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Factors affecting successful colonoscopy procedures: Single-center experience

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ABSTRACT

Objective: Colonoscopy is a gold standard procedure for several colon pathologies. Successful colonoscopy means demonstration of the ileocecal valve and determination of colon polyps. Here we aimed to evaluate our colonoscopy success and results.

Material and Methods: This retrospective descriptive study was performed in İstanbul Eren hospital endoscopy unit between 2012 and 2015. Colonoscopy results and patient demographics were obtained from the hospital database. All colonoscopy procedures were performed under general anesthesia and after full bowel preparation.

Results: In all, 870 patients were included to the study. We reached to the cecum in 850 (97.8%) patients. We were unable to reach the cecum in patients who were old and obese and those with previous lower abdominal operations. Angulation, inability to move forward, and tortuous colon were the reasons for inability to reach the cecum. Total 203 polyp samplings were performed in 139 patients. We performed 1, 2, and 3 polypectomies in 97, 28, and 10 patients, respectively. There were 29 (3.3%) colorectal cancers in our series. There was no mortality or morbidity in our study.

Conclusion: General anesthesia and full bowel preparation may be the reason for increased success of colonoscopy. Increased experience and patient-endoscopist cooperation increased the rate of cecum access and polyp resection and decreased the complication rate.

Keywords: Colonoscopy, diagnosis, cecum, polyp

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INTRODUCTION

Endoscopic applications are the most efficient approaches used for executing mucosal pathologies in the gastrointestinal system. Today, colonoscopy is a gold standard method for determining the pathologies of lower gastrointestinal system (1). Colonoscopy is the basis of colon cancer screening process (2). It enables therapeutic procedures as well as diagnostic use. It can be used for interventional purposes such as biopsy, polypectomy, treatment of gastrointestinal system bleeding, excision of foreign body, volvulus detorsion, stenotic segment dilatation, stent placement, and tumor fulguration (2). Colonoscopy is made most frequently for colorectal cancer screening and data vary among societies (3). The colonoscopy results in our country were presented from different geographies (4-7). When examining the colonoscopy results, reaching the cecum and not overlooking the adenomas are shown as success criteria (8, 9). Failing to anesthetize and inadequate bowel cleansing are the most important failure factors (4).

In this study, we aimed to examine the endoscopy results of lower gastrointestinal system applied at a specific interval at our hospital in Istanbul by questioning our failed interventions with the literature information.

MATERIAL AND METHODS

Information about 896 patients applying to İstanbul Eren Hospital Endoscopy Unıt in June 2012 and September 2015 with colonoscopy indication was evaluated retrospectively from hospital files. The research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects." Rectal bleeding, change in bowel habits, stomach ache, fecal occult blood positivity, anemia, persistent non-infectious diarrhea, and personal and familial colorectal cancer history were determined as endoscopy indications for further examination of radiological colorectal pathologies. Only first diagnostic applications of patients who are diagnosed as inflammatory bowel disease were included in the study. Patients who had serious arrhythmia, who had 3 and 4 WHO performance score, who were in acute phase of diverticulitis, and who had coagulation disorder posing contraindications for biopsy or polyectomy were not included in the study. In colonoscopy, patients whose cecum cannot be reached and the most proximal reaching distance were determined. In the examination, while diminutive polyps were removed using cold forceps and polypectomy was performed using snares for polyps that measured 1 cm or more. Age,

gender, body mass index (BMI), previous abdominal surgical history, colonoscopy findings of patients, and pathology results of samples taken during colonoscopy were examined retrospectively. Characteristics of patients whose cecum could not be reached were compared with the characteristics of patients whose cecum was reached.

Informed consent was taken from all patients before the procedure. Nutrition with pulpless, liquid food was started two days before the intervention. Bowel cleansing of patients was provided by oral cenosite solution and rectal sodium phosphate rectal enema one day before the examination Patients with inadequate colon cleansing were prepared again by additional doses within the same day and their procedures were repeated on the following day. Secondary interventions were reported as valid procedure. Patients were scheduled for colonoscopy after minimum 8 h of fasting. All colonoscopy procedures were performed under sedation and analgesia guided by a Anesthesiology and Reanimation Specialist. For sedation, 1-5 mg midazolam and 0.5 mg/kg propofol were administered intravenously, and for analgesia, 50-150 mg meperidine was administered. All procedures were carried out using Pentax EPK-100p (Hoya Comp; Tokyo, Japan) and the most proximal section that was reached was documented by photographing it.

Statistical Analysis

Data obtained were recorded in Statistical Package for the Social Sciences 15.00 (SPSS Inc.; Chicago, IL, USA) program. The results were given by mean±standard deviation. Chi square independent test was used for statistical analysis and $p<0.05$ was accepted as significant.

RESULTS

Of the total 870 patients, 382 were males (43.9%) and 488 were females (56.1%). Mean age of patients was determined to be 53.3±8.4 years (range: 13-90); 48.7% were ≥50 years old. Mean BMI of patients was found to be 32.1±3.2. Cecum and terminal ileum were reached in 850 (97.8%) patients. Cecum could not be reached only in 20 (2.2%) patients. The most proximal distance that could be reached was hepatic flexura in 10 patients, splenic flexura in 8 patients, and sigmoid colon in 2 patients. Sharp angulation in 9 patients, discontinuation of colonoscopy in 8 patients, and tortuous structure of colon in 3 patients were seen as the reason why cecum could not be reached. The comparison of patients whose cecum could or could not be reached is given in Table 1. It was determined that mean age of patients whose cecum could not be reached was 62.3±6.2 years, their female/male ratio was 13/7, and their mean BMI was 36.4±2.8. Pathologies detected in colonoscopy examination are given in Table 2. Colorectal polyp was detected in 139 patients in our study (15.9%) and total 203 polyps were sampled pathologically. It was found that the number of patients having a single polyp that was sampled was 97 (69.7%), 2 polyps that were sampled was 28 (20.1%), and 3 polyps that were sampled was 10 (7.1%). Sampling of more than 3 polyps was carried out for the other 4 patients. Snare polypectomy was performed in 49 (35.2%) of 139 patients having colorectal polyp. In the study, the number of patients having colorectal cancer diagnosis was 29 (3.3%), and according to their localizations, these cancers were located in the rectum in 6 (20.7%) patients, in the sigmoid colon in 6 (20.7%) patients, in the hepatic flexura in 5 (17.2%) patients, in the colon in 4 (13.8%) patients, in the cecum in 3 (10.3%) patients, in the descending colon in 2 (6.9%) patients, in the rectosigmoid junction in 2 (6.9%) patients, and in the splenic flexura in 1 (3.4%) patient (Table 3). Of the colorectal cancer patients, 26 (89.6%) were

Table 1. Comparison of patients in whom can not reach the cecum and cecum is reached

	Cecum was reached (n=876)	Cecum inaccessible (n=20)	p
Age* (year)	52.8±8.1	62.3±6.2	<0.05
BMI* (kg/m^2)	32±3.1	36.4±2.1	<0.05
History of colorectal surgery**	14 (1.5)	1 (5)	0.19
History of non-colorectal lower abdominal surgery**	22 (2.5)	4 (20)	<0.05

BMI: body mass index
Datas are presented as * mean±standard deviation, ** n (%).

Table 2. Our results with lower gastrointestinal endoscopy

Endoscopic diagnosis	Number	Percentage (%)
Normal	354	40.6
Colorectal cancer	29	3.3
Colorectal polyp	150	17.2
Hemorrhoidal disease	191	21.9
Diverticular disease	67	7.7
Colitis		
Nonspecific colitis	68	7.8
Ulcerative colitis	33	3.7
Crohn disease	9	1
Ischemic colitis	1	0.1
Anal polyp	11	1.2
Anal fissure	46	5.2
Perianal fistula	10	1.1
Solitary rectal ulcer	5	0.5
Anastomotic ulcer	1	0.1
Rectal prolapse	1	0.1
Angiodysplasia	1	0.1
Parasites	1	0.1

Table 3. Tumor localization in patients diagnosed with colorectal cancer

Tumor localization	Number	Percentage (%)
Rectum	6	20.7
Sigmoid colon	6	20.7
Rectosigmoid junction	2	6.9
Ascending colon	4	13.8
Splenic flexure	1	3.4
Hepatic flexure	5	17.2
Descending colon	2	6.9
Cecum	3	10.3

≥50 years old. Fourteen (1.6%) patients included in the study had previous surgical history with the reason of colorectal cancer. Although tumor recurrence was not observed in the anastomosis line of any patients, 1 patient having anterior resection history before 7 years was diagnosed with metacrone colorectal cancer in hepatic flexura. No complications developed during or after the procedure in any patient undergoing an endoscopic procedure.

DISCUSSION

Today, colonoscopy procedures are the gold standard in the diagnosis of gastrointestinal mucosal pathologies, especially in colorectal cancers. In addition to diagnostic evaluations, colonoscopy enables therapeutic procedures such as biopsy, polypectomy, endoscopic mucosal resection, volvulus detorsion, bleeding control, dilatation of strictures, and endoluminal stent applications (6). Quality of colonoscopy depends on cecal intubation and adenoma detection (8).

Older age is the major risk factor for colorectal cancers. For this reason colonoscopy procedure every 10 years after 50 years of age is the most effective cancer screening method. Mean age of patients undergoing (49-57.9) colonoscopy procedures in our study was similar to that reported in the previous studies (4, 7, 10, 11). In the study, most of the cases of colorectal cancer detected in patients undergoing colonoscopy were ≥50 years old. This result proved the necessity of again giving importance to colon cancer screening programs in patients aged ≥50 years (12). Success concept in colonoscopy is defined by imaging the cecum. Reaching the cecum or terminal ileum is an aim for accepting the intervention as successful and efficient. Especially, publications arguing that the rates of colonoscopy procedures in which cecum is imaged should be about 95% in specialized health centers (11). American Cancer Society Colorectal Cancer Task Force determined the standard criteria of cecum intubation success as 90% and set 95% goal as the ideal rate. Rates of reaching the cecum in important centers in United States were found to be 96%-100% (13). Colonoscopy success depends on three factors (12): (1) endoscopist related, experience and skill; (2) patient related, vital findings during procedure, colonoscopy reason, gender, BMI, previous abdominal surgery, radiotherapy, and situation of bowel cleansing; (3) technique related, sedation technique used and colonoscopy device. In a study conducted by Aslina et al. (13), it was found that the rate of reaching the cecum in females (92.7%) was lower than that in males (95.5%). As for the study by Anderson et al. (14), it was determined that gender was not a factor related to failure.

In our study, higher failure rate in females can be explained by the fact that previous non-colorectal lower abdominal operations are mostly gynecological surgeries. In the study conducted by Cirocco and Rusin (15), it was reported that previous hysterectomy operations are a factor for failed colonoscopy. While low BMI (<25) was found to be a failure factor in the study conducted by Anderson et al. (14), failure was higher in overweight patients in our study. We think that this is caused by the fact that overcoming the technical problems is more difficult in overweight patients. Previous colorectal surgery of patients is not a failure factor for colonoscopy. Reducing the flexures in colorectal surgery may provide advantage for colonoscopy. Increase in colon length and decrease in resistance are seen by age (16). In the literature, advanced age was shown as the factor for failure in colonoscopy (17). Aslinia et al. (13) reported that the success rate for reaching the cecum decreased in patients aged 65 years and above.

In some studies conducted in our country, colonoscopy success rates were presented between 61.7% and 81% (4, 5). Patient discord and inadequate bowel cleansing were shown as the reason of low rates. The basic reason why rates in our study are higher is that procedures are performed in the presence of Anesthesia and Reanimation Specialists. Considering the centers attaining high success rates, it is seen that 90% of colonoscopies are performed using propofol support (17). Unfortunately, the fact that Anesthesia and Reanimation Specialists are inadequate in number for colonoscopy examinations, reduces the success rates. Administration of propofol by nurses has shown better results but it's not possible for regulations in our country (18). Overcoming the obstacle of inadequate bowel cleansing is possible and additional bowel cleansing preparation was made for repeating in our patients the following day. Thus, inadequate bowel cleansing was not seen among the reasons of failed colonoscopy.

Another factor in colonoscopy activity is the success of polyp detection. In meta-analysis conducted by Van Rijn et al. (19), overlook rate of polyps was 21% in small-sized polyps (≤5 mm) and 13% in medium-sized polyps (6-9 mm). In screening programs, it was seen that colorectal cancer related to overlooked lesions developed in 0.7 in 1000 of normal reported colonoscopy examinations (20). Polyp determination rates by endoscopists are therefore among significant criteria. In the study conducted by Bretagne JF et al. (21), 1-, 2-, and 3-piece polyp detection rates of endoscopists were found to be 25%-46%, 5%-21%, and 2%-12%, respectively. According to the numbers of polyps sampled at our center, successful results were obtained. In the literature, the fact that endoscopists carry out more than 200 procedures and have experience of more than 5 years is shown as the reason why endoscopists are successful in colonoscopy (22). At our center, surgical endoscopist experience reached this number and all endoscopists had basic endoscopy training as a part of their specialization training programs. Colonoscopy education among surgeons are good enough for high quality. Surgeon-performed colonoscopies meet the standard quality (23).

Colonoscopy-related mortality was reported as 0.02%, and colonoscopy-related morbidity was reported as 0.25% (24). In some studies conducted in our country, complication rate in diagnostic colonoscopy varied between 0% and 0.16% (6, 7). Complication rates increase depending on inadequate bowel cleansing and previous abdominal surgery (4). It was seen that this rate increased more in mucosal resection and therapeutic procedures applied for large polyps. In our study, total 205 polyps were sampled pathologically using forceps or snares. The fact that no complication was seen in our study may depend on no intervention except biopsy and polyectomy, adequate bowel cleansing, and team-patient harmony provided by anesthesia and the gained experience.

In colonoscopy examinations, occurrence rate of normal findings varies between 34% and 42% (4, 5, 25). The most frequent pathology following normal findings is haemorrhoidal dis-

ease. Haemorrhoidal disease rates are seen to be around 14%-58% in our country (4, 5, 18). Different rates in the literature were obtained from different geographic regions, and 21% rate in our study supports the haemorrhoidal disease rate in Istanbul region. Following the hemorrhoid, the most frequent pathology is polyps; 60%-90% of colorectal cancers are caused by adenomatous polyps (26). Therefore, all colorectal adenomas should be sampled. Thirty percent of polyps may be overlooked in screening only by rectosigmoidoscopy (27). Colonoscopy examination should be conducted in all cases in which polyps are detected. Polyp detection rates in our country are between 7% and 20% and are similar to the results of our study (4, 5, 7).

Inflammatory bowel diseases are seen at different rates in the world. Although they are more frequent in Nordic countries, the frequency in our country is low. The rate of inflammatory bowel diseases among colonoscopy procedures in the study made of Bowles et al. was 13% (25). However the rate of inflammatory bowel disease among colonoscopy procedures in the studies performed in our country were between 3.9%-4.9%. (6, 7). Other pathologies such as diverticulitis, anal fissure, and rectal solitary ulcer detected in colonoscopy were seen at rates similar to those in the literature (4-7).

Colonoscopy is the gold standard method for the diagnosis of colorectal cancers. In the studies conducted in our country, as a result of lower gastrointestinal system endoscopy, colorectal cancer detection rates are between 1% and 14% and vary by region (6, 7). In another study conducted in Istanbul, colorectal cancer was detected in 3.55% of patients undergoing colonoscopy and in 3.06% of patients undergoing rectosigmoidoscopy (5). In our study, this rate was 3.2% and showed similarity with this study. In many studies, it was shown that colorectal cancers were frequently located in left colon (5). In our study, the most frequent two localization places were determined as rectum and sigmoid colon. The rates of existence of colorectal cancers in rectum and sigmoid in our study were 20.7% and 20.7% which were similar with the rates presented in the literature. In our colonoscopy applications, it was seen that while the rate of reaching the cecum was so high, colorectal cancer detection rate was low according to the literature. This may be because colonoscopy results in the literature studies are frequently obtained from risky groups in screening programs, and in our study, colonoscopy was performed for other pathologies except cancer.

CONCLUSION

Colonoscopy success rates may be increased by adequate bowel cleansing with anesthesia. Increase in experience increases the rates of patient harmony, reaching the cecum, and polyp excision and reduces the complication rates. Surgeons can perform high-quality colonoscopy.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects" (amended in October 2013).

Informed Consent: Informed consent was not received due to the retrospective nature of the study.

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