clinical characteristic of patients.

Variables		Numbers
Age (years)	(Mean±SD)	57.2±16.60
Sex ratio	F/M	36/84
Family history	P/A	48/72
Indication	GI bleeding	46
	Pain abdomen	28
Indication	Screening	18
	others	24
	Caecum	6
	Ascending colon	15
	Hepatic flexure	2
Site	Transverse colon	5
Site	Splenic flexure	2
	Descending colon	2
	Sigmoid colon	14
	Rectum	6

Table 2: Result of analysis MR colonography.

Sizes of polyp	Number of patient	Number of patients detected polyp			
	True positive	False negative	False positive	True negative	
All size	48	8	4	52	
>8 mm	22	-	-	90	
4 to 8 mm	18	6	2	76	
1 to 4 mm	8	20	4	48	

Table 3: Diagnostic accuracy of MR colonography.

Parameters (%)	All size	>8 mm	4–8 mm	1-4 mm
Sensitivity	85.71	100	73.00	28.57
Specificity	92.85	100	97.44	92.31
Positive p value	92.30	100	90.00	66.67
Negative p value	86.66	100	92.68	70.59
Accuracy	94.34	To 100	92.16	70

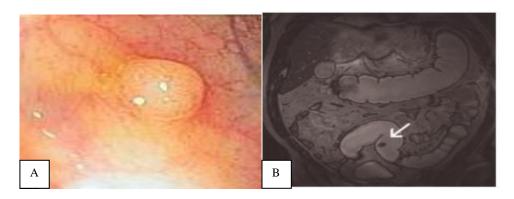


Figure 1 (A and B): Colonic polyp in conventional colonoscopy and MR colonography showing colonic polyp.

As per Table 2 regarding result of analysis of magnetic resonance colonography, out of 112 with respect to size of polyp, regarding all size of polyp true positive cases were 48, false negative cases were 8, false positive cases were 4 and true negative cases were 52. For size of polyp

more than 8 mm. True positive cases were 22 and true negative cases were 90. For size between 4 mm to 8 mm true positive cases were 18, false negative cases were 6, false positive were 2 and true negative were 76. Size below 4 mm true positive cases were 8,true negative

cases was 48, false negative cases was 20 and false positive case were 4.

As per Table 3 sensitivity, specificity, positive predictive value, negative predictive value and accuracy of MR colonography were calculated. For all size of tumours, sensitivity was 85.71%, specificity was 92.85%, positive predictive value was 92.30%, negative predictive value was 86.66% and accuracy was 94.34%. For size more than 8 mm all these parameters were 100%. For size of polyp between 4 mm to 8 mm the sensitivity, and specificity were 73.00% and 97.44% respectively. The positive predictive value was 90.00% negative predictive value was 92.68% and accuracy was 92.16%. For 1 mm to 4 mm size of polyp the sensitive was 28.57%, specificity was 92.31%, positive predictive value was 66.67%, negative predictive value was 70.59% and accuracy was 70% (Figure 1).

Table 4: Comparison of MR colonography and conventional colonoscopy with respect to size of poly in total patients.

Size		Observed	Not observed
>8 mm	MRC	48	8
	CC	56	0
<8 mm	MRC	10	42
	CC	52	0

As per Table 4 for polyp size more than 8 cm it was detected in 48 patients and not detected in 8 patients but by colonoscopy it was detected in 56 patients. For size less than 8 cm magnetic resonance colonography detected polyp in 10 patients but colonoscopy detected in 52 patients.

DISCUSSION

In present study one hundred twelve patients were evaluated for colonic polyposis based on presenting symptoms, by colonoscopy and magnetic resonance colonography. In our study the mean age of the patient was 57.20±16.60 yrs. This finding was supported by the work of Papparado et al. ¹⁰ Mean age in his study was 59 yrs. There was male predominance in our study which supported by the study of Papporadio et al and Hartmann et al we have observed that family history has present in 42.85% patient and gastrointestinal bleeding was the most common indication for evaluation of patients. ^{10,11} This finding corroborates with the study of Hafeez et al. ¹³ Hartmann et al has reported that GI bleeding in 65.7% which is higher than our study. ¹¹

In present study most commonly legion was found in ascending colon followed by sigmoid codon, caecum and rectum this finding corroborate with the observation of Neals et al but is not supported by the work of Laiw et al. ^{14,15}

Regarding number of patients with polyp, all for all size of polyp true positive cases were 48 and true negatives cases were 52. For size more than 8 mm there is no false negative and false positive cases. But size 1 mm to 4 mm there are more false negative and false positive findings. This finding is supposed by the work of Hoffman et al but Beker et al finding differs from us but his study was included all type of lesion. 16,17

We have observed that for all size polyp sensitivity, specificity, positive predictive value, negative predictive value and accuracy was between 85.71% to 94.34%. For size above 8 mm all these value was 100% for size below 4 mm to 8 mm sensitivity was less and specificity was 97.44%. For size below 4 mm sensitivity was 28.57% and specificity was 92.31% but all parameter was less. This finding was supported by the work of Hartmann et al and Pappalardo et al. 10,11 Zijta et al has reported that for size 10 mm sensitivity was 84% which does not support our study. 18 Debatic et al has reported that for size exceeding 10 mm sensitivity and specificity exceeds 95% which again support our study. We have observed that by colonoscopy all size of polyp can be detected but magnetic resonance colonoscopy can detect polyp of comparatively larger size. This finding was supported by Luboldt et al.20

CONCLUSION

Conventional colonoscopy is a gold standard for screening and early detection of colonic polyposis. Magnetic resonance has enraged as good alternation for this. In present study we have found that there was male predominance in patient and gastrointestinal bleeding was common clinical presentation. We have also observed that all size of poly MR colonography as having sensitivity and specificity around 90% but MR colonography is highly sensitive and specific for polyp size above 8 mm but it is less sensitive for size below 4 mm.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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