Diagnostic and Interventional Endoscopy

Original Article

A Retrospective Analysis of 4001 Colonoscopies in Tertiary Referral Center

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Cite this article as: Erol F, Özütemiz AÖ. A retrospective analysis of 4001 colonoscopies in tertiary referral center. *Diagn Interv Endosc.* 2022;1(2):29-33.

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Received: May 13, 2022 **Accepted:** July 13, 2022 **DOI:** 10.5152/DiagnIntervEndosc.2022.220714

Abstract

Objective: The aim of this study was to evaluate the indications, success, and findings of the colonoscopy procedures that were performed at our endoscopy unit and compare it with similar Turkish studies.

Methods: The reports of 4001 colonoscopy procedures that were performed between March 2013 and March 2016 at the Endoscopy Unit of Gastroenterology Department in our center were evaluated retrospectively. Data including age, gender, indications, findings, the status of bowel preparation, and cecal intubation were recorded.

Results: In a 3-year period, a total of 4001 colonoscopy procedures were performed and 2134 (53.3%) of the patients were male. The mean age of patients was 55.91 ± 14.58 (18-95) years. The largest group consisted of follow-up procedures (1566, 39.14%), which were colorectal polyp surveillance (749, 19.1%), post-cancer resection surveillance (413, 10.32%), and inflammatory bowel disease surveillance (372, 9.29%). Colorectal polyp (31.92%) was the most common finding. Colorectal cancer rate was 2.92%.

Conclusion: It was noteworthy that the most common colonoscopy indication was colorectal polyp surveillance. Post-cancer resection surveillance and inflammatory bowel disease surveillance rates were higher in our study than in similar studies in our country. These results can be explained by the fact that our center has a specific inflammatory bowel disease outpatient clinic and is a tertiary referral polypectomy center in the region.

Keywords: Colonoscopy, colorectal polyp, colorectal cancer, inflammatory bowel disease

INTRODUCTION

Colonoscopy is a diagnostic procedure for gastrointestinal diseases by the visualization of terminal ileum, colon, and anal canal. A good-quality evaluation by colonoscopy requires technical skills, knowledge, and experience. Colonoscopy is performed for both diagnostic and therapeutic purposes.[1] Diagnostic indications include colorectal cancer (CRC) screening and surveillance, treatment, follow-up for previous colon disorders such as inflammatory bowel disease (IBD), and diagnosis of the patients who exert probable signs and symptoms of ileal or colonic disease. Therapeutic indications are the dilatation of stenosis, stent insertion, colonic decompression, extraction of foreign bodies, and treatment of small lesions which are found during diagnostic procedures such as polypectomy.

Colorectal cancer is one of the most commonly seen causes of death and is a frequently seen cancer in both the world and our country. Colonoscopy provides the opportunity for the recognition and extraction of the CRC and colorectal polyp (CRP) during a single procedure. Previous studies showed that screening using colonoscopy reduced the incidence of CRC and the death rates caused by CRC.[2,3] Colonoscopy makes them possible by recognizing precancer lesions during the early, curable stage of the disease and by giving the opportunity of excision of the lesion at this stage. Although non-polypoid lesions are harder to recognize than polypoid lesions, colonoscopy is the most sensitive method for detecting non-polypoid lesions. Colonoscopy is the gold standard tool for the diagnosis of CRC.

METHODS

All the colonoscopy procedures which were performed between March 2013 and March 2016 at the endoscopy unit of the gastroenterology department in our center were retrospectively evaluated. We collected the demographic data, the data of indications, results, and success of the colonoscopies. Thus, we collected our clinical data and aimed to compare it with the previous Turkish literature for the purpose of acquiring clinical benefits.

In this study, 21 864 reports of endoscopy procedures were scanned from the report archive of the endoscopy unit. In total, 4001 reports of colonoscopy procedures in 3620 patients were found. The following data were extracted from the report archive and were evaluated retrospectively: age,

sex, indication for colonoscopy, state of bowel cleansing, state of cecal intubation, results of biopsy, and polypectomy procedure parameters if existed.

Informed consents were obtained from all patients both orally and written. The patients were told to have a watery diet starting 48 hours before the procedure for colon preparation. The night before the procedure, 500 mg of sennosid A+B calcium laxative solution was given in 2 doses with 2 hours pause to each patient. On the morning of the procedure, 118 mL of sodium dihydrogen/diphosphate-containing enema was given to each patient for bowel preparation. The patients were told to fast after 12:00 PM until the procedure. The patients had an intravenous (iv) catheter, and by this way, they were given iv hydration, 1-5 mg of midazolam, and 25-50 mg of pethidine HCl for sedation before and during the procedure, if necessary. Deep sedation was achieved by iv propofol when required. All colonoscopic examinations were conducted with the same device of Olympus (Tokyo, Japan) colonoscopes by gastroenterologists. Biopsy and polypectomy materials were examined at the department of pathology. The study was approved by the ethical committee of clinical research of our center (17-7/3). The collected data were recorded and statistically analyzed by using the software of Microsoft Excel 2013. Numerical variables were presented as mean ± standard deviation, and categorical variables were presented as numbers (n) and percentages (%).

RESULTS

In total, 4001 colonoscopies in 3620 patients were performed and 2134 (53.3%) of the patients were male and 1867 (46.7%) of them were female. The ages of the patients were between 18 and 95 years (mean: 55.91 ± 14.5) (Table 1).

The most common indication for colonoscopy was for CRP treatment and surveillance (Table 2). This group consisted of patients who had a previous history of polypectomy and were at surveillance program or who were referred to our clinic for polypectomy. The cases who were examined under the title of screening consisted of those who were above 50 years of age, who had a positive stool blood test, or had a family history of CRC. The procedures for patients who were diagnosed with IBD were classified under the title of either ulcerative colitis (UC) or Crohn's disease (CD).

No lesion was detected in the colonoscopy of 30.72% of cases. In 228 patients, colonoscopy could not be done because of inadequate bowel preparation and patient intolerance, and hence they required a secondary procedure. The most common lesion was CRP (31.92%). Because of the concomitant lesions, the number of total detected lesions (n=4777) was higher than the number of colonoscopies (n=4001) (Table 3).

Table 1. Demographic Characteristics

Number of patients, n	3620
Number of colonoscopy, n	4001
Sex	
Male, n (%)	2134 (53.3)
Female, n (%)	1867 (46.7)
Age	
Mean ± SD	55.91 ± 14.5
Range	18-95

SD, standard deviation.

Table 2. Indications for Colonoscopy

Indication	n	%
Surveillance	1566	39.14
• Colorectal polyp*	764	19.1
• Post-cancer resection surveillance	413	10.32
• Ulcerative colitis**	231	5.77
• Crohn's disease**	141	3.52
• Solitary rectal ulcer syndrome	7	0.17
• Peutz–Jeghers syndrome	6	0.15
• Post-operative***	4	0.09
Screening	620	15.5
Unexplained iron-deficiency anemia	495	12.37
Lower gastrointestinal bleeding	309	7.72
Diarrhea	309	7.72
Abdominal pain	296	7.4
Abnormal imaging	226	5.64
Constipation	162	4.05
Other	18	0.45
• Fecal incontinence****	5	0.12
• Volvulus	5	0.12
• Primary sclerosing cholangitis	3	0.07
• Subileus	2	0.05
• Ogilvie's syndrome	2	0.05
• Foreign body	1	0.02
Total	**4001**	**100**

*Patients who had a previous history of polypectomy and were at surveillance program or who were referred to our clinic for polypectomy; **Patients who were examined for disease activation or cancer screening;***The pre-colostomy closure examinations of patients who have been operated for trauma (n=2), diverticulitis and abscess (n=1), diverticulitis (n=2);****Patients who had fecal incontinence and were above 50 years old.

The most common colonoscopy indication was the CRP surveillance (n=474, 37.12%) in CRP-detected patients (n=1277). Other common indications were screening, post-cancer resection surveillance, iron deficiency anemia (IDA), rectal bleeding, abnormal imaging, abdominal pain, constipation, diarrhea, UC and CD surveillance, Peutz–Jeghers Syndrome, and solitary rectal ulcer syndrome.

In patients with a mass in the colon (n=138), the most common indication for colonoscopy was abnormal imaging (n=59, 42.75%). The other indications were screening (17.39%), rectal bleeding (15.22%), IDA (8.7%), post-cancer resection surveillance (5.07%), CRP surveillance (4.35%), constipation (3.62%), and abdominal pain (2.9%). The most common histopathological diagnosis was adenocarcinoma (n=117, 84.78%). The second most common diagnosis was adenoma with high-grade dysplasia (n=11). Totally, 125 cases had malignant lesions, 11 cases had precancerous lesions, and 2 cases had benign lesions. Malignant lesions except adenocarcinoma included metastasis of carcinomas, renal cell carcinoma, neuroendocrine tumors, and lymphomas. Benign lesions were a lipoma and hyperplastic polyp.

Totally, 620 colonoscopies were performed for screening. Because of concomitant lesions, the total number of detected lesions (n=733) was higher than the number of procedures (n=620). While 257 (41.45%) of the colonoscopies were reported as normal, 185 (29.84%) of the cases were diagnosed with CRP, and 24 of the cases were diagnosed with a colorectal mass (Table 4).

To investigate the etiology of the IDA, 495 patients underwent colonoscopy. Because of the concomitant lesions, 590 results were obtained.

Table 3. Colonoscopy Findings

Lesion	n	%
Colorectal polyp	1277	31.92
Normal	1229	30.72
Hemorrhoids	754	18.84
Colonic diverticulosis	399	9.97
Ulcerative colitis	261	6.52
Inadequate examinations	228	5.7
Crohn's disease	171	4.27
Mass	138	3.45
Non-specific colitis*	57	1.42
Angiodysplasia	54	1.35
Ulcerous lesion**	44	1.1
Lipoma	35	0.87
Colonic stenosis	23	0.57
Erosive lesion	18	0.45
Ischemic colitis	18	0.45
Solitary rectal ulcer syndrome	9	0.22
Volvulus	6	0.15
Other	56	1.4
• Extrinsic compression	20	0.5
• Radiation colitis	9	0.22
• Indeterminate colitis	7	0.17
• Parasitosis	7	0.17
• Rectal varices	5	0.12
• Perforation***	3	0.07
• Fistula	3	0.07
• Inverted appendix	1	0.02
• Hemangioma	1	0.02
Total**	**4777**	**119.39**

*Cases with findings such as hyperemia and edema without specific diagnosis;**Cases with ulcer who underwent a biopsy with no specific diagnosis;***Cases with colon perforation due to the procedure (n=2) and a patient who underwent colonoscopic examination with the suspicion of fistulized chronic perforation and perforation was found (n=1);****Because of the concomitant lesions, the number of total detected lesions was higher than the number of colonoscopies.

The most common result was normal colonoscopy (n=180, 36.36%) and 128 cases were diagnosed with hemorrhoids, 126 cases were diagnosed with CRPs, and 12 cases were diagnosed with colorectal masses (Table 5).

Table 4. Colonoscopy Findings During Screening by Colonoscopies

Lesion	n	%
Normal	257	41.45
Colorectal polyp	185	29.84
Hemorrhoids	132	21.29
Colonic diverticulosis	65	10.48
Inadequate examinations	37	5.97
Mass	24	3.87
Lipoma	9	1.45
Angiodysplasia	6	0.97
Nonspecific colitis	6	0.97
Ulcerous lesion	4	0.64
Erosive lesion	3	0.48
Extrinsic compression	3	0.48
Crohn's disease	1	0.16
Parasitosis	1	0.16
Total*	**733**	**118.22**

*Because of concomitant lesions, the total number of detected lesions (n=733) was higher than the number of procedures (n=620).

Table 5. Colonoscopy Findings in Patients Who Underwent Colonoscopy For Unexplained Iron-Deficiency Anemia (N=495)

Lesion	n	%
Normal	180	36.36
Hemorrhoids	128	25.85
Colorectal polyp	126	25.45
Colonic diverticulosis	60	12.12
Inadequate examinations	54	10.90
Mass	12	2.42
Angiodysplasia	11	2.22
Extrinsic compression	6	1.21
Ulcerous lesion	4	0.80
Non-specific colitis	2	0.40
Crohn's disease	2	0.40
Erosive lesion	2	0.40
Lipoma	2	0.40
Ischemic colitis	1	0.20
Total*	**590**	**119.19**

*Because of the concomitant lesions, 590 results were obtained.

DISCUSSION

In our study, most of the patients were above 50 years of age (n=2529, 63.2%), 952 (23.8%) patients were between 50 and 60 years of age, and 935 (23.37%) between 60 and 70 years of age. The age and sex distribution of the patients was consistent with previous studies conducted in our country.[4,5]

The most common indication for colonoscopy was CRP surveillance (n=764, 19.1%). The second most common indication was the screening (n=620, 15.5%). In our country, the most common indications for colonoscopies in similar studies were constipation (22.2%)[5] and lower gastrointestinal symptoms (85.6%).[6] In studies conducted by Suissa et al[7] and Lieberman et al[8], the prevalence of the colonoscopies performed for CRP surveillance was similar to ours (13.5% and 17.2%, respectively). However, the most common indication for colonoscopy was not the CRP surveillance in these studies. They were rectal bleeding (21.9%)[7] and screening (35.4%).[8] The majority of the patients were follow-up patients (39.14%) in our study. Colorectal polyp surveillance was the most common indication in this group (19.1%); followed by post-cancer resection surveillance (10.32%) and IBD surveillance (9.29%) (Table 2). These results can be explained by the fact that our center has a specific IBD outpatient clinic and is a tertiary referral polypectomy center in the region.

A successful colonoscopy is achieved by visualization of caecum. The American Society for Gastrointestinal Endoscopy and the American College of Gastroenterology Task Force on Quality in Endoscopy recommended the standard success of cecal intubation as 90% in all cases and 95% in screening healthy adults.[1] In our study, the rate of cecal intubation is calculated as 88% (n=3520) which is very close to the above-mentioned standard. Most cases in which the cecal intubation was not possible had inadequate bowel preparation (73.33%). Although the bowel preparation was optimal, in 128 cases (3.2%), we could not reach the cecum because of looping or patient intolerance. Our cecal intubation rate was 94.4% in cases with adequate bowel preparation. Despite the inadequate bowel preparation, we could reach the cecum in 38.38% of the cases. Bowel preparation in 2298 (57.43%) cases was adequate, while it was partially adequate in 1142 (28.54%) cases and inadequate in 561 (14.02%) cases. Recently conducted studies in our country revealed 78%[9] and 73.4%[5] rates of cecal intubation. Despite

inadequate bowel preparation, the rate of cecal intubation was close enough to recommended standards in our clinic.

We did not detect any pathological findings in 1229 (30.72%) cases in the present study. Similar studies conducted recently in our country revealed 33.38%,[4] 38.8%,[6] 42.1%,[10] 42.9%,[11] 48.4%,[5] and 49.7%[9] normal colonoscopy results. The rate of normal colonoscopy results in the present study is lower than in other studies conducted in our country. The most commonly detected lesion was CRP (n=1277, 31.92%) in the present study. Recently conducted studies in our country showed the incidence of CRP detection between 6.2% and 22.06%.[4-6,9-16] Only 1 study detected a similar CRP incidence (34.9%) to our study.[17] The incidence of detecting CRP in this study was found to be higher than the average level of our country. These results prove the importance of CRC screening programs again.

Colorectal mass was detected in 138 (3.45%) cases, 117 (84%) of which resulted as CRC in the present study. All CRC cases had an adenocarcinoma. The second most common histopathological diagnosis was adenoma with high-grade dysplasia (n=11, 7.97%). The incidence of CRC was between 1.0% and 14% in similar studies conducted in our country,[4-6,9-11] while the incidence was between 3.6% and 18.5% worldwide.[18-21] The most common localization of CRC was sigmoid colon in the present study (30.77%) which was a similar finding with previous literature.[4,5]

In patients with a mass in the colon (n=138), the most common indication for colonoscopy was abnormal imaging (n= 59, 42.75%). Screening (17.39%) was the second most common indication. In a recent study, patients diagnosed with CRC were diagnosed by screening program (10.7%), by diagnostic colonoscopy (79.2%), and by urgent surgery (7.1%). In the same study, CRC patients who were diagnosed by screening colonoscopy were at an earlier stage than the patients who were diagnosed by diagnostic colonoscopy and by urgent surgery (38.5%, 7.2%, and 0%, respectively).[22] In the light of this data, the importance of screening programs for detecting CRC at an earlier stage to reduce economic burden, mortality, and morbidity is highlighted again. Four of the 117 CRC-diagnosed patients had a

Table 6. The Comparison of Colonoscopy Findings of Present Study with Previous Similar Studies Conducted in Turkey

Reference	City, Year	n (%)	Number of Colonoscopies (n) and Duration of study (month)
Normal			
4	Karabük, 2015	601 (33.38)	1800, 72
5	Konya, 2015	727 (48.4)	1500, 18
6	Erzurum, 2000	814 (38.8)	2103, 132
9	Diyarbakır, 2006	160 (49.7)	322, 40
10	Ağrı, 2012	310 (42.1)	736, 44
11	Düzce, 2010	445 (42.9)	1038, 60
Present study	İzmir, 2018	1229 (30.72)	4001, 36
Hemorrhoids			
4	Karabük, 2015	453 (25.16)	1800, 72
5	Konya, 2015	225 (15.0)	1500, 18
6	Erzurum, 2000	370 (17.6)	2103, 132
9	Diyarbakır, 2006	57 (17.7)	322, 40
10	Ağrı, 2012	208 (28.4)	736, 44
11	Düzce, 2010	340 (32.5)	1038, 60
Present study	İzmir, 2018	754 (18.84)	4001, 36
Colorectal polyp			
4	Karabük, 2015	360 (20.0)	1800, 72
5	Konya, 2015	207 (13.8)	1500, 18
6	Erzurum, 2000	130 (6.2)	2103, 132
8	Antalya, 2018	876 (34.9)	2512, 60
9	Diyarbakır, 2006	48 (14.9)	322, 40
10	Ağrı, 2012	84 (11.4)	736, 44
11	Düzce, 2010	66 (6.4)	1038, 60
12	Aydın, 2017	525 (13.3)	3953, 48
13	Bursa, 2011	894 (14.3)	6250,65
14	Ankara, 2014	896 (11.1)	8033, 48
15	Erzurum, 2017	260 (16.1)	1618, 24
16	İstanbul, 2020	362 (17.5)	2068, 33
Present study	İzmir, 2018	1277 (30.72)	4001, 36
Colorectal cancer			
4	Karabük, 2015	110 (6.11)	1800, 72
5	Konya, 2015	21 (1.4)	1500, 18
6	Erzurum,2000	216 (14.0)	2103, 132
9	Diyarbakır, 2006	18 (5.59)	322, 40
10	Ağrı, 2012	7 (1.0)	736, 44
11	Düzce,2010	41 (6.4)	1038, 60
Present study	İzmir, 2018	117 (2.92)	4001, 36

history of previous CRC operation and they were diagnosed as having metachronous CRC. This finding proves the importance of post-cancer resection surveillance.

The incidence of IBD was 10.79% in our study (UC: 6.52%, CD: 4.27%). Our incidence rate for IBD was higher than in previous studies conducted in our country.[4,5,11] We thought that having a specific outpatient clinic for these patients in our clinic and being a tertiary referral center might have attributed to this finding. The comparison of results of colonoscopies with previous similar studies conducted in our country is shown in Table 6.

Normal colonoscopy was the most common result in patients diagnosed with IDA (36.36%) while lesions were detected in 53.74% of them. The most common lesions were CRPs (25.45%). These results prove the importance of a diagnostic colonoscopy for patients with IDA. All the cases for whom colonoscopy was performed because of diarrhea (n=116) had biopsies except 7 patients who had a contraindication. The most common histopathological result was reported to be normal (n=79, 72.48%), and the most common lesion was collagenous colitis (n=13, 11.93%). Two cases of amyloidosis, 1 case of mantle cell lymphoma, and 1 case of probable ischemic colitis were detected. These results show the importance of obtaining biopsy specimens in all patients who undergo colonoscopy for an indication of chronic diarrhea, even if there are no visual signs of disease during the colonoscopy.

Totally, 2 colonoscopic perforations occurred in 4001 procedures(0.049%). It is recommended to have an incidence of colonoscopic perforation below 0.2% in all-cause colonoscopies and below 0.1% in screening colonoscopies.[1] The perforation incidence in the present study was below these limits. The incidence of perforation was between 0.16% and 0.31% in other studies conducted in our country.[4,9,11] There was no perforation in only 1 study.[5]

In conclusion, the importance of colonoscopy is proven again in the present study for the diagnosis, surveillance, and treatment of colorectal diseases, for the detection and removal of CRPs, and for prevention and early diagnosis of CRC. The majority of the patients in our study consisted of surveillance patients which was higher than the similar studies performed in our country. The most common colonoscopy indications were CRP surveillance, post-cancer resection surveillance, and IBD surveillance. These can be explained by the fact that our center has a specific IBD outpatient clinic and is a tertiary referral polypectomy center in the region.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Ege University (Date: August 8, 2017, Decision No:17-7/3)

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – E.F., Ö.A.Ö.; Design E.F., Ö.A.Ö.; Supervision – Ö.A.Ö.; Materials – E.F., Ö.A.Ö.; Data collection/processing – E.F.; Analysis/interpretation – E.F., Ö.A.Ö.; Literature review – E.F., Ö.A.Ö.; Writing – E.F.; Critical review – Ö.A.Ö.

Declaration of Interests: The authors declare that they have no competing interest.

Funding: This study received no funding.

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