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Article

Distribution of colorectal polyps according to Paris and Vienna classification systems: a prospective cohort single center study

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Abstract. *Background:* Colorectal polyps are a frequent finding in colonoscopy. They comprise the precursor of colorectal cancer through the adenoma-carcinoma sequence. Early detection and removal of pre-neoplastic adenomatous colorectal polyps during screening colonoscopy decreases the incidence of colorectal cancer and its related mortality. This study aimed at reporting the distribution of colorectal polyps according to demographic, anatomic and clinical data and classifying them according to Paris and Vienna classifications in a group of patients at Medical Research Institute, Alexandria University, Egypt between November 2019 and August 2020. *Methods and Patients:* In a prospective cohort study, 28 patients were referred for colonoscopy with 38 colorectal polyps which were classified using Paris classification, resected endoscopically, evaluated histopathologically then classified according to Vienna classification. *Results:* The study showed that male gender had higher incidence of colorectal polyps (67.9%). This incidence increased with advancing age (mean age was 55.14 ± 10.36 years). Bleeding per rectum represented the most common presenting symptom (35.7%). The most common colon segment affected was sigmoid colon (50%) followed by rectum (26.3%). The mean size of polyps was 11.8 ± 5.6 mm. According to Paris classification, 50% of polyps were classified as class 0-Ip and 50% were classified as class 0-Is. Regarding Vienna classification, 50% of polyps were classified as group 4.1, 34.2% of polyps were classified as group 1 while 15.8% of polyps were classified as group 3. *Conclusion:* This study evaluated the colorectal polyps findings among colonoscopy patients. Early and prompt diagnosis

with adequate polypectomy of pre-neoplastic colorectal polyps can decrease incidence of colorectal cancer and related morbidity and mortality.

Keywords: Colonic polyps, adenomas, colorectal cancer, Paris classification, Vienna classification.

Introduction

Colorectal cancer (CRC) is a leading cause of morbidity and mortality worldwide. It is ranked second among causes of cancer-related deaths globally and third among cancers according to estimates. [1] Endoscopic polypectomy and polyp retrieval for histopathological examination represents the cornerstone for diagnosis of adenomatous polyps and CRCs. [2] Colorectal polyps represent the precursors of CRCs. [3] They are a diverse set of lesions that differ in terms of shape, cellular origin and molecular alteration. They are usually asymptomatic, but also can cause changes in bowel habits, bleeding, anemia and even obstruction if a large polyp is located in the rectum. [4]

Histologically, colorectal polyps are divided into adenomatous polyps (70%) which have potential to turn malignant and non-adenomatous polyps (30%) which have no malignant potential. Adenomatous polyps are further categorised into tubular, tubulo-villous and villous adenomas in accordance with the prevailing histological pattern. [5]

Many risk factors are related to developing colorectal adenomas and CRCs; including advancing age, male gender, personal or family history of adenomas or CRCs, hereditary CRC syndromes, some unfavorable habits as sedentary life, smoking, alcohol and red meat overconsumption, as well as some diseases as ulcerative colitis, cystic fibrosis, liver cirrhosis, diabetes mellitus and obesity. [6]

Early detection and polypectomy during screening colonoscopy decreases the incidence of developing CRC and its related mortality. All polyps identified during colonoscopy should be resected and histologically evaluated since the histology of polyps cannot be reliably determined with the standard white light colonoscopy. This has several drawbacks including the possibility of bleeding and intestinal perforation, as well as the cost burden of resecting non-neoplastic polyps unnecessarily. [7]

Several classification systems are generated to classify colorectal polyps based on their morphology and histology. Paris classification is a consensus system widely used to describe colorectal polyps morphology. It serves as a validated standardized system to classify gastrointestinal superficial neoplastic lesions and to predict the presence of submucosal invasion. Lesions are categorized as polypoidal (protruded) (type 0-I), non-polypoidal (non-protruded) (type 0-II) or excavated (type 0-III). The polypoidal type is either pedunculated (type 0-Ip), semi-pedunculated (type 0-Isp) or sessile (type 0-Is). The non-polypoidal type is subdivided into elevated (type 0-IIa), flat (type 0-IIb) or depressed (type 0-IIc). [8]

Vienna classification has been developed to resolve discrepancies in histological diagnosis of colorectal tumors between Western and Japanese pathologists. Histopathologic diagnosis is classified into five groups according to neoplastic severity and depth of invasion. This classification also distinguishes between epithelial neoplastic lesions limited to the mucosa and those invading the submucosa. [9]

The aim of this study was reporting the distribution of colorectal polyps based on demographic, clinical and anatomic data as well as according to Paris and Vienna classifications. It emphasized the importance of in vivo classification of colorectal polyps based on histological type and depth of invasion in order to take rapid prompt decisions in polyp management and follow-up, and thus early detection of pre-cancerous lesions and decreasing the incidence of colorectal cancer morbidity and mortality during screening colonoscopy with minimal unnecessary interventions and complications.

Materials and Methods

Twenty eight patients have been included in a prospective cohort study who had colonoscopies for symptoms of lower digestive tract including rectal bleeding, diarrhea, abdominal pain, constipation, anemia and occult blood in stool. All patients enrolled in this study were recruited from the Medical Research Institute, Alexandria University inpatient and outpatient departments in the period between November 2019 and August 2020.

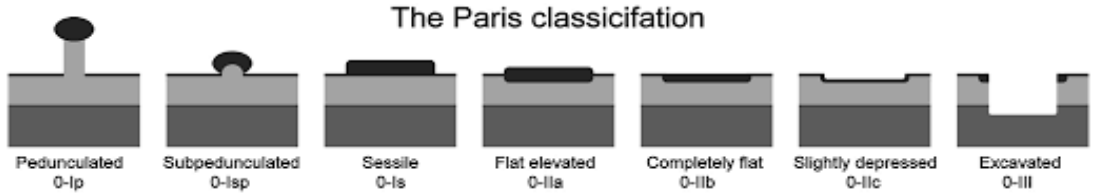
Patients had been subjected to detailed history taking and clinical examination. Routine laboratory tests were performed including complete blood picture, prothrombin time and activity and serum creatinine. Preparation for colonoscopy was performed using Polyethylene Glycol electrolyte oral solution-3350 (PEG-ELS). [10]

The colonoscope was done using intravenous sedation and intravenous antispasmodic as needed. [11] The procedure was done using Olympus® colonoscope (Olympus® Evis Lucera CV-260SL processor, Japan) to all patients; the caecum was accessed using the standard white light and the polyps were detected during withdrawal of the colonoscope. [12]

Characterization of the polyps including polyps number, size and site were reported and captured. All polyps identified were classified according to Paris classification [8] of colorectal polyps morphology (Figure 1), resected by snare polypectomy with good hemostasis. [13]

Findings were ascertained by two well experienced endoscopists to decrease the inter-observer variations.

Figure (1): Schematic representation of Paris classification for mucosal neoplasia. Adapted from: Morphological classifications of gastrointestinal lesions. Best Pract Res Clin Gastroenterol. 2017 Aug; 31(4):359-367.



Histopathological evaluation

All resected polyps were exposed to histopathological evaluation by a well qualified pathologist to identify the type of polyp, the presence and the severity of dysplasia and whether the polyp was entirely resected or not. According to Vienna classification, dysplasia was categorized into low-grade dysplasia (LGD) and high-grade dysplasia (HGD) (Table 1). HGD includes both in-situ and intramucosal cancer.[9]

Table (1): Vienna classification for histological classification of colorectal polyps.

Category	**Diagnosis**
Group 1	Negative for dysplasia
Group 2	Indefinite for dysplasia
Group 3	Mucosal low grade neoplasia - Low grade adenoma - Low grade dysplasia
Group 4 - Subgroup 4.1 - Subgroup 4.2 - Subgroup 4.3 - Subgroup 4.4	Mucosal high grade neoplasia - High grade adenoma/dysplasia - Carcinoma in situ - Suspicious for invasive carcinoma - Intramucosal carcinoma
Group 5	Submucosal invasion by carcinoma

Exclusion criteria: Incomplete colonoscopies, inadequate bowel preparations, genetic syndromes like familial adenomatous polyposis (FAP) and hereditary non-polyposis colon cancer (HNPCC), CRCs, inflammatory bowel diseases, detection of CRCs during examination, prior colon resection, prior radiation therapy to the abdomen, severe cardiovascular, pulmonary, renal diseases, coagulation disorders, and anticoagulant use.

The protocol of our study was accepted by the ethics committee of Faculty of Medicine, Alexandria University, Egypt approval number (IRB No: 7555) on 14 th March 2018. The patients received a thorough explanation of the nature of the study, the potential risks and the anticipated benefits. The study was performed according

to the Declaration of Helsinki tenets 1964 (revision of Edinburgh 2000). Before taking part in the study, all patients signed a written informed consent.

Statistical analysis:

The IBM SPSS software program version 20.0 was used to analyze data fed into the computer (Armonk, NY: IBM Corp.). Number and percentage were used to describe qualitative data. The range (minimum and maximum), mean, median, standard deviation and interquartile range were used to describe quantitative data (IQR).

Results

The study involved 28 patients who had 38 colorectal polyps that were resected, retrieved and histologically examined. Among the studied patients, 19 were males (67.9%) and 9 were females (32.1%). Age of patients ranged between 2 and 87 years old, with a mean value of 45.8 ± 22.9 years. Regarding the presenting symptom, 10 patients complained of bleeding per rectum representing the most common complain (35%). Another 8 patients complained of diarrhea (28.6%), while 5 patients complained of abdominal pain (17.9%), 4 patients complained of constipation (14.3%) and 2 cases had positive occult blood in stool (7.1%).

According to number of polyps among the studied patients, 21 patients had 1 polyp (75%), 5 patients had 2 polyps (17.9%), while 1 patient had 3 polyps and another patient had 4 polyps (3.6%).

The site of the polyps varied between 10 and 150 cm from the anal verge with a mean value of 43.16 ± 36.13 cm. Regarding the colon segment affected, 19 polyps were located in sigmoid colon (50%), 10 polyps were located in rectum (26.3%), 4 polyps were located in the transverse colon (10.5%), 3 polyps were located in the descending colon (7.9%), while 1 polyp was located in the ascending colon and another polyp was located in caecum (2.6% each).

Furthermore, the size of polyps ranged between 0.3 and 2.5 cm with a mean value of 1.18 ± 0.56 cm. Regarding the presence or absence of peduncle, 19 polyps were pedunculated and 19 polyps were sessile, representing 50% of the total polyps for each type.

According to Paris classification of colorectal polyps morphology, our study had 50% of polyps class 0-Ip (with pedicle) and 50% class 0-Is (without pedicle).

While considering Vienna classification, 19 polyps classified in group 4.1 (50%), 13 polyps were classified in group 1 (34.2%) and 6 polyps were classified in group 3 (15.8%).

Discussion:

CRC has risen to become one of the most frequent cancers worldwide, accounting for the second and the third most common cancers in women and men respectively. [14] Studies proved that colorectal cancer could be prevented in about 80% of patients by screening colonoscopy and polypectomy. [15] Even though colonoscopy is the method of choice for diagnosing colorectal polyps, it has an adenoma miss rate of 6-27% which may impair the effectiveness of colon cancer

prevention measures. Therefore, screening colonoscopy should involve the removal of any polyps detected during the procedure and their submission for histological evaluation. [16]

Advances in endoscopic technologies have led to significant improvement in the diagnosis and management of adenomas, high-grade dysplasias, and early-stage CRC. Thanks to the development of high resolution and high contrast ratio endoscopic optic systems as well as various classification systems that aid in accurate categorization of polyp types and histological patterns, the surface pattern and microvascular architecture of lesions can be observed during colonoscopy. [17]

This study involved 28 individuals of various ages who had 38 colorectal polyps with various morphologies, types, sites, and sizes. Each patient underwent a complete colonoscopy, snare polypectomy with appropriate hemostasis, polyp retrieval and histological analysis.

The mean of age in our study was 55 years old and the male gender predominated. Penn et al [18] and Cawich et al [19] agreed with these findings and proved the male gender preponderance of colorectal polyps. Additionally, according to Grahn et al [20] and Song et al [21], colorectal polyp incidence rises with advancing age, with the strongest correlation occurring above 50 years old.

Patients participated in our study with various clinical menifestations, including rectal bleeding, abdominal pain, constipation, diarrhea and faecal occult blood test. In agreement with our findings, Shahmoradi et al [22] and Benedix et al [23] identified bleeding per rectum as the most frequent manifestation. While the most prevalent clinical complaint in another study by Kuipers et al [24] was chronic constipation.

Our study found that, in line with the majority of studies, most of patients (21 patients, or 75% of patients) had one colorectal polyp with a mean value of 1.36 ± 0.73 polyps. According to Amano et al [25] study, ADR increased with the number of endoscopically discovered polyps but the correlation reached plateau at five or more polyps, which also found that the average number of polyps was 1.5 ± 2.3 (95% confidence interval: 1.4-1.6). While in another study by Oliveira et al [30], the mean number of polyps detected and resected was 3 ± 2 while in the surveillance colonoscopy was 2.3 ± 1.2.

Our study revealed that the majority of polyps discovered were located in the left colon, specifically in the recto-sigmoid region: sigmoid (50%) and rectum (26.3%). This is consistent with a study by Valarini et al [27] that discovered that the right and transverse colons were highly associated with dysplasia and that polyps were more common in the left colon (38.5%) and rectum (32.5%) than the right colon. Additionally, Shahmoradi et al [22] study came to the conclusion that the sigmoid and descending colons accounted for 28.6% and 23.2% respectively of all polyps. However, a research by Qumseya et al [28] indicated that the right colon had somewhat more polyps than the left colon (54% vs. 46% respectively). They also claimed in their study that the proportion of polyps that were adenomas was significantly larger on the right colon when compared with the left colon: 69.4% vs. 39.3% ($p = 0.0001$).

According to Paris classification, polyps are categorized equally in our study to 50% as type 0-Ip (pedunculated) and 50% as type 0-Is (sessile). Ahire et al [29] study stated that the majority of colorectal polyps were sessile in nature (68.8%). Furthermore, according to Szura et al [30] study, a total of 143 polyps (37 %) were pedunculated or sub-pedunculated (Paris types 0-Ip and 0-Ips respectively), 188 (49 %) polyps were sessile (Paris type 0-Is) and the remaining 55 polyps (14 %) were superficial and elevated (Paris types 0-IIa, b, c). In contrast, in 2009 Nakajo et al [31] study concluded that the visibility rate was higher for pedunculated polyps (59%) than for non-pedunculated polyps (27%) ($p = 0.004$).

According to Vienna classification, 50% of the polyps in our study had high grade dysplasia (group 4.1), 13.4% had no dysplasia (group 1) and 15.8% had low grade dysplasia (group 3). This was in agreement with Denis et al [32] study in which endoscopic biopsies were performed in 56.2% of cases; the result was absence of neoplasia (3.4%), low-grade dysplasia (28.8%), high-grade dysplasia (27.1%), in situ carcinoma (17.0%) and invasive carcinoma (23.7%). In contrast with a study by Valarini et al [27], no dysplasia was observed in 87.5% of the polyps, 10.4% presented high grade dysplasia and 2.1% were adenocarcinomas.

The relatively small sample size and the requirement that the participating endoscopists have vast experience in colonoscopy, polypectomy, and evaluating the type of polyps to standardise and validate the study's findings were the study's two main limitations. The study's most significant weakness was the lack of patients with colorectal polyps. To ascertain whether the categorization techniques used during real-time colonoscopy are generalizable, more clinical trials with bigger sample sizes need to be conducted.

Conclusion

This study emphasized the importance and validity of demographic, clinical and anatomical classification of colorectal polyps, as well as Paris and Vienna classification systems based on histological type and depth of invasion in order to take rapid prompt decisions in polyp management and follow-up. This aids early detection of pre-cancerous lesions and decreasing the incidence of colorectal cancer morbidity and mortality during screening colonoscopy with minimal interventions and complications.

Conflicts of Interest:

The authors declare that they have no conflicts of interest regarding the publication of this article.

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Abbreviations:

CRC: Colorectal cancer
PEG-ELS: Polyethylene Glycol-electrolyte oral solution
LGD: Low-grade dysplasia
HGD: High-grade dysplasia
HNPCC: Hereditary non-polyposis colorectal cancer
FAP: Familial adenomatous polyposis
IQR: Inter-quartile range
SD: Standard deviation
ADR: Adenoma detection rate

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