Research article

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Evaluation of colonoscopy results of patients in a colorectal cancer screening program: A retrospective cohort study

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Abstract

Background/Aim: Colorectal cancer is at the forefront of cancer-related deaths. Early detection and treatment of precursor lesions with screening programs are imperative. In this study, we aimed to determine the outcomes of colonoscopy and the effectiveness of screening.

Methods: The colonoscopy results of 758 patients who were referred for positive fecal occult blood tests between October 2015 and January 2020 were examined in this retrospective cohort study. The demographic, pathological, and colonoscopic findings were recorded.

Results: No pathology was detected in 53.3% of patients during colonoscopy. In patients with a pathology, polyps (28.5%), diverticular disease (15.44%), and colitis (2.37%) were most common. Patients with malignancy accounted for 3.69% of all patients and 12.96% of patients with polyps. Among adenoma types, the risk of dysplasia and/or malignancy was higher in villous polyps compared to tubulovillous and tubular polyps, and in tubulovillous polyps compared to tubular polyps ($P<0.01$). The presence of dysplasia and/or malignancy was evaluated mutually between the subgroups according to polyp size. There was no significant difference in the incidence of dysplasia between the patients with polyps of 6-10 mm and those with polyps of 11-20 mm ($P=0.192$). Among all other subgroups, an increase in polyp size caused a significant increase in dysplasia and/or malignancy ($P<0.001$).

Conclusion: The results of this study showed that colonoscopy performed on colorectal cancer screening patients with a positive fecal occult blood test was quite successful in diagnosing precancerous lesions and colorectal cancer.

Keywords: Colorectal cancer, Screening, Polyps, Malignancy

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Introduction

Colorectal cancer (CRC) is the fourth most diagnosed and third most fatal cancer worldwide, according to World Health Organization GLOBOCAN 2018 data. It accounts for 11% of all cancer diagnoses [1]. Detection of precancerous lesions and early-stage cancers is important for CRC. Given the normal mucosa-adenoma-cancer sequence, detection of adenomas and attempts to address them are becoming important, especially among the screening population [2]. For this reason, CRC can be easily overlooked; however, it is preventable if appropriate screening methods are used [3]. Screening for colorectal cancer is conducted to screen a population at risk without any symptoms for asymptomatic precancerous lesions and early-stage tumors [4]. The program, which has been successfully managed since 2015 under the leadership of the Ministry of Health in our country, is carried out in Cancer Early Detection and Screening Center and Family Health Centers, and colonoscopy centers. In this study, we aimed to determine the effectiveness of the colonoscopy results and screening of patients aged between 50-70 years who were referred to the general surgery outpatient clinic due to the positive fecal occult blood (FOB) tests performed at first-line health institutions.

Materials and methods

The data of patients who were referred to our hospital's general surgery outpatient clinic between October 2015 and January 2020 because of positive FOB tests conducted in first-line medical institutions and underwent colonoscopy were reviewed in this retrospective cohort study. The age, gender, whether polyps were detected, the procedure used in patients with polyps, surgery, and pathology results after the diagnosis of malignancy were evaluated in patients with complete colon cleansing whose cecum could be reached in colonoscopy. Patients whose cecum could not be reached due to insufficient colon-cleansing, patient intolerance and anatomical reasons were excluded from the study.

Statistical analysis

The Statistical Package for Social Sciences (SPSS for Windows v.25.0) was used for statistical analyses. Descriptive statistics involved mean and standard deviation. Crosstables were shown as percentage ratios. The continuous data were examined in terms of distribution with the Shapiro-Wilk test. Then, the data were statistically compared using the unpaired t-test for normally distributed samples or the Mann-Whitney U test for non-normally distributed samples. Variables with categorical data were compared using chi-square or Fisher's exact tests. Analysis of Variance (ANOVA) was used to compare the groups. A post hoc Games-Howell multiple comparison tests was utilized to compare the subgroups. The statistical significance level was $P<0.05$.

Results

Colonoscopies were performed on 758 patients, 369 females, and 389 males, all of whom were admitted due to FOB positivity during the screening period. The median age was 59.5 years (min 47 - max 77). No pathologies were detected in the colonoscopy of 405 patients. The most common pathologies included polyps, diverticular disease, and colitis, in order of frequency. One patient was diagnosed with a solitary rectal ulcer, and one was diagnosed with melanosis coli. Demography and colonoscopy data of patients are presented in Table 1.

The number of patients with polyps was 216 (28.5%). Among them, 133 (61.57%) were male and 83 (38.43%) were female. The median age was 60.29 (±6.05) years. One hundred twenty-three patients (56.94%) underwent polypectomy. Tubular adenoma was most observed, while a low-grade neuroendocrine tumor was reported in 1 patient. High-grade dysplasia was detected in 19 patients, and 28 malignancies were observed, 5 of which were intramucosal carcinoma and 23 of which were adenocarcinoma. Patients with malignancy accounted for 3.69% of all patients and 12.96% of patients with polyps. A follow-up decision was made for 3 of 28 patients diagnosed with malignancies and for a NET-diagnosed patient. Demography, pathology, and colonoscopy data of patients with polyps are shown in Table 2.

Table 1: Demographic and colonoscopic findings of all colorectal cancer screening patients

		n	%
Sex, n %	Female	369	48.68
	Male	389	51.32
Age, median, min-max		59.5	47-77
Colonoscopic findings, n %	Normal	405	53.43
	Polyp + Mass	216	28.50
	Diverticular disease	117	15.44
	Colitis	18	2.37
	Solitary rectal ulcer	1	0.13
	Melanosis coli	1	0.13

min: minimum, max: maximum

Table 2: Demographic, colonoscopic and pathological characteristics of colorectal cancer screening patients with polyps (n=216)

		n	%
Sex, n %	Female	83	38.43
	Male	133	61.57
Age, mean (SD)		60.29 (6.05)	
Localization, n %	Rectum	37	17.13
	Sigmoid Colon	114	52.78
	Descending Colon	17	7.87
	Splenic Flexure	3	1.39
	Transverse Colon	26	12.04
	Hepatic Flexure	5	2.31
	Ascending Colon	7	3.24
	Cecum	7	3.24
Polyp size, n %	<5 mm	77	35.65
	6-10 mm	76	35.19
	11-20 mm	40	18.52
	>20 mm	23	10.65
Action, n %	Polypectomy	123	56.94
	Biopsy	93	43.06
Adenoma Type, n %	Tubular	123	56.94
	Tubulovillous	47	21.76
	Villous	25	11.57
	Hyperplastic polyp	16	7.41
	Inflammatory polyp	4	1.85
	NET	1	0.46
Dysplasia, n %	None	83	38.43
	Low-grade	86	39.81
	High-grade	19	8.80
	Intramucosal carcinoma	5	2.31
	Adenocarcinoma	23	10.65

NET: Neuroendocrine tumor, SD: Standard Deviation

Nineteen patients were operated on after the diagnosis, and 5 patients with a locally advanced tumor located in the rectum were operated on after neoadjuvant therapy. One patient whose rectum biopsy showed malignancy received adjuvant chemotherapy since he also had lung and bone metastases at the time of diagnosis. Of the 11 patients with rectal tumors, 6 underwent low anterior resection, 4 underwent laparoscopic low anterior resection and 1 underwent abdominoperineal resection surgery. Five of the 8 patients who underwent anterior resection due to sigmoid colon tumor were operated on laparoscopically. Two patients with left colon tumors underwent laparoscopic

surgical resection and 3 patients with right colon tumors underwent open surgical resection.

In Table 3, the presence of dysplasia and malignancy was compared in terms of demographic, pathological, and colonoscopy data. Age (*P*=0.617) and gender (*P*=0.967) did not significantly affect the occurrence of dysplasia and/or malignancy among our patients. Dysplasia and/or malignancy were more likely to occur in the rectosigmoid region compared to the left and right colons (*P*=0.016). Among adenoma types, the risk of dysplasia and/or malignancy of villous polyps was higher compared to tubulovillous and tubular polyps, and those of tubulovillous polyps were higher than tubular polyps (*P*<0.01). The presence of dysplasia and/or malignancy were evaluated mutually between subgroups according to polyp size. There was no statistically significant difference in the incidence of dysplasia between the patient group with polyps sized 6-10 mm and 11-20 mm (*P*=0.192). Among all other subgroups, an increase in polyp size was found to cause a significant increase in dysplasia and/or malignancy (*P*<0.001).

Table 3: Comparison of the presence of dysplasia and malignancy with demographic, colonoscopic and pathological data

		No dysplasia n=83	Dysplasia n=105	Malignancy n=28	*P*-value
Age, median (Q1-Q3)		60 (55-64)	60 (55-65)	61.5 (56-65)	0.617*
Sex	Male	52 (39.1)	64 (48.1)	17 (12.8)	0.967
	Female	31 (37.3)	41 (49.4)	11 (13.3)	
Localization, n (%)	Rectosigmoid	57 (37.7)	72 (47.7)	22 (14.6)	0.016
	Left Colon	8 (22.2)	24 (66.7)	4 (11.1)	
	Right Colon	18 (62.1)	9 (31.0)	2 (6.9)	
Adenoma Type, n (%)	Tubular	57 (46.3)	65 (52.8)	1 (0.8)	<0.001
	Tubulovillous	5 (10.6)	37 (78.7)	5 (10.6)	
	Villous	0 (0)	3 (12.0)	22 (88.0)	
Polyp size, n (%)	≤5 mm	46 (59.7)	29 (37.7)	2 (2.6)	<0.001
	6-10 mm	27 (35.5)	45 (59.2)**	4 (5.3)	
	11-20 mm	10 (25.0)	22 (55.0)**	8 (20.0)	
	>20 mm	0 (0)	9 (39.1)	14 (60.9)	
Size, median (Q1-Q3) (mm)		4 (4-8)	8 (5-13)	23.5 (17-30)	<0.001*

* Mann-Whitney U test, mm: millimeter, ** In post hoc analysis, 6-10 mm and 11-20 mm polyps did not differ in terms of dysplasia.

Discussion

Early diagnosis of colorectal cancer in asymptomatic patients is facilitated by screening programs. Fecal tests and colonoscopy are widely used throughout the world. Colonoscopy is one of the most important analyses because it allows early diagnosis of these patients, obtaining pathological samples, and total removal of detected adenomas. But the fact that it is an invasive and uncomfortable procedure, and the large number of individuals to be screened are significant problems. For this reason, it is cost-effective to determine the patients to undergo colonoscopy by noninvasive diagnostic methods. Despite nuances, screening programs based on fecal immunochemical testing are mainly used around the world [5, 6]. A study comparing fecal tests and colonoscopy in screening showed that patients' participation in fecal tests was higher. Although the cancer detection rates of both screening methods are similar, colonoscopy was more successful in polyp detection rates [7].

In our country, fecal immunochemical testing is performed in the patient group aged between 50-70 years, and patients with fecal occult blood are referred for colonoscopy. In recent years, many suggested that the age for screening onset be set at 45 years [8], especially in areas with a high incidence of CRC and individuals with above-average risk. However, this will lead to an increase in the number of patients to be screened, bringing an additional burden [9]. The age at which screening will be stopped is controversial. Comorbid diseases, which increase with age, reduce the prolongation of life expectancy with screening. Female patients aged 90 years and males aged 85 years do not benefit from screening. The ages on which most are focused are 70 and 75 years. A person's health, life expectancy, and functional condition play a role in the age at which screening will be done [10].

The quality of colonoscopy to be performed in patients with positive fecal occult blood during screening is important. Colon cleansing is the most important reason affecting quality. A successful colon cleansing will increase the rate of reaching the cecum, as well as help increase the visibility of small polyps. Colonoscopy should be performed by experienced endoscopists, and the success of reaching the cecum should be above 95%. The process should not take less than 6 minutes, especially the return after cecum visualization [11]. In our center, the cecum could not be reached at the first try in a small number of patients because of a dirty colon. After the colon cleansing was repeated, the cecum was reached in all.

A polyp detection rate of >25% during colonoscopy for screening indicates good colonoscopy quality [12]. Corley et al. [13] reported polyp detection rates as 7.4%-52.5% for different endoscopists, and each 1% increase in polyp detection rate was associated with a 3% decrease in cancer risk. In our study, at least one polyp was identified in 216 (28.5%) patients colonoscopically. Studies report that the detection rate of colorectal cancer in screening patients ranges between 0.26%-4.1% [14-16]. In another large study in which 7503 consecutive cases not covered by the CRC screening program were discussed, the malignancy rate was reported as 4.1% in the histopathological examination of 611 patients with polyps [17]. In this study, patients with malignancy accounted for 3.69% of all patients and 12.96% of patients with polyps, which indicates that CRC screening patients with detected polyps are more likely to have a malignancy. Additionally, all our patients had early-stage tumors, except for one patient with metastasis at the time of diagnosis and 5 patients with progressive local tumor at the rectum.

Limitations

The main limitations of this study include its retrospective and single-center design. Second, there was no control group to increase the power of the current analysis. We think that the effectiveness of screening programs will be better demonstrated with multicenter, prospective studies.

Conclusion

The results of this study showed that colonoscopy performed on colorectal cancer screening patients with a positive FOB test was quite successful in diagnosing precancerous lesions and colorectal cancer. In addition, colonoscopy can prevent colorectal cancer by complete removal of detected lesions, and it is useful in the differential diagnosis of diverticular disease, colitis, and solitary rectal ulcer that may cause fecal occult blood positivity.

References

1. Rawla P, Sunkara T, Barsouk A. Epidemiology of colorectal cancer: incidence, mortality, survival, and risk factors. Prz Gastroenterol. 2019;14(2):89-103. doi: 10.5114/pg.2018.81072.
2. Bonelli L. Colorectal carcinoma: is screening possible?. Tech Coloproctol. 2004;8Suppl2:267-72. doi: 10.1007/s10151-004-0174-1.
3. Brenner H, Chen C. The colorectal cancer epidemic: challenges and opportunities for primary, secondary and tertiary prevention. Br J Cancer. 2018;119(7):785-92. doi: 10.1038/s41416-018-0264-x.

4. Rex DK, Boland CR, Dominitz JA, Giardiello FM, Johnson DA, Kaltenbach T, et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients from the U.S. Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol. 2017;112(7):1016-30. doi: 10.1038/ajg.2017.174.

5. Li JN, Yuan SY. Fecal occult blood test in colorectal cancer screening. J Dig Dis. 2019;20(2):62-4. doi: 10.1111/1751-2980.12712.

6. Sharma R. An examination of colorectal cancer burden by socioeconomic status: evidence from GLOBOCAN 2018. EPMA J. 2019;11(1):95-117. doi: 10.1007/s13167-019-00185-y.

7. Quintero E, Castells A, Bujanda L, Cubiella J, Salas D, Lanas Á, et al. COLONPREV Study Investigators. Colonoscopy versus fecal immunochemical testing in colorectal-cancer screening. N Engl J Med. 2012;366(8):697-706. doi: 10.1056/NEJMoa1108895.

8. Mannucci A, Zuppardo RA, Rosati R, Leo MD, Perea J, Cavestro GM. Colorectal cancer screening from 45 years of age: Thesis, antithesis and synthesis. World J Gastroenterol. 2019;25(21):2565-80. doi: 10.3748/wjg.v25.i21.2565.

9. Wolf AMD, Fontham ETH, Church TR, Flowers CR, Guerra CE, LaMonte SJ, et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. CA Cancer J Clin. 2018;68(4):250-81. doi: 10.3322/caac.21457.

10. Day LW, Velayos F. Colorectal cancer screening and surveillance in the elderly: updates and controversies. Gut Liver. 2015;9(2):143-51. doi: 10.5009/gnl14302.

11. Schoenfeld P. Quality in Colorectal Cancer Screening with Colonoscopy. Gastrointest Endosc Clin N Am. 2020;30(3):541-51. doi: 10.1016/j.giec.2020.02.014.

12. Maida M, Camilleri S, Manganaro M, Garufi S, Scarpulla G. New endoscopy advances to refine adenoma detection rate for colorectal cancer screening: None is the winner. World J Gastrointest Oncol. 2017;9(10):402-6. doi: 10.4251/wjgo.v9.i10.402.

13. Corley DA, Jensen CD, Marks AR, Zhao WK, Lee JK, Doubeni CA, et al. Adenoma detection rate and risk of colorectal cancer and death. N Engl J Med. 2014;370(14):1298-306. doi: 10.1056/NEJMoa1309086.

14. Lin YP, Long TF, Ma J, Zhou HR, Zhou H, Zhang X, et al. Analysis of colorectal cancer screening results in Kunming from 2014 to 2017. Zhonghua Yu Fang Yi Xue Za Zhi. 2019;53(11):1162-65. doi: 10.3760/cma.j.issn.0253-9624.2019.11.017.

15. Arunah C, Feisul IM, Nor Saleha IT, Muhammad Radzi AH. Overview of colorectal cancer screening programme in Malaysia. Med J Malaysia. 2020;75(3):235-39.

16. Zhiqiang F, Jie C, Yuqiang N, Chenghua G, Hong W, Zheng S, et al. Analysis of population-based colorectal cancer screening in Guangzhou, 2011-2015. Cancer Med. 2019;8(5):2496-502. doi: 10.1002/cam4.1867.

17. Basak F, Caliskan Y, Tilev S, Sisik A. Lower gastrointestinal endoscopic polypectomy: Cross-sectional study with 7503 consecutive endoscopic procedures. J Surg Med. 2019;3(11):809-11. doi: 10.28982/josam.653586.

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