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Colonoscopy complications: experience with 8968 consecutive patients in a single institution.

Complicações em colonoscopia: experiência uni-institucional com 8968 pacientes.

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A B S T R A C T

Objective: to evaluate the incidence, epidemiological characteristics, diagnosis and evolution of patients who returned to the emergency care units of the Albert Einstein Hospital in São Paulo/SP with signs and symptoms suggestive of colonoscopy complications up to 30 days after the procedure. **Methods:** we conducted a retrospective, uni-institutional study of patients submitted to colonoscopy in 2014 who returned to the Emergency department (ED) within 30 days after the procedure. **Results:** 8968 patients underwent colonoscopies, 95 (1.06%) of whom had complaints related to possible complications. Most of the procedures were elective ones. Minor complications (nonspecific abdominal pain/distension) were frequent (0.49%) and most of the patients were discharged after consultation at the ED. Severe complications were less frequent: perforation (0.033%), lower gastrointestinal bleeding (0.044%), and intestinal obstruction (0.044%). ED consultations in less than 24 hours after the procedure was associated with a higher index of normal colonoscopies (p=0.006), more diagnosis of fever (p=0.0003) and dyspeptic syndrome (p=0.043), and less diagnosis of colitis/ileitis (p=0.015). The observation of fever in patients treated at the ED was associated with the diagnosis of polyps at colonoscopy (p=0.030). **Conclusion:** the data corroborate the safety of the colonoscopy exam and points to a reduction in major complications rates.

Keywords: Colonoscopy. Fever. Abdominal Pain. Emergency Medical Services.

INTRODUCTION

Colonoscopy is a diagnostic and therapeutic tool that allows examination and treatment of the rectum, colon, and distal ileum. It is safe and effective to reduce colorectal cancer mortality[1,2], and is recognized as the gold standard for screening this disease. However, even when performed under ideal conditions, complications may occur. These complications can vary from mild discomfort and pain to death. Mortality rates range from 0.006% to 0.5%[1,3-5], and are consequence of major complications such as perforation and hemorrhage, especially in patients with severe comorbidities.

The complications of colonoscopy cover a wide spectrum of situations, including the clinical conditions of the patient, medication use, conditions of the equipment and of the exam environment, training of the endoscopist and type of procedure performed. Such complications may be due to intestinal preparation, perforation, bleeding, mesentery lesion, extracolic organ lesions, cardiovascular complications and infection.

Mild complications are more frequent, and often lead patients to seek the emergency department (ED) usually with complaints of abdominal pain/distension, flatulence, nausea and intestinal bleeding without hemodynamic repercussion[6]. The risk of severe complications is low, ranging from 0.079% to 0.84%[7-9]. Intestinal bleeding is the most frequent serious complication, usually in patients undergoing procedures such as polypectomy, endoscopic resection and biopsies[2], but it is often self-limited, with no need for medical intervention.

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The risk of infection is mainly related to the occurrence of bacteremia due to the translocation of microorganisms from the intestinal lumen to the bloodstream. Previous studies have shown that the risk of bacteremia during colonoscopy is low (2% to 4%)[10] and that the risk of infection from bacteremia is even lower.

Colon perforation during colonoscopy may be related to polypectomy (thermal lesion), in addition to other causes such as direct trauma to the organ wall, barotrauma, biopsies, lateral laceration by loop pressure, tumor fracture or post-polypectomy[11,12].

The most common cause of bleeding during or after colonoscopy is polypectomy, which is observed in 1.2% of patients, and is divided into immediate and late bleeding[5]. Immediate bleeding can be considered as part of the polypectomy. Intraluminal bleeding is practically non-existent in diagnostic colonoscopies without biopsies[12]. Late bleeding usually occurs within the first 14 days after polypectomy, but there are reports of up to 29 days after the procedure[13].

Colonoscopy has shown great development in the last decades, becoming a widely available screening tool for colorectal cancer and, in many cases, also therapeutic. Considering the more universal use of colonoscopy in recent years, as well as increasing procedures, both in absolute number and in complexity, it is questioned whether this could lead to an increase in complication rates, on which there is no evaluation through studies in the emergency care scenario.

The objective of this study was to evaluate the incidence, epidemiological characteristics, clinical presentation and evolution of the patients who returned to the emergency care units with signs or symptoms indicating complications of colonoscopy up to 30 days after the procedure.

METHODS

After approval by the Ethics in Research Committee of the Albert Eisntein Hospital (protocol number 1,377,722), we carried out a retrospective, uni-institutional study, by evaluating the medical records of all the patients who underwent colonoscopy at the institution in the year 2014. We selected those who returned to the Emergency department (ED) within 30 days of the procedure with diagnosis or signs/symptoms that indicated colonoscopy complications, such as fever, chills, dehydration, abdominal pain/distension, constipation and bleeding. We excluded patients who returned to the ED with non-colonoscopy-related complaints.

Medical records of all included patients were reviewed and demographics were documented. Colonoscopic findings and procedures were registered. The adequacy of bowel preparation was also recorded. Data from ED consultation were recorded: diagnosis, time to presentation in the ED and patient destination. In order to perform association analysis, study population was divided in groups according to: time to presentation in the ED (less than 24h x more than 24h), diagnosis of fever and patient destination (discharge x hospital admission).

We described categorical variables by absolute frequencies and percentages, and the numerical ones by mean and standard deviation (SD) or median and quartiles (first and third quartiles), in addition to minimum and maximum values. We assessed the association between categorical variables with the Pearson's Chi-Square test or the Fisher's exact test, when appropriate. In the comparison between groups of interest regarding numerical variables, we used the Student's t-test or the non-parametric Mann-Whitney test if the variable had an asymmetric distribution observed in the histograms. We performed the analyzis using the SPSS program, considering a significance level of 5%.

RESULTS

During 2014, 8968 patients underwent colonoscopy at our Institution. Of these, 578 (6.44%) returned to one of the EDs of the hospital within 30 days after the procedure with complaints unrelated to the procedure, and 95 patients (1.06%) returned to one of the ED's with complaints related to the procedure. We included these 95 patients in the study. Figure 1 shows the patient flowchart. Table 1 brings data from the colonoscopy reports.

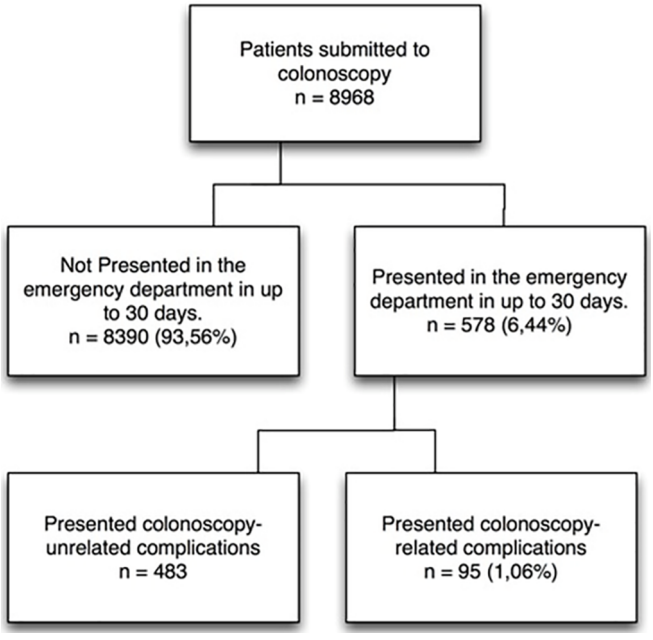

Figure 1. *Flowchart of the studied population.*

Table 1. *Data from colonoscopies.*

Characteristic	
Patients (n, %)	95 (100%)
Age (years) (mean±SD)	52±17
Gender (n, %)	
Male	39 (41.05%)
Female	56 (58.95%)
Colonoscopic findings (n, %)	
Normal	32 (33.68%)
Colitis/ileitis	10 (10.53%)
Colitis/ileitis + polyps	4 (4.21%)
Diverticular disease	9 (9.47%)
Diverticular disease + polyps	14 (14.74%)
Polyps	20 (21.05%)
Bowel cancer	4 (4.21%)
Inadequate bowel preparation	2 (2.11%)
Procedure (n, %)	
None	39 (41.05%)
Biopsy	15 (15.79%)
Argonium cauterization	1 (1.05%)
Decompression	1 (1.05%)
Polypectomy + biopsy	39 (41.05%)
Bowel preparation (n, %)	
Adequate	93 (97.89%)
Inadequate	2 (2.11%)
Exam setting (n, %)	
Elective	87 (91.58%)
Urgent	8 (8.42%)

There were three perforations diagnosed during or immediately after the procedure: two related to polypectomy and one caused by clip application in a cecal lesion. Considering the total number of procedures, the perforation rate was 0.033%. We did not include these three patients in the subsequent analysis. Table 2 shows the data referring to the ED visits. The two cases of acute appendicitis were diagnosed 14 and 19 days after the colonoscopy, respectively.

Four patients had a diagnosis of lower gastrointestinal bleeding, corresponding to 4.21% of complications and to 0.044% of colonoscopies. The mean age of these patients was 58.33 years (29-84) and the mean time of return to the ED was 13.6 days (5-27). Three patients with lower gastrointestinal bleeding were admitted. One had a previous diagnosis of diverticular disease, rectal ulcer and actinic proctitis after radiotherapy for prostatic neoplasia: during colonoscopy, argon plasma coagulation was performed. He returned to the ED 27 days after colonoscopy and bleeding was probably unrelated to the colonoscopy. The second patient had sigmoiditis and colon polyps:

polypectomies and biopsies were performed; the patient returned to the ED five days after the procedure. The third patient had diverticular disease and no procedure was performed during colonoscopy, returning to the ED nine days after the exam. The fourth patient presented slight anal bleeding due to an orificial disease and was discharged after ED consultation.

We compared patients who returned to the ED within 24 hours of the colonoscopy with patients who returned to the ED more than 24 hours after colonoscopy. The return in less than 24 hours had a greater association with normal colonoscopies (p=0.006) and less colitis/ileitis (p=0.015). Fever (p=0.0003) and dyspeptic syndrome (p=0.043) were also more prevalent among patients who returned in less than 24 hours. The other characteristics studied did not show significant differences between the two groups.

We also compared patients with and without fever in the ED. This signal was associated with the finding of polyps at the colonoscopy (p=0.03). The other characteristics studied did not show significant differences between the two groups.

Finally, we compared patients who were hospitalized with those who were discharged. Hospital admission was associated with acute appendicitis (p=0.034), colitis (p=0.001), lower gastrointestinal bleeding (p=0.021) and intestinal obstruction (p=0.001). ED's discharges

Table 2. *Data from Emergency department visits.*

Characteristic	
Patients (n, %)	95 (100%)
Emergency room diagnosis (n, %)	
Appendicitis	2 (2.11%)
Dehydration	6 (6.32%)
Diverticulitis	5 (5.26%)
Abdominal pain/distension	44 (46.32%)
Anal pain	1 (1.05%)
Fever	20 (21.05%)
Colitis	4 (4.21%)
Lower gastrointestinal bleeding	4 (4.21%)
Dyspeptic syndrome	5 (5.26%)
Intestinal obstruction	4 (4.21%)
Time from colonoscopy to ER visit (n, %)	
More than 24 hours	63 (66.32%)
Less than 24 hours	32 (33.68%)
Fever (n, %)	
No	75 (78.95%)
Yes	20 (21.05%)
Destination (n, %)	
Discharge	77 (81.05%)
Admission	18 (18.95%)

were associated with a diagnosis of nonspecific abdominal pain/distension (p=0.001). The studied characteristics did not show differences between the groups.

DISCUSSION

The present study main findings were: the rate of colonoscopy-related complications that presented in the ED in up to 30 days after the procedure was 1.06%. Most procedures were performed electively with adequate bowel preparation. Previous studies have evaluated only specific colonoscopy complications, while the present one evaluated all possible complications, from emergency situations to mild complaints that did not result in hospital admission. However, immediate adverse events related to the procedure and to the preparation/sedation were not directly measured, except for the early perforation rate.

Mild complications, such as nonspecific abdominal pain/distension, were frequent (0.49% of all patients and 46.32% of the population studied), and most cases were discharged after ED consultation. Severe complications were less frequently observed: perforation (0.033%), lower gastrointestinal bleeding (0.044% of all patients and 4.21% of the study population) and intestinal obstruction (0.044% of all patients and 4.21% of the studied population). Virtually all of these patients were hospitalized after the ED visit.

In the present study, the rate of patients seeking the ED for colonoscopy-related complications was 1.06%, which is similar to the result reported in the literature. Prospective cohorts report a rate of 1% of healthcare service demand for new symptoms after colonoscopy[1,6] and a rate of 1.7% of healthcare use within 30 days of the procedure[14]. Also according to the literature, the search for the ED after colonoscopy in our population was higher among women (58.95%).

Severe complications are uncommon after colonoscopy. In a prospective study, Ko *et al*.[6] demonstrated that the incidence of such complications directly related to colonoscopy was 2.01/1000 exams (95% CI: 1.46-2.71). In a systematic review, the prevalence of perforation was 0.5/1000 (95% CI: 0.4-0.7), bleeding of 2.6/1000 (95% CI: 1.7-3.7) and death, 2.9/1000 (95% CI: 1.1-5.5)[1]. In our study, three perforations were diagnosed during the exam (0.033%) and there was no procedure-related mortality up to 30 days after the procedure. Such results points to a reduction in major complications rates, which can be result from the technological improvements of modern colonoscopy devices and the greater experience of professionals involved, currently with more specific and specialized training to perform this procedure.

We should also note that the vast majority of procedures were elective (91.58%) and with adequate colon preparation (97.89%). Another factor that may have contributed to the low rate of serious complications was the mean age of the studied population (51.9 years). The incidence of complications tends to be higher in older age groups[2,15]. On the other hand, other studies suggest that age is not an independent risk factor for complications and that the incidence of complications correlates with the presence of comorbidities[16].

Other reports identify polypectomy as an independent risk factor for serious complications[2,15,17,18]. In our study, in contrast, polypectomy was performed frequently (41.05%), without affecting the risk of hemorrhage or perforation. The reasons for the low incidence of bleeding after polypectomy deserve better evaluation considering the procedure data, such as the technique employed and the experience of the professionals involved.

As described in the literature, mild complications were more common, and most of the symptoms presented by the patients were mild and self-limiting[1,19,20]. Up to one-third of patients may report mild and transient symptoms after colonoscopy[15,20]. Nonspecific abdominal pain and distension are the most frequently reported minor complications[1,14,19]. In the present study, these complications represented 46.32% of the diagnoses in the ED.

Acute appendicitis following colonoscopy is a rare complication with a reported incidence of 0.038%[21]. It may be caused by over insufflation, preexisisting subclinical appendicitis or fecalith in the appendix[22], generally described in up to ten days after procedure. In our study there were two cases of acute appendicitis after the first ten days. These cases are probably not related to colonoscopy due to the long interval of occurrence.

Time association between colonoscopy and the ED consultation was an important factor in the study: 33.68% of the patients visited the ED within 24 hours after the procedure. Literature data show that most complications occur up to seven days after the procedure and that the incidence of minor complications is greater in the first 48 hours. Complications become less frequent after 14 days[16,19]. The data of the present study are in agreement with these findings.

There was also a higher incidence of fever among the patients who sought the ED early (43.75%) compared with those who did it later (9.53%). This fact can be explained by transient bacteremia and the release of inflammatory mediators caused by the procedure[10,11]. This finding, however, may not have a relevant clinical impact, since there was no difference in hospital admission rates. This was associated with the diagnosis of appendicitis, lower gastrointestinal bleeding, intestinal obstruction and colitis, as would be expected in these more severe complications. Patients diagnosed with nonspecific pain and abdominal distension were mainly discharged after evaluation in the ED.

The present study also compared patients that presented in the ED without fever with those presenting with fever. In these two groups, there were no significant differences in age and no differences were observed regarding the procedures performed, such as biopsy or polypectomy, although there was a correlation between the colonoscopic finding of a polyp and the diagnosis of fever in the ED. Considering that polypectomy may use diathermy and burn the colonic wall, there is a risk of perforation or greater bacterial translocation and fever. In this setting, we tried to correlate presence of fever with polypectomy, but this hypothesis was not confirmed. There was a tendency of patients who underwent polypectomy to present more fever (55% vs 37.33%) but without statistical significance. The presence or absence of fever also did not correlate with hospital admission or discharge, as might be supposed. These findings suggest that the presence of fever after colonoscopy (excluding more evident complications such as sepsis or perforation) is not an independent factor for decision making regarding the ED's conduct or patient's destination (hospitalization vs. discharge)[9,10].

This study corroborates the general evidence that colonoscopy is a safe procedure and points to a reduction in major complications rates.

R E S U M O

Objetivo: *avaliar a incidência, características epidemiológicas, diagnóstico e evolução dos pacientes que retornaram às unidades de pronto atendimento (UPA) do Hospital Albert Einstein em São Paulo/SP com sinais e sintomas sugestivos de complicações até 30 dias após realização de colonoscopia.* **Métodos:** *estudo retrospectivo uni-institucional de pacientes submetidos à colonoscopia em 2014 e que retornaram, em até 30 dias após o procedimento, a uma UPA.* **Resultados:** *foram realizadas colonoscopias em 8968 pacientes, dos quais 95 (1,06%) tiveram queixa relacionada à possível complicação. A maioria dos procedimentos foi realizada eletivamente. Complicações menores (dor abdominal inespecífica/ distensão) foram frequentes (0,49%) e a maioria dos pacientes recebeu alta após consulta na UPA. Complicações graves foram menos frequentes: perfuração (0,033%), hemorragia digestiva baixa (0,044%) e obstrução intestinal (0,044%). A procura à UPA em menos de 24 horas após o procedimento associou-se a maior índice de colonoscopias normais (P=0,006), mais diagnóstico de febre (P=0,0003) e síndrome dispéptica (P=0,043) e menos diagnóstico de colite/ileíte (P=0,015). A presença de febre em pacientes atendidos na UPA associou-se ao diagnóstico de pólipos na colonoscopia (P=0,030).* **Conclusão:** *os dados do presente estudo corroboram as evidências de segurança do exame de colonoscopia e apontam para redução nos índices de complicações mais graves deste exame.*

Descritores: *Colonoscopia. Febre. Dor Abdominal. Serviços Médicos de Emergência.*

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