

Successful colonoscopy; completion rates and reasons for incompleteness

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ABSTRACT

Factors such as poor bowel preparation or obstructing colonic disease may confound the reporting of colonoscopy completion rates, as these factors are outside of the control of the endoscopist performing the procedure. By adjusting for these factors when calculating a colonoscopy completion rate, it may be possible to make a more accurate assessment of a unit's or individuals' competence.

Details of two thousand two hundred and sixteen colonoscopies performed by four consultants and their trainees between 1993-2000 were analysed retrospectively from a prospective endoscopy database. Crude (all cases) and adjusted (excluding poor bowel preparation and disease as causes of incompleteness) rates were recorded for each sex, and by age according to cause.

Overall crude and adjusted completion rates were 77.9% and 85.0% respectively. There was a significant difference between male and female completion rates due to a difference in the incidence of excess looping and intolerance of the procedure (adjusted rate 88.9% in males vs. 81.6% in females, $p < 0.05$). There was a non-significant trend to lower completion rates in patients over 75 years of age compared to younger patients. Completion rates were significantly higher following bowel resection (adjusted rates 93.5% vs. 82.8%, $p < 0.05$). There was no significant difference between completion rates for inpatient and outpatient referrals ($P = 0.36$).

Reporting colonoscopy completion rates by adjusting for factors such as poor bowel preparation and obstructing colonic disease allows for direct comparisons of completion rates reported by different units. Reporting completion rates in this way also highlights the effect of inadequate bowel preparation on successful colonoscopy.

INTRODUCTION

Colonoscopy remains the gold standard for investigation of most colonic disease. However the number of incomplete examinations limits its usefulness especially in the investigation of suspected colonic malignancy where full examination of the bowel is mandatory. Published completion rates vary widely from 55-98.8%.¹⁻³ Our aim was to examine colonoscopy completion rates in our unit over a seven year period and to try to identify the impact of disease and inadequate bowel preparation on the caecal intubation rate.

METHODS

Details of all colonoscopies performed by four consultants and their trainees in a single unit between 1993-2000 were analysed retrospectively from a prospective endoscopy database. Bowel preparation was achieved with Klean-Prep (*Norgene*), and 165cm Olympus endoscopes were

used in all cases. Patients were sedated with intravenous benzodiazepines (diazepam or midazolam) and pethidine if required. All patients were routinely monitored for heart rate and oxygen saturation. Fluoroscopy was not used in any case.

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Routine manoeuvres and change of patient's position were used as necessary to facilitate forward movement of the colonoscope. Crude (all cases) and adjusted (excluding poor bowel preparation and disease as causes of incompleteness) rates are reported as described by Church.¹⁸ Complete colonoscopy was defined as visualisation of the caecum, confirmed by identification of the ileo-caecal valve and tri-radiate fold, or by performing terminal ileoscopy. Details of the endoscopist, referral source, patient sex, indications for colonoscopy and previous surgery were noted. Student's t-test was used to detect differences between completion rates; significance was achieved when $p < 0.05$.

RESULTS

2,216 colonoscopies were performed in the study period (1,079 males). Mean age was 53 years (range 15-94 years) and there was no difference in age between male and female patients. Overall crude and adjusted completion rates were 77.9% and 85.0% respectively. 144 procedures (69 in

male patients) were abandoned because of inadequate bowel preparation and 14 procedures (8 in males) were incomplete because of obstructing lesions or severe colitis (Table I). 256 procedures (94 in males) were incomplete due to excessive looping and patient intolerance. This was more common in females (adjusted completion rate 88.9% in males vs. 81.6% in females, $p < 0.05$), due to an increased difficulty in negotiating the female sigmoid colon (36.4% of failures occurred distal to the splenic flexure in females vs. 30.0% in males, $p = 0.5$). Diverticular disease was the cause of incompleteness in 29 males and 47 females (24.2% vs. 22.5% of failures for each sex, ns). Completion rates were significantly higher following bowel resection (adjusted rates 93.5% vs. 82.8%, $p < 0.05$). Two hundred and nine colonoscopies were performed on patients over 75 years of age (Table II). The crude and adjusted completion rates were 71.8% and 80.9% respectively. Although there was a trend towards lower completion rates in older patients, there was no significant difference in

TABLE I

Causes of incomplete colonoscopy by gender

	<i>Poor bowel preparation</i>	<i>Obstructing disease or colitis</i>	<i>Excess looping/patient intolerance</i>	<i>Diverticular disease</i>
Overall	114	14	256	76
Male	69	8	94	29
Female	75	6	162	47

Table II

Effect of age on colonoscopy completion rates

<i>Age (years)</i>	<i>Total no. of procedures</i>	<i>Cause of incompleteness</i>				<i>Completion rate (%)</i>	
		<i>Poor bowel preparation</i>	<i>Obstruction/colitis</i>	<i>Looping/intolerance</i>	<i>Diverticular disease</i>	<i>crude</i>	<i>adjusted</i>
All	2216	144	14	256	76	77.9	85.0
<75	2007	137	2	235	57	78.5	85.4
>75	209	7	12	21	19	71.8	80.9

adjusted completion rates between patients over 75 years of age compared to younger patients.

DISCUSSION

Colonoscopy is the investigation of choice for most colonic disease⁴⁻⁷ though its usefulness is limited by the technical proficiency of the endoscopist.¹ Completion rates of over 90% should be attainable after 200 examinations,^{8,9} though published completion rates vary widely from 55-98.8%.¹⁻³ The documentation of completed colonoscopy can be troublesome as identifying caecal landmarks can be difficult.^{10,11} In addition, various factors have been shown to reduce the completion rate independent of the skill of the endoscopist such as prior pelvic surgery, and a long transverse colon.^{12,13} However total colonoscopy is mandatory in the investigation of colonic disease particularly if neoplastic disease is suspected.

We have demonstrated the advantage of measuring colonoscopy completion rates by allowing for incomplete examinations due to obstructing lesions of the colorectum and inadequate bowel preparation. Reporting completion rates in this way allows fair comparison of the performance of an endoscopy unit and allows individuals to assess their own technical ability. The difference in completion rates between male and female patients is emphasised, as more examinations fail in the left than right colon in females than males.

It is well recognised that colonoscopy is difficult in particular groups of patients. It tends to be more difficult in women due to a longer more tortuous colon.^{12,13} Failure in women most often tends to occur in the sigmoid colon as opposed to the ascending colon in males.¹³ Several studies also suggest that previous abdominal surgery, especially abdominal hysterectomy, makes colonoscopy more difficult.¹³ The roles of age, diverticular disease, peritonitis and pelvic irradiation are more controversial.¹²

Several means of improving colonoscopy completion rates have been proposed. The usefulness of judicious abdominal pressure is well established.^{14,15} Gastroscopes or paediatric colonoscopes may facilitate passage of a stricture and have been used with considerable success,¹⁶ and more recently the introduction of variable stiffness colonoscopes has proved helpful.¹⁷ Fluoroscopy remains popular but has the disadvantages of being time-consuming and

exposing endoscopy staff and the patient to radiation.^{10,11} Recently real-time electronic imaging has been proposed as an aid to training and completion of difficult colonoscopy.¹⁸ It has the advantage of being relatively inexpensive and easy to use, though it is not currently widely available. Improvement in the quality of bowel preparation would improve completion rates. There is little difference in the quality of currently available preparations, though patient compliance may be better with non-polyethylene glycol preparations, and in certain patient groups, for example the elderly, administering bowel preparation in hospital may improve compliance.^{19,20}

In conclusion, completion rates in our unit are in line with current UK practice and our data highlight the difference in completion rates between males and females. The use of rates adjusted for disease and inadequate bowel preparation allow a fairer evaluation of colonoscopic ability. An improvement in bowel preparation would significantly improve the efficacy of colonoscopy and strategies to improve practice will be sought.

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