Background

Flexible sigmoidoscopy (FS) is usually carried out without any sedation while the majority of colonoscopies are performed using some form of intravenous sedation. These variations in clinical practice are illogical since during either flexible sigmoidoscopy or colonoscopy the passage of the scope frequently causes painful looping of the instrument [1]. As stated in a recent edition of a standard textbook “some stretching of peritoneal attachments is inevitable, at least transiently, during colonoscopy. This may cause growing or acute unpleasant visceral pain...” [2].

When unsealed FS is performed using standard 168cm or 130cm colonoscopes, the mean depth of penetration is consistently less than 72cm and over half of these examinations are discontinued because of discomfort. In a recent study [3], magnetic endoscope imaging (MEI[4]) was used to determine the depth of insertion at non-sealed, screening FS using a 60cm FS [5]. Pain was a frequent rate-limiting factor in depth of insertion[5]. Better understanding of the mechanisms of pain during both flexible sigmoidoscopy and total colonoscopy should help to improve technique b) patient tolerance and c) point the way forward for future instrument design and manufacture.

Methods

Four experienced endoscopists (GDB, DN, JH and JP) carried out the 145 colonoscopies reported. All had ME[4] with simultaneous “painometer” recording equipment and FS were performed by JSB Medical Ltd. There were 141 patients with intact colons and 4 who had previously undergone colonic surgery (two each with previous anterior resections and hence no sigmoid or descending colon, or AP resection with left sided colectomy leading to upper descending colon). Of these patients, 108 were imaged with either 12.8mm or 15.2mm, 105cm long adult colonoscopes and 37 with a prototype Olympus 10mm thin and longer 160cm MS230I scope. Thirty-two patients had these colonoscopies carried out without sedation while 113 had light sedation. Forty of the patients examined with an adult scope and all 37 with the MS230I scope had a stiffening sigmoid overtube (OT) inserted once the splenic flexure had been traversed as previously described[6,7].

Pain recording

Having obtained prior ethical approval, patients were informed that they would almost certainly experience a sensation in the rectum due to the endoscope itself and b) abdominal bloating due to insufflation. It was explained that in addition to this they might get some discomfort due to looping/stretching of the colonic mesentry. We requested that, in this event, the patient let the staff know so that a) the event could be recorded and b) action could be taken to relieve the discomfort.

Results

A total colonoscopy was carried out in 144 of the 145 patients. Some examples taken from one session are shown in Figure 1. It can be seen that the vast majority of the pain experienced before reaching the splenic flexure coincided exactly with periods of stretching or looping of the sigmoid colon. Furthermore inability to straighten the sigmoid colon at times of sigmoid looping/stretching was in 27 of the 145 patients no sigmoid looping occurred prior to reaching the splenic flexure. In this group 25/27 reported no pain whatsoever as the colonoscope passed easily and smoothly up to the splenic flexure.

Female patients experienced significantly more pain than males during the passage of the adult endoscope to the splenic flexure (Figure 2). In both male and female patients there was a dramatic reduction in pain during the first half of the examination when the Olympus MS230I scope was used (Figures 3a and 3b).

In general, once the splenic flexure had been passed, the examination tended to be relatively painless provided recurrent sigmoid looping was prevented. None of the 4 patients who had undergone previous colonic surgery had any pain during their colonoscopy. The use of a sigmoid stiffening overtube with either scope significantly reduced pain in the second half of the examination (Figure 4). There were differences between the number of re-ported pain events in the second half of the examination in the 14 patients in whom the overtube failed to work compared with the 63 patients in whom adequate splinting was achieved (Figure 5).

Figure 1 - Bladen Endoscope Imaging System with MRI software to analyse discomfort/pain events during colonoscopy. These computer-generated images show that the episodes of discomfort/pain tend to occur when the sigmoid colon became stretched/looped (Figures 1a, b, d, e, f). Pain was rapidly relieved when the sigmoid colon was straightened (Figures 1c, e). If a conventional OT was used the limited HS-inflating segment is shown in green while the position of the individual magnetic sensors in the biopsy channel of the colonoscope are shown in blue. The optical channels correspond to the anus, splenic flexure and hepatic flexure. The horizontal axis at the bottom of each image is the time in minutes since the start of the procedure and the blue vertical spikes represent episodes of discomfort/pain when the “painometer is squeezed

Conclusions

Women experience significantly more discomfort than men during both FS and colonoscopy [7]. We have shown that discomfort/pain during the first half of a FS colonoscopy can be greatly reduced by using a thinner and “flatter” instrument but the examination takes longer to perform [8]. A stiffening sigmoid overtube [6] significantly reduces the pain experienced during the second half of the examination providing adequate splinting of the sigmoid colon is achieved. Variable stiffness sigmoid overtubes should reduce pain in the first half of the examination but (as currently designed) will not prevent sigmoid re-looping and thus pain during the second half of the examination.

References