ORIGINAL ARTICLE / ÖZGÜN MAKALE

Effect of Changing Patient's Position During Colonoscopy to the Colonoscopy Time, Ileal Intubation Rate and Number of Polyps

Kolonoskopi Sırasında Hasta Pozisyonunun Değiştirilmesinin Kolonoskopi Süresi, İleal Entübasyon Oranı Ve Polip Sayısına Etkisi

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Geliş Tarihi: 08.09.2022 **Kabul Tarihi:** 12.01.2023

Abstract

Objective: Colonoscopy is universally considered as the conventional tool for the identification and removal of adenomatous polyps. The aim was to evaluate the effect of position change on the cecal and ileal intubation rates and the detection rate of polyps. In this way, it is aimed to accelerate the colonoscopy procedure time and increase its sensitivity.
Methods: The study included 943 patients aged between 17 and 90 years presented for a diagnostic colonoscopy at our hospital surgery clinic from January 2008 to December 2018.
Results: The results indicated significantly lower median cecal and ileal intubation time and higher polyps detection rate owing to change in the patient's posture to supine than in the left lateral position during colonoscopy procedure ($p<0.0001$). Moreover, cecal ($p<0.0001$) and ileal ($p=0.001$) intubation time was negatively correlated with the number of polyps detected. The age of the participating patients was the demographic factor found to be positively correlated with the number of polyps detected ($p<0.0001$). Furthermore, changing the patient's posture to supine led to an 11% increase in the polyp detection rate in the cecum, ascending colon, and hepatic flexure combined regions ($p<0.0001$). The odds of detection of polyps in this region were 2.11 (95%CI, 1.60-2.78) times higher in supine posture compared to the left lateral position.
Conclusion: The above findings strengthen the relevance of the position of the patient in the polyp detection rate during colonoscopy procedures.

Keywords: Colonoscopy, Cecal Intubation Rate, Ileal İntubation Rate, Colorectal Cancer, Left Lateral Position, Supine Position

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Nasıl Atıf Yapılmalı: Aktürk R, Serinsöz S. Effect of Changing Patient's Position During Colonoscopy to the Colonoscopy Time, Ileal Intubation Rate and Number of Polyps. Journal of Immunology and Clinical Microbiology 2022;7(4):74-81 DOI: 10.58854/jicm.1172499

Öz

Amaç: Kolonoskopi, adenomatöz poliplerin tanımlanması ve çıkarılması için tüm dünyada sık kullanılan yöntem olarak kabul görmektedir. Çalışmamızda, pozisyon değişikliğinin çekal ve ileal entübasyon oranlarına ve polip saptanma oranlarına etkisinin değerlendirilmesi amaçlandı. Bu sayede kolonoskopi işlem süresinin hızlandırılması ve hassasiyetinin arttırılması hedeflenmektedir.

Yöntem: Çalışmaya Ocak 2008 ile Aralık 2018 tarihleri arasında hastanemiz cerrahi kliniğine tanısal kolonoskopi için başvuran 17-90 yaş arası 943 hasta dahil edildi.

Bulgular: Sonuçlar, kolonoskopi işlemi sırasında sol lateral pozisyona göre hastanın sırtüstü duruşundaki değişiklik nedeniyle ortalama çekal ve ileal entübasyon sürelerinin anlamlı derecede daha düşük olduğunu ve polip saptama oranının daha yüksek olduğunu saptadık ($p<0.0001$). Ayrıca çekal ($p<0.0001$) ve ileal ($p=0.001$) entübasyon süreleri ile saptanan polip sayısı arasında negatif korelasyon olduğu görüldü. Dahil edilen hastaların yaşı ile tespit edilen polip sayıları arasında pozitif korelasyon olduğu izlendi ($p<0.0001$). Ayrıca, hastanın duruşunu sırtüstü olarak değiştirmek, çekum, çıkan kolon ve hepatik fleksur kombine bölgelerinde polip saptama oranında %11'lik bir artışa yol açtığı tespit edildi ($p<0.0001$). Bu bölgede polip saptanma olasılığı, sırtüstü pozisyonda sol yan pozisyona göre 2,11 (%95 GA, 1,60-2,78) kat daha yüksek olarak belirlendi.

Sonuç: Yukarıdaki bulgular, kolonoskopi işlemleri sırasında polip saptanma oranında hastanın pozisyonunun önemini güçlendirmektedir.

Anahtar Kelimeler: Kolonoskopi, Çekal Entübasyon Oranı, İleal Entübasyon Oranı, Kolorektal Kanser, Sol Yan Pozisyon, Sırtüstü Pozisyon

INTRODUCTION

Colonoscopy is a technique widely used in patients with disorders in the abdomen and is a critical feature of all screening initiatives for colorectal cancer (CRC). It finds great value in the detection and prevention of CRC and holds considerable application in non-neoplastic disorders as well. The advantages incurred by colonoscopy comprises of complete colon visualisation, polyp identification and elimination, and extensive lesion examination of the tissue. In addition, polypectomy colonoscopy reduces CRC incidence by up to 90 % (1).

The relative effectiveness of colonoscopy screening relies on many factors such as bowel preparation, cecal intubation rate (CIR), time of extraction, and rate of adenoma diagnosis. Cecal intubation is characterised as progressing the tip of the colonoscope to a spot close to the ileocecal valve so that the entire cecal caput, such as the medial wall of the cecum, can be visualised. Hence, it is imperative to perform a full colonoscopy to reduce the level of polyp in all colon segments. The existing guidelines recommend benchmarks for positive cecal intubation levels of at least 90% for all colonoscopies and at least 95% for colonoscopy screening, recognizing that most clinicians would surpass these minimum requirements (2,3).

For certain cases, an endoscopist may encounter trouble progressing through the colon, leading to incomplete colonoscopy. Patient-related as well as technical attributes contribute to the occurrence of numerous problems in clinical practice leading to incomplete colonoscopy (4). Specific patient factors include improper preparation of bowel, pain and sensitivity, low total body mass, sex (female) and age (young) while diverticulosis, prior surgical adhesions, angulation or bowel loop fixation, and inadequate sedation are included under the technical factors (5). Therefore, colonoscopy can trigger uncommon but severe complications and colonoscopies that are inappropriately operated are related

to larger interval rates in the incidence of cancers (6).Colonoscopy is a technically demanding and complicated technique that requires preparation and experience to ensure a positive outcome. There are multiple colonoscopy training strategies for efficient intubation and removal of the cecal, along with quality assessment measures for colonoscopy skill quality. The various techniques utilised for the process of colonoscopy include magnetic navigation, simulation models, double-balloon colonoscopy (DBC) and numerous auxiliary techniques such as abdominal compression, changing the position of a patient, and water immersion colonoscopy.

In technically difficult circumstances, magnetic navigation systems have greatly enhanced the colonoscopy efficiency of clinicians. Compared to conventional colonoscopy, this technique confers with a lower chance of colonoscopy failure and reduced cecal intubation time (7). The colonoscopy training model and colonoscopy simulator type II, the two major physical simulation techniques, are widely used worldwide. Additionally, multiple computer-simulated endoscope programs also come into play, which includes Simbionix Simulator GI Mentor, LM-107 Simulator Type II, Olympus Colonoscopy Simulator Endo TS-1, and AccuTouch Endoscopy Simulator CAE Healthcare. The initial step of the learning process for colonoscopy is accelerated by training on simulators, with significantly diminished pain in the patients subsequent to colonoscopic procedures. The major effect of simulators on clinical dealings in the upcoming years also needs to be monitored (8).

DBC is considered as an effective procedure for cecal intubation following an initial incomplete colonoscopy. Reports suggest a higher CIR as compared to the conventional colonoscopy, which suggest that it may be a productive educational option for cecal intubation, minimising the training time and eventually reduce the call for suitable training in colonoscopy procedures (9). Abdominal compression may be initiated on the abdomen segment where a loop is anticipated, however, the air insufflation technique keeps the colon lengthy and protracted making it cumbersome to progress effectively with the colonoscope. In such a scenario, water immersion colonoscopy helps in avoiding over-distension of the intestine with air. Although there are numerous encouraging results related to the efficiency of water immersion colonoscopy, a recent study comparing water infusion with air insufflation during colonoscopic insertion revealed that water infusion did not boost the CIR compared to air insufflation. However, the adenoma detection rate (ADR) was observed to be marginally higher and abdominal pain associated with the procedure was decreased by water infusion technique (10).

Repositioning the patient in the right lateral decubitus or supine position promotes and allows the transition from the angulated splenic flexure to the mid-transverse colon. The left side location is suitable for the intuition of the endoscope from the middle transverse colon to the distal ascending colon, while the left side or supine location is useful for advancing the endoscope from the distal ascending colon. However, the above-mentioned statement is debatable due to various inconclusive studies in the literature (11-13).

Detecting and extracting polyps at screening colonoscopy is critical for successful colon cancer prevention and accounts for reliable risk stratification to notify accurately projected monitoring intervals. The ADR has surfaced as the principal quality colonoscopy performance measure and any new technique that enhances ADR is absolutely entitled. Numerous novel ADR-enhancing tools and technologies have been addressed in recent times, but few have demonstrated enduring functional benefits. Given the search for innovative technologies, basic elements of colonoscopic technique should not be ignored or underrated when it comes to polyp detection (14).

This piece of research study aims to detect and treat premalignant lesions. There is evidence to substantiate the premise that systematic change of position on withdrawal significantly improves the presentation of the mucosa and polyp identification, which are termed as the core theme of a high-quality examination (13). Moreover, the quality and efficiency of the process are determined based on the speed of the process and the number of polyps detected (14). Therefore, in this study, we aimed to investigate the effect of position change of patients during a colonoscopy on time of reaching the cecum, ileal intubation rate, and the number of polyps detected.

METHODS

A total number of 1688 patients aged between 17 and 90 years presented for a diagnostic colonoscopy at our hospital surgery clinic from January 2008 to December 2018 were invited to participate in the study. We excluded patients with insufficient bowel cleansing, presenting without polyp, morbid obesity, late adhesions due to recurrent abdominal surgery, or age <16 years. All patients were handed over the informed consent form, and the study started once the patients gave the written informed consent form. The study was approved by S.B.Ü. İstanbul Education Research Hospital Clinical Research Ethics Committee, 07/02/2020, no:2161.

The patients were prepared with a standard colonoscopy preparation diet for the process of colonoscopy. Sodium phosphate was used as a laxative. All patients underwent colonoscopy under anaesthesia with a protocol.

Colonoscopy was started in the left lateral position in all patients. The examination was also performed from the beginning of the colonoscopy until the cecum was reached. Polypectomy was applied to the detected polyps and the procedure was continued. When the hepatic flexure was reached, a group of patient's was placed in a supine position. Time to reach the cecum and ileum intubation were recorded. On the way back, the examination continued in the same way. Polypectomy was performed on detected polyps. The removed polyps were divided into groups according to the regions where they were removed and sent for pathological examination.

The patients were divided into two groups, with a change of position and no position change. These two groups were analysed for parameters such as the time to reach the cecum, the duration of the ileum intubation, the number of polyps detected, the polyps' detection site, and the pathological grade of the polyps.

Statistical analysis

All statistical analyses were performed using the SPSS program (version 21.0, SPSS Inc., Chicago, IL). A normality test was performed using the Shapiro-Wilk test for continuous variables. Categorical and continuous variables are presented as percentages and median ± interquartile range (IQR), respectively. Categorical variables were analysed using Pearson's chi-square test. Comparisons of continuous variables were carried out using the Mann-Whitney U-test. Spearman correlation was used to estimate the strength of association between variables. A p-value of <0.05 was considered statistically significant for all analyses.

RESULT

We assessed a total number of 1688 patients who underwent colposcopy during the study period. Out of these, 745 patients were ineligible based on our exclusion criteria (insufficient bowel cleansing, n=154; presenting without polyp, n=330; morbid obesity, n=98; late adhesions due to recurrent abdominal surgery, n=38; age <16 years, n=125), and 943 were analysed. There were 402 females and 541 males with an average age of 59 ± 18 years (range 17-90 years). Following the treatment protocol, the patients were divided into 2 groups with 542 patients operated in the left lateral position and 401 patients in the left lateral to the supine position (Table 1). The cecal and ileal intubation time was 15 ± 6 min and 3 ± 2 sec, respectively. The details of characteristics of polyps and carcinomas detected during the procedure of colonoscopy are presented in Table 2.

Table 1. Baseline patient characteristics

Characteristics	**n=943**	
Sex	**n**	**%**
Male, n (%)	541	57.4
Female, n (%)	402	42.6
Age (years)		
Median ± IQR (min-max)	59 ± 18 (17-90)	
Patient's posture change		
Left lateral position, n (%)	542	57.5
Left lateral to supine position, n (%)	401	42.5
Cecal intubation time (min)		
Median ± IQR (min-max)	15 ± 6 (7-32)	
Ileal intubation time (sec)		
Median ± IQR (min-max)	3 ± 2 (0-6)	

In the study, it was observed that there were a statistically significant between-group differences in cecal and ileal intubation time and the number of polyps detected owing to change in the patient's posture to supine

during colonoscopy procedure (p<0.0001; Table 3).The median cecal and ileal intubation time was significantly lower with a higher number of polyps detected in supine than in the left lateral position. Additionally, cecal and ileal intubation time was found to be negatively correlated with the number of polyps detected, which indicated the fact that lower cecal (p<0.0001) and ileal (p=0.001) intubation time increased the chance of detecting a higher number of polyps during colonoscopy (Table 4).

Table 2. Characteristics of polyps and carcinomas detected during colonoscopy

Characteristics	n	%
Polyps		
Hyperplastic polyp	481	36.0
Low-Grade Dysplasia	621	46.5
Intermediate-Grade Dysplasia	21	1.60
High-Grade Dysplasia	212	15.9
Carcinoma	55	5.83
Polyp location		
Cecum	112	11.9
Ascending colon	85	9.0
Hepatic flexure	107	11.3
Transverse colon	139	14.7
Splenic flexure	54	5.7
Descending colon	114	12.1
Sigmoid colon	382	40.5
Rectum	342	36.3
Carcinoma location		
Cecum	4	0.4
Ascending colon	7	0.7
Hepatic flexure	1	0.1
Transverse colon	2	0.2
Splenic flexure	1	0.1
Descending colon	4	0.4
Sigmoid colon	13	1.4
Rectum	23	2.4

Furthermore, the relation between the number of polyps detected and cecal and ileal intubation time with age was studied. The obtained data confirmed a positive correlation between age of the participating patients and number of polyps detected (p<0.0001; Table 5).

Table 3. Impact of changing patient's posture on cecal and ileal intubation time and number of polyps detected

Characteristics	Position during colonoscopy		P
	Left lateral	Left lateral to supine	
Cecal intubation time (min)	17 ± 8	12 ± 6	<0.0001
Ileal intubation time (sec)	3 ± 2	2 ± 1	<0.0001
Number of polyps	1 ± 0	1 ± 1	<0.0001

Data presented as Median ± IQR

Table 4. Association of number of polyps detected with cecal and ileal intubation time

Characteristics	r*	p
Cecal intubation time (min)	-0.27	<0.0001
Ileal intubation time (sec)	-0.12	0.001

*Spearman's correlation coefficient

Table 5. Association of age with number of polyps detected and cecal and ileal intubation time

Characteristics	r*	p
Number of polyps	0.24	<0.0001
Cecal intubation time (min)	-0.004	0.90
Ileal intubation time (sec)	0.001	0.98

*Spearman's correlation coefficient

The effect of the patient's posture on polyp detection rate (the number of patients with ≥ 1 polyp detected in each colon segment) during colonoscopy was also studied and the details are presented in Table 6. It is noteworthy to state that as compared to the position of the patients in the left lateral position, changing the patient's posture to supine led to an 11% increase in the polyp detection rate in the cecum, ascending colon, hepatic flexure combined regions(p<0.0001). The odds of detection of polyps in the combined regions were 2.11 (95%CI, 1.60-2.78) times higher in supine posture compared to the left lateral position (p<0.0001).

Table 6. Impact of changing patient's posture on polyp detection rate during colonoscopy

Colon segment	Position during colonoscopy				*p*	OR (95%CI)
	Left lateral		Left lateral to supine			
	n	%	n	%		
Cecum	52	46.4	60	53.6	0.012	1.66 (1.12-2.46)
Ascending colon	34	40.0	51	60.0	0.001	2.18 (1.38-3.43)
Hepatic flexure	51	47.7	56	52.3	0.029	1.56 (1.04-2.34)
Transverse colon	70	50.4	69	49.6	0.07	1.40 (0.98-2.01)
Splenic flexure	23	42.6	31	57.4	0.023	1.89 (1.09-3.30)
Descending colon	49	43.0	65	57.0	0.001	1.95 (1.31-2.89)
Sigmoid colon	215	56.3	167	43.7	0.54	1.09 (0.84-1.41)
Rectum	166	48.5	176	51.5	<0.0001	1.77 (1.35-2.32)
Cecum + Ascending colon + Hepatic flexure	137	45.1	167	54.9	<0.0001	2.11 (1.60-2.78)

OR: odds ratio

DISCUSSION

To date, considerable attention has been placed on the type of equipment and other technical advancements for maximising efficiency and performance. Efforts to enhance colonic visualisation and polyp detection, however, will also require that colonoscopists concentrate on basic and cost-effective techniques (15). Variation in the position of the patient is a cost-effective tool for improving outcomes like the detection rate of a polyp (16). The modification of a patient's position is complemented by the colon's intra-abdominal motion and fluid and gas intraluminal motion. For decades now, radiologists have been using these refinements to maximise views during examination procedures (17). It has been implied that changing the position of the patient to expose the colon segments to the top of the abdomen enhances luminal distension and thus detects lesions through colonoscope withdrawal.

The primary objective of this study was to examine the effect of position change of patients on cecum and ileum intubation time along with the number of polyps detected during the procedure. Although changes in position during the removal of the colonoscope were suggested to enhance the luminal view, the paucity of factual evidence has hampered quite a comprehensive deployment of the above-mentioned technique (18). Our data demonstrate that there were statistically significant differences between the observed groups in cecal and ileal intubation time and a number of polyps detected as a result of the change in the patient's posture during colonoscopy. The median cecal and ileal intubation time was significantly lower in supine posture than in the left lateral position. The change in the patient's posture to supine also allowed the detection of a significantly higher number of polyps than in the left lateral position. The most probable explanation, with the gravitational forces in motion, can be due to the displacement of the air column at the cecal base, thereby allowing a higher detection rate of the polyps. This change in position helped put certain segments of the colon into a position within the abdomen, which allowed optimum viewing. It was also associated with increased colon distension (inflation), thus enabling better visualisation. The detection of polyps was more if the patient remained supine (19).

In addition, cecal and ileal intubation time was observed to be negatively correlated with the number of polyps detected, which implied that lower cecal and ileal intubation time increased the chance of detecting a higher number of polyps during a colonoscopy. A positive correlation between age of the participating patients and the number of polyps detected was also observed. The results corroborated with the findings reported in a study, which

involved more than 12,000 colonoscopies showing that the gender and age of the patients, the quality of bowel preparation, the level of continuing medical education of endoscopists, and the quality of endoscopic tools were factors linked to the ADR (20).

We also observed that changing the patient's posture to supine from the left lateral position yielded an 11% enhancement in the polyp detection rate majorly in the region of the cecum, ascending colon, and hepatic flexure combined regions. In the present analysis, luminal distension in the supine position was classified adequate having the presumption that the rise in polyp detection resulted from increased luminal distension, this would suggest that the supine posture is still an effective strategy. Shift in dynamic position is logical as air naturally rises to the highest level. These shifts in position lead to improved distension with less air insufflation, fluid and debris removal, and flexure opening of tight angles. This strategy also helps to facilitate the insertion process. The patient needs to be sedated gently, however, so shifting from the left side to the supine position is straightforward, but shifting to the right side becomes more complicated. Another group of investigators carried out a randomised crossover trial and found that position change during removal in the procedures substantially enhanced the rate of polyp and adenoma detection (21). The study was further validated by a report supporting this in a randomised trial in which patients 1:1 were randomly allocated by the investigators to be tested either in the left lateral position during colonoscope withdrawal or in other positions. In the population observed, the ADR was enhanced by 9.8% in the transverse colon, splenic flexure, descending, and sigmoid colon (12). The major limitation of the present study was that it was conducted in a single centre. Multi-centric trials would add reproducibility of data followed by a good acceptance rate.

CONCLUSION

Our results indicate that an appreciable enhancement in the polyp detection rate was observed majorly in the region of the cecum, ascending colon, and hepatic flexure combined regions through simple position change techniques. Ultimately, a multicenter trial involving a larger cohort of endoscopists is envisioned to verify the generalizability of our data and to establish whether enhanced visualisation induced by the change of position leads to improvements in polyp detection rate with reduced precipitation reduced CRC.

Abbreviations

Adenoma Detection Rate (ADR)

Cecal Intubation Rate (CIR)

Colorectal Cancer (CRC)

Double-Balloon Colonoscopy (DBC)

InterQuartile Range (IQR)

ACKNOWLEDGEMENT

Conflict of Interest

The authors declare no conflict of interest

Support Resources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Declaration

The study was approved by S.B.Ü. İstanbul Education Research Hospital Clinical Research Ethics Committee, 07/02/2020, no:2161.

Authorship Contributions

Concept: SS, RA, Design: RA, SS Supervising: RA, Financing and equipment: RA, SS Data collection and entry: RA, SS, Analysis and interpretation: RA, SS, Literature search: RA, SS Writing: RA Critical review: RA, SS

Thanks

We would like to acknowledge the www.makaletercume.com for their outstanding scientific proofreading and editing services that were provided for this manuscript.

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