Original Article

Correlation between location, size and histologic type of colorectal polyps at the presence of dysplasia and adenocarcinoma

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ABSTRACT: Adenocarcinoma represents 96-98% of colorectal neoplasms, and neoplastic polyps (adenomas) are their precursors. The aim of this study is to correlate size, location and histologic type of colorectal polyps at the presence of dysplasia and adenocarcinoma. Methods: Colonoscopies from January/2007 to December/2008 were retrospectively studied, in order to evaluate the characteristics of the polyps. Results and Discussion: Out of the 2,401 analyzed colonoscopies, 583 (24.3%) presented polyps. Due to the lack of histopathologic data, 139 exams were excluded. Mean age of the patients was 58±12 years, and 60% were females. Polyps were prevalent in the left colon (38.5%) and rectum (32.5%). Out of the 850 polyps which were histologically examined, 55.17% were tubular adenomas; 21.88%, hyperplastic; 17.05%, serrated; 5.4%, tubulovillous; and 0.47%, villous. As to polyps ≤1.0 cm, dysplasia was observed in 16.0% and adenocarcinoma in 1.9%. Those >1.0 cm, 72.0% (p<0.001) presented dysplasia, and 25.3% (p<0.001) presented adenocarcinoma. Polyps in the right and transverse colon were strongly associated with dysplasia (17.8% and 16.7%). Adenocarcinomas were prevalent in the left colon (2.5%) and rectum (2.1%). Conclusion: Polyps were more frequent in the left colon and rectum. The right and transverse colons were strongly correlated with dysplasia. Those of the left colon and rectum were associated with adenocarcinoma. Lesions >1.0 cm were positively related to dysplasia and neoplasm.

Keywords: intestinal polyps; colorectal neoplasms; colonoscopy.

INTRODUCTION

Colorectal câncer (CRC) is among the most prevalent diseases in western and eastern countries, and its incidence has been increasing in the past decades[1-7]. In the United States and England, it is the second most common condition among all malignant diseases[8]. In Brazil, it is the fourth most frequent malignant neoplasm among men, and the third in women[7]. The incidence of this disease increases after the age of 50, however there are other factors to explain such as changes in diet and smoking[4,6,7].

Adenocarcinomas represent 96 to 98% of colorectal malignant tumors, and it is a known fact that neoplastic polyps (adenomas) are precursors to this type of cancer[9]. About 2/3 to 3/4 of colon polyps are adenomatous, with potential to become CRC – adenoma-carcinoma sequence[5,7]. Some high risk factors for cancer were identified from adenomas, such as the size of the polyp, histologic type and the presence of high grade dysplasia[10].

Since most patients with polyps are asymptomatic, tracking these lesions through fecal occult blood,

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rectosigmoidoscopy and colonoscopy enables the suspicion, detection and removal of the lesion[1,2,5,11]. Since 2000, colonoscopy has become the most important examination to track polyps and CRC. Nowadays, in the USA, one out of four colonoscopies aim to track polyps[10]. Besides detecting polyps, their removal through endoscopic polypectomy has proved to be effective to reduce the incidence of this tumor[2,5,12]. Anatomopathological analysis enables the histological classification of adenomas, and also allows checking for dysplasia or neoplasm, as well as vascular and/or lymphatic invasion[13]. This assessment determines if polypectomy and/or mucosectomy were effective to heal the patient who presented with polyp or CRC, or if therapeutics will be necessary[14].

The objective of this study was to correlate location, size and histologic type of colorectal polyps at the presence of high grade dysplasia and adenocarcinoma.

METHODS

A retrospective study was conducted with patients who were submitted to colonoscopy from January 2007 to December 2008 and presented with colorectal polyps, regardless of being referred to examination.

Colon preparation started 24 hours prior to the examination, and consisted of a free-fiber diet, ingestion of bisacodyl, 10% mannitol solution or polyethylene glycol and intestinal lavage with monobasic and dibasic sodium phosphate.

All patients had a pre-anesthesia appointment and were submitted to general anesthesia with propofol 2–3 mg/kg.

Two different scopes were used: *Olympus CLV E*, model *CF*, and the other was *Fujinon 2200*, model *EC250HL*.

All procedures were performed by one member of the endoscopy team; all of three had broad experience in this type of procedure and were registered by the Brazilian Society of Digestive Endoscopy and/or the Brazilian Society of Coloproctology.

When a colorectal polyp was found, the location of the lesion in the colon and/or rectum was identified by anatomical references. The right colon was defined as the segment between the appendicular ostium and/or the ileocecal valve until the shadow of the liver (hepatic flexure of the colon). Transverse colon was determined as the segment between the shadow of the liver and the spleen (splenic flexure of the colon). The left colon consisted of the segment between the splenic flexure and the rectosigmoid junction. Finally, the rectum was the segment distal to this junction.

The approximate size of the polyp was assessed by an open biopsy forceps, with 0.8 cm of diameter. Afterwards, polypectomy and/or mucosectomy were performed. Mucosectomy was chosen for flat or broad-based lesions, and the elevation of the lesion was maintained with the submucosal saline or 10% mannitol injection. For polyp resection diathermic devices with different shapes were used (oval, elliptic or hexagonal), with diameters ranging from 16 to 35 mm; the shape choice depends on the size of the polyp and the presence or absence of pedicle. For polyps measuring up to 0.5 cm, a hot-biopsy was occasionally performed. Two electrocauteries were used in the polypectomy, one WEM, HF 120, and one Medicir MBJII.

After being removed, the polyps were immerse in 10% formalin, separated by segment (right, transverse, left colon and rectum) and sent to the pathology department..

Adenoma was determined as a pre-malignant neoplasm with abnormal glandular epithelium and no stromal invasion. The identification of adenomas was based on structural and cytology modifications. They were classified as tubular, villous and tubulovillous adenomas, according to the presence of 0 to 25% of villous tissue for tubular adenoma ; 25 to 75% of villous lesions, as tubulovillous; and above 75%, as villous. Cellular atypia was defined as enlarged nucleus, chromatin dispersion and prominent nucleolus. The loss of polarity, stratification and atypical mitotic figures, coexisting with architecture changes, characterizes high grade dysplasia. Adenocarcinoma isan invasion of any degree in the stroma[13]. If the *muscularis mucosae* had been compromised, it was classified as submucousal adenocarcinoma; in this situation, vascular and/or lymphatic invasion was assessed.

Statistica v.8.0. software was used to analyze data and significance was reached if $p<0.05$.

RESULTS

From 2,401 videocolonoscopies, 583 (24.3%) had colorectal polyps. Out of these, 139 were excluded due to lack of histopathological data.

The mean age of the 444 analyzed patients was 58±12 years (26 to 90 years old), and (nº patients) 60% were females. The mean number of polyps was 2:54.1% presented only one polyp; 23.2% had two polyps; and 22.5% presented three or more polyps.

No statistical significance between the number of polyps and the age of the patient was found (p=0.350) (Figure 1). However, the chances of having more than one polyp are significantly higher for men than for women (p=0.020). 52.2% of the males had more than one polyp, compared to 42.0% of the females.

Polyps were more frequently located in the left colon (38.5%), followed by the rectum (32.5%), right colon (15.5%) and transverse colon (13.3%).

In relation to size, 60.7% measured less than 0.5 cm, 25.8% had 0.6 to 1.0 cm, and 13.4% measured more than 1.0 cm.

Out of the 882 polyps that were found, 32 could not be recovered during colonoscopy or were removed from the study for not being related to the epithelial line. Among the 850 polyps that were histologically analyzed, 55.2% were tubular, 21.9% were hyperplastic, 17.1% were serrated, 5.4% were tubulovillous and 0.5 were villous adenomas.

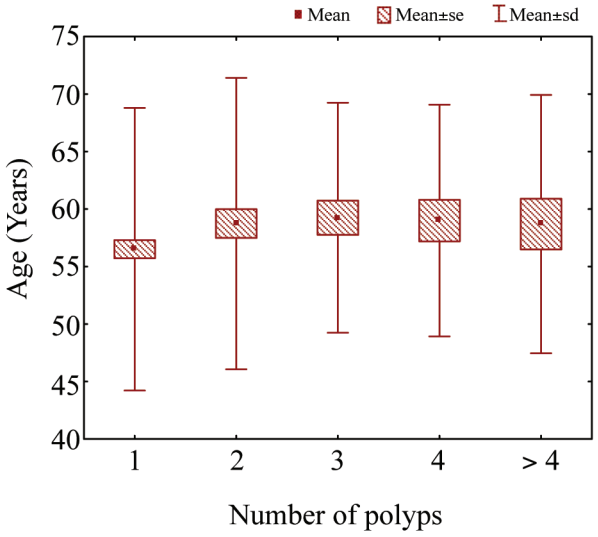
No dysplasia was observed in 87.5% of the polyps; 10.4% presented high grade dysplasia and 2.1% were adenocarcinomas.

The prevalent histologic type in the rectum was the hyperplastic adenoma (35.01%), followed by the tubular adenoma (33.93%), which was also prevalent in the left colon (58.23%), followed by the hyperplastic adenoma (21.03%). In the transverse colon, the tubular adenoma was also prevalent (79.64%), followed by the serrated one (9.7%); the tubular adenoma was prevalent in the right colon (71.2%), followed by the tubulovillous one (11.36%).

Polyps that were larger than 1.0 cm corresponded to 19.5% of the lesions in the left colon; 15.3% in the right colon; 8.2% in the rectum; and 6.0% in the transverse colon. Out of the four villous polyps found, one was in the right colon and three were in the rectum.

The hyperplastic adenoma was frequently smaller than 1 cm (97.85%), followed by the serrated (91.72%) and tubular (85.07%) adenomas. Among the ones that were larger than 1.0 cm, villous and tubulovillous adenomas were prevalent (56.0%) (Table 1).

The size of the polyp and the grade of dysplasia were highly related. The larger the polyp, the higher the chances of presenting high grade dysplasia or



se: Standard Error; sd: Standard Deviation

Figure 1. *Relation between age and number of polyps.*

Table 1. *Relation between size and histologic type.*

Size (cm)	Histologic type			
	Hyperplastic	Tubular	Tubulovillous or Villous	Serrated
≤1	182	399	22	133
	97.85%	85.07%	44.00%	91.72%
>1	4	70	28	12
	2.15%	14.93%	56.00%	8.28%
Total	186	469	50	145
				p<0.001

adenocarcinoma (Figure 2). Out of the serrated adenomas, 98.6% did not present dysplasia, as well as 86.6% of the tubular adenomas. However,, tubulovillous adenomas 69.6% presented high grade dysplasia. Out of the four villous polyps found, two had high grade dysplasia and one presented adenocarcinoma (Table 2). The polyps located in the right or transverse colon had higher chances of high grade dysplasia than those located in the left colon or rectum; however, the chances of adenocarcinoma were lower (p=0.003) (Table 3).

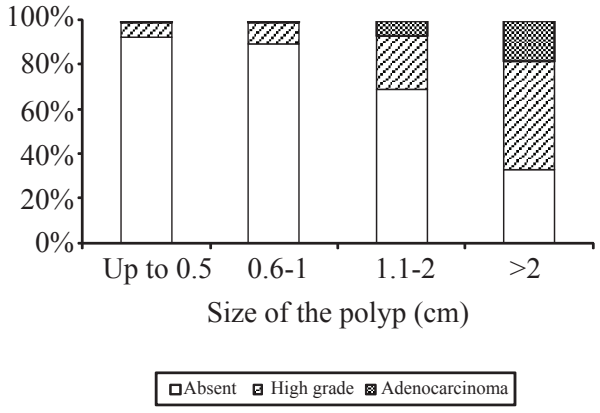


Figure 2. *Relation between size and grade of dysplasia.*

DISCUSSION

Colorectal câncer is the third most common cause of cancer in the world, and the second cause in developed countries[1,2,6], representing 9.4% of all cancers[15]. In Brazil, it is the fourth most common malignant neoplasm among men and the third in women[15].

The adenoma-carcinoma sequence was first analyzed by Morson and is considered as the main path for colorectal carcinogenesis[16-18].

Out of the colonoscopies analyzed in this study, 24.28% presented colorectal polyps. This information is in accordance with findings in literature, which show the prevalence of polyps of 16.4 to 29.96% in colonoscopies[7,9].

Median age of the patients with polyps was similar to other studies, in which the mean ranged from 57.5 and 62.5 years[7,9,19]. Thus, the prevalence of the disease is higher among individuals over 50 years old[1,4,6,7,20].

Table 2. *Relation between dysplasia and histologic type.*

Dysplasia	Histologic type				
	Hyperplastic	Tubular	Tubulovillous	Villous	Serrated
Absent	186	406	7	1	143
	100.00%	86.57%	15.22%	25.00%	98.62%
High grade	0	53	32	2	2
	0.00%	11.30%	69.57%	50.00%	1.38%
Adenocarcinoma	0	10	7	1	0
	0.00%	2.13%	15.22%	25.00%	0.00%
Total	186	469	46	4	145
					p<0.001

Table 3. *Relation between dysplasia and location.*

Dysplasia	Right colon	Transverse colon	Left colon	Rectum
Absent	106	92	295	256
	80.30%	81.42%	89.12%	91.43%
High grade	24	19	28	18
	18.18%	16.81%	8.46%	6.43%
Adenocarcinoma	2	2	8	6
	1.52%	1.77%	2.42%	2.14%
Total	132	113	331	280
				p=0.003

Most of the patients who had polyps were females. The relation between gender and the development of polyps is not clear yet, but some studies point to higher prevalence rates among men[2,4,5,7,19]. This difference in our findings in comparison to literature is possibly due to the higher number of colonoscopies performed in women than in men in the analyzed service.

In this sample, it was more likely for men to have more than one polyp with a relation of 1.2:1 (p=0.202).

Polyps were more frequently located in the left colon and the rectum, and these two locations accounted for 71.0% of the observed polyps, which is in accordance with other studies[6,9,17]. On the other hand, Santos et al. (2008) located a higher number of polyps in the right colon[7].

Polyps larger than 2.0 cm (3.08%) were more frequently correlated with high grade dysplasia, and were more likely to become adenocarcinoma. Polyps larger than 1.0 cm were more frequently found in the left colon, followed by the right colon and rectum. The size of the polyp is considered as the most important risk factor for *in situ* and invasive neoplasm, even though it is possible to observe high grade dysplasia in small lesions[1,6,9,16,21]. Some studies have demonstrated that adenomatous polyps tend to be larger than hyperplastic polyps[2]. In these cases, villous adenomas are the largest (mean of 1.56 cm), and tubular adenomas are the smallest (mean of 0.47 cm)[6]. In this study, hyperplastic polyps were the smallest, and tubulovillous or villous polyps were the largest. Almost all hyperplastic polyps had less than 1.0 cm (97.85%), and 56.0% of the tubulovillous or villous polyps had more than 1.0 cm.

Histologically, tubular polyps were the most prevalent (54.3%), which is shown in different studies[2,6,7,22]. Other authors reported the prevalence of hyperplastic polyps[7,9], which was the second most frequent in our study.

Villous adenomas have more potential to be malignant[6,7,16]. Out of the four villous polyps analyzed, two presented high grade dysplasia, and one was classified as adenocarcinoma. This is in accordance with literature, however, it cannot be statistically assessed due to the restricted sample size.

It has been increasingly accepted that colorectal cancer with microsatellite instability involves serrated polyps instead of adenomas[22]. Since it consists of adenomatous and hyperplastic tissues[7], the serrated adenoma may be related with dysplasia. Out of the 143 serrated polyps, only two presented high grade dysplasia (1.38%), and there were no adenocarcinomas, but this information also represents limited value due to the sample size.

High grade dysplasia was more prevalent in polyps located in the right and transverse colon. Polyps in the left colon and the rectum were strongly associated with adenocarcinoma.

Studies regarding the genetic characteristics of colorectal tumors will provide great advances as to the understanding of this neoplasm, once genetics opens perspectives in order to substantially change prognosis and survival rates related to this disease[16,23,24].

Recent updates of the National Polyp Study and the U.S. Multi-Society Task Force recommend that patients be identified as low risk (one or two tubular adenomas smaller than 1.0 cm or low grade dysplasia) or high risk (three or more adenomas, one of them being larger than 1.0 cm, villous or tubulovillous histology or high grade dysplasia)[10]. Low risk patients should undergo another colonoscopy in five years or more, while high risk patients should be submitted to a new colonoscopy in three years, as long as all polyps are properly removed[4,10,18]. According to guidelines of the American Gastroenterology Association and the American College of Gastroenterology, low risk patients should be re-evaluated in five years[10]. The American Cancer Society informs that low risk patients should be followed-up for a period from three to six years[10]. Regardless of this disagreement as to time of follow-up, the conclusion is that periodic colonoscopies are necessary to detect polyps; besides, this examination enables their removal and reduces the prevalence of adenocarcinoma. It is common for gastroenterologists not to follow the guidelines as to endoscopic surveillance. They usually recommend a smaller interval because of the suboptimal quality of the colonoscopy or due to clinical factors associated with the patient; also, they might be afraid of not detecting an existing adenoma or of the incomplete resection of colorectal cancer[10].

FINAL COMMENTS

In this study, out of the analyzed colonoscopies, the presence of polyps in ¼ of them was observed, especially in the left colon and rectum, measuring less than 1.0 cm and being histologically classified as tubular adenomas. However, tubulovillous and villous adenomas, which are larger than 1.0 cm, were strongly correlated with high grade dysplasia and adenocarcinoma. These findings are in accordance with literature. Since it is a known fact that polyps are precursors of adenocarcinomas, referral to colonoscopy, recognition of the polyp and the establishment of adequate therapeutic measures, besides the determination of prognosis and periodic monitoring of the patients are essential to reduce the incidence of CRC.

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RESUMO: O adenocarcinoma representa 96-98% do câncer colorretal, sendo os pólipos neoplásicos (adenomas) seus precursores. O objetivo desse estudo é correlacionar tamanho, localização e tipo histológico de pólipos colorretais com a presença de displasia e adenocarcinoma. Métodos: Estudou-se retrospectivamente colonoscopias realizadas entre janeiro/2007 e dezembro/2008, avaliando-se as características dos pólipos. Resultados e Discussão: Das 2401 colonoscopias analisadas, 583 (24,3%) apresentaram pólipos. Por falta de dados histopatológicos, excluiu-se 139 exames. A média de idade foi 58±12 anos, sendo 60% mulheres. Houve predomínio no cólon esquerdo (38,5%) e reto (32,5%). Quanto ao tamanho, 86,58% eram ≤1 cm. Dos 850 pólipos analisados histologicamente, 55,17% eram adenomas tubulares, 21,88% hiperplásicos, 17,05% serrilhados, 5,4% tubulovilosos e 0,47% vilosos. Dos pólipos ≤1,0 cm, 16,0% apresentaram displasia e 1,9% adenocarcinoma; dos >1,0 cm houve displasia em 72,0% (p<0,001) e adenocarcinoma em 25,3% (p<0,001). Pólipos do cólon direito e transverso associaram-se mais à displasia (17,8% e 16,7%, respectivamente). Adenocarcinoma predominou no cólon esquerdo (2,5%) e reto (2,1%). Conclusão: Os pólipos predominaram em cólon esquerdo e reto. Os do cólon direito e transverso correlacionam-se fortemente à displasia, e os do reto e cólon esquerdo ao adenocarcinoma. Lesões maiores que 1,0 cm associaram-se positivamente com a presença de displasia e neoplasia.

Palavras-chave: pólipos intestinais; neoplasias colorretais; colonoscopia.

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