> Translation of the article

Endoscopic mucosal resection and conventional polypectomy in colorectal adenomas treatment

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ABSTRACT *AIM: to compare the early and long-term results of endoscopic mucosal resection (EMR) and conventional polypectomy for benign epithelial colon neoplasms.*

PATIENTS AND METHODS: the retrospective study included 344 patients with histologically verified adenomas of the size of up to 40 mm in the colon, who underwent EMR or conventional polypectomy. Mucosectomy (EMR) was performed in 207 patients, while conventional polypectomy was performed in 137.

RESULTS: there were no significant differences in the postoperative morbidity rates between the methods (OR 1.8; 95% CI: 0.7–4.8, p = 0.3). Fragmentation significantly more often occurred in the group of conventional polypectomy (OR 3.5; 95% CI: 2.3–5.5, p = 0.001, especially when the size of the neoplasm was over 1 cm (OR 3.1; 95% CI: 1.1–8.9, p = 0.037). Recurrence occurred in 19/173 (10.9%) in 12 (8.3%) patients of the EMR group. In the polypectomy group, recurrence developed in 22 (23.1%) patients, in 24/108 (22.2%) cases at the site of the postoperative scar. It was found that the adenoma recurrence in the area of endoscopic excision occurs significantly more often after conventional polypectomy (OR 2.3; 95% CI: 1.2–4.4; p = 0.016).

CONCLUSION: EMR and conventional polypectomy both are the safe methods with low morbidity rates. However, the EMR is the preferred method of endoscopic excision for adenomas larger than 1 cm due to the fact that it allows for deeper and more complete resection than conventional polypectomy.

KEYWORDS: endoscopic mucosal resection, polypectomy, colorectal adenomas

CONFLICT OF INTEREST: The authors declare no conflict of interest.

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INTRODUCTION

Adenomas originating from the cells of the glandular epithelium are the most common form of benign colorectal neoplasms [1]. The average detection rate of adenomas in the target population (age of screening, follow-up after surgery, or complaints of changes in intestinal function) reaches 31% [2]. The prevalence and malignant potential of colorectal adenomas determines the high efficiency of their timely diagnosis and removal in reducing the mortality of the population because of colorectal cancer [3].

For endoscopic excision of colorectal neoplasms, conventional polypectomy and mucosectomy are most widely used [4]. Mucosectomy is the resection of a fragment of the intestinal wall, including the mucosa up to the submucosal base, using a diathermic loop [5]. The main difference between mucosectomy and conventional polypectomy is the lifting of the submucosal layer of the adenoma, which, with the help of special solutions,

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allows achieving a deeper and more complete resection of the tissue [6].

This study is a retrospective audit, the purpose of which is to compare the immediate and long-term results of treatment of patients with benign epithelial neoplasms of the colon, removed by mucosectomy or conventional polypectomy.

PATIENTS AND METHODS

A retrospective study included patients treated from October 2014 to December 2019.

The results of the treatment of the patients with histologically confirmed benign epithelial neoplasms of the colon up to and including 40 mm in size, who underwent endoscopic mucosectomy or conventional polypectomy with the colonoscope, were analyzed. The study groups were adjusted as per the age, gender of the patients, as well as the size of the neoplasms.

Mucosectomy was performed in 207 patients (95 men and 112 women) with 260 benign neoplasms of the colon. The group of the patients with conventional polypectomies included 137 patients (59 men and 78 women) with 160 benign neoplasms of the colon. The median age of the patients included in the study in the mucosectomy group was 67 (27–80) years compared to 62 (27–82) years in the polypectomy group.

The assessment of the size of a neoplasm was carried out using the width of the branches of the biopsy forceps, which in the unfolded state is 8 mm. The median size of the neoplasms in the mucosectomy group was 13 (7–40) mm versus 15 (6–35) mm in the polypectomy group.

Mucosectomy was started with an injection of gelatin solution with indigo carmine into the submucosal layer to create a tumor lifting at a distance of at least 1 cm from the edge of the neoplasm. After selecting the appropriate endoscopic loop, it was thrown over the lesion and tightened at its base with a small grip of the unchanged mucosa to resect the mucosa within the unaffected tissue. Together with the tightening of the loop, electric current was supplied in various cutting and coagulation modes.

Conventional polypectomy was performed in a standard volume: a diathermic loop was thrown over the lesion with an additional check of the radicality of the capture. Removal was performed by a multi-stranded electric loop in the coagulation mode or in the combined pulse mode.

After removing the lesion, the specimen was extracted for the morphological study. If it was impossible to remove the formation *en bloc*, the method of fragmentation by multiple loop electroexcision was used.

After discharge, the patients who had the tumor removed *en bloc*, a control colonoscopy was recommended after 6 months, and, in case of the specimen fragmentation, after 3 months.

The primary patient data was entered into the Microsoft Excel 2018 spreadsheet for Windows 10. With the normal distribution of the variation series, the quantitative parameters were described using the median values and the standard deviation. In case of an abnormal distribution of the variation series, the medians and its extreme values were used. To compare the average values, an unpaired t-test was used. The Mann-Whitney test was used to compare the medians. The determination of cut-off points for quantitative parameters was carried out using ROC analysis with the construction of a ROC curve (Receiver Operating Characteristic). The results were considered significant when the area under the ROC curve was at least 0.5. The statistical analysis was performed using SPSS 23.0 software for Windows (SPSS Inc., USA). The differences were considered statistically significant at $p < 0.05$.

RESULTS

According to the inclusion criteria, the results of the treatment of 344 patients were analyzed. Mucosectomy was performed in 207 patients, while conventional polypectomy was performed in 137 patients.

The median time for performing conventional polypectomy with the colonoscope was 35 (15–70) minutes versus 60 (37–80) in the mucosectomy group. This time difference was significant ($p = 0.0001$). It is important to note that this took into account the time of setting up the equipment, endoscopic search for target tumors,

Table 1. *Complications after mucosal resection and conventional polypectomy*

The nature of complications	Mucosectomy (n = 260)	Polypectomy (n = 160)	p
Postpolypectomy syndrome	9/260 (3.5%)	3/160 (1.9%)	0.34
Bleeding	4/260 (1.5%)	1/160 (0.7%)	0.4
Total:	13/260 (5.0%)	4/160 (2.6%)	0.2

Table 2. *The risk of recurrence*

Method	Follow-up Supervision	Recurrence
Mucosectomy	173/260 (66.5%)	19 (11.0%)
Polypectomy	108/160 (67.5%)	24 (22.2%)

stopping bleeding, as well as the time of removing the colonoscope.

Intraoperative blood loss in both cases was minimal and clinically insignificant.

There were no complications that would require conversion to abdominal surgery in any of the groups.

In the group of conventional polypectomies, up to 30 days after the surgery, 1 patient developed bleeding, which was stopped endoscopically. Four patients after mucosectomy required repeated endoscopic surgery, while in two cases, despite the presence of blood clots in the intestine lumen, there were no signs of continuing bleeding. In the other two patients, the bleeding was controlled by applying an endoclipse. Assessment of the incidence of postpolypectomy syndrome showed that 9 patients after mucosectomy required antibacterial drugs, compared to 3 patients in the polypectomy group (Table 1). When comparing the early results, it was found that there were no significant differences in the incidence of postoperative complications between the methods (OR 1.8; 95% CI: 0.7–4.8, $p = 0.3$).

The specimen fragmentation occurred in 71/160 (44.3%) cases in the polypectomy group versus 48/260 (18.4%) in the mucosectomy group. Due to the high rate of fragmentation during polypectomy, we constructed a ROC curve with a cut-off point to determine what size of neoplasms is a significant limitation of polypectomy in favor of mucosectomy for the purpose of radical removal of the specimen *en block* (Fig. 1). The area under the curve was 0.77, which reflects the satisfactory prognostic significance of the model. It was found that significant differences in the incidence of fragmentation appear when the size of the neoplasm is over 1 cm. The sensitivity of the model at this cut-off point was 94%, and the specificity was 82%.

Thus, when analyzing the incidence of fragmentation, significant differences were obtained between the groups of conventional polypectomy and mucosectomy. According to our data, fragmentation was significantly more often in conventional polypectomy (OR 3.5; 95% CI: 2.3–5.5,
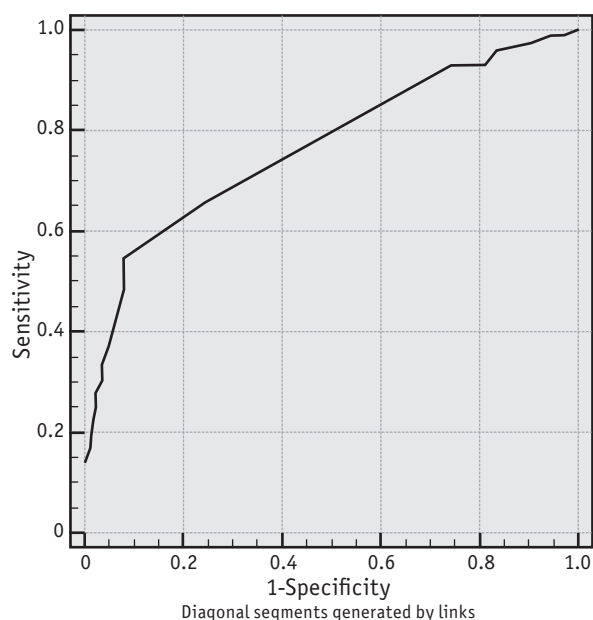
Figure 1. *ROC curve of the dependence of the fragmentation rate on the tumor size during polypectomy*

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$p = 0.001$), especially when the neoplasm size was over 1 cm (OR 3.1; 95% CI: 1.1–8.9, $p = 0.037$).

Late outcomes were assessed in 144/207 (69.5%) patients with 173/260 (66.5%) benign neoplasms in mucosectomy group and 95/137 (69.3%) patients with 108/160 (67.5%) colon polyps in the polypectomy group. The median follow-up period after polypectomy was 14 ± 7.3 months and mucosectomy was 11 ± 7.4 months.

Local recurrence was considered to be the appearance of a tumor in the site of the postoperative scar during endoscopic control. In the mucosectomy group, 19/173 (10.9%) recurrent neoplasms were detected in 12 (8.3%) patients. In the polypectomy group, recurrence developed in 22 (23.1%) patients, in 24/108 (22.2%) cases at the site of the postoperative scar (Table 2).

It was found that recurrence of adenoma in the site of endoscopic surgery occurs after conventional polypectomy (OR 2.3; 95% CI: 1.2–4.4; $p = 0.016$). All the patients underwent repeated endoscopic surgery: mucosectomy or endoscopic dissection in the submucosal layer without signs of re-recurrence, with an average follow-up period of 8.6 ± 3.7 months.

DISCUSSION

Timely diagnosis and treatment of benign epithelial colorectal neoplasms is an urgent problem of colorectal surgery, since it reduces mortality caused by malignant neoplasms of this localization, and the wide prevalence among the working-age population makes this problem socially significant.

The comparative analysis of the early results of mucosectomy and conventional polypectomy showed the safety of the studied methods. The incidence of clinically significant complications did not exceed 5.0%.

The major complication that may require repeated endoscopic or even abdominal surgery is delayed bleeding, the risk of which increases in direct proportion to the size of the neoplasm [7].

According to the study by Van Der Star et al., which combined the results of treatment of 542 patients with large (> 20mm) colon neoplasms who underwent mucosectomy, the risk of delayed bleeding

reaches 7.7% (42/542), which in 72% of cases require repeated endoscopic surgery [8].

In addition to the risk of bleeding, with an increase in the size of neoplasms, both with conventional polypectomy and mucosectomy, there are certain restrictions on the removal of neoplasms *en bloc*. Thus, with a mean tumor size of over 22 mm, only 53.5% of tumors can be removed *en bloc* [9]. This is due to the limited size of the endoscopic loop. According to the presented study, specimen fragmentation occurred in 71/160 (44.3%) cases in the polypectomy group, versus 48/260 (18.4%) in the mucosectomy group ($p = 0.001$).

It is important to note that the risk of fragmentation directly affects the risk of the lesion recurrence. Removal of the tumor in fragments by a loop implies the impossibility of histological assessment of the resection margins and the radicality of the performed procedure. According to the retrospective studies by Belderbos T. and Briedigkeit A. et al., the risk of recurrence in this case is 15–20% [10,11], and with the removal of lesion exceeding 20 mm, it can reach 30% [12]. In the retrospective analysis, it was proved that significantly more often the recurrence of adenomas in the site of endoscopic removal occurs after conventional polypectomy (OR 2.3; 95% CI: 1.2–4.4; $p = 0.016$).

Therefore, when choosing the method of endoscopic excision of tumors comparable in size, preference should be given to endoscopic mucosectomy [13].

However, even in case of continued growth of the tumors detected during endoscopic control, in most cases, recurrent neoplasms are small in size, and they can be easily removed [14].

According to the results of the multicenter prospective study of 1,000 consecutive mucosectomies of polyps reaching 13 cm in size, 93% (135 out of 145) of local recurrences were successfully removed endoscopically, and only 10 remaining patients underwent abdominal surgery [15].

Similarly, all the patients with recurrence included in this study underwent repeated mucosectomy or submucosal endoscopic dissection without recurrence, with an mean follow-up of 8.6 ± 3.7 months after the repeated procedure.

A significant limitation of the study is its retrospective nature and the inclusion of patients

with neoplasms larger than 25 mm in diameter, since their endoscopic excision in most cases was deliberately carried out by the fragmentation.

CONCLUSION

Mucosectomy and conventional polypectomy are the safe methods of removing colon adenomas with a low number of complications.

However, mucosectomy is the preferred method of endoscopic excision of adenomas larger than 1 cm due to the fact that it allows to perform deeper and more complete resection than conventional polypectomy, which leads to a lower risk of recurrence. Most cases of local recurrences can be successfully removed endoscopically.

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