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Original article

Post-colonoscopy colorectal cancer: Characteristics and predictive factors[☆]

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ABSTRACT

Introduction and aims: A high quality colonoscopy is key in preventing colorectal cancer, but the risk of colorectal cancer (CRC) exists. The aims of the study were to investigate the incidence, characteristics and predictive factors of post-colonoscopy colorectal cancer (PCCRC).

Material and method: A retrospective and prospective observational study was designed. A population undergoing colonoscopy between 1-01-1997 and 31-12-2014 was included. We analyzed demographic variables, characteristics of the diagnostic colonoscopy of CRC, of the previous ones and the lesions found in them. To compare the PCCRC group versus the CRC group without previous colonoscopy, the Student's *t*-test and multiple logistic regression were used to determine predictive factors of PCCRC (SPSS[®] 15). The statistical significance was $p < 0.05$.

Results: A total of 56,984 colonoscopies, 1977 CRC and 132 patients (mean 70.8 years old, 56.8% male) with at least one colonoscopy in 10 years before were registered (PCCRC). Seventy and a half percent of the previous colonoscopies were completed and 63.7% had an adequate bowel preparation. Predictive factors of PCCRC were personal history of polyps (OR 35.01; 95% CI 11.1–110.8; $p < 0.001$), previous CRC (OR 176.64; 95% CI 51.5–606.1; $p < 0.001$), family history of CRC (OR 3.14; 95% CI 1.5–6.4; $p = 0.002$) and proximal CRC (OR 3.15; 95% CI 2.1–4.9; $p < 0.001$).

Conclusions: PCCRC rate in 10 years was 6.7%. An adequate follow-up and a high-quality colonoscopy could prevent PCCRC, especially in patients with risk factors.

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Cáncer colorrectal poscolonoscopia: características y factores predictivos

RESUMEN

Introducción y objetivos: La calidad de la colonoscopia es clave para asegurar la prevención del adenocarcinoma colorrectal (ACCR), aunque el riesgo de ACCR existe. Los objetivos del estudio fueron investigar la incidencia, las características y los factores predictores de ACCR poscolonoscopia (ACCRPC).

Material y método: Estudio observacional retrospectivo y prospectivo sobre una población sometida a colonoscopia entre 1-01-1997 y 31-12-2014. Se analizaron variables demográficas, características de la colonoscopia diagnóstica de ACCR, de las previas y de las lesiones encontradas en ellas. Se aplicaron test de contraste de hipótesis para comparar el grupo de ACCRPC con el de ACCR sin colonoscopia previa y regresión logística múltiple para identificar factores independientes de ACCRPC (SPSS[®] 15), considerando significación estadística una $p < 0,05$.

Palabras clave:

Adenocarcinoma colorrectal
Cáncer poscolonoscopia
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Resultados: Se registraron 56.984 colonoscopias, 1.977 ACCR y 132 pacientes (edad media de 70,8 años y 56,8% varones) con al menos una colonoscopia en los 10 años previos (ACCRPC). El 70,5% de las colonoscopias previas fueron completas y el 63,7% tenían una preparación adecuada. Los factores de riesgo independientes relacionados con la aparición de ACCRPC fueron los antecedentes personales de pólipos colónicos (OR 35,01; IC 95% 11,1-110,8; $p < 0,001$), antecedentes personales de ACCR (OR 176,64; IC 95% 51,5-606,1); $p < 0,001$), antecedentes familiares de ACCR (OR 3,14; IC 95% 1,5-6,4); $p = 0,002$) y la localización del ACCR en el colon derecho (OR 3,15; IC 95% 2,1-4,9; $p < 0,001$).

Conclusiones: La tasa de ACCRPC a 10 años fue del 6,7%. Realizar un adecuado seguimiento y una colonoscopia de calidad puede evitar la aparición del ACCRPC, especialmente en los pacientes con factores de riesgo.

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Introduction

Colorectal cancer (CRC) is the most common tumour in the Western world and is the second leading cause of cancer death, with an incidence of 440,000 cases and 210,000 deaths each year in Europe,^{1,2} of which more than 13,000 correspond to Spain, with an average survival in the European Union of 54% at 5 years.³ Adenomatous polyps are considered the precursor lesions of most colorectal tumours and colonoscopy is the most effective method for the prevention and early detection of CRC, since it allows a complete visualization of the colorectal mucosa, adenoma resection before they degenerate into malignant tumours and CRC diagnosis in the early stages. Several observational studies have been published describing rates of CRC onset between 2.9 and 7.9% after a previous colonoscopy without neoplastic lesions,⁴⁻⁶ showing a low risk of CRC; however, post-colonoscopy CRC (PCCRC) occurs. The concept and nomenclature of PCCRC have recently been revised,⁷ defining interval CRC as that which occurs after a screening programme or a follow-up colonoscopy in which no cancer is detected, and before the recommended date for the next examination. The PCCRC would be the one that appears after a colonoscopy indicated for any reason and before the recommended date for the next endoscopic follow-up. There is great variability in published studies on the definition of PCCRC, some include CRCs diagnosed within 3 years, others within 5 or 10 years, and others without definite time after a baseline colonoscopy.^{4,8-10}

The colonoscopy's quality is a key point to ensure the prevention of colorectal cancer. In the study by Singh et al.¹¹ it is evident that a poor-quality colonoscopy was the cause of most PCCRC that occurred within 3 years after a normal colonoscopy. In recent years, several articles have been published on aspects related to the colonoscopy procedure, such as that of Brenner et al.⁴ or that of Samadder et al.,⁶ in which PCCRC characteristics are described, for example, a higher rate of occurrence in the proximal colon, and the possible predictive factors related to its occurrence, such as incomplete polypectomy, inadequate preparation of the colon or the absence of a correct follow-up.

The objectives of this study were to investigate the incidence of PCCRC in a population of Western Andalusia over a period of 17 years (1997-2014), as well as to analyze the characteristics and predictive factors associated with PCCRC.

Materials and method

Observational population-based study with retrospective and prospective phase that includes patients diagnosed with CRC between 1st January 2007 and 31st December 2014 in a population belonging to the healthcare area of Córdoba (Centre), and all patients of the same population that underwent a colonoscopy between 1st January 1997 and 31st December 2014. The CRC patient data were obtained from a hospital registry of gastrointestinal cancer processes created in 2006. The inclusion of patients

in this registry was performed prospectively in the following cases: outpatient study protocol of neoplastic-like or endoscopically unresectable lesions, patients with endoscopic biopsy of adenocarcinoma and minutes of the weekly meeting of the subcommittee of gastrointestinal tumours. In the retrospective phase, cases extracted from the Pathological Anatomy database were used, using as a search criterion the biopsies with colorectal cancer diagnostic code (endoscopic, by puncture and surgical), and cases from the endoscopic examination database with a colorectal cancer diagnostic code. Patients with a final diagnosis other than adenocarcinoma (adenoma and diverticulitis), samples sent from other hospitals for immunohistochemical study, patients referred for study and/or treatment from other healthcare areas or whose address did not belong to the healthcare area of the study population were excluded, as well as patients with recurrence of a previous tumour process.

The PCCRC group was obtained by matching the selected data from the registry of gastrointestinal cancer processes with that of endoscopic examinations, identifying the subjects who had had a colonoscopy between 6 months and 10 years before the date of CRC diagnosis.

Demographic variables (age and sex), personal and family cancer history, characteristics of the diagnostic colonoscopy of CRC were analyzed: cecal intubation rate and quality of preparation (considering adequate a good or excellent preparation according to the ASGE scale, or if all segments obtained 2 or more points according to the Boston scale). Colonoscopy characteristics prior to the diagnosis of CRC were also collected as well as data on the lesions detected through them (size, location and histology). Variables related to the CRC were recorded, such as lesion location and tumour stage at the time of diagnosis, as well as the treatment indicated after the same (surgery, cancer or palliative therapy). TNM staging of the tumours was obtained after surgery by the anatomopathological study of the resection specimen and/or based on imaging techniques (abdominal and endorectal ultrasound, chest X-ray, thoracic-abdominopelvic computed tomography and positron emission tomography).

In the statistical analysis, the quantitative variables were described by means and standard deviation, while in the categorical variables, frequency tables were used. A descriptive study of the baseline characteristics of patients with PCCRC was made. The contrast of hypotheses was performed using Student's *t* test for quantitative variables or Chi-square for categorical variables. In the case of variables with asymmetric distribution, nonparametric tests were used. Multivariate analysis was performed using multiple logistic regression to identify independent predictors of PCCRC, as well as to control potential confounding factors. The variables with $p < 0.30$ in the univariate analysis were included in the initial model. In this model, the variables with $p > 0.15$ were eliminated one by one, until obtaining the reduced model. Those variables with a statistical *p* value between 0.05 and 0.15 were tested as possible confounding factors, and extracted from the model only if the said role was excluded. All possible interactions were tested. The

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