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SUCCESS RATE OF COLONOSCOPIES AND REASONS THAT PREVENT PROCEDURE COMPLETION - RETROSPECTIVE STUDY

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Abstract

Background*. Colonoscopy is a common performed procedure in Gastroenterology, and it's widely used for diagnosis, treatment and surveillance of a wide range of conditions and symptoms. Properly performed, it's generally safe, more accurate than a virtual colonoscopy and well-tolerated by patients. The completion of a colonoscopy is defined by cecal intubation with the visualization of colonic mucosa and distal terminal ileum when it's possible.*

Patients and methods. *We reviewed retrospectively all consecutive endoscopies database of the lower digestive tract, done over a period from 2014-2017 in our clinic. The recommended completion based on the latest guidelines ranges from 90-95% completion rate according to the indication.*

Results. *11214 consecutive colonoscopies were done. Overall cecal intubation was successful in 9456 procedures (87.3%). If we exclude the interventional procedures (414 procedures), where cecal intubation was not necessary, the main reasons of non-intubation were due to intolerance of the patients (388 patients), followed on the second place by patients with obstructive cancer (299 patients). The presence of diverticulosis, poor preparation for colonoscopy and post-surgical adhesions were significant findings in non-successful procedures.*

Conclusions. *In normal daily practice, colonoscopy is completed in 88.01% of the procedures but we think that this result will stimulate the efforts to incorporate more quality measures and time in our endoscopy laboratory.*

Rezumat

Introducere. *Colonoscopia este o procedură obișnuită efectuată în gastroenterologie și este larg utilizată pentru diagnosticarea, tratamentul și supravegherea unei game largi de afecțiuni și simptome. Efectuată în mod corespunzător, este în general sigură, mai precisă decât o colonoscopie virtuală și bine tolerată de către pacienți. Finalizarea unei colonoscopii este definită prin intubarea cecului cu vizualizarea mucoasei colonului și a ileonului terminal distal când este posibil.*

Internal Medicine

Original papers

Pacienți și metodă. *Am examinat retrospectiv toate endoscopiile consecutive ale tractului digestiv inferior realizate în intervalul 2014-2017 în clinica noastră. Efectuarea investigației complete recomandată pe baza celor mai recente ghiduri variază de la 90-95%, în funcție de indicație.*

Rezultate. *Au fost realizate 11214 colonoscopii consecutive. Per ansamblu, intubarea cecului s-a realizat la 9456 de proceduri (87,3%). Dacă excludem procedurile intervenționale (414 proceduri), unde nu a fost necesară intubarea cecului, principalele cause care nu au permis finalizarea procedurii au fost intoleranța pacienților (388 pacienți), urmată de depistarea unui cancer obstructiv (299 de pacienți). Prezența diverticulozei, pregătirea inadecvată pentru colonoscopie și aderențele post-chirurgicale au fost constatări semnificative în procedurile nefinalizate.*

Concluzii. *În practica normală zilnică, colonoscopia este finalizată în 88,01% dintre proceduri, dar credem că acest rezultat va stimula eforturile de a adopta mai multe măsuri pentru creșterea calității în laboratorul nostru de endoscopie.*

Introduction

Colonoscopy was invented in Japan at the end of the 1950s and from there on it remained the gold standard of identification of colon pathologies, especially in detection of colorectal cancer and its precursors. Beside these, the procedure itself allows us to perform therapeutic maneuvers such as polypectomies, prosthesis or dilatation of colon stenoses, and the possibility to perform biopsies for the subsequent histopathology examination[1]. As the time went by, the procedure itself changed due to the development of new mechanic technologies (Cap-fitted colonoscopy, Endocuff, Endorings) and optic technologies (NBI/FICE/iScan), which had a major impact on the detection and treatment of colon polyps and colorectal adenomas[2,3]. However to be considered a gold standard the procedure should observe firstly the safety of the patient, and secondly the quality criteria in colonoscopy: the detection rate of adenomas, the rate of cecal and terminal ileal intubation, the withdrawal time, the colon preparation (Boston scale)[4,5]. The procedure can be influenced by many factors such as patient gender[6,7], age[6,8], associated pathologies - diverticulosis[9], difficulty and

Colonoscopies	Year					Total
		2014	2015	2016	2017	
Complete	YES (%)	2410	2732	2548	1766	9456
Incomplete	NO (%)	576	490	360	332	1758
	Total	2986	3222	2908	2098	11214

Table 1. *Number of incomplete colonoscopies during the period of 4 years*

Age	Number	Percentage
18 - 29 years	70	4.0
30 - 49 years	329	18.7
50 - 69 years	850	48.4
70 - 89 years	502	28.6
90 - 100 years	7	.4
Total	1758	100.0

Table 2. *Distribution of patients by age*

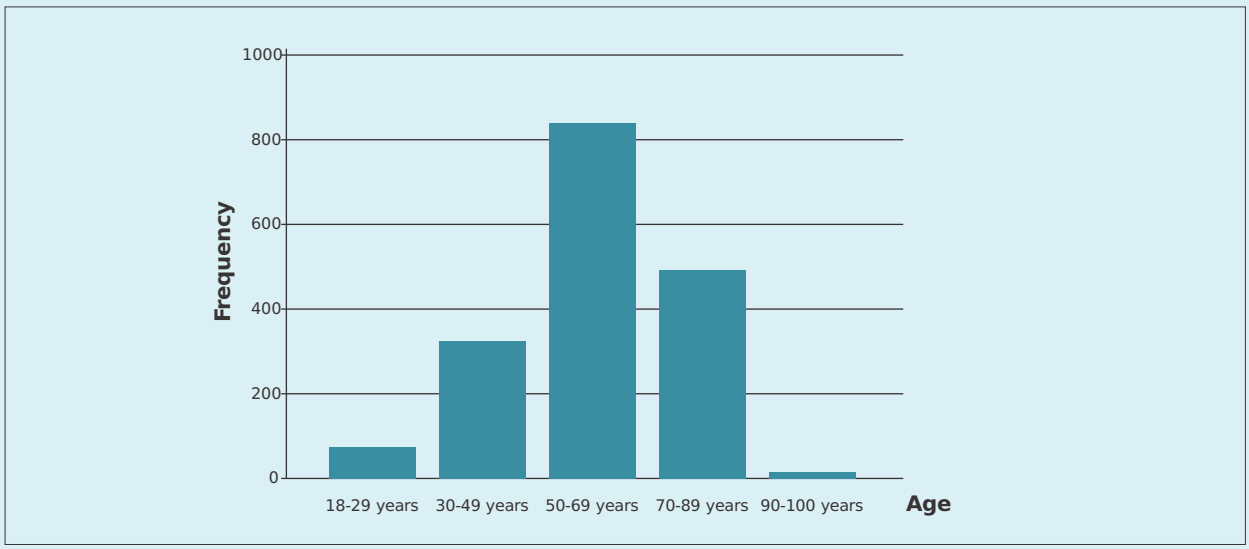

Figure 1. *Distribution of patients by age*

complexity of the procedure,[8] and, last bot not least, the type of the device that is used[10]. The purpose of the study was to discover the reasons for which the cecal intubation was not possible in patients from the Gastroenterology Clinic of the "Dr. Carol Davila" Central Universitary Emergency Military Hospital in the interval of the years 2014 - 2017.

Methods

It was performed a retrospective analysis on all the incomplete colonoscopies performed in the endoscopy laboratory of our clinic, in the time period 1 January, 2014 - 16 August, 2017, using both registries from the endoscopy laboratory and those from the hospital archive. All colonoscopies were included, including therapeutic ones and those performed in emergency. For this study, the result of each incomplete procedure, meaning non-visualization of the cecum together with the ileocecal valve, was noted separately in a Microsoft Excel document. Procedures were performed by both senior specialist and specialist physicians, and resident physicians in the specialty of gastroenterology. On the entire duration of the procedures, they were accompanied by specialized healthcare personnel (nurses with competences in digestive endoscopy). Colonoscopies were performed on 3 types of devices: Olympus Exera III, Olympus Exera II clv-180, and Pentax. Patients performed the preparation with Fortrans 4 sachets, 24 hours before the procedure, and the periprocedural sedation was performed with Midazolam intravenously only in case of necessity. The procedures were declared inconclusive only when patients had inadequate preparation or when the cecum was not visualized in its entirety. During the procedure all patients were monitored - HR and oxygen saturation.

Results

A number of 11216 colonoscopies were performed during the approximately 4 years. The age of the patients included in the study had varied between 18 and 95 years, with an average of 60.2 years, and a distribution by gender of 857 men - 48.7% and 901 women- 51.3 %, $P < 0.001$.

Taking into consideration that in our center most procedures have screening as an indication, most patients in whom the procedure was not completed were aged between 50-70 years (48.4%), followed by the range 70-90 years (28.6%), 30-50 (18.7%), and the smallest part was represented by those between 18-30 years (4%) ($P < 0.001$)

All the performed procedures were analyzed in a single table, regardless if a patient had

Title	Number	Percentage
Senior specialist physician	1160	66.0
Specialist physician	356	20.3
Resident physician	242	13.8
Total	1758	100.0

Table 3. *Distribution of the performed procedures by the professional degree of the physician*

	Number	Percentage
Intolerance of the patients	388	22.1
Loops / Difficult anatomy	265	15.1
Malignant stenoses	299	17.0
Inflammatory diseases (acute episode)	2	0.1
Diverticulosis	119	6.8
Insufficient preparation	271	15.4
Polypectomies (for which insertion until cecum was not necessary)	414	23.5
Total	1758	100.0

Table 4. *Reasons for incomplete colonoscopies*

one or more colonoscopies, and the patients - regardless of the type of admission (ambulatory or hospitalization) - received the same indication for preparation from the treating physician.

Besides gender and age, we have taken into consideration also the experience of the gastroenterologist physician, as in our clinic there are both senior specialist physicians and specialist physicians, and resident physicians. Resident physicians are allowed to perform screening procedures under careful supervision of the instructing physician (a senior specialist physician).

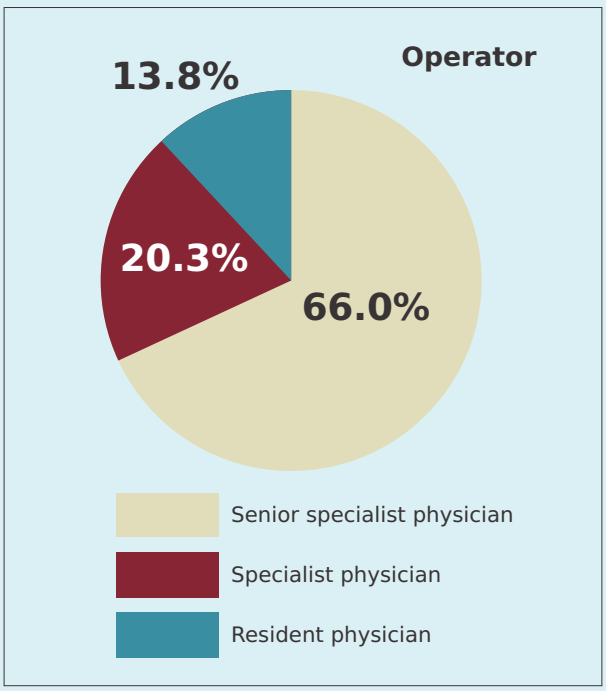

Figure 2. *Distribution of the performed procedures by the professional degree of the physician*

From the total of 11216 colonoscopies, 9456 were complete, and the remaining 1758 were incomplete, without visualization of the cecum. If we exclude the cases with inadequate preparation, with Boston scale <5 (271 patients) and the interventional procedures in which the reaching of the cecum was not necessary (414 patients), the percentage of complete colonoscopies in our clinic is 89.8%

The most common reasons leading to non-completing of the procedures were: on the first place the intolerance of the patients; on the second place circumferential stenoses due to proliferative masses of the colon discovered during colonoscopies, which did not allow the endoscopist to advance (risk of perforation and bleeding); on the third place the loops formed during the procedure (alpha or sigma-type) together with the difficult anatomy (post-surgery especially in women or obese people), colonic diverticulosis, and inflammatory diseases, together with insufficient preparation (Table 3).

In Table 4 we have described the insertion site by the associated pathology, and the majority of incomplete colonoscopies had an insertion rate until the hepatic angle

A higher frequency of the diverticulitis pathology in the left colon can be noted (particularly in the descending colon and sigmoid colon), and also a higher detection rate of malignant stenosing masses in the

	INSERTION						Total
	Rectum	Sigmoid colon	Descending colon	Transverse colon	Hepatic angle	Ascending colon	
Intolerance	6.1%	14.3%	26.3%	22.8%	28.9%	19.5%	22.1%
Loops	1.5%	15.9%	14.6%	14.4%	20.9%	11.7%	15.1%
Malignant stenoses	55.3%	29.9%	12.8%	8.6%	6.5%	15.6%	17.0%
Inflammatory diseases (acute episode)				0.5%			0.1%
Diverticulosis		16.5%	7.7%	3.7%	3.1%	5.2%	6.8%
Insufficient preparation	36.4%	13.7%	9.7%	13.9%	15.2%	28.6%	15.4%
Polypectomy	0.8%	9.8%	28.8%	36.1%	25.3%	19.5%	23.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5. *The maximum insertion point in case of incomplete colonoscopies*

same region (rectum, rectosigmoid junction (RSJ), and sigmoid colon), but the therapeutic procedures, especially polypectomies, were performed in a higher percentage in the right colon.

Discussions

In general practice many factors are involved in completing a colonoscopy, starting from a sufficient preparation, tolerance of the patient, experience of the endoscopist, and sometimes also sedation. Complete colonoscopy is essential, especially when the indication is the follow-up of a patient with high-risk adenomatous polyps (high-grade dysplasia). Studies published to date describe a rate of reaching the cecum between 55% and 90% in developed centers with experienced endoscopists[11,12,20].

Several demographic factors were analyzed related to incomplete procedures, such as age, gender, experience of the endoscopist, discomfort of the patient, and also tolerance and preparation for the procedure, reflected on the Boston scale[7,10].

Regarding frequency by gender, in our study it was noted that the number of incomplete

colonoscopies was higher in women than in men, with 51.3% compared to 48.7%, P<0.001. This difference can be explained mostly by anatomical differences, particularly in women who suffered abdominal-pelvic surgeries, especially hysterectomies and other gynecologic surgeries[13,14]. Studies have shown that, in addition to surgical history most common in women, these have generally a longer and more lax colon, that could explain the lower rates of cecal intubation reported to those recorded in men[15].

We have noted that advanced age was associated with a decreased rate of reaching the cecum. This can be caused my many factors such as cardiopulmonary co-morbidities, decreased motility, pelvic adhesions, and higher risk of complications.

A cecal intubation of over 90% of the cases depends on many factors, including the type and the compliance of the patient to pain, the type of the sedation, the preparation (Boston scale), and the experience of the endoscopist. A large part of incomplete colonoscopies in our clinic were caused by the intolerance of patients to the procedure, even if they were sedated with Midazolam. In some studies it is recommended not to use sedation, and sedation to be used only in case that the patients requests this.[16] Another study reported a percentage of 84.2% complete colonoscopies that were performed via sedation of the patient compared to a percentage of 76.1% in the absence of sedation[17].

A quite large number of patients presented themselves for the procedure having an insufficient preparation, Boston scale between 4 and 6, and this led to a number of 271 non-completed procedures. An improvement of the preparation for colonoscopy would surely lead to a higher number of successful procedures; for now there are no significant differences between preparation regimens recommended to the patients, although some patients tolerate more poorly preparations based on polyethylene glycol. In some cases, in groups of patients over the age of 50 years, it was noted that the administration of the preparation for colonoscopy in the hospital had better results during the procedure[18,19].

We think that this study will have a positive effect on our clinic, and it will allow the future implementation of new measures to improve the quality of endoscopy and to increase the percentage of complete procedures.

Conclusions

The rates of reaching the cecum in our center are under the current European requirements, but by improving the preparation of the patient for colonoscopy we will significantly improve these rates in the future.

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