

Colonoscopy Completion Rates and Reasons for Incompletion

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Abstract:

Objectives: Colonoscopy is one of the major procedures in gastroenterology. Since the procedure is operator dependant, Quality of each procedure is the main element of reliable outcome. One of the elements is the completion rate. Completion rate of endoscopy unit is a reliable measure to improve the quality of the procedure.

Methodology: We here reviewed retrospectively our endoscopy database from the main tertiary hospital in Qassim province, central part of Saudi Arabia. The recommended completion based on several professional societies range from 90 – 95 % completion rate according to the indication. We retrospectively reviewed our endoscopy database over the period from 2005 to 2008 in King Fahad Specialist Hospital.

Results: Our adjusted completion rate was 85.3 %. The main reason of incompletion was poor preparation. Our completion rate was comparable throughout the study period. Conclusion: our completion rate is below recommended range. We think this result will stimulate the efforts to incorporate more quality measures in the endoscopy unit.

Key Words: Colonoscopy, Qassim Region

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Introduction

Colonoscopy remains the gold standard for investigation of most colonic diseases. Since its introduction 50 years ago, there has been a rapid development in the technology. Increased maneuverability and flexibility of the endoscopes, accompanied by an improved optical resolution with the introduction of the video-endoscopes, have increased the ability of the procedure to detect disease.^(1, 2) The competence of the endoscopists, defined as the endoscopists' ability to reach the cecum—or, in the case of previous colonic surgery, the ileocolic anastomosis—has increased over time.⁽³⁾ However, the number of incomplete examinations limits its usefulness, especially as an investigative tool for colonic malignancy or other colonic diseases for which full examination of the bowels is mandatory. The completion rate reported in the literature varies widely, from 55% to 98.8%.⁽⁴⁻⁶⁾ Several American task forces specify a minimum intubation rate of the cecum of 90% for all cases and 95% for screening colonoscopies.⁽⁷⁾ Possible factors influencing the success rate of colonoscopy include the patient's sex,^(8,9) age,^(6,8) level of complexity of the colonoscopy,⁽⁶⁾ presence of diverticulosis,⁽¹⁰⁾ and type of colonoscope used.⁽⁴⁾

The aim of this study was to evaluate the completion rate and reasons for incompleteness of colonoscopy in a tertiary care hospital in the central area of Saudi Arabia.

Methods

All colonoscopies performed in the endoscopy unit at King Fahd Specialist Hospital from November 1, 2005, to October 31, 2008, were retrospectively analyzed using the hospital's colonoscopy database. All colonoscopies including diagnostic, therapeutic, and emergency procedures were included. The results of each procedure were noted in a standardized report created by Microsoft Access. Complete colonoscopy was defined as visualization of the cecum, confirmed by the following landmarks: ileocecal valve, ileal intubation, or appendiceal orifice. Indications for colonoscopy, sex, and age were noted. We reported both crude and adjusted completion rates. *Crude rate* is defined as reported completion rate for both well- and poor-preparation colonoscopy while *adjusted*

rate excludes poor preparation as cause of incomplete examination.

Five experienced endoscopists completed all procedures. Competent assisting staff was helping in these procedures. Bowel preparation was an inpatient or outpatient process, depending on the patient's health condition, and was achieved using a standard 2-L polyethylene glycol-based preparation 24 hours before the procedure. Colonoscopy was performed using the Olympus PCF-160AL Evis Exera Video Colonoscope in all cases. Patients were sedated with intravenous midazolam and pethidine only if required. A procedure was defined as inconclusive if there was inappropriate cleansing of the colon and rectum that made adequate inspection impossible. All patients were routinely monitored for heart rate and oxygen saturation.

Statistical significance was analyzed using Fisher exact tests for categorical variables and student *t* tests for normally distributed continuous variables. A two-tailed *P* value of < .05 indicated statistical significance; odds ratios (ORs) with 95% confidence intervals (CIs) were also determined.

Results

A total of 304 colonoscopies were performed during the study period. The age of patients ranged from 13 to 90 years, with an average patient age of 48.2 years. Out of the 304 patients, 170 were men (56 %) and 134 were women (44%). The most common indications for both groups are outlined in **Table 1**. Repeated procedures in the same patient analyzed separately. For both Inpatient and outpatient Procedures, verbal instructions are given to the patient routinely by the treating endoscopist at the time of the procedure booking according to the routine standards of instructions of the hospital. Of the 304 cases, 198 examinations were completed. 106 procedures were incomplete. If we exclude poor preparation indication (59 patients) and normal finding proximally (13 patients), our adjusted completion rate is 85.3%. Of the 117 findings related to the colon (the same finding in 2 areas counted twice), 34.2% were in the sigmoid and 29% were in the rectum; other areas are illustrated in **Table 2**.

The overall crude and adjusted completion rates were 64.9% and 84.2%, respectively. Completion rates were slightly higher in men

(106 out of 198) than in women (92 out of 198), with no significant difference between the sexes. Completion rates did not change over time (**Table 3**). Colonoscopy could not be completed for variety of reasons (**Table 4**), and 50% of the incomplete colonoscopies reached the splenic flexure (**Table 2**).

Table 1. Characteristics of participants population: N=304

CHARACTERISTIC	COMPLETE EXAMINATION, N (%)	INCOMPLETE EXAMINATION, N (%)
Sex	198	106
*Male	109 (55.1)	61 (57.5%)
* Female	89 (44.9)	45 (42.5%)
Indication [†]	197 [‡]	105 [‡]
• Polyps follow-up	8	2
• Diarrhea	14	3
• Colon cancer	15	9
• Bleeding	180	43
• Intestinal Obstruction	8	12
• IBD-related	19	12
• Abdominal pain	5	5
• Screening	29	9
• Constipation	12	5
• Irritable bowel syndrome	2	1
• Anemia	5	2
• Other	16	1

*Significance is set at < .05

[†]Patients might have had more than 1 indication.

[‡]One patient in this group had an unknown indication.

IBD—inflammatory bowel disease.

Table 2. Findings, by intestinal region

INTESTINAL REGION	COMPLETE EXAMINATION, N=198	INCOMPLETE EXAMINATION, N=106	P VALUE *
Anus	198	105	
• Findings, n (%)	35 (17.7)	14 (13.3)	.273
Rectum	198	100	
• Findings, n (%)	50 (25.3)	34 (34.0)	.134
Sigmoid	198	97	
• Findings, n (%)	33 (16.8)	40 (41.2)	.0001
Mass obstructing lumen	1 (0.5%)	8 (8.3)	.001
Descending Colon	198	73	
• Findings, n (%)	25 (12.7)	14 (19.2)	.179
• Erosion/congestion, n (%)	12 (6.1)	12 (16.4)	.014
Splenic flexure	198	52	
• Findings, n (%)	16 (8.2)	9 (17.2)	.068
• Erosion, n (%)	11 (5.6)	7 (13.5)	.069
Transverse colon	198	34	
• Findings, n (%)	20 (10.2)	5 (14.7)	.386
Ascending colon	198	8	
• Findings, n (%)	18 (9.2)	1 (12.5)	.549
Cecum	198	0	
• Findings, n (%)	10 (10.2)	--	--

*Significance is set at < .05

Table 3. Numbers of incomplete colonoscopy over the 3-year study period

EXAMINATION		YEAR			TOTAL
		2006	2007	2008	
Complete examination	Yes, N (% of year)	39 (63.9)	66 (66.0)	93 (65.0)	198 (65.1%)
Incomplete examination	No, N (% of year)	22 (36.1)	34 (34.0)	50 (35.0)	106 (34.9)
	Total, N	61	100	143	304

Table 4. Reasons for incomplete colonoscopy

Reason	NO. of cases (%)
Poor bowel preparation	59 (54.7)
Obstructing disease	18 (16.9)
Excess looping or stricture	6 (6)
Inflammation	11 (1)
Normal findings proximally	13 (12)

Discussion

Colonoscopy is the investigative tool for most colonic disease.⁽¹¹⁻¹⁴⁾ In our study, 85.3% of examinations reached the cecum. Complete colonoscopy is essential when performing surveillance of patients at high risk for diseases such as colonic carcinoma. Since its introduction in the late 1960s, the technology of colonoscopy has developed rapidly. Still, a complete colonoscopy is not always possible to perform.⁽¹⁾ Published completion rates vary widely from 55% to 98.8%, depending on the patient cohort.⁽⁴⁻⁶⁾

The literature suggests that the colonoscopist should be able to reach the cecum more than 90% of the time. Completion of colonoscopy is determined by many factors, including type of patient, procedure indications, type of sedation, physician expertise, bowel preparation, and other factors. Routine practice is to perform endoscopy without sedation unless the patient specifically requests it. Tasi et al⁽¹⁵⁾ reported multiple patient factors that

affect completion rates, including male sex, high body mass index, no previous gynecology surgery, and previous colonic resection. However, our cohort showed higher rates of completion in male patients. The incompleteness rate has been reported to be more in women^(16, 17) due to a longer, more tortuous colon.⁽⁸⁾ Khashab et al⁽¹⁸⁾ studied colorectal anatomy and concluded that women had significantly longer colons than men.

It has previously been reported in the literature that screening colonoscopy achieved higher completion rates than other indications.⁽¹⁹⁾ This concept was challenged by the recent retrospective analysis of 129 549 colonoscopies, which found that colonoscopy done for screening had a comparable rate of completion compared with overall completion rates for that of other indications.⁽²⁰⁾ They also reported the factors associated with incomplete colonoscopy, namely nonspecific abdominal symptoms, female sex, advancing age, academic clinical setting, and specific ethnic

populations. Our cohort is typical of a daily practice endoscopy unit where indications are variables; further, that our cohort included inpatients and outpatients are a factor that might explain lower completion rates. Occasionally, documentation of completed colonoscopy landmarks is challenging and unstandardized, which can affect recorded completion rates.^(6, 21)

According to several cohort and observational studies, sedation during colonoscopy can affect completion rates. Based on a German endoscopy database, recent multivariate logistic regression analysis identified predictors of incomplete colonoscopy, which included sedation or analgesia (OR 0.507, 95% CI 0.411–0.626). These findings indicated that the use of sedation or analgesia increased the likelihood of a complete colonoscopy nearly 2-fold.⁽²²⁾ Another study reported a sedated colonoscopy completion rate of 84.2% compared with a non-sedated colonoscopy completion rate of 76.1%.⁽²³⁾

We reported that the main reason for incomplete colonoscopy was inadequate preparation. In a single recent Italian study focusing on estimating the overall completion rate of colonoscopies performed under routine propofol sedation, factors interfering with cecal intubation were inadequate colon cleansing, endoscopists' expertise in performing colonoscopies, a body weight of less than 60 kg, age older than 71 years, and the need for active intervention by the anesthesiologist.⁽⁷⁾ Improvement in the quality of bowel preparation would improve completion rates. There is little difference in the quality of currently available preparations, although patient compliance might be better with non-polyethylene glycol preparations; also, in certain patient groups, such as the elderly, administering the bowel preparation in hospital might improve compliance.^(24,25)

We believe that this paper will affect our endoscopy unit by providing evidence to support the implementation of further measures to ensure quality and completion. Our report is based on retrospective analysis of endoscopic data, and has several limitations, in particular inconsistent documentation and standardization of descriptions when reporting findings. Our

database did not always document use of sedation during procedures, which is another important limiting factor.

Conclusion

Completion rates in our study are below recommended rate. The use of adjusted completion rates allows a fairer evaluation of colonoscopies performed. Improvement of bowel preparation would substantially improve the efficacy of colonoscopy.

References

1. Dafnis G, Granath F, Pahlman L, Ekblom A, Blomqvist P. Patient factors influencing the completion rate in colonoscopy. *Dig Liver Dis* 2005; 37(2):113-8.
2. Schapiro M, Auslander MO, Schapiro MB. The electronic video endoscope: clinical experience with 1200 diagnostic and therapeutic cases in the community hospital. *Gastrointest Endosc* 1987; 33(2):63-8.
3. Marshall JB, Barthel JS. The frequency of total colonoscopy and terminal ileal intubation in the 1990s. *Gastrointest Endosc* 1993; 39(4):518-20.
4. Wayne JD, BM. Total colonoscopy: is it always possible? *Gastrointest Endosc* 1991; 37(2):152-4.
5. Danesh BJZ, Spiliadis C, Williams CB, Zambartas CM. Angiodysplasia - an uncommon cause of colonic bleeding: colonoscopic evaluation of 1,050 patients with rectal bleeding and anaemia. *Int J Colorectal Dis* 1987; 2(4):218-22.
6. Church JM. Complete colonoscopy: how often? And if not, why not? *Am J Gastroenterol* 1994;89(4):556-60.
7. Cardin F, Minicuci N, Andreotti A, Pinetti E, Campigotto F, Dona BM, et al. Maximizing the general success of cecal intubation during propofol sedation in a multi-endoscopist academic centre. *BMC Gastroenterol* 2010; 10:123.
8. Cirocco WC, Rusin LC. Factors that predict incomplete colonoscopy. *Dis Colon Rectum* 1995; 38(9):964-8.
9. Saunders BP, Fukumoto M, Halligan S, Jobling C, Moussa ME, Bartram CI, et al. Why is colonoscopy more difficult in women? *Gastrointest Endosc* 1996; 43(2 Pt 1):124-6.

10. Galandiuk S. Colonoscopy to the cecum. *Semin Colon Rectal Surg* 1992; 3:18-23.
11. Aldridge MC, Sim AJ. Colonoscopy findings in symptomatic patients without X-ray evidence of colonic neoplasia. *Lancet* 1986;2(8511):833-4.
12. Durdey P, Weston PMT, Williams NS. Colonoscopy or barium enema as initial investigation of colonic disease. *Lancet* 1987; 2(8558):549-51.
13. Lindsay DC, Freeman JG, Cobden I, Record CO. Should colonoscopy be the first investigation for colonic disease? *Br Med J (Clin Res Ed)* 1988; 296(6616):167-9.
14. Irvine EJ, O'Connor J, Frost RA, Shorvon P, Somers S, Stevenson GW, et al. Prospective comparison of double-contrast barium enema plus flexible sigmoidoscopy v colonoscopy in rectal bleeding: barium enema v colonoscopy in rectal bleeding. *Gut* 1988; 29(9):1188-93.
15. Tsai MS, Su YH, Liang JT, Lai HS, Lee PH. Patient factors predicting the completion of sedation-free colonoscopy. *Hepatogastroenterology* 2008; 55(86-87):1606-8.
16. Cirocco WC RL. Documenting the use of fluoroscopy during colonoscopic examination: a prospective study. *Surg Endosc* 1991;5(4):200-3.
17. Anderson JC, Gonzalez JD, Messina CR, Pollack BJ. Factors that predict incomplete colonoscopy: thinner is not always better. *Am J Gastroenterol* 2000; 95:2784-7.
18. Khashab MA, Pickhardt PJ, Kim DH, Rex DK. Colorectal anatomy in adults at computed tomography colonography: normal distribution and the effect of age, sex, and body mass index. *Endoscopy* 2009; 41(8):674-678.
19. Tassios PS, Ladas SD, Grammenos I, Demertzis K, Raptis SA. Acquisition of competence in colonoscopy: the learning curve of trainees. *Endoscopy* 1999; 31(9):702-6.
20. Gupta M, Holub JL, Eisen G. Do indication and demographics for colonoscopy affect completion? A large national database evaluation. *Eur J Gastroenterol Hepatol* 2010; 22(5):620-7.
21. Marshall JB, Brown DN. Photodocumentation of total colonoscopy: how successful are endoscopists? Do reviewers agree? *Gastrointest Endosc* 1996; 44(3):243-8.
22. Crispin A, Birkner B, Munte A, Nusko G, Mansmann U. Process quality and incidence of acute complications in a series of more than 230,000 outpatient colonoscopies. *Endoscopy* 2009; 41(12):1018-25.
23. Radaelli F, Meucci G, Sgroi G, Minoli G, Italian Association of Hospital Gastroenterologists (AIGO). Technical performance of colonoscopy: the key role of sedation/analgesia and other quality indicators. *Am J Gastroenterol* 2008; 103(5):1122-30.
24. Marshall JB, Pineda JJ, Barthel JS, King PD. Prospective, randomized trial comparing sodium phosphate solution with polyethylene glycoelectrolyte lavage for colonoscopy preparation. *Gastrointest Endosc* 1993; 39(5):631-4.
25. Thomson A, Naidoo P, Crotty B. Bowel preparation trial comparing sodium phosphate and polyethylene glycol in a predominantly elderly population. *J Gastroenterol Hepatol* 1996; 11(2):103-7