Colonoscopy using a thin prototype 130cm endoscope in combination with a modified enteroscope stiffening overtube

[1]Bell GD, [2]Hancock J, [3]Rowland RS, [4]Dogramadzi S, [4]Allen C

[1]Sunderland University Medical Sciences Faculty, [2]Department of Gastroenterology, Sunderland Royal Hospital, [3]RMR Systems Ltd, Kirton, Suffolk, [4]Department of Electrical and Electronic Engineering, Newcastle University

Background

We previously used magnetic endoscope imaging (MEI) [1,2] to determine depth of insertion at non-sedated flexible sigmoidoscopy (FS) using both a standard 60cm FS [3] as well as longer and thinner (10mm diameter) prototype endoscopes (Olympus XCFSEV and MS230I) [4,5] see Figures 1a and 1b. The thinner prototype endoscopes appeared to produced less pain than standard thickness adult colonoscopes but we found they were simply too floppy and short to guarantee total colonoscopy in an acceptable percentage of patients.

Figure 1a - Olympus XCFSEV and MS230I prototype 10mm endoscopes

Figure 1b - Thickness of the Olympus XCFSEV and MS230I prototype 10mm endoscopes compared with a standard adult colonoscope

Aims

We decided to see if colonoscopy using a thin endoscope in combination with a suitable stiffening overtube[6] would a) be useful in certain cases in whom colonoscopy with a standard adult instrument had been unsuccessful, b) produce an acceptable intubation rate to the caecum when used in "all-comers", c) cause less discomfort/pain than an adult instrument and as a consequence, d) potentially increase the numbers of patients being offered non-sedated colonoscopy in the UK.

Figure 1c - An Olympus enteroscope overtube cut down to a length of 35 cm easily accommodates the 10mm MS230I endoscope

Method and Results

We describe our experience using the MS230I 10mm diameter 130cm length Olympus prototype in combination with a cut-away 35cm muzzle-loaded version of an Olympus enteroscope overtube (outer diameter 11.5mm) see Figure 1c. We compare this with the results obtained with standard diameter (12.8 and 13.2mm) adult colonoscopes all of which were 165cm in length (Olympus CF240L and CF230L or Pentax EC3840F2). In all we used MEI in 216 of the 279 colonoscopies performed (or supervised) by GDB from 4th February 1999 to 4th February 2000. In 36 of the MS230I patients and 104 of the patients examined with an adult colonoscope we used a "painometer" as well as MEI [7]. Please see Table 1 for demographic details.

	Adult colonoscope	MS230I plus overtube	Statistical significance
Number	217	62	
Mean age(SD) years	57.8(13.3)	57.7(13.0)	NS
Number (%)of women	83/217 or 38.2%	47/67 or 70.1%	P<0.0001
Number(%) females with hysterectomy	7/83 or 8.4%	13/47 or 27.7%	P=0.0077
Mean (SD)dose of Midazolam	3.6(1.5)	2.8(1.2)	P=0.0007
Mean(SD) dose of Pethidine	42.6(14.3)	36.6(12.6)	P=0.0053
Time(SD) from anus to caecum in seconds-both sexes	727.3(324.4)	974.9(339.7)	P<0.0001
Time(SD) from anus to caecum in seconds- males	678.9(313.9)	927.9(273.3)	P=0.0016
Time(SD) from anus to caecum in seconds- females	815.6(328.1)	995.8(366.9)	P=0.0343
Mean(SD) number of episodes of discomfort/pain-both sexes	7.2(5.6)	3.6(2.7)	P=0.0004
Mean(SD) number of episodes of discomfort/pain-males	6.0(4.9)	2.2(1.7)	P=0.0025
Mean(SD) number of episodes of discomfort/pain-females	9.9(6.0)	4.3(2.8)	P=0.0002
Mean(SD) insertion depth in cms	127.1(14.1)	120.1(8.5)	P<0.0001

Table 1 - Demographic details of 279 patients colonoscoped

Adult colonoscope – Total Colonoscopy rates with and without the MS230I

In the 217 patients in whom we used an adult colonoscope, 78 had an overtube inserted as previously described [6] while no overtube was used in the remaining 139 cases. We succeeded in reaching the caecum in 202 patients thus giving an ITT (intention to treat) success rate of 202/217 or 93.1%. Of the 15 "failures" there were 4 with obstructing carcinomas and 2 with inadequate bowel preparation so on a "per protocol" basis our total colonoscopy rate would have risen to 202/211 or 95.7% if no further action had been taken. Of the remaining 9 "failures", 3 patients with IBS deemed the examination "intolerable" and asked for the examination to be terminated. In 5 of the remaining 6 patients in whom we had been unable to get beyond the sigmoid/descending colon junction with an adult endoscope, we successfully carried out a total colonoscopy with the MS230I plus overtube thus increasing the per protocol success rate to 207/211 cases or 98.1%.

MS230I plus enteroscope overtube- total colonoscopy rate

We successfully reached the caecum in 59/62 of the patients in whom we commenced with the MS230I scope and succeeded in all 5 of those in whom we had previously failed with an adult colonoscope. Thus our overall success rate was 62/67 or 95.5%. Two of the 3 failures occurred in very large obese

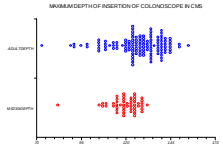


Figure 2 - The maximum depth of insertion of both standard colonoscopes and the MS230I plus overtube

women in whom the 35cm overtube was too short to adequately splint the left side of the colon. As a result the 130cm endoscope was simply not long enough to get beyond the hepatic flexure in either case – see Figure 2.

Total episodes of recorded discomfort/pain during colonoscopy

With the MS230I and overtube combination, the 36 patients reported a mean of 3.6 episodes of discomfort compared with a mean of 7.2 episodes in

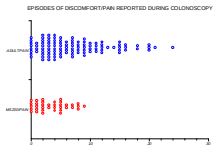


Figure 3 - Total number of episodes of discomfort / pain experienced during colonoscopy

the 105 patients in whom an adult colonoscope was used (P=0.0004) – see Figure 3.This is particularly significant since we actually used significantly smaller doses of both midazolam (P=0.0007) and pethidine (P=0.0053) in the MS230I group of patients – see Table 1.

Time to pass the endoscope from anus to caecum

With the adult colonoscope the mean (SD) anus to caecal time of 727.3(324.4) seconds or 12 minutes

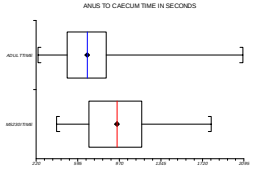
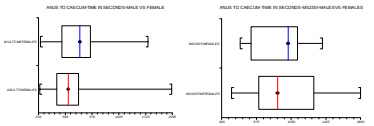


Figure 4 - Total time to pass the colonoscope from anus to caecum



Figures 5a and 5b - With both an adult colonoscope(left) and the thinner MS230I endoscope (right) the total time to pass the colonoscope from anus to caecum was significantly longer in female patients than males

and 7 seconds was significantly faster(P<0.0001) than with the MS230I plus overtube combination (mean time of 974.9(339.7) or 16 minutes and 15 seconds)-see Figure 4. In both groups the time to reach the caecum tended to be shorter in male than female patients – see Figures 5a and 5b.

Conclusions

We have shown that a floppy 10mm diameter colonoscope can be passed to the caecum in over 95% of cases provided the left side of the colon is adequately splinted with a suitable overtube. Had the instrument been 160cm rather than 130cm in length then our success rate would have been even higher (see Figure 2). The thin endoscope was also a useful adjunct in the small percentage of patients in whom an experienced colonoscopist fails with a standard diameter adult instrument. The patient experienced significantly less discomfort than with a standard colonoscope but it took us on average about 4 minutes longer to reach the caecum. The thinner instrument was particularly useful in women who had pelvic adhesions as a result of a previous hysterectomy- see Table 1. A variable stiffness 10mm diameter 160cm instrument which could be used with or without a stiffening overtube would appear to have much to commend it particularly in female patients who have undergone previous pelvic surgery [8].

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