Who Needs Follow-Up after Endoscopic Resection of Colorectal Adenomas?

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Surveillance colonoscopy · Colorectal cancer · Adenoma · Hereditary colorectal cancer

Summary
Background: Surveillance colonoscopy after endoscopic resection of colorectal adenomas is a crucial step in the concept of colorectal cancer screening. After identifying the patients at risk with screening and resection of adenomas, there has to be a tailored surveillance. Surveillance colonoscopy should detect recurrent and metachronal adenomas at a stage where they can be removed endoscopically. In the following, the criteria for a risk-adapted surveillance interval are presented.

Methods: A literature review based on American, European, and German guidelines for surveillance after polypectomy and the German guideline for the diagnosis and treatment of ulcerative colitis, as well as a selective literature search into hereditary colorectal cancer were performed.

Results: State of the art surveillance after endoscopic resection of colorectal adenomas is based on a focused anamnesis and the index colonoscopy. On the basis of existing guidelines, a risk-adapted surveillance strategy can be implemented.

Conclusions: Adherence to surveillance guidelines is a basic part of colorectal cancer screening and should be the starting point for further research.
Colonoscopic surveillance plays an important role in the concept of colorectal screening endoscopy. Individuals with adenomas in the index endoscopy have a higher risk of developing metachronous adenomas and carcinomas than individuals without adenomas. Colonoscopy surveillance should detect adenomas at a stage where they can be removed endoscopically. Overuse of colonoscopy surveillance leads to a higher burden for individuals, a higher risk of complications, and potentially a higher proportion of individuals lost to follow-up. Several national guidelines and also a European guideline for surveillance intervals exist [1–4]. The evidence for the intervals is based mainly on empirical data with the endpoint advanced adenoma after a certain post-interventional time interval. This is used as a surrogate marker for the prevention of colorectal cancer. The adherence to established guidelines is poor, even in high-quality centers [5, 6]. The following recommendations are based on the German S3 guideline ‘Kolorektales Karzinom’ [4].

**Anamnesis**

All recommendations are based on risk stratification. Therefore it is important to assess all known risk factors (fig. 1). Risk stratification is mainly based on the index colonoscopy. The criteria histology, number of adenomas, resection technique, and size allow certain conclusions to be drawn as to whether there is a higher risk of recurrence or development of metachronous adenomas. Besides the index colonoscopy, a focused anamnesis is important to check whether there is evidence of hereditary nonpolyposis colorectal cancer (HNPCC), increased familial risk of colorectal cancer, or ulcerative colitis. Each condition leads to modification of the surveillance strategy. Patients fulfilling the Amsterdam II Criteria or the Revised Bethesda Guidelines are at risk of HNPCC. These patients should receive human genetic counseling and molecular pathologic testing for microsatellite instability (MSI) and mismatch repair protein immunohistochemistry. Patients diagnosed with HNPCC should undergo annual colonoscopy surveillance [7]. Familial risk of colorectal cancer describes a group of people with an inherited form of colorectal carcinoma where the genetic changes are not completely understood [8].

Patients with a first-degree relative, parent, sibling, or child diagnosed at age >50 years with colorectal cancer have a two- to threefold higher risk of colorectal cancer [9]. In the case of a first-degree relative under 45, the risk is three- to sixfold higher [10]. This leads to a shorter interval to colonoscopy in the case of a negative index colonoscopy according to the American guidelines if the first-degree relative is younger than 60 at the time of diagnosis. The German guideline recommends colonoscopy surveillance after 10 years as in the normal-risk population.

**Index Colonoscopy**

If no adenoma is found in the index colonoscopy, the German guideline for the diagnosis and treatment of ulcerative colitis recommends colonoscopy surveillance every 1–2 years, 8 years after diagnosis of the disease in the case of pancolitis, and 15 years after diagnosis in the case of distal colitis [11].

The criteria histology, number of adenomas, resection technique, and size in the index colonoscopy are used to stratify patients into three risk groups: no risk, low risk, and high risk (fig. 2). Histology as stratification criterion of surveillance is based on the differentiation between tubular adenomas (low risk) and adenomas with villous components of at least 25% or high-grade dysplasia (HGD) (high risk). While the higher risk of advanced adenomas was shown for villous adenomas in a recent pooled analysis of 9,176 patients, HGD was not an independent risk factor in this analysis [12]. One disadvantage of using histology as a risk factor is the high interobserver variability [13, 14]. The surveillance guidelines of the British Society of Gastroenterology do not use adenoma sub-
tional serrated adenoma (TSA), 3 or more adenomas, size ≥10 mm, and resection in en bloc technique.

In addition, there are special constellations (table 2). In the case of a piecemeal resection, a first colonoscopy surveillance should be done in 3–6 months. In the case of 10 or more adenomas in the index colonoscopy, patients should get human genetic counseling and a genetic diagnostic work-up for APC mutations for attenuated FAP (aFAP) and MUTYH mutations for MUTYH-associated polyposis (MAP). Patients with aFAP or MAP should undergo annual colonoscopy. In the case of nondysplastic polyposis syndromes, there is little evidence of recommendations for surveillance intervals. For hyperplastic polyposis syndrome (HPP), there is increasing evidence that this syndrome leads to a higher risk of developing colorectal cancer. The World Health Organization (WHO) criteria for HPP are 5 or more polyps proximal to the sigmoid with at least 2 polyps of >10 mm, 20 or more polyps distributed throughout the entire colon, or 1 hyperplastic polyp and a first-degree relative with HPP. In the case of HPP, patients should undergo annual colonoscopy surveillances [22].

All these recommendations are based on a high-quality index colonoscopy. There is increasing evidence that good quality is as important as the other risk factors. A recent publication in the New England Journal of Medicine showed that the adenoma detection rate is an independent predictor of carcinoma interval after the index colonoscopy [23]. Inadequate bowel preparation as a quality criterion leads to a higher rate of missed lesions [24, 25]. These quality factors need to be considered when implementing risk stratification. Colonoscopy surveillance is important for reducing the incidence and mortality of colorectal cancer. Only if guidelines are adhered to can the maximum benefit of screening for colorectal cancer be obtained.

Disclosure Statement

No conflicts of interest.

Table 1. Standard risk groups

| Risk group       | Adenomas, n | Size < 10 mm | En bloc resection | HIEN or villos histology |
|------------------|-------------|--------------|-------------------|-------------------------|
| No risk          | n.a.        | yes          | yes               | no                      |
| Low risk         | <3          | yes          | yes               | no                      |
| High risk        | 3–9         | no           | yes               | yes                     |

HIEN = High-grade intraepithelial neoplasia; n.a. = not applicable.

Table 2. Special constellations

| Surveillance interval, months | Piecemeal resection | ≥10 adenomas | Hyperplastic polyposis syndrome | pT1 cancer |
|------------------------------|---------------------|--------------|-------------------------------|------------|
| 3–6                          | 12                  | 12           | 12                            | 3–6        |

* These are quality factors that need to be considered when performing risk stratification.
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