Original Research Paper

Medicine

THE RELATION BETWEEN DISTAL AND PROXIMAL FINDINGS IN PATIENTS UNDERGOING COLONOSCOPY.

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ABSTRACT **INTRODUCTION AND BACKGROUND:** Patients who have distal advanced neoplasia are more likely to develop proximal neoplasia and even advanced neoplasia. Colonoscopy has been reported to be accurate and quite efficient screening technique and can diagnose both proximal and distal lesions. It is significant to determine the relationship between distal and proximal colonoscopic findings, which helps with selection of subsequent follow-up interventions for the patients with distal lesions.
OBJECTIVE: To figure out the relationship between the distal and proximal findings in patients who had undergone colonoscopy.
Patients and Methods: This prospective study was conducted from February 2018 to February 2019 on 301 patients who had been referred for colonoscopy to Kurdistan center for gastroenterology and hepatology in Sulaimaniya-Iraqi Kurdistan-Iraq. Required data were collected through a researcher-designed checklist, their medical records, and face-to-face interviews. The collected data were analyzed through descriptive statistics and Chi-square test using Statistical Package for Social Sciences (version 22.0).
RESULTS: The male patients and those aged 25-64 years had a higher rate of distal lesions. Presence of blood in the stool was found to be an indication for incidence of distal lesions.The results also revealed that the most frequent sites of colorectal lesions were found to be left side colon, the rectum, both left and right sides of colon, and sigmoid, respectively. There was a significant relationship between the distal and proximal findings in patients undergoing colonoscopy.
CONCLUSION: Colonoscopy can be employed as a reliable screening technique to distinguish distal lesions in the colon. Also, due to the significant relationship between the distal and proximal findings , therefore, distal and proximal findings of colonoscopy have predictive value to spot colorectal disorders.

INTRODUCTION:

The assumption that there is a relationship between distal lesions and proximal neoplasia which is based on the distal and proximal findings has been considered as a basis for using flexible sigmoidoscopy followed by colonoscopy in colorectal cancer screening programs. Based on this assumption, it has been widely established that patients who are diagnosed with distal advanced neoplasia (AN) are more likely to develop proximal neoplasia (PN) and proximal advanced neoplasia (PAN) [1, 2]. However, according to formal guidelines, no significant association has been reported between distal hyperplastic polyps (HP) and PN and/or PAN [2, 3]. Also, research has revealed no established significant relationship between distal non-advanced adenomas (NAA) and PN and PAN, and screening recommendations leave the follow-up program for patients with NAA to the clinician's judgment [4, 5]. It has been suggested that in about half of the patients, PN do not have distal markers and are thus not identifiable by the sigmoidoscopy outcome alone [6, 7]. It has also been demonstrated that patients aged over 60 years, those who smoke, and those with a history of colorectal cancer have a higher prevalence of PN [8]. Colorectal cancer (CRC) is the second major cause of cancer-induced mortality all over the world [9]. A large number of cases of CRC develop from adenomatous polyps which grow from a small size to a larger one, and over a relatively long period of 5 to 10 years, they develop into cancer and dysplasia. It has been confirmed that about 80% of CRC cases can be prevented through colonoscopic removal of adenomatous polyps, which in turn leads to a remarkable decrease in the overall rate of mortality [10]. CRC screening has been demonstrated by several research studies to be cost-effective and clinically useful in the population with an average risk& can result in a significant decrease in death in due to CRC [11, 12]. Therefore, it has been claimed that CRC is a preventable disease by developing and

implementing appropriate national screening programs [13]. In spite of the fact that it is clearly pointed out that utilizing any strategy to screen CRC is far better than not avoiding monitoring, there is no consensus that shows with certainty which method can be the optimal screening technique [14]. Over the last few years, there has been a shift from screening with rigid sigmoidoscopy, guaiac-based fecal occult blood tests (FOBTs)& digital rectal examinations to more complicated fecal immunochemical testing (FIT) for analysis of stool for mutated DNA, CT colonography, colonoscopies, and human hemoglobin [15]. It has been demonstrated that both colonoscopy and fecal immunochemical testing are similarly efficient in the detection of CRC; however, patients who were screened with the former method were reported to have more adenomas[16].Endoscopic procedures, including flexible proctosigmoidoscopy (PS) and colonoscopy, detect both carcinomas and adenomas and allow endoscopic polypectomy and removal of in-situ cancers during a single examination,but they are invasive procedures not always accepted by asymptomatic patients refered for screening purposes and although it has been indicated that they are highly cost-effective, they are still more expensive than FIT [9].Colonoscopy has been referred to as the most accurate method for early diagnosis and prevention of CRC and premalignant precursor lesions. Although colonoscopy is stated to be the most expensive method, patients who have undergone colonoscopic screening and presented no colonic lesions can postpone repeating this screening test for at least 10 years [17]. PS is characterized needs less bowel preparation, no sedation , less invasive and less expensive procedure , with very few cases of morbidity [18] & causes significant decrease in the incidence of CRC and death rate. Complete colonoscopy should be carried out for patients at high risk for cancer or with advanced adenomas or adenomas [19]. There has been a change in CRC epidemiology, with increase in the frequency of tumors in proximal

colonic segments [20]. Iin the absence of a distal lesion, right-sided neoplasia may occur& found that 37-60% cases of advanced proximal neoplasia are not associated with distal ones [14]. Isolated proximal adenomas can be predicted through some risk factors like a family history of CRC, smoking, and increased age, significant to know because PS may fail to detct them if no lesions exist in the distal colon [21].

PATIENTS AND METHODS:

A prospective study carried out from February 2018 to February 2019. A sample consisted of 301 patients who were selected from those patients who had referred for colonoscopy to Kurdisran centerfor gastroenterology and hepatology. The patients aged 50.34 years on average, with the youngest and the oldest being 15 and 90 years, respectively (See Table 3.1). Nineteen patients aged 15-24 (youth group), 201 aged 25-64 (adults group), and 81 aged 65 and more (senior group) (See Table 3.2).There were 170 males and 131 females in the study. All of those patients who were found to have distal lesions were recruited for the study. The patient's data including age, gender, stool status, bowel status, abdominal pain or discomfort, appetite status, weight status, nausea& vomiting , history of colonoscopy, previous colonoscopic findings, ileal intubation ,cecal incubation, results of colonoscopy, site of lesions, and frequency and percentage of distal and proximal lesions were collected using a researcher-designed checklist and by reviewing their medical records and interviewing them. The colonoscopic findings were analyzed to find the relation between and proximal distal lesions. In order to recruit the patients for the present study, the following inclusion criteria were regarded: Presence of distal lesion in colonoscopy ,Adequately prepared patients, Patients underwent total colonoscopy, Willingness and consent to participate in the study. The following exclusion criteria were used: Patients with normal colonoscopic ,patient underwent only rectosigmoidoscopy alone, not adequately prepared patient &unwillingness to take part in the study. The collected data were analyzed through SPSS (Statistical Package for Social Sciences) version 22.0. For this purpose, descriptive statistics was employed, and the results were presented as frequencies. Also, Chi-square test was used to analyze the relationship between distal and proximal findings. Ethically necessary approval was obtained from the Scientific and Ethical Committee of Iraqi Board for Medical Specialization in Internal Medicine. Moreover, verbal consent was obtained from all of the patients who have involved in the study.

RESULTS:

The mean age was 50.34 years, with a median of 50 years, standard deviation of 17.718, a minimum of 15 years, and a maximum of 90 years (Table 3.1).

Table 3.1. The results of descriptive analysis of the patients' age

Age (years)	
Mean	50.34
Median	50.00
Std. Deviation	17.718
Minimum	15
Maximum	90

Most of the patients (66.8%) were 25-64 years (labeled as adults), followed by 81 patients (26.9%) to the age group of 65 years and more (labeled as seniors), and 19 patients (6.3%) to the age group 15-24 years (labeled as youth) (Table 3.2).

Table 3.2. The frequency and percentage of the patients' age

Age groups	Frequency (N)	Percentage (%)
15 - 24 Youth	19	6.3
25 - 64 Adults	201	66.8
65 and over senior	81	26.9
Total	301	100.0

With regard to the patients' gender, the results revealed that 56.5% of the patients (n=170) were males and 43.5% (n=131) were females (Table 3.3).

Table 3.3. The patients' gender frequency and percentage

Gender	Frequency (N)	Percentage (%)
Male	170	56.5
Female	131	43.5
Total	301	100.0

In terms of presence of blood in stool, the results showed that 164 patients (54.5%) had normal stool, while 137 patients (45.5%) had observed blood in their stool (Table 3.4).

Table 3.4. The patients' stool status

Stool status (presence of blood in stool)	Frequency(N)	Percentage (%)
Normal	164	54.5
Bleeding	137	45.5
Total	301	100.0

72 patients (23.9%) had normal bowel, 91 (30.2%) had constipation, 91 (30.2%) had diarrhea, and mixed diarrhea and constipation in 47 cases (15.6%) (Table 3.5).

Table 3.5. The patients' bowel status

Bowel status	Frequency (N)	Percentage (%)
Normal	72	23.9
Constipated	91	30.2
Diarrhea	91	30.2
Alternate between diarrhea and constipation	47	15.6
Total	301	100.0

Most of the patients (90%) had abdominal pain or discomfort, while only 30 patients (10%) did not (Table 3.6).

Table 3.6. The patients' abdominal pain or discomfort

Abdominal pain or discomfort	Frequency (N)	Percentage (%)
Yes	271	90.0
No	30	10.0
Total	301	100.0

Most of the patients (71.8%) did not lose their appetite, while loss of appetite was observed in 85 patients (28.2%) (Table 3.7).

Table 3.7. The appetite status of the patients

Loss of appetite	Frequency (N)	Percentage (%)
Yes	85	28.2
No	216	71.8
Total	301	100.0

Most of the patients (92.7%) stated that they did not vomit, and only 22 patients (7.3%) had these experiences (Table 3.8).

Table 3.8. The status of nausea or vomiting in the patients

Nausea or vomiting	Frequency(N)	Percentage (%)
Yes	22	7.3
No	279	92.7
Total	301	100.0

Most of the patients (85%) had colonoscopy for the first time, while the rest 15% had it before and previous colonoscopic findings, 13 (28.9%) cases had ulcerative colitis, 13 (28.9%) had colonic polyp, 4 (8.8%) had colonic cancer, 4 (8.8%) had rectal cancer, 2 (4.5%) had colonic diverticulosis, 2 (4.5%) had solitary rectal ulcer syndrome, and 1 (2.3%) had Crohn's disease (Table 3.9).

Table 3.9. History of colonoscopy

Is it the first time doing colonoscopy	Frequency (N)	Percentage (%)
Yes	256	85.0
No	45	15.0
Total	301	100.0
Previous colonoscopic finding (n=45)		
Normal	6	13.3
Ulcerative colitis	13	28.9
Colonic polyp	13	28.9
Rectal cancer	4	8.8
Colonic cancer	4	8.8
Solitary rectal ulcer syndrome	2	4.5
Colonic Diverticulesion	2	4.5
Crohn's disease	1	2.3
Total	301	100.0

Cecal intubation rate was (99.3%) and only 2 patients (0.7%) had not (Table 3.10).

Table 3.10. Colonoscopy with cecal intubation

Cecal intubation	Frequency (N)	Percentage (%)
Yes	299	99.3
No	2	0.7
Total	301	100.0

Most of the patients (87.7%) had ileal intubation and only 2 patients (0.7%) had not (Table 3.11).

Table 3.11. Colonoscopy with ileal incubation

Ileal intubation	Frequency(N)	Percentage (%)
Yes	264	87.7
No	37	12.3
Total	301	100.0

105 patients (34.9%) had polyp as the most frequent colonoscopic finding, 63 (20.9%) had ulcerative colitis, 55 (18.3%) had diverticulosis, 29 (9.6%) had ulcer, 28 (9.3%) had tumor, 13 (4.3%) had crohn's disease, 4 (1.3%) had Telangiectasia, and 8 (2.6%) had vascular Ectasia (Table 3.12).

Table 3.12. The results of colonoscopy

Colonoscopic finding	Frequency (N)	Percentage (%)
Tumor	28	9.3
Diverticulosis	55	18.3
Polyp	105	34.9
Ulcerative colitis	63	20.9
Ulcer	29	9.6
Crohn's disease	13	4.3
Vascular Ectasia	8	2.6
Total	301	100.0

Table 3.13 presents the site of the lesions. As indicated in this table, the most frequent site of lesions was Left sided colon with 67 lesions (22.3%), followed by rectum (19.3%), both Lts&Rt sides of colon (15.9%), sigmoid (10.3%), cecum (7.0%), rectosigmoid (6.6%), Rt side (6.0%), ilium (3.3%), splenic flexure (3.0%), transverse colon (2.0%), descending colon (2.0%), ascending colon (1.7%), and hepatic flexure (0.7%) respectively (Table 3.13).

Table 3.13. Results regarding the site of the lesions

Site the lesions	Frequency (N)	Percentage (%)
Rectum	58	19.3
Rectosigmoid	20	6.6
Sigmoid	31	10.3
Descending colon	6	2.0
Splenic flexure	9	3.0
Transverse colon	6	2.0
Hepatic flexure	2	0.7
Ascending colon	5	1.7
Cecum	21	7.0
Ilium	10	3.3
Rt sided colon	18	6.0
Lt sided colon	67	22.3
Both Rt& Lt sides	48	15.9
Total	301	100.0

More than half of the patients (59.5%) only had distal lesions, 59 (19.6%) only had proximal lesions, 46 (15.3%) had both types of lesion with the same disease, and 17 (5.6%) had both lesions with different diseases (Table 3.14).

Table 3.14. Frequency and percentage of distal and proximal lesions

Distal and proximal findings	Frequency (N)	Percentage (%)
Distal lesions only	179	59.5
Proximal lesions only	59	19.6
Both (same disease)	46	15.3
Both (different diseases)	17	5.6
Total	301	100.0

Regarding the relationship between distal and proximal findings and the colonoscopic findings, the results of the present study revealed a significant relationship between these two at p=0.001 (Table 3.15). Therefore, the finding that distal findings significantly correlated with proximal findings can be utilized to predict colorectal disorders such as tumors, diverticulosis, polyp, ulcerative colitis, ulcer, telangiectasia, crohn's disease, and vascular Ectasia.

Table 3.15. Relation between distal and proximal findings

Colonoscopic findings	Distal and proximal findings				Total	P-value
	Distal lesions only	Proximal lesions only	Both (same disease)	Both (different diseases)		
Tumor	16	9	0	3	28	0.001
	57.1%	32.1%	0.0%	10.7%	100.0%	
Diverticulosis	35	8	11	1	55	
	63.6%	14.5%	20.0%	1.8%	100.0%	
Polyp	59	27	14	5	105	
	56.2%	25.7%	13.3%	4.8%	100.0%	
Ulcerative colitis	45	0	12	6	63	
	71.4%	0.0%	19.0%	9.5%	100.0%	
Non specificUlcer	15	12	1	1	29	
	51.7%	41.4%	3.4%	3.4%	100.0%	
Telangiectasia	3	0	1	0	4	
	75.0%	0.0%	25.0%	0.0%	100.0%	
Crohn's disease	3	2	7	1	13	
	23.1%	15.4%	53.8%	7.7%	100.0%	
Vascular Ectasia	3	1	0	0	4	
	75.0%	25.0%	0.0%	0.0%	100.0%	
Total	179	59	46	17	301	
	59.5%	19.6%	15.3%	5.6%	100.0%	

Regarding the sites and frequency of associated colonoscopic findings showed that 28 cases had tumor, with most of them (12) being located in rectum. Fifty-five cases had diverticulosis, with most of them (22) being in distal. Also, 105 had polyp, with most of them being located in sigmoid (22), rectum (19), proximal and distal (14), distal (10), and cecum (10). Moreover, ulcerative colitis were spotted in 63 cases, with most of them being located in distal, rectum, and recto sigmoid with 26, 17, and 14 cases, respectively. Furthermore, ulcer was found in 29 cases, with most cases being located in rectum (8), proximal and distal (7), and ilium (6). Moreover, crohns disease was seen in 13 cases, with most cases (8) being found in proximal and distal. Finally, 8 cases of vascular ectasia was found, most of which (4) were in the distal, followed by rectum with 2 cases (See Table 3.16).

DISCUSSION:

The present study was an investigation into the relationship between distal and proximal colonoscopic findings. The results revealed a significant correlation between distal and proximal findings in patients undergoing colonoscopy. Proximal findings were found to be useful in predicting tumors, polyps, diverticulosis, and ulcer. As reported by Atkin et al [22] a large number of patients who undergo single screening flexible sigmoidoscopy and polypectomy with colonoscopy referral are 55 to 64 years old. In line with that study, in this study, accordance to the results presented in Table 3.1, it could be seen that the patients' mean age was 50.34 with a median of 50 years, ranging from 15 to 90 years of age. The results presented in this table could be considered as a proof to the outcomes of the study by Atkin et al [23] regarding the probable age of occurrence of CRC disorders.

Table 3.16. Frequency of associated lesions and their locations

Colonoscopic finding	Site													Total
	Rectum	Recto sigmoid	Sigmoid	Descending colon	Splenic flexure	Transverse colon	Hepatic flexure	Ascending colon	Cecum	Ilium	Proximal	Distal	Proximal & Distal	
Tumor	12	3	1	0	0	0	0	0	7	0	3	2	0	28
Diverticulosis	0	1	4	4	4	1	0	0	2	0	5	22	12	55
Polyp	19	2	22	2	5	5	2	3	10	3	8	10	14	105
Ulcerative colitis	17	14	0	0	0	0	0	0	0	0	0	26	6	63
Ulcer	8	0	3	0	0	0	0	2	2	6	0	1	7	29
Corohns disease	0	0	1	0	0	0	0	0	0	1	1	2	8	13
Vascular Ectasia	2	0	1	0	0	0	0	0	0	0	1	4	1	8
Total	58	20	31	6	9	6	2	5	21	10	18	67	48	301

As reported by Quaresma et al [11], over half of patients with colorectal cancer who had undergone colonoscopy were 50 to 60 years old. Almost similarly, the results of the present study presented in Table 3.2 showed that 66.8% of patients who underwent colonoscopy belonged to the age group 25-64 years. In the current study and based on the results given in Table 3.3, it could be concluded that 56.5% of the patients were males and 43.5% were females, which implies that intestinal disorders are more common among men.

Initial signs are not often specific; however, the symptoms that indicate CRC suspicion include change of bowel habits, blood in the stools, or anemia. Right-sided colon cancer is reported to be characterized by some general symptoms such as unknown fever, weight loss, and fatigue and anemia, while left-sided colon cancers are usually accompanied with change in bowel habits and blood in stools [24,25]. In the present study and based on the results presented in Table 3.4 regarding the presence of blood in stool, it was seen that 54.5% of the patients had normal stool, while 45.5% had been detected with blood in their stool. This finding is in line with previous studies which reported that presence of blood in stool could be considered as a risk factor for development of colorectal disorders [24,25].

Successful colonoscopy is critically dependent on a clean colon and inadequate preparation result in more patient discomfort, increased procedure time, aborted procedures, and decreased adenoma detection rate [26,27]. Based on the results presented in Table 3.5, bowel habits was normal in 23.9% of patients, while 30.2% of patients had diarrhea, 30.2% had constipation, and mixed in 15.6% of them. With regard to the effects of bowel status, Sung et al [27] pointed out that abnormal status of the bowel can inappropriately affect results of colonoscopy test.

As reported by Smith et al, the abdominal pain is one of the most common presentations in patients who are suffering from colorectal disorder and have undergone colonoscopy [28]. In addition, Cadoni et al referred to bloating and abdominal pain following colonoscopy as common presentations that can last for 1 to 2 days [29]. Similarly, the results presented in Table 3.6 showed that only 10% of the patients did not have abdominal pain or discomfort; therefore, abdominal pain and discomfort are considered as clinical symptoms in colorectal disorder patients undergoing colonoscopy.

According to the results of the study conducted by Amandeep et al [29], the major symptoms of colorectal disorder include fever with chills at times and pain in the lower left part of the abdomen. Other symptoms may include diarrhea, constipation, loss of appetite and weight, fatigue, and nausea [30]. Similarly, the results of the present study demonstrated that 28.2% of patients lost their appetite (Table 3.7) which can be symptoms of colorectal disorder, as reported by Amandeep et al [30].

Potential side effects of colonoscopy such as rectum irritation, bloating, vomiting, and nausea can be due to the substances that are utilized to cleanse the colon and the air used to inflate it [31]. In this regard, the results of this study showed that only 7.3% of patients stated that they had experienced nausea and vomiting before the colonoscopy test (Table 3.8).

In accordance with the results presented in Table 3.9, only 15% of patients had undergone colonoscopy before and 85% of them had colonoscopy for the first time. The history of colonoscopy, and the medical history should be taken into careful account [21]. Patients' previous colonoscopic findings revealed that 28.9% of patients had ulcerative colitis, 28.9% colonic polyp, 8.8% colonic cancer, 8.8%

rectal cancer, 4.5% colonic diverticulosis, 4.5% solitary rectal ulcer syndrome, and 2.3% Crohn's disease these all considered for each patient (Table 3.9).

Based on the results presented in Table 3.10, approximately all of the patients (99.3%) had experienced cecal intubation before and most of the patients (87.7%) had undergone ileal intubation before (Table 3.11). Ileal intubation and cecal intubation depend much on adequate bowel preparation[32].

In Table 3.12, the main abnormality that been observed was polyp with a rate of 34.9% among the patients, Ramos et al [33,34]. This study showed that ulcerative colitis detected in18.3% (Table 3.12).

Regarding the site of the colorectal lesions, distal colon was the most frequent site of lesions with a percentage of 22.3%, rectal lesions seen among 19.3% of the patients, followed by both LT&RT sides of colon with 15.9%, sigmoid with 10.3%, and the cecum with 7.0% (Table 3.13). As pointed out by David et al [35], there is a biological difference between lesions of the proximal colon and distal lesions, such that the former become malignant within a short period,so 59.5% of patients only had distal lesions, 19.6% only had proximal lesions and 15.3% had both types of lesion with the same disease and 5.6% of them had both lesions with different diseases (Table 3.14). This finding is in good agreement with those of the study conducted by David et al [35]. It is also in line with the findings of the study carried out by Paul et al. who concluded that colonoscopy technique had a high performance in detecting distal and proximal lesions [20].

According to the results presented in Table 3.15, the results of the present study revealed that there is a significant relationship between proximal and distal findings (p=0.001). The finding is agreement with that of the study carried out by Huang et al [36] who investigated the relationship between distal and proximal findings in colonoscopy screening for finding colorectal disorders.

According to the results presented in Table 3.15 above, it can be concluded that distal lesions can be utilized to predict colorectal disorders such as tumors, diverticulosis, polyp, ulcerative colitis, ulcer, telangiectasia, crohn's disease, and vascular Ectasia. This finding is in agreement with those of the study carried out by Dodou et al. (2011) who indicated that there is an association between distal lesions and proximal neoplasia, and that this association becomes more significant with increased severity of the distal lesion [37]. In their study, Dodou et al. (2011) suggest that it is necessary to investigate other risk factors, including genetic predisposition and environmental risks, that are involved with proximal neoplasia because more than half of the proximal neoplasia are isolated [37]. Similarly, Levin et al. (1999) revealed that distal findings are significant predictor of proximal advanced neoplasia (PAN) [4].

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