Polyp recurrence after colonoscopic polypectomy

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Colorectal cancer (CRC) is the third most commonly diagnosed malignant tumor in the world. The past few years have seen a remarkable increase in both incidence and mortality of CRC in developing countries like China, posing a serious threat to human health. It is currently believed that about 70% of colorectal cancers are derived from conventional adenomas and 30% are derived from serrated adenomas.[1] As reported, CRC incidence rates per 10,000 person-years were 20.0 for advanced adenoma and 9.1 for non-advanced adenoma.[2] Colonoscopy, as an important tool for CRC screening and follow-up, can prevent the development of CRC by detecting and removing precancerous lesions, thereby effectively reducing the incidence and mortality. Current guidelines for post-polypectomy surveillance mostly recommend a 3- to 10-year interval according to baseline risk stratification.[3] However, there is no such guideline in China yet and doctors tend to perform the next colonoscopy within 1 year, which is much shorter than current international recommendations.

In this study, we aim to determine the risk factors for polyp recurrence and to investigate the recurrent time based on initial colonoscopy results in Peking Union Medical College Hospital (PUMCH). This is a single-center population-based retrospective cohort study conducted at PUMCH from 2012 to 2017. It had been approved by the Ethical Committee of PUMCH (S-K828) and all patients had given their informed consent prior to the study. All patients who had at least two colonoscopies, with at least one polyp in any colonoscopy were included in the study. The interval between two procedures was more than 6 months. The colonoscopies were performed by experienced attending physicians. Polyp treatment procedures included polypectomy, endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) adapting to different polyps. Patients were excluded if they had a personal history of CRC, inflammatory bowel disease, Behçet disease or intestinal infectious disease. Patients were also excluded if they were diagnosed with CRC within 6 months of the index colonoscopy. Data were obtained from medical records at the baseline colonoscopy, including demographic information (age, gender) and polyp features (number, size, and histology). The biopsies were examined by two pathologists and consensuses were reached. When more than one polyp was found, the most advanced (either size or histology) one was used for categorization. Based on the pathology archive at the baseline colonoscopy, the study population was categorized into three groups: (1) no polyp detected, (2) low risk, including hyperplastic polyps and tubular adenomas, (3) high risk, including tubulovillous adenomas, villous adenomas, serrated adenomas and polyps with dysplasia. The interval between the index colonoscopy and the colonoscopy when polyps appeared was calculated. The interval between the index colonoscopy when polyps were completely resected and colonoscopy without recurrence after 3 years was also calculated. Kaplan-Meier analysis (log-rank tests) and Cox proportional hazards analysis (covariates included age, sex, polyp size, number, and histology) were performed to determine the risk factors for polyp recurrence. Multivariate linear regression analysis (independent variables included polyp size, number, and histology) was then used to investigate polyp recurrent time. A P value of less than 0.05 was considered statistically significant. All analyses were conducted with SPSS 25.0 statistical software (IBM Corporation, USA).

After ineligible patients were excluded, a total of 1397 patients (mean age 58.6 ± 11.1 years, 884 males) were included in this study. The proportions of polyps 0–5 mm, 6–10 mm, and >1 cm were 53.7%, 27.6%, and 18.7%, respectively. The proportions of 0–2, 3–10, and >10 polyps were 64.4%, 32.7%, and 2.9%, respectively. A total of 272 high-risk polyps, and 788 low-risk polyps were detected at baseline, and 53 pathology archives were missing. During a mean of 2.5 ± 1.3 years of follow-up, 11 interval CRCs and

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24 polyps with dysplasia were found. The proportions of polyp recurrence in 0.5 to 1 year, 1 to 2 years, 2 to 3 years, >3 years, and no recurrence after 3 years were 26.9%, 36.7%, 18.2%, 12.2%, and 6.0% respectively. In the univariate analysis, age ($P = 0.002$), sex ($P = 0.010$), polyp size ($P < 0.001$), polyp number ($P < 0.001$), and histology ($P < 0.001$) were significantly associated with polyp recurrent time. In the Cox multivariate regression analysis, polyp size, number, and histology were significantly associated with polyp recurrent time. Hazard ratios for polyps 6–10 mm and >10 mm compared to polyps 0–5 mm were 1.387 (95% confidence interval [CI] 1.200–1.604, $P < 0.001$) and 1.649 (95% CI 1.369–1.986, $P < 0.001$) respectively. Hazard ratios for 3–10 and >10 polyps compared to 0–2 polyps were 1.396 (95% CI 1.229–1.585, $P < 0.001$) and 2.558 (95% CI 1.835–3.566, $P < 0.001$) respectively. Hazard ratios for low-risk and high-risk polyps compared to no polyp were 1.254 (95% CI 1.076–1.461, $P = 0.004$) and 1.511 (95% CI 1.214–1.881, $P < 0.001$) respectively. According to the linear regression analysis, the predicted recurrent time of patients with ≤2 polyps ≤5 mm in size or low-risk polyps was 20 to 27 months. The recurrent time of patients with 3–10 polyps ≥ 6 mm in size or high-risk polyps was 15 to 18 months. The recurrent time of patients with >10 polyps was 13 months.

Characteristics of the baseline colonoscopy are important predictors for developing metachronous neoplasia and determining appropriate intervals for surveillance. Several studies have suggested that high-risk factors at basal colonoscopy include pathology (villous lesions and high-grade dysplasia), size (>1 cm), number, and genetic predisposition (polyposis syndromes).[4] In this study, polyp size, number, and histology were found to have significant associations with its recurrent time, which is consistent with previous findings. As for colonoscopy surveillance interval, patients with >10 polyps relapsed in the shortest time as 13 months in this study, which is consistent with the latest US Multi-Society Task Force (US MSTF) guidelines, where 1 year rather than <3 year follow-up was recommended after removal of >10 adenomas.[5] Surveillance recommendation for patients with 3–10 polyps, ≥10 mm, or high-risk polyps ranges from 3 to 5 years, while a much shorter interval was expected in this study. It might be because we counted both non-advanced and advanced polyps, rather than advanced adenomas alone, in the follow-up colonoscopy as recurrence. In fact, only 11 interval CRCs and 24 polyps with dysplasia were found in our surveillance compared to 1278 non-advanced polyps, which might lead to overestimation of the risk in this group. Most guidelines put diminutive (<5 mm) and small (5–9 mm) polyps in the same category. However, it was noticed that patients with small polyps relapsed much earlier than those with diminutive polyps (18 months versus 24 months). Anderson *et al*'s[6] research also suggested that individuals with at least one small adenoma may be at higher risk for advanced adenomas than those with only diminutive adenomas. Recent studies put forward the opinion that patients with 1–2 small tubular adenomas without dysplasia have significantly lower risks of CRC compared to the general population after baseline polypectomy.[7] The latest US MSTF guidelines also prolonged the surveillance interval from 5–10 years to 7–10 years for these patients. Since the follow-up time was not long enough in our study, the predicted recurrent time for these individuals might be biased.

There are some limitations in our study. First, this was single-center research without enough external validation. Second, the sample size was not big enough and the follow-up time was too short. Third, the recurrent time in our study was the interval between two colonoscopies, which was bound to be longer than the time for new polyps to really develop. Finally, the recurrent time was predicted on the basis of single risk factor. Factor interaction needs to be considered in the future.

In conclusion, polyp size, number, and histology were significantly associated with polyp recurrence. It might be appropriate to repeat colonoscopy within 1 year for patients with >10 polyps, while others do not need such frequent follow-ups. Patients with small adenoma might require closer surveillance than those with only diminutive adenomas.

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Conflicts of interest

None.

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