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IMPACT OF ANATOMIC FACTORS AND PRIOR ABDOMINAL OR PELVIC SURGERY ON COLONOSCOPY OUTCOMES

R.A. MATEESCU[1*] R. CĂLIN[1] M. JINGA[1]
F. IONIȚĂ-RADU[1] S. BUCURICA[1]

Abstract:

OBJECTIVE: To evaluate the anatomic factors and the impact of previous abdomino-pelvic surgeries on incomplete lower gastrointestinal endoscopies in Central Universitary Emergency Military Hospital from Bucharest, between 2015-2019.

BACKGROUND: Some studies has shown that colonoscopies are more challenging and request more time and patience, when are performed on patients with a surgical history. We conclude that the anatomic structures from abdomen and pelvis suffer some changes like scars and adhesions after major surgeries.

METHODS: We study the cecal intubation rate on a total of 788 colonoscopies on patients with intact or previous surgery on the colon.

RESULTS: Our study include 2 groups, one with complete procedures (cecal intubation), and one with incomplete procedures and we found differences, regarding - female sex (232 men and 206 women vs 93 men and 257 women; p<0,001), age > 60 years old , a history of prior abdominal or pelvic surgery (total hysterectomy, anexectomy, and post-colon adenocarcinoma resections; p<0,001), patients who were at the first colonoscopy vs patients at check-up; p<0,001, rectal and sigmoidian loops formation. No statistical relevance was observed regarding the operator (senior specialist vs specialist physician, p<0,005), and there was no correlation between the patient's BMI (body mass index) vs cecal intubation; p=0,587.

CONCLUSION: We found that some factors and pathologies had an impact on incomplete colonoscopies. The most important ones are the loops formations, colonic diverticulosis, and the patient surgical history who disturbed the normal anatomy and made the colonoscopy more difficult

Key words: *Difficult colonoscopy, endoscopy, quality, anatomy*

[1] Central Universitary Emergency Military Hospital Bucharest.
* corresponding author: mateescu.raul@gmail.com

1. Introduction

Nowadays, the frequency of the colorectal cancer in the general population it is high, and the only way to prevent this is the screening colonoscopy, sigmoidoscopy or computer tomography colonography [6]. The procedure helps the gastroenterologist to identify and resect premalignant lesions (colonic polyps) and early neoplasms. Also, it is used for surveillance in other pathologies of lower gastrointestinal tract, such as inflammatory bowel diseases (Crohn disease and Ulcerative Colitis) Colonoscopy it is useful in evaluation of weight loss, bloating, abdominal pain and to treat pathologies like fistulas, hemorrhoids and lower gastrointestinal bleeding [7, 8]. A complete colonoscopy with visualization of the cecum and rectum is essential to determine the presence of adenomas and for the screening programs worldwide.[10]. Worldwide the studies describe that incomplete colonoscopy occurs in approximately 10% of cases.

Incomplete procedure is defined as the incapacitation to reach the cecum, and it can be a result of the endoscopist's skills (formation of colonic loops), patient factors - such gender, age [2], BMI (body mass index), anatomic conformation of the colon, and surgical history including abdominal and pelvic surgeries resulting in adhesions and anatomic alterations [5], [8, 9]. A principal factor for incomplete procedures is the loops formation (especially alpha and gamma loops) of the colonoscope shaft especially in the proximal colon (recto-sigmoidal junction and sigmoid colon). This fact is due to excessive pushing of the instrument and not reducing when it is possible. It is described in literatures that loop formation is very often, in about 91 from 100 cases [1], [11], [13]. The inability of reducing the loops can result in a lot of pain that the patient feels, discomfort and if the doctor pushes too much, the risk of perforation and bleeding is extremely high [3], [18].

The study was performed to demonstrate how the abdominal and pelvic surgeries and anatomic factors are affecting the colonoscopies completion rates.

Table 1

Endoscopic procedures in the Endoscopy compartment of Central Universitary Emergency Military Hospital – Bucharest between 2015-2019

	Cecal intubation		
	No	Yes	Total
Male	91	234	325
Female	255	208	463
Total	350	438	788

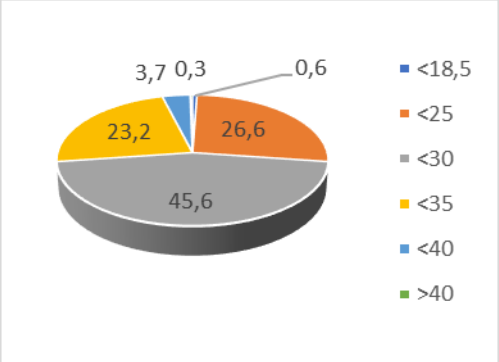

Fig. 1. *Distribution of BMI among the patients. BMI, body mass index.*

2. Materials and Methods

A retrospective analysis was carried out on 788 colonoscopies performed in the Endoscopy compartment of Central Universitary Emergency Military Hospital for 5 years between 2015-2019. All the

colonoscopies, except the therapeutic ones were included in the study. The results were analyzed and every patient had a background check with all the antecedents and previous surgeries noted separately. Procedures were performed by gastroenterology physicians, and on the entire duration of the procedures they were assisted by resident physicians with competence in digestive endoscopy. Colonoscopic examinations were done using a video colonoscope - Olympus Exera III and Olympus Optera CV-170. Bowel cleansing was accomplished by asking patients to ingest Moviprep or Fortrans 2 sachets, followed up by 2 pills of Dulcolax, 24 hours before the procedure, and 2 sachets 5 hours before the procedure followed by 2 pills of Dulcolax. At some patients, especially on women with prior pelvic surgeries, we used minimal sedation (Midazolam intravenously) for their comfort. During all the procedures, the patients were monitored with HR and oxygen saturation. Cecal intubation rates on this study were evaluated regarding following factors: sex, age, BMI (body mass index), a history of abdominal and pelvic surgery, rectal and sigmoid loops formations, diverticulosis (figure 1).

3. Results

All the procedures that were performed in the time mentioned, were not consecutive cases. We tried to select the cases: men and women with a history of abdominal or pelvic surgery, difficult anatomy, and for that reason the overall cecal completion rate was extremely low. Our patients' age was in interval of 20 and 89 years. In the current group the average age was 59,6 years, and we divided the population by gender: 325 men – 41,2% and 463 women –58,8%, P < 0.001. From the total of 788 patients, a number of 330 (42%) had a background of abdominal or pelvic surgical procedures. The overall adjusted completion rate with cecal and terminal ileon intubation was 234 men (29.69%) and 208 women (26.39%), P < 0.001 (Table 1).

We analyzed all colonoscopies in an excel table, even if a patient had one or more previous colonoscopies and if the patient was hospitalized or ambulatory.

We have a large clinic where we take care of patients from all over the country, and for that we also analyzed the patients who were not at their first colonoscopy, and we had 584 patients at their first procedure, and 1 patient at the sixth colonoscopy. We noticed, in most cases an increase of the cecal intubation rate, maybe due to the patients understanding of the procedure, and the confidence of the physician because they already knew the pathology, P < 0.001 (table 2).

Table 2

Number of the previous colonoscopies on patients

Procedure number	Total procedures	Complete procedures	Total
1	584	296	50.68%
2	107	78	72.89%
3	73	54	73,97%
4	17	9	52.94%
5	6	4	66.66%
6	1	1	100%
Total	788	442	56.09%

Besides age, gender, number of previous colonoscopies we took in consideration also the experience of the doctors. The procedures were done by a senior specialist and a specialist physician. We tried to correlate the patient's medical history and specialist degree, but we had a

weak correlation regarding cecal intubation, P < 0.005 (figure 2).

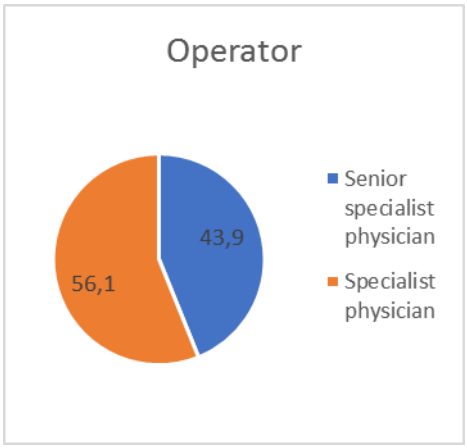

Fig. 2. *Colonoscopies distribution by specialist degree*

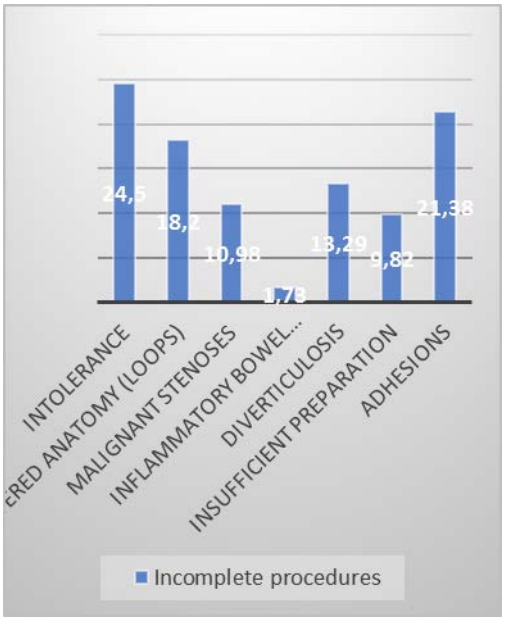

Fig. 3. *Reasons for incomplete procedures*

Prior abdominal or pelvic surgery was present in 330 (41.87%) patients. If we exclude the cases with inadequate preparation , with the Boston scale < 5 (6 patients), the most frequent surgeries were cholecystectomy in 62 (18.78%), P < 0.001, appendectomy in 61 (18.48%), right colectomy in 36 (10.9%), P < 0.001, hysterectomy in 31 (9.39%), P < 0.001, left colectomy in 24 (7.27%), P < 0.001 patients. For a complete colonoscopy, a good bowel preparation it is a must. Some studies from the western countries describes a rate which varies from 20 to 70% of patients with inadequate bowel cleansing, and this result in incomplete procedures [7]. A higher frequency of post-surgical adhesions was noted by the examiners especially post hysterectomy, cholecystectomy, and left colectomy. This fact leads to the failure to intubate the cecum and, in some cases the endoscopists documented more than one reason for a patient in their report.

The most frequent reasons were adhesions (n = 172), loop formation (alpha in the sigmoid colon and sigma on the transvers colon) because of the altered anatomy, including a much stronger pain felt by the patient, and finally the intolerance to the procedure. Some combination is also possible with complicated diverticulosis (n = 18), fixation and angulation of the colonoscope shaft (n = 37), occlusive mass (n = 8) which did not allow the endoscopist to advance (very high risk of perforation and bleeding) (figure 3).

We described the insertion sites regarding to prior abdominal or pelvic surgery, and the most common cases of incomplete colonoscopies were until the sigmoid colon and recto-sigmoid junction insertion. The most frequent procedure that had an impact of insertion was cholecystectomy (10 patients), followed by hysterectomy (7 patients) P < 0.001. Moreover, the diverticulosis which is much more frequent in the proximal colon

(particularly at the rectosigmoidian junction and sigmoid colon) and the increasing rate of malignant stenosis masses which are found in the same region are influencing the cecum insertion. The most common proximal segments intubated were the sigmoid (n = 48) and descending (n = 45) colon, followed by the splenic flexure (n=37) and recto-sigmoidian junction (n=25).

4. Discussions

Colonoscopy is the most significant and relevant procedure for most colonic diseases, although in some cases it is limited by the endoscopist's experience and technical proficiency [14]. An incomplete procedure can result in missing important pathology inclusive cancer in early stages, and, furthermore, a complete colonoscopy is essential in the follow-up of patients with colonic polyps (high – grade dysplasia) and inflammatory bowel disease [4], [14].

Our results show that the completion rate of cecal intubation was influenced by the local anatomy and post-surgical procedures of the patients (hysterectomy, cholecystectomy). Regarding the complete colonoscopy by gender, our study concludes that the number of incomplete procedures was 28 % in men and 51,07% in women., $P < 0.001$. Women with a history of pelvic surgery are more likely to undergo incomplete colonoscopy [2]. Some studies from literature describe the anatomic differences between male and female pelvis, which is deeper and more rounded. For that the colonoscopy is much more complicated and challenging especially in patients with hysterectomy, because of a more fixed and angulated proximal sigmoid colon [2], [15].

Other studies conclude that the female colon is much longer than in men and, because of that, the colonoscopy is much more technically difficult in women. We did not investigate the length of the colon [12]. However, in this study, the most common surgical procedure with impact over the colonoscopies was cholecystectomy followed by hysterectomy. Besides that, it was also noted that patients with diverticulosis had more chances for an incomplete colonoscopy, but this fact has also been shown by others [4]. We have a lot of patients that had an incomplete colonoscopy due to intolerance and the abdominal pain during the procedures, even that we used a superficial sedation. The guidelines recommend not to use sedation to every patient, but only in cases of necessity or if the patient requests this [16].

5. Conclusions

As we mentioned above, we found several anatomic structures that correlates with the patient surgical history and which have a major impact on the cecum intubation. These findings include diverticulosis, formation the loops (alpha, sigma) in the proximal colon due to post-surgical adhesions. We have several limitations in our study, such as the endoscopist's training level and the number of previous colonoscopies and techniques used; the follow up on the patients with incomplete procedures that we guided them to perform a CT colonoscopy or a CT abdomino-pelvin scan. The results may tell us the reasons why we failed to complete the colonoscopies.

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