

Original Article

Cecal Intubation Rate During Colonoscopy at a Tertiary Hospital in South-West Nigeria: How Frequent and What Affects Completion Rate?

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ABSTRACT

Background: Colonoscopy is useful in the diagnosis, treatment of colorectal diseases, and for colorectal cancer screening program. Complete colonoscopy is therefore crucial for the success of any screening program. One important measure of the quality of colonoscopy is the cecal intubation rate (CIR). **Aim:** This was to assess the CIR at our endoscopy unit and evaluate the factors responsible for uncompleted cases. **Patients and Methods:** This was a prospective study at the endoscopy unit of the University College Hospital, Ibadan. All consenting patients referred for colonoscopy were recruited into the study. Colonoscopy was performed per protocol, and cecal intubation was considered successful when the medial wall of the cecum was intubated. **Results:** Total of 305 colonoscopies were performed comprising 168 (55.1%) males and 137 (44.9%) females. Mean age was 57.5 ± 14.0 years (range 15-90 years). The crude CIR was 89.2%, whereas the adjusted CIR was 95.1%. Completion rate was higher in males, in patients who were younger than 58 years and in patients with adequate bowel preparation. **Conclusion:** CIR in our practice is high and comparable to the recommended rates. Female gender, age older than 58 years, and inadequate bowel preparation had a crude association with lower CIR, but this was not statistically significant.

KEYWORDS: *Cecal intubation rate, factors, frequency, Nigeria*

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INTRODUCTION

Colonoscopy has been found useful in the diagnosis, as well as in the treatment of colorectal diseases and has also been recommended for colorectal cancer screening program.^[1] Complete colonoscopy is therefore crucial for the success of any screening program.^[2] One important measure of the quality of colonoscopy is the cecal intubation rate (CIR).^[3] CIRs have been reported to vary between 55% and 98.8%.^[4-6] Some of the factors that affect CIRs are age, gender, quality of bowel preparation, and certain diseases of the colon such as diverticular disease and inflammatory bowel disease.^[5,7-11] The endoscopist's experience, as well as his/her procedure volume also affect CIRs.^[12]

The aim of this study was to assess the CIR at our endoscopy unit and evaluate the factors responsible for uncompleted cases.

PATIENTS AND METHODS

This was a prospective study at the endoscopy unit of the University College Hospital, Ibadan. All consenting

patients who were referred for colonoscopy were recruited into the study. Consent for both the procedure and the study was obtained from the patients. In this study, the procedures followed were in accordance with the revised Helsinki Declaration (2013). All the patients underwent bowel preparation which consisted of liquid diet, 10-30 mg of bisacodyl tablets in the morning, bisacodyl suppository nocte, as well as 1 L of normal saline taken orally twice daily, all for 3 days before the procedure. All patients being worked up for colonoscopy are adequately assessed to know if they can tolerate such an amount of normal saline.

Information collected from the patients included the age, gender, weight, height, indication for the procedure, and prior history of abdominal or pelvic surgery.

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The premedications consisted of intravenous midazolam 2.5-5 mg and pentazocine 15-30 mg in titrated doses. Digital rectal examination was carried out on all the patients before the insertion of the colonoscope. Colonoscopy was thereafter performed per protocol using Olympus Exera III Video colonoscope (CF-HQ190L, Olympus UK) with the patients in the left lateral position. All the procedures were performed by the same endoscopist. Supine posture and abdominal pressure were applied where necessary. Cecal intubation was considered successful when the medial wall of the cecum was intubated. Patients' vital signs were monitored pre-, intra-, and post-procedure using multiparameter monitor (Marathon Z, Health-care Equipment and Supplies Co. Ltd., UK).

Bowel preparation was adjudged as poor, if there was a significant amount of semisolid/solid feces; satisfactory, if only clear liquid or small amount of semisolid feces; good, if only a small amount of clear liquid was seen in the colonic lumen. Those who had poor bowel preparation were asked to take a liter of normal saline orally, and the procedure was repeated after about 1-2 h on the same day.

After the procedure, all the patients were observed for 2 h before being discharged home with an assistant. They were also counseled with respect to resumption of oral intake and to report any observed complication immediately.

The data were analyzed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Means were used to express continuous variables, and the means were compared where appropriate. Univariate analysis of factors that affect cecal intubation was carried out. A $P < 0.05$ was considered statistically significant.

RESULTS

A total of 305 colonoscopies were performed comprising 168 (55.1%) males and 137 (44.9%) females, giving a male:female ratio of 1.2:1. All the participants in this study were recruited consecutively. The mean age of the patients was 57.5 ± 14.0 years (range 15–90 years). The bowel preparation was adjudged to be good, satisfactory, and poor in 123 (40.3%), 122 (40.0%), and 60 (19.7%) patients, respectively [Figure 1]. The crude CIR was 89.2% (272/305). In 19 patients, the procedure was incomplete because of obstructing lesions found either in the rectum or sigmoid colon and so, the adjusted CIR was 95.1% (272/286). The results showed that completion rate was higher in males compared to females (153 [56.3%] males vs. 119 [43.8%] females), but there was no significant difference between the sexes ($P = 0.24$) [Table 1]. Analysis of the age showed that CIR

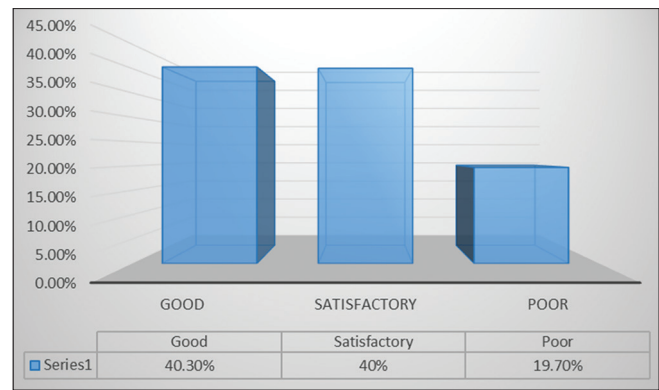


Figure 1: Quality of bowel preparation in the patients

Table 1: Univariate analysis of the effects of patient-related factors on cecal intubation rate

Factors	Cecal intubation rate, n (%)	P
Gender		
Male	153/272 (56.3)	0.24
Female	119/272 (43.8)	
Age (years)		
<58	145/272 (53.3)	0.13
≥58	127/272 (46.7)	
Bowel preparation		
Good	118/272 (43.4)	0.06
Satisfactory	102/272 (37.5)	
Poor	52/272 (19.1)	

was higher (145 [53.3%]) in patients who were younger than 58 years, compared to those patients who were 58 years of age or older (127 [46.7%]). Again, there was no significant difference between the two groups ($P = 0.13$) [Table 1].

Multivariate logistic regression analysis of the effect of these factors on cecal intubation was not performed because none of them was significantly associated with CIR on univariate analysis. With respect to bowel preparation, higher CIR was observed in patients with good bowel preparation (118 [43.4%]), compared to those with satisfactory (102 [37.5%]) and poor (52 [19.1%]) bowel preparations. However, there was no statistically significant difference observed among these groups ($P = 0.06$). The results showed that 44 patients had constipation as the indication for colonoscopy, and the crude CIR in them was 88.6% (39/44), whereas the adjusted CIR was 97.5% (39/40) after excluding four patients who had obstructing distal colonic tumors.

DISCUSSION

Complete colonoscopy as evidenced by cecal intubation is considered crucial, especially if right-sided colonic neoplastic lesion is being suspected. Cecal intubation is mandatory to have an effective colonoscopy. CIRs

over 90% have been accepted as the benchmark for competency in colonoscopy.^[13,14] In this study, the crude CIR was 89.2% which is lower than that reported by Waye and Bashkoff^[6] (95%), Church^[5] (93.6%), and Rathgaber and Wick^[15] (98.4%). In all of these studies, the sample sizes were much larger than in our study, and this may explain the higher CIRs observed. This view is supported in a study by Park *et al.*,^[16] where they observed that CIRs steadily increased as the volume of procedures increased. The CIR in this study is however higher than that obtained by Dafnis *et al.*^[7] (81%) and Bowles *et al.*^[17] (76.9%). The latter was a multicenter study, in contrast to our study, which was carried out at a single center. Furthermore, in a multicenter study by Onyekwere *et al.*^[18] in Lagos, which is in the same geopolitical zone, the CIR was lower (81.2%) than in this study. It is possible that combination of endoscopists with varying expertise, different areas of specialization (physicians vs. surgeons), as well as different volumes of procedures could reduce the mean CIR as was also the case in the study by Bowles *et al.*^[17]

There have been reports about a relationship between the level of sedation and cecal intubation. Hsu *et al.*^[19] and Froehlich *et al.*^[20] observed that deep sedation improved CIR. Although all the patients in our study had moderate sedation, the CIR was still comparable with what were obtained in those studies. This probably implies that the influence of sedation on CIR is minimal. However, if a patient is not adequately sedated, the procedure may be terminated prematurely because of patient's discomfort. Hence, the emphasis should be on adequate sedation and analgesia, not necessarily deep sedation.

One of the factors that predict higher CIR is the quality of bowel preparation. This was clearly demonstrated in this study where the highest CIR was observed in those patients with good bowel preparation. This trend was also observed in several other studies.^[8,21,22]

In this study, male gender was associated with higher CIR. This is in agreement with other studies where lower CIRs were observed in females.^[5,7-10,21,22] One explanation for this gender difference is that females have been reported to have longer and more sharply angulated colon compared to males.^[23]

The effect of age on CIR has been found to be inverse, with older age associated with lower CIR, and this was observed in this study. The explanations have to do with the aging process that takes place in the colon, which includes an increase in the length of the entire colon, as well as increased redundancies which predispose to excess looping, thereby making scope advancement difficult.^[24]

Constipation has been reported to lower CIR by some investigators.^[5,19] However, the CIR observed in our patients with constipation was much higher than those reported by these investigators (97.5% vs. 75% and 94.4% respectively).

The expertise of the endoscopist is another determinant of CIR. A study by Harewood^[21] revealed a direct correlation between the level of expertise and CIR. Lee *et al.*^[25] reported CIR of 94.4% after 200 procedures. This is consistent with the result of our study, if we considered the adjusted CIR of 95.1% in 272 patients.

CONCLUSION

CIR in our practice is high and comparable to the recommended rates. Factors observed to be associated with lower CIR on univariate analysis were female gender, age older than 58 years, and inadequate bowel preparation, but this association was not statistically significant.

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Conflicts of interest

There are no conflicts of interest.

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