Low rate of local recurrence detection by rectoscopy in follow-up of rectal cancer

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Abstract

Aim The main aim of this study was to examine the effectiveness of rectoscopy for detecting local recurrence of rectal cancer in patients following low anterior resection.

Method This was a retrospective study of 201 patients, who underwent low anterior resection for rectal or rectosigmoid cancer between 2007 and 2009 and who were followed up with rigid rectoscopy and imaging. A total of 91 patients were excluded from the analysis for various reasons, leaving 110 patients eligible for analysis.

Results A total of 613 rectoscopies were performed, and 48 biopsies taken. Six local recurrences were detected in the 110 patients, three of which were first detected by rectoscopy and three by CT. Two of the local recurrences were detected outside the follow-up programme because of symptoms: one by rectoscopy and one by CT. Three of 613 (0.5%) rectoscopies led to detection of local recurrence. The sensitivity and specificity of rectoscopy to detect local recurrence was 0.50 and 0.93, respectively. Nineteen distant metastases were detected, and two patients had both local recurrence and distant metastasis. All local recurrences and distant metastases were detected within 48 months of surgery.

Conclusion Rigid rectoscopy is poor at detecting local recurrence. Only 3 out of 613 rectoscopies (0.5%) detected local recurrence. Due to extramural growth of some recurrences, the sensitivity is also very low. Based on our results, routine rectoscopy in the surveillance of asymptomatic patients cannot be recommended.

Keywords Rectoscopy, rectal cancer, local recurrence

What does this paper add to the literature?
Systematic follow-up after rectal cancer surgery is widespread, but documentation regarding follow-up rectoscopies is scarce. This study suggests that rectoscopy is unreliable at detecting recurrence and cannot be recommended as routine practice.

Introduction

Colorectal cancer is one of the most commonly diagnosed cancers in men and women, with 1325 new cases of rectal or rectosigmoid cancer in 2017 in Norway. The 5-year survival rate has increased over the last decades, being 68.9% and 69.4% in the period 2013–2017 for women and men, respectively [1]. Over the same time period the incidence of local recurrence has also decreased. Today, the estimated 5-year local recurrence rate for Stage I–III patients operated on in Norway in the period 2015–2017 is 3.4% [1]. About 30–60% of local recurrences grow outside the lumen and are not visible by rectoscopy [2]. Despite common practice, there is little evidence that intensive follow-up programmes improve survival compared with minimal or no follow-up [3].

According to the Norwegian national guidelines, follow-up after low anterior rectal resection is conducted by the surgeon and comprises rigid rectoscopy every 6 months for the first 3 years and every 12 months for the following 2 years (Table 1) [4]. Rectoscopy is considered a relatively easy and cheap examination, although patients may experience pain, discomfort and anxiety [5]. However, the effectiveness of rectoscopy in detecting local recurrence after surgery for rectal malignancy has not been studied.

The main aim of this study was to examine the effectiveness of rectoscopy in detecting local recurrence after surgery for rectal cancer.

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Table 1 Norwegian guidelines for follow-up [6].

Postoperative month	1	6	12	18	24	30	36	48	60
CEA	x		x	x	x	x	x	x	x
CT liver/abdomen/pelvis		x							x
Liver US with contrast			x	x	x	x	x	x	
Low-dose CT thorax			x		x		x	x	x
Colonoscopy									x
Rectal examination		x	x	x	x	x	x	x	x

Tumour > 20 cm from anal verge.
CEA, carcinoembryonic antigen; US, ultrasound.

Method

Patient population and exclusion criteria

All patients who underwent surgery for rectal cancer with an anastomosis less than 15 cm from the anal verge between 2007 and 2009 at the Haukeland University Hospital, Norway were included. All patients were examined preoperatively by rectoscopy using a rigid scope. Rectosigmoid cancer was defined as tumour less than 20 cm from the anal verge. A total of 91 out of the initial 201 patients were excluded (Fig. 1).

Follow-up protocol

The Norwegian follow-up protocol is shown in Table 1. In addition to measurement of serum carcinoembryonic antigen (CEA) and radiological examinations, the follow-up comprises digital rectal examination and rigid rectoscopy every 6 months for the first 3 years and every 12 months for the following 2 years. At 60 months postoperatively, a colonoscopy is also included. According to the guidelines, patients are supposed to be followed up for 60 months. For various reasons, some of the patients had either a shorter or a longer follow-up. Data from all follow-ups at the surgical outpatient clinic were collected even if they occurred after the recommended 60-month postoperative follow-up period.

Rectoscopies and imaging procedures were registered as belonging to the same follow-up appointment if they occurred within a timeframe of 2 months. This meant that many patients ended up having more than the recommended eight follow-up appointments as there were regularly more than 2 months between rectoscopy and radiological imaging. Consultations consisting only of information concerning pathology postoperatively, anamnesis, CEA measurement or general clinical examination without rectoscopy or imaging were not considered as oncological follow-up appointments. Patients receiving colonoscopy were registered in the database, but no further analysis was carried out.

The reference value for CEA levels was defined as the first postoperative value available, and all following measurements were compared with this. A significant elevation of CEA was defined as a three-fold increase relative to the postoperative value [4].

Statistics

Data from the electronic patient record (DIPS™ ASA, Bodø, Norway) were registered and analysed by SPSS version 23 (SPSS, Chicago, Illinois, USA). As many as 15 consecutive follow-ups have been registered per patient. Sensitivity and specificity for rectoscopy were calculated using a contingency table. A true positive was defined as local recurrence detected by rectoscopy on routine follow-up and confirmed by biopsy. Local recurrences detected by CT or MRI, and not rectoscopy, were defined as false negatives with respect to rectoscopy. In evaluating the effectiveness of rectoscopy we calculated the total number of examinations that needed to be performed to detect a single recurrence.

Ethics

The regional ethics committee (REK) in Bergen, Norway approved this study.

Results

Patient characteristics

Characteristics of the study population are shown in Table 2. Postoperative complications according to tumour classification are in Table 3. Patients not eligible for follow-up were older, suffered from a higher rate of comorbidity and were more often classified as American Society of Anesthesiologists (ASA) group III (data not shown).
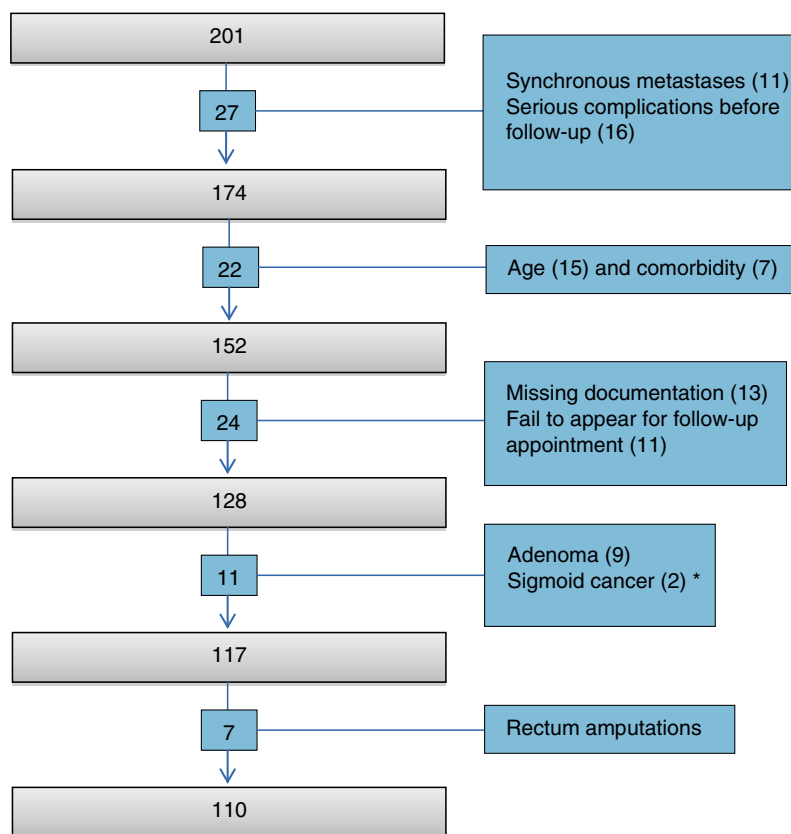
Figure 1 Patient exclusion.

Number of local recurrences

Six out of 110 patients (5.5%) were diagnosed with local recurrence during the observation period; four of these were detected at routine follow-up appointment, of which two were first detected with CT scan and two by rectoscopy (Table 4). None of the patients with local recurrence detected at routine follow-up reported symptoms prior to examination. One of the patients who had the recurrence detected by rectoscopy had a CT scan performed at the same time which did not reveal the recurrence. Another patient had the local recurrence detected by CT scan, later confirmed by MRI. This patient did not undergo rectoscopy in the follow-up, and we have no information about intraluminal tumour growth or whether the tumour could be visible during rectoscopy. Furthermore, two recurrences were detected outside the follow-up programme in patients admitted to hospital, one with rectal bleeding (local recurrence detected by rectoscopy) and the other with pulmonary embolism (local recurrence detected by CT scan and confirmed by rectoscopy). Only one of the patients with local recurrence had a serum CEA measured at the same follow-up as the recurrence was detected, but the value

measured was not significantly increased. Hence five out of six patients with local recurrence underwent rectoscopy.

The histological features found in Table 3 were analysed for their ability to predict local recurrence. A microscopically positive circumferential margin (CRM; R1, tumour growth < 1 mm of the CRM) was found in six patients. None of these developed tumour recurrence. The distal resection margin was defined as ´narrow´ when tumour was detected within 5 mm. We found that five of the six patients with local recurrence had a narrow or positive distal resection margin. Of the 86 patients who did not develop recurrent cancer, three had a positive and eight a narrow distal resection margin. The sensitivity of a narrow distal resection margin of less than 5 mm was 33.3% (95% CI 11.8–61.6), specificity 92.0% (95% CI 83.4–97.1), diagnostic accuracy of positive R narrow being 82.2% (95% CI 72.7–89.5).

Rectoscopy and biopsy outcome

There were 48 biopsies (7.8%) taken in the 613 rectoscopies performed, of which 43 were reported as benign and 4 (10.4%) malignant. Two specimens were taken

Table 2 Patient characteristics.

	Number (percentage)*
Gender (M:F ratio)	1.56
Age (years), median (range)	62.0 (21–84)
BMI (kg/m^2)	
Underweight (< 18.5)	2 (1.8)
Normal (18.5–25)	44 (40.0)
Overweight (> 25)	59 (53.6)
Missing data	5 (4.5)
Smoker	
Yes	31 (28.2)
No	79 (71.8)
Comorbidity	
Heart	27 (24.5)
Lung	13 (11.8)
Diabetes	7 (6.4)
Hypertension	45 (40.9)
ASA classification	
I	19 (17.3)
II	73 (66.4)
III	16 (14.5)
IV	2 (1.8)
Anastomosis < 5 cm	
Yes	21 (19.1)
No	82 (74.5)
Missing data	7 (6.4)
Anastomosis level (cm), mean (SD)	7.1 (3.1)

*Except where stated otherwise.
ASA, American Society of Anesthesiologists; BMI, body mass index.

Table 3 Complications, Dukes and pTNM.

	Number (percentage)
Clavien–Dindo	
1	65 (59.1)
2	21 (19.1)
3	23 (20.9)
4	1 (0.9)
5	0 (0.0)
Reoperation	
None	35 (31.8)
Stoma reversal	51 (46.4)
Metastasis/recurrence	19 (17.3)
Acute complications	21 (19.1)
Other	8 (7.3)
Residual tumour	
Distal margin ≥ 5 mm	93 (84.5)
Distal margin 0–4 mm/uncertain margin	12 (10.1)
Circumferential resection margin < 1mm	6 (3.0)
Macroscopic residual tumour	5 (4.5)
Dukes	
A	35 (31.8)
B	31 (28.2)
C	30 (27.3)
D	5 (4.5)
Unknown/missing data	9 (8.2)
pTNM	
T1	12 (10.9)
T2	33 (30.0)
T3	53 (48.2)
T4	3 (2.7)
Tumour not found	8 (7.3)
Missing data	1 (0.9)
N0	77 (70.0)
N1	26 (23.6)
N2	7 (6.4)
M0	105 (95.5)
M1	5 (4.5)

outside regular follow-up. One of the local recurrences detected in routine follow-up was detected by CT prior to rectoscopy. No convincing suspect tumour lesions were detected by rectoscopy; however, biopsy was taken because of the CT description. For this reason, this biopsy was not counted as 'pathology seen in rectoscopy' when calculating sensitivity and specificity but as 'normal rectoscopy' (Table 5). The sensitivity and specificity of rectoscopies to detect local recurrence are calculated to be 0.50 and 0.93, respectively (the two local recurrences detected outside regular follow-up are not included). The numbers used in this calculation are shown in Table 5.

Technical difficulties in performance of rectoscopy

Some patients were not prepared adequately for rectoscopy upon arrival at the appointment, making the examination impossible or inconclusive. Additionally, patients with stenotic anastomosis or abscesses left the examination inconclusive with regard to recurrence.

Imaging and CEA

In addition to the local recurrences 19 distant metastases were detected, eight by CT scan, seven by chest X-ray and/or liver ultrasound and four by CEA measurements. Six of 617 CEA measurements (1.0%) were significantly elevated, two leading to detection of metastasis and two revealing metastases at CT scan on the same follow-up (defined as detected by CT scan in this paper); the last two had no metastasis despite the elevation in CEA. Two metastases were detected after elevated, nonsignificant values. None of the patients with local recurrences had a raised CEA.

Table 4 Local recurrences.

Patient number	Months after operation	Modality	Symptoms	Comment
1	11	CT		Confirmed by DRE and biopsy taken 1 month after CT scan. CEA not measured at time of recurrence
2	40	CT		Confirmed by MRI. CEA value not significantly increased. No rectoscopy
3	7	Rectoscopy		CEA not measured at time of recurrence. No CT
4	32	Rectoscopy		CEA not measured at time of recurrence. CT 3 months before without pathology
5	Outside follow-up (35 months)	Rectoscopy	Rectal bleeding	Unknown CEA value
6	Outside follow-up (12 months)	CT		Admitted to hospital with pulmonary embolism. Recurrence suspected on CT confirmed by rectoscopy. Unknown CEA value

CEA, carcinoembryonic antigen; DRE, digital rectal examination.

Table 5 Sensitivity and specificity of rectoscopy in routine follow-up.

			No recurrence	Local recurrence	Sum
Sensitivity	0.50				
Specificity	0.93				
PPV	0.04		No recurrence	Local recurrence	Sum
NPV	0.99	Normal rectoscopy	564	2	566
Accuracy	0.93	Pathology seen in rectoscopy	43	2	45
Likelihood	7.14	Sum	607	4	611

NPV, negative predictive value; PPV, positive predictive value.

Time of follow-up

Follow-up appointments were based on guideline recommendations. Figure 2 shows the number of follow-up appointments for each month postoperatively, ranging from 0 to 90 months, with vertical lines marking the recommended times for follow-up in months.

Patients who experienced complications or had a temporary stoma started follow-up later than recommended. A total of 931 follow-ups were registered, giving 821 intervals. The mean interval length is 5.87 months and 188 intervals were exactly 6 months long. Twenty out of 110 patients had their first follow-up later than 6 months after operation. Eighty-four of 110 patients attended the final follow-up at 60-months.

Discussion

The main aim of this study was to evaluate the effectiveness of rectoscopy in surveillance after rectal cancer surgery. The adoption of national surveillance guidelines is time-consuming. Even though rectoscopies are recommended on every follow-up from 6 to 60 months after operation, only a maximum of 75% of the patients at any given time during follow-up were examined by rectoscopy. Only 5 out of 48 biopsies taken were malignant, and only three of these were taken on regular follow-up appointments. Our findings suggest that rectoscopy is poor at detecting local recurrence. These findings are in agreement with the only other study on the subject, in which rectoscopy failed to diagnose the one local recurrence in 112 patients [5].

Our results do not permit any conclusions to be drawn on the significance of presenting symptoms. Only one patient in this study experienced bleeding due to recurrence of cancer. Therefore, we cannot conclude on whether the presence of symptoms is a better indication for rectoscopy than a routine rectoscopy of all patients. It is possible that patient discomfort deters patients from repeated rectoscopy. The examination is usually, but not invariably, well tolerated [6]. We recognize that flexible sigmoidoscopy is better tolerated than rigid rectoscopy [7].

Over the 5 years of follow-up in the present study we have observed a trend away from X-rays and ultrasonography towards CT scans. This probably reflects increased reliance on CT imaging, and the fact that national guidelines suggest CT scan as an alternative if contrast-enhanced ultrasound is not available [4].
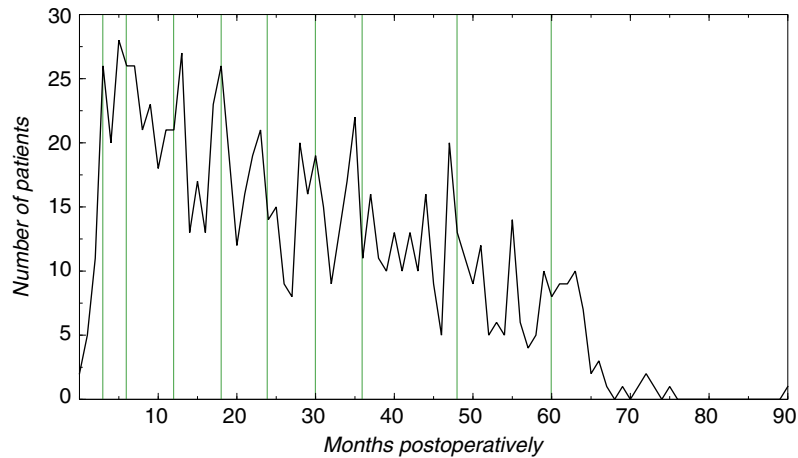
Figure 2 Number of patients at follow-up appointments 0–90 months after operation. Vertical lines mark the recommended times for follow-up according to national guidelines [6].

Imaging (CT scan, chest X-ray and abdominal ultrasound) detected 15 out of 19 metastases. Additionally, imaging was used to confirm metastases in the remaining four patients with elevated CEA values. The use of CT scan in follow-up to detect local recurrence is further supported by the fact that local recurrence with extraluminal involvement has become the most prevalent pattern after the introduction of total mesorectal excision [8]. In a study conducted by Rahbari et al. [9], 62.0% of the local recurrences were located extraluminally. In another study by Kusters et al. [10], only 22.9% of local recurrences were in the proximity of the anastomosis. We still recommend digital rectal examination and rectoscopy in symptomatic patients as these procedures are simple and will detect obvious recurrence. Extraluminal recurrence, on the other hand, cannot be detected by rectoscopy and in some cases can also be difficult to detect by endoscopic ultrasound and CT. In our institution, we perform MRI in these cases.

In our study, one of the local recurrences was detected by rectoscopy and not by CT. However, CT remains a method of choice since it can detect distant metastasis in addition to local recurrence. Most of the recurrences occur during the first 3 years and affect the liver, lymph nodes, lung and peritoneum, and no fewer than 20% of metastases occur during the first 3 months after diagnosis [11]. Therefore, annual CT of thorax, abdomen and pelvis for the first 3 years after surgery can be recommended.

Our data show a higher risk of local recurrence among patients with a distal resection margin of less than 5 mm. Based on these findings, this subgroup of patients could benefit from a closer follow-up, including clinical examination and rectoscopy by the surgeon.

A close distance of the tumour to the CRM has also been shown to be a strong and independent risk factor for local recurrence. An involved CRM of < 1 mm carries the highest risk for local recurrence with a hazard ratio of 4.4 [12] in mid rectal cancer. However, in the present study none of the patients with CRM < 1 mm developed a local recurrence [13].

In this retrospective study, information about why patients left the programme, had the start of follow-up delayed or had more appointments than recommended is not available. Another issue concerns patient compliance with follow-up, especially towards the end of the programme. Only 76% of patients attended to the last follow-up. The number of patients leaving the follow-up programme was higher than in other similar studies [14–16]. The present study revealed a low compliance with follow-up and large differences in the number of and intervals between follow-up appointments.

Further studies are necessary to measure the effectiveness of surveillance programmes for patients treated for rectal cancer. In the present surveillance protocol, rectoscopy is not effective. Future studies should also address the ability of rectoscopy to detect local recurrence [17].

Traditional follow-up programmes focus primarily on the detection of recurrence and less on late effects and quality of life. A recent study from Denmark investigated a more patient-centred follow-up, with an increased focus on physiological and psychological outcomes. The hypothesis is that patient-led follow-up will enable identification and treatment of adverse events and lead to earlier detection of local recurrence [18].

A close nurse-guided follow-up embedded in a symptom-orientated postcancer care programme may be more helpful for patients from all necessary perspectives and better accepted. In specialized hands it could be more effective and efficient, restricting routine rectoscopies only to selected high-risk patients.

Conclusion

Routine rigid rectoscopy has a low sensitivity to detect local recurrences and is not efficient. There is an evident difference from scheduled follow-up appointments as recommended by national guidelines regarding time point and frequency, and there are a high number of dropouts from the programme within a 5-year follow-up period. This results in a relatively high number of patients going without surveillance. CT scan seems to be more appropriate for detecting extraluminal recurrence and distant metastasis. Rectoscopy cannot be recommended as routine part of a follow-up programme.

Acknowledgements

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