Patient experiences of MR colonography and colonoscopy: a qualitative study

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Objectives: The aim of this study was to apply qualitative techniques to assimilate data on patient experience and attitudes during MR colonography (MRC) and colonoscopy (CC).

Methods: 18 patients (11 male, 8 female, median age 40.5 years), 10 of whom had known colonic inflammatory bowel disease (IBD) and 8 who were under investigation for suspected colonic neoplasia (non-IBD), underwent MRC and conventional CC. Semi-structured interviews were performed to assimilate test experiences and preferences, and themes were extracted using thematic analysis.

Results: Thematic analysis identified three main themes: (i) physical experience, (ii) information provision and (iii) overall preference. Patients expressed mixed views about the physical experience of MRC but specifically identified water filling, breath holding and lying still as problematic. Anxiety was expressed regarding potential incontinence. Scanner noise interfered with the understanding of instructions, particularly amongst non-IBD patients. Non-IBD patients expressed greater anxiety over the delay in receiving the MRC report than IBD patients. In general MRI was considered as the more informative and safer investigation. Patients reported more physical discomfort during CC (notably IBD patients) related to air insufflation and colonoscopic manipulation but were more satisfied with the feedback they received. 10 patients (56%) stated an overall preference for MRC and 5 (28%) preferred CC. Reasons for preferences stated by the patients included discomfort, speed of the test, safety, perceived diagnostic ability and the ability to take biopsies.

Conclusion: Experiences of MRC and CC are complex and influenced by clinical indication. Individuals place different weightings on the relative importance of test attributes including discomfort, noise, immobility, feedback, safety and fear of incontinence and this defines overall preference.

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Colonoscopy (CC) remains the reference standard for diagnosing colonic inflammatory bowel disease (IBD) and neoplasia. However there is considerable interest in potentially less invasive radiological alternatives with reduced risk of serious complications. Recent data suggest that MR colonography (MRC) achieves adequate sensitivity for detection and grading of inflammation [1] and is proposed as a safer, less invasive alternative to colonoscopy for monitoring and restaging of IBD.

Although diagnostic performance is the major determinant for uptake of any radiological investigation, acceptability to patients is also an important consideration. This is especially relevant in IBD, given the need for repeated colonic examinations over the course of the disease. Patient acceptance is influenced by several factors, including test expectations, comfort, overall satisfaction and

diagnostic performance. While it is assumed that patient acceptance of MRC is higher than colonoscopy, this is based on a limited number of studies [2–7]. For example, Achiam et al [2] reported that, in a cohort of 64 patients, 71% expressed preference for MRC as a future examination because it was less painful and unpleasant than CC.

However, existing data have limitations. In particular, it is premature to use quantitative techniques whereby researchers create structured questionnaires based on their own pre-conceived expectations of factors relevant to patients' experiences. Such an approach prevents patients from describing expectations, experiences and preferences in their own words. For example, a recent qualitative investigation of patient experience of colonoscopy and CT colonography [8] revealed important differences in patient experience of staff interactions not previously considered by the authors, but which had important implications for the associated test anxiety.

Furthermore, the influence of clinical indication has received little attention to date. It is perfectly possible that IBD patients who undergo routine colonic surveillance

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may have different expectations and priorities from non-IBD patients referred for one-off colonic investigation. Baseline studies with less structured qualitative methods in different patient groups are therefore essential to develop comprehensive quantitative assessments for new diagnostic tests. The aim of this study was to apply qualitative techniques to assimilate data on patient experience and attitudes during MRC and CC and to evaluate how this is moderated by clinical indication.

Methods and materials

The study was approved by the local ethical review committee and all recruited patients gave written informed consent. Between October 2007 and October 2008, 11 male and 7 female patients (median age 40.5 years, range 17–65 years) were recruited from an ongoing trial at University College Hospital, London, comparing MRC with same-day CC. Patients referred for routine CC were invited to undergo MRC approximately 2 h beforehand. Of the 18 patients, 10 had known colonic IBD (8 ulcerative colitis and 2 Crohn's disease; 7 males and 3 females; median age 35 years, range 17–61 years) and were being assessed during a clinical flare ($n=6$) or undergoing general surveillance ($n=4$). 8 patients (4 males and 4 females; median age 48 years, range 26–65 years) were undergoing investigation for suspected colonic neoplasia (change in bowel habit $n=3$, rectal bleeding $n=3$ and prior history of colonic polyps $n=2$). All IBD patients experienced at least one prior CC compared with just two in the non-IBD group (for polypectomy). None had undergone prior MRC, although two IBD patients had undergone MRI enterography before and two non-IBD group patients had undergone MRI for other reasons (knee and spine).

All patients underwent full bowel purgation [ten Senna tablets (Reckitt Benckiser Healthcare, Hull, UK) and two sachets of magnesium citrate (citramag; Sanochemia Diagnostics, Bristol, UK)] the day before CC.

Patient information

Patients all received the standard colonoscopy information sheet explaining the procedure including use of sedation and analgesia.

The information sheet pertaining to MRC described the colonic distension with water, the need for iv gadolinium injection and the lack of ionising radiation. The perforation risk from MRC was stated as less than 3 in 10 000 and total duration of the test was 30 min.

Procedures

MR colonography

An experienced practitioner performed MRC 2 h before subsequent CC. Following rectal introduction of a 16F Foley catheter, the colon was gently filled with 1.5 l of warm tap water from an enema bag held at shoulder height. Bowel motility was abolished by intravenous spasmolytic (Buscopan; Boehringer Ingelheim, Ingelheim, Germany) 0.3 mg kg^{-1} (maximum 20 mg) immediately prior to imaging; iv gadolinium (0.2 mg kg^{-1}) was also administered.

Images were acquired in the prone position and during breath hold using a 1.5T Siemens Avanto (Siemens AG, Erlangen, Germany) magnet. 3 sequences were acquired, requiring approximately 15 breath holds per patient.

The procedure took 20–30 min, after which the water was allowed to drain back into the enema bag. Patients were then escorted to the endoscopy suite.

Colonoscopy

CC was performed by experienced operators with 2–10 years' experience. An iv sedative (midazolam $50 \mu\text{g kg}^{-1}$, maximum 10 mg, and fentanyl $100 \mu\text{g}$) was administered. Multiple biopsies were taken in those with IBD. Among non-IBD patients, three had polypectomy and the remaining five had multiple ileocolonic biopsies to exclude microscopic colitis. The procedure took an average of 45 min. Patients were provided with refreshments prior to discharge.

Patient interviews

All patients were interviewed by the same researcher (RH) prior to discharge. The interview schedule was constructed in collaboration with a health psychologist with considerable experience of assessing patient experience of diagnostic procedures (CW). Interviews were semi-structured to allow freedom of expression by patients regarding their experience and concerns. Key aspects of each procedure (e.g. anxiety, safety concerns, embarrassment, discomfort, interaction with staff and feedback of results) were identified prior to the interviews in order to allow direct questioning if not mentioned by the patient to begin with.

Interview transcripts were analysed using standard thematic analysis [8] to assimilate individual patient experiences into broad descriptive groups of concerns and interests, therefore facilitating overall interpretation of the data. In particular, the data were coded by identifying recurrent themes related to patient perception of their experiences. As codes were accumulated, they were grouped into more general themes by the researchers.

Results

Three main themes emerged from the thematic analysis: (i) physical experience, (ii) information provision and (iii) overall preference.

MR colonography

(i) Physical experience

In general all patients expressed mixed views about the physical experience of MRC and several themes emerged.

Water filling Most patients [both non-IBD (four out of eight) and IBD (eight out of ten)] described water filling as either uncomfortable or painful and frequently described it as problematic. Filling was mainly associated with episodic cramps, which were mild and tolerable for most (e.g. "For me the whole procedure was ok, you do feel little pressure

of water filling inside but no pain." IBD patient, male, age 29 years). However, for a subgroup of patients it was intolerable (e.g. "It became quite painful as water was filling in my stomach. It was not pleasant as pain was coming and going. They gave me some injection which made it better for some time but pain came back again and gradually became unbearable." Non-IBD patient, female, age 26 years).

In addition, three patients (two IBD and one non-IBD) expressed anxiety and worry regarding potential incontinence of the water enema. For example, "It was ok except the fluid part, it's not a good feeling when water is filling and moving inside giving the worry that I couldn't hold it and mess can happen" (IBD patient, male, age 44 years). Only one patient (non-IBD) actually suffered incontinence suggesting it was the fear of incontinence that was important.

Breath holding Four patients (three IBD and one non-IBD) found it difficult to hold their breath and/or coordinate with the instructions and timings given. "Sometime breathing was difficult to coordinate as there was not much time in between for normal breath" (IBD patient, male, age 34 years); "holding the breath was hard especially for such a long time, although near the end it became easy, maybe I got use to it" (IBD patient, female, age 36 years).

Lying still in the MRI scanner IBD patients (five out of ten) in particular described lying in the MRI scanner and restriction of movements as uncomfortable. One patient suggested the use of a TV as a distraction: "Lying in same position for an extensive time period and not being able to move is very uncomfortable and in addition there is some weight on your back for the scan, which gets unbearable after approximately 20 min. There should be something in the room for distraction during scan, something like a TV even without the sound as you have to hear the breathing instruction as well" (IBD patient, male, age 61 years).

(ii) Information provision

Patients mentioned that they would have preferred instructions about times during examination when they would be able to relax their posture.

Scanner noise The noise of the scanner interfered with understanding of instructions, particularly amongst non-IBD patients (four out of eight) who may have been less familiar with diagnostic tests: "The noise and vibration of the MRI machine was surprising and disrupted communication of instructions" (non-IBD patient, male, age 48 years).

Information dissemination and uncertainty Patients expressed mixed opinions about feedback of the test results, although most did comment on the need to wait for the formal MRC report. Non-IBD patients (six out of eight) expressed greater anxiety over this delay: "You don't get any report, I have to wait for my clinic appointment but if you can get the report the same day it can give some peace of mind" (Non-IBD patient, female, age 34 years).

Another patient mentioned: "There was no feedback, I have to wait for the report, but I would like to know as early as possible" (non-IBD patient, female, age 38 years).

Conversely, the IBD group (four out of ten) expressed less anxiety: "They didn't give me any feedback; I have to wait for my clinic appointment to discuss with the consultant. I know I have ulcerative colitis so I am ok to wait to know how I am doing" (IBD patient, male, age 40 years).

Extra colonic findings Patients of both groups (12/18) were often of the view that MRI was the more advanced, informative and safer investigation and were able to visualise extra-colonic organs: "There are few things about MR like it is a very advanced technology, you can see not only one part of the tummy but the whole of it which I think is very good to have at one time and there are few risk factors as chance of perforation is very small" (non-IBD patient, male, age 48 years).

Colonoscopy

(i) Physical experience

Opinions were mixed but the emerging themes were less varied compared with MRC and concentrated on air insufflation, colonoscopic manipulation (particularly discomfort below the ribs) and taking of biopsies. As detailed below, despite their familiarity, IBD patients more frequently reported discomfort or pain during CC than non-IBD patients, particularly during endoscope manipulation.

Pain during colonic insufflation Patients in both groups (13/18) mentioned discomfort or pain to some degree during air insufflation: "It was painful continuously not like MR where cramps were episodic, it was severe and all over the tummy. Although it was intolerable they did complete the procedure" (IBD patient, female, age 26 years).

Colonoscopic manipulation Both IBD and non-IBD patients associated discomfort/pain with movement of the scope, particularly among the IBD group in which nine of the ten patients specifically mentioned painful episodes during the procedure: "It was continuously painful—very bad pain and I think it was happening as they were moving that scope inside" (IBD patient, female, age 17 years).

Fewer non-IBD patients (four out of eight) also reported pain or discomfort: "There was discomfort a few times during the test. I think it was due to movement of tube, for a few minutes and not continuous" (non-IBD patient, female, age 38 years).

Sedation was an important moderator of the experience: "I went to sleep during the test but when I woke up at some point I felt some dull pain, only for 5–6 min," (IBD patient, male, age 61 years).

(ii) Information provision

Test result feedback Patients were more satisfied with the feedback they received during and after CC compared with MRC. They noted the ability to observe the same screen as the physician while also receiving an

explanation from the medical team either immediately or later in recovery. "I was able to see on screen which was fascinating and the doctor did explain to me as well that everything was normal" (Non-IBD patient, female, age 40 years). Some of the patients (both IBD and non-IBD) however, did not find this feedback particularly reassuring, in part owing to persistent effects of sedation and lack of full comprehension: "They did explain to me a few things but I can't remember as I was not very alert due to sedation." (IBD patient, male, age 44 years).

(iii) Overall preference

There were divergent views regarding which of the two procedures patients preferred overall and the most important factors influencing their choice.

Of the 18 patients, 10 (56%) stated an overall preference for MRC and 5 (28%) preferred CC. 3 patients (17%) did not express any preference as both tests were very painful and preferred to leave the decision to the clinician. Among the IBD group, 5 patients (50%) preferred MRC, 3 (30%) preferred CC while 2 (20%) had no preference. In non-IBD patients, 5 (62.5%) had a preference for MRC, 2 (25%) for CC and 1 patient (12.5%) expressed no preference.

The reasons for preferences were mixed (Table 1). In particular patients had differing views of which test was more uncomfortable and how this influenced their preference. Duration, safety, perceived diagnostic capability and ability to take biopsies were all noted as specific reasons underpinning stated preferences.

Discussion

It is clear that patient experience of both MRC and CC is complex and influenced by many factors. Our study

included patients from two different groups, those with IBD and patients with clinical suspicion of bowel neoplasia (non-IBD group).

Most of the prior quantitative studies of MRC and CC experience have included questions on procedural discomfort. Achiam et al [2] used a five-point pain scale and indicated significantly greater discomfort during CC than MRC, a similar finding to Florie et al [4] who also grouped pain into five categories from "none" to "extreme". In our qualitative study, pain was mentioned more frequently with CC than MRC. All the IBD patients had at least one previous experience of CC but despite this familiarity, they more frequently reported discomfort during CC. The reported beneficial effect of sedation was a common theme and supported by findings from similar samples [7]. However colonic distension with water during MRC was very unpleasant for some, although the differing degree between individuals was striking, ranging from "a little pressure" to "unbearable". Using a structured questionnaire for 171 patients, Florie et al [4] also reported that 51% of patients felt colonic filling was the most "burdensome" part of MRC.

We also found that the need to lie still during the MRI is more problematic than previously described, particularly for IBD patients. In addition, the intrusive nature of the MRI scanner noise was noted by several non-IBD patients, another facet of the examination which has not been reported in prior quantitative work.

Although only 1 of the 18 patients suffered any incontinence during MRC, fear of incontinence was stated by several patients and is a disadvantage compared with CC.

An interesting outcome of our study is the reported difference in perceived feedback during MRC and CC. The ability to view the procedure was a distinct advantage of CC together with the immediate diagnostic feedback

Table 1. Example quotes pertaining to test preference

Preference for MRC	Preference for CC
After reading the information and having the both test I think MRI is safer and more informative. (Non-IBD patient, male, 65 years old)	Colonoscopy. One reason is being less painful and other I think they can take biopsies which can be more helpful for the diagnosis and treatment later. (Non-IBD patient, female, 48 years old)
MRC was quicker than CC, no sedation was involved so nobody needs to come to take you home. (IBD patient, female, 36 years old)	For me colonoscopy was easier and total time period for the test was shorter as compare to MR. Things during MRI like breathing instructions are difficult to follow specially being on your tummy. (IBD patient, male, 61 years old)
One thing it was more comfortable and I think there are less risks with it as it is only water going into your body through a small tube but in colonoscopy tube is very big. (Non-IBD patient, male, 55 years old)	It was more comfortable. (Non-IBD patient, female, 36 years old)
It can give more information and it is less invasive. (IBD patient, male, 63 years old)	For me both tests are ok but colonoscopy is more comfortable and you have sedation for it which you don't have in MRI. (IBD patient, male, 44 years old)
After my experience I would prefer MR. They both are good and MR is more embarrassing but I think it can give more information as compared to colonoscopy. You can take a biopsy during colonoscopy which is beneficial but dangerous as it can damage bowel. (Non-IBD patient, female, 38 years old)	I would say both are good tests but MR is painful and colonoscopy more comfortable although I think you can get more information through MR but I will prefer CC. (IBD patient, male, 41 years old)
MRI was less invasive just a small tube and water but in colonoscopy one thing tube is bigger and then they take biopsy which is more invasive, there is more manipulation in it as well. (Non-IBD patient, male, 57 years old)	

CC, colonoscopy; IBD, inflammatory bowel disease.

either during the procedure or before discharge. This was particularly noted by the non-IBD group undergoing investigation for suspected colorectal neoplasia, supporting previous work describing the patient's preference for early feedback, especially in cases of suspected cancer [9]. This may explain lower anxiety levels within IBD patients who have a known diagnosis and are not generally considering a diagnosis of cancer.

An important limitation of our study is that we did not provide patients with explicit information on the comparative diagnostic accuracy of MRC and CC. Previously, in comparisons of CT colonography and CC, relative diagnostic performance had a major influence on overall patient preference [10]. However we were still able to elicit interesting perceptions from patients about the diagnostic capabilities of MRI such as a "new", "expensive" and "superior" technology compared with CC.

Patients perceived the ability of MRI to visualise beyond the colon as a definite advantage along with its superior safety profile. This supports the findings of prior CT colonography research [8] that patients are intrigued by the ability of modern scanners to image organs outside the large bowel. However, patients are often unaware that this may sometimes trigger subsequent tests to investigate unexpected findings. There are strong parallels between CT colonography and MRC in this respect.

Although there was a slight overall preference for MRC, this tendency was not strong. Furthermore, a large range of factors influenced patients' preferences with marked inter-individual differences. Simply asking patients' "preference" in quantitative studies is overly simplistic given the complexity of underlying determinants of patient opinion.

This study has built on the existing literature regarding comparative patient experience during MRC and CC. By using qualitative methods we have identified new aspects of MRC which directly impact on patient preference including the need to lay still, noise from the scanner, fear of incontinence, delayed diagnostic feedback and perceived diagnostic performance of the "new technology". Although our study included a small sample size, this is the norm for a qualitative study like this and useful information has been gleaned. However, further study using a larger sample size may well be worthwhile given the wide range of patient opinions we found. We also acknowledge that MRC is a developing technique which a multitude of approaches advocated for bowel preparation (full or reduced), colonic insufflation (liquid or gas) and MR sequence selection. Our data may not therefore be directly applicable to institutions using differing MRC protocols.

We did find clear differences in the importance of these factors to patients with differing clinical indications. Such data have important implications with regards to the provision of patient information for those undergoing MRC. Focus should be placed upon increasing the detail and relevance of information media. It can also assist the design of future quantitative measures of patient experience by incorporating the additional dimensions and considering clinical indications to allow subgroup analysis. Our findings should also be followed up by more direct ways of testing patient preferences using strategies such as conjoint analysis and discrete choice modelling, a procedure used frequently for health economic research. Data gathered in our study will be instrumental when

asking people to balance risks and benefits associated with invasive and non-invasive testing modalities.

In conclusion, patient experiences of MRC are complex. The assumption that MRC is better tolerated and preferred to CC is not valid for all patients. Individuals place differing personal weightings on the relative importance of test attributes which defines overall test preference. Informed discussion prior to requesting specific colonic investigations would likely improve current clinical practice.

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References

1. Ajaj WM, Lauenstein TC, Pelster G, Gerken G, Ruehm SG, Debatin JF, et al. Magnetic resonance colonography for the detection of inflammatory bowel disease of large bowel: quantifying the inflammatory activity. *Gut* 2005;54:257–63.
2. Achiam MP, Chabanova E, Logager V, Thomsen HS, Rosenberg J. Implementation of MR colonography. *Abdom Imaging* 2007;32:457–62.
3. Kinner S, Kuehle CA, Langhorst J, Ladd SC, Nuefer M, Zoepf T, et al. MR colonography vs. optical colonoscopy: comparison of patient's acceptance in a screening population. *Eur Radiol* 2007;17:2286–93.
4. Florie J, Birnie E, Gelder RE, Jensh S, Haberkorn B, Bartelsman JF et al. MR Colonography with limited preparation: patient acceptance compared with that of full-preparation colonoscopy. *Radiology* 2007;245:150–9.
5. Goehde SC, Descher E, Boekstegers A, Lauenstein T, Kühle C, Ruehm SG, et al. Dark lumen MR colonography based on faecal tagging for detection of colorectal masses: accuracy and patient acceptance. *Abdom Imaging* 2005;30:576–83.
6. Hartman D, Bassler B, Pfeifer B, Eickhoff A, Weickert U, Riemann JF et al. Patient acceptance of magnetic resonance colonography: a prospective inquiry for comparison to conventional colonoscopy. [In German.] *Dtsch Med Wochenschr* 2006;131:2519–23.
7. Langhorst J, Kühle CA, Ajaj W, Nüfer M, Barkhausen J, Michalsen A, et al. MR colonography without bowel purgation for the assessment of inflammatory bowel disease: diagnostic accuracy and patient acceptance. *Inflamm Bowel Dis* 2007;13:1001–8.
8. Wagner C, Knight K, Halligan S, Atkin W, Lilford R, Morton D, et al. Patient experiences of colonoscopy, barium enema and CT colonography: a qualitative study. *Br J Radiol* 2009;82:13–19.
9. Davey HM, Lim J, Butow PN, Barratt AL, Houssami N, Higginson R. Consumer information materials for diagnostic breast tests: women's views on information and their understanding of test results. *Health Expect* 2003;6:298–311.
10. Wagner CV, Halligan S, Atkin WS, Lilford RJ, Morton D. Choosing between CT colonography and colonoscopy in the diagnostic context: a qualitative study of influences on patient preferences. *Health Expect* 2009;12:18–26.