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Original research

The impact of BMI on early colorectal neoplastic lesions and the role of endoscopic diagnosis:. An Italian observational study

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ABSTRACT

Introduction: CRC often arises from polyps: an early detection and resection are effective in decreasing both incidence and mortality rate. Relation between risk factors, adenomas and CRC have been showed, but there is little evidence for overweight association with preneoplastic lesions. This study analyzed the correlation between body mass index (BMI) and primitive site of polyps.
Methods: We performed a retrospective study, in a period between January 2010 and October 2014. Subjects aged 50 years and older who underwent their first-time screening colonoscopy were included. Reports regarding characteristic of the polyps were collected.
Results: 142 patients were enrolled and they were divided into two groups: group I – patients with left sided colonic polyps, and group II – patients who right sided colonic polyps. The ANOVA test-one way, documents a difference between the BMI and the colon localization of polyps.
Conclusions: Patients with overweight had a higher risk to develop lesions in the left colon compared to patients with normal weight. Despite the fact that Italian epidemiological studies have found a prevalence of polyps of 44–53% in rectal-sigmoid segment, 32–36% in transverse segment and of 14–20% in right segment, we showed an incidence of 26.05% for right sided polyps, which maybe related with the eating habits of the territory.
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1. Introduction

Colorectal cancer (CRC) is the third most common diagnosed malignancy in the world and is the second leading cause of cancer death in developed countries; it is the third in incidence for men after prostate and lung cancer, the second in women after breast cancer [1–4].

In 1990, Bufill first proposed the classification in right- and left-sided CRCs based on embryology and to different microenvironments and blood supplies [5].

Actually, evidence has shown that right-sided colon cancer (RC) and left-sided colon cancer (LC) represent distinct entities, with respect to differences observed in the biology, pathology, epidemiology and clinical outcomes [6–13]. Indeed, it is clear that chromosomal instability (CIN) is more frequent in LC tumors, and one major CRC pathway (CIMP) occurs frequently in RC [14].

Several prognostic factors have been analyzed and widely

Abbreviations: CRC, colorectal cancer; OS, overall survival; BMI, body mass index; CIN, chromosomal instability; CIMP, CRC pathway; SEM, standard error medium; RR, relative risk; IGF, insulin-like growth factor; IR, insulin receptor; OB-R-signal, OB-(leptin)-receptor signal.

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discussed in the literature [15–18] and, among them, the role of location of the primary tumor, in terms of RC or LC origin, has been investigated as these predict outcome and prognostic factor [9,19,20].

Many studies investigated the association of risk factors and CRC by anatomic subsite of the tumor (e.g., CRC/LC sited) [21–24] and described several risk indices and prediction tools for advanced neoplasia of the colon. As for the association between increased body mass index (BMI) and adenomas, however, inconsistent results from epidemiological studies has been reported in several studies [25]. Moreover, few has been showed for anatomic polyps site and BMI and the role of BMI in the natural history of non cancerous polyps. However, overweight and obesity have a crucial role in CRC's development [26], which may partly reflect associations with different molecular types of carcinogenesis. Adipose tissue has an important role in innate immune response. The secretion of cytokines and adipokines (adiponectin, leptin, resistin and ghrelin) are responsible for a paracrine loop between adipocytes and macrophages, which concur to the inflammation. Results from meta-analyses suggest that changes in the levels of adipocytokines may indicate the initiation and progression of CRC and adenoma [27–29].

The purpose of this study was to analyze the correlation between BMI and colonic polyps site.

2. Methods

2.1. Study design

We performed a retrospective study, in a period between January 2010 and October 2014. Patients were enrolled in Department of Medical and Surgical Science of University "Magna Graecia" of Catanzaro, Italy. This study was approved by the Ethical Committees of University "Magna Graecia" of Catanzaro, in accordance with the Declaration of Helsinki and the Guideline for Good Clinical Practice. Before the beginning of the study, all participants provided written informed consent.

2.2. Population

All asymptomatic individuals aged 50 years and older who underwent their first-time screening colonoscopy were included in the current study. Demographic data of patients included age, gender, smoking habits, comorbidities, personal and family history of CRC or other neoplasia, and surgical history were obtained. At admission, height and weight and BMI score (as weight in kilograms divided by height in meters squared) were measured. According to the BMI classification [30], we used the following categories: normal weight = BMI <25 kg/m^2, overweight = BMI 25–29.9 kg/m^2, class I obesity = BMI 30–34.9 kg/m^2, class II obesity = 35–39.9 kg/m^2, class III obesity = > 40 kg/m^2.

Colonoscopy reports regarding characteristic of the polyps (number and size of polyps, polyp distribution, resection for polyps, and synchronous lesions) were collected.

Bowel preparation was performed in most of the patients by having the patients ingest on the day prior to examination 4 L of polyethylene glycol lavage solution and low-residue diet preceded by the use of laxative taken the previous 2 days. A complete colonoscopy was defined as cecal intubation, which was identified by visualization of the appendiceal lumen. Colonoscopy examination was carried out during withdrawal of the scope. Conscious sedation was given by the endoscopist assisted by an attending nurse or anesthesiologist using intravenous midazolam (mean dose 2.5 mg), hyoscine 20 mg and pentazocine 30 mg or pethidine 50 mg. All polyps identified during colonoscopy were biopsied or removed endoscopically and submitted for histopathology.

The location of the polyps was defined as recto-sigmoid (rectum and sigmoid colon), proximal colon or right (from caecum to ascending colon), left colon (splenic flexure and descending colon), transverse.

The polyp size was classified as small (<10 mm), medium (10–20 mm), or large (>20 mm). Estimation of polyp size was performed by the endoscopist using the diameter of the open biopsy forceps. In the event of multiple polyps, only the size of the largest was considered for the purposes of analysis.

Histopathology of all colorectal lesions was documented according to the World Health Organization criteria as follows: hyperplastic, serrated, tubular, tubular-villous, villous, and cancer [31,32]. Polyps with the features of tubular, tubular-villous, villous were defined as adenoma.

2.3. Inclusion criteria

Patients with hyperplastic polyps, tubular polyps, tubular-villous adenoma ≤10 mm in size.

2.4. Exclusion criteria

Patients with negative endoscopy, who had serrated polyps or advanced adenomas included those that were ≥10 mm in size, with villous or tubular-villous histology, or high-grade dysplasia and with Familial Adenomatous Polyposis, Peutz-Jeghers syndrome, Lynch I-II syndromes (HPNCC) and Inflammatory Bowel Diseases were excluded. Patients who had incomplete procedure due to any cause and previous colonic resection were also excluded from the cohort.

2.5. Statistical analysis

All data are expressed as mean ± standard error medium (SEM). Anova test was used to evaluate the difference between the groups. Differences identified by ANOVA were pinpointed by unpaired Student's *t*-test. The test of Pearson was used to evaluate the correlation between BMI and colonic tumor site. The threshold of statistical significance was set at $^*P < 0.05$. SPSS (SPSS Inc., Chicago, USA) software was used for statistical analyses. We defined this study as exploratory, therefore we did not determine a power calculation. In this light, these results could only be labeled as exploratory.

3. Results

We enrolled 3487 (Table 1) patients [1421 females (40.75%) and 2066 males (59.25%)]; of these, 142 [males (84%), female (58%)] were considered for inclusion criteria and were divided into two groups: group I – patients with left polyps, group II – patients with right and transverse polyps, according to the colonic localization.

We detected 89 (62.68%) left, 16 transverse (11.27%) and 37 (26.05%) right polyps (Table 2).

Detected polyps were removed during colonoscopy and the specimens were transferred in separate formalin containing jars to the pathology department.

3.1. Correlation

The ANOVA test-one way documents a correlation between the BMI and the colonic localization of polyps. In particular, the group of patients with right colon polyps location (group II – 0) are characterized by a lower BMI media value compared with the group of patients with left site of colon polyps (group I – 1) (Fig. 1.). (* indicates p = 0.035).

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