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Research Article

Combined Staged Treatment of Villous Tumours of the Rectum and Colon

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Abstract

Aim of the Study: To develop and introduce into clinical practice a method of staged treatment of villous tumors of the colon based on using the combination of diathermocoagulation and high-intensity laser radiation.

Materials and Methods: The patients were divided into 2 groups. The first (control) group included 80 patients and were treated only with using of endoscopic loop and electricity energy. The second (examined) group consisted of 52 patients. Their treatment included combination of two methods: endoscopic excision with an endoscopic loop and laser vaporization of the tumor base. The patients of both control and examined groups had villous tumors with size from 1.5 to 8 - 9 cm in diameter. In some cases, the base of the tumor occupied up to half of the intestinal lumen, the length reached 8 - 9 cm. Depending on the size of the tumor removal was performed in one stage or in several steps (multistage). In 32 cases tumors excision were performed by its fragmentation during one procedure, in 20 cases the tumors were removed in several stages.

Results: In the control group of patients, tumors up to 2 - 3 cm in diameter in most cases were removed during one procedure. The lesions larger than 3 cm were removed during one or more procedures at the first hospitalization. The relapse rate in this group was 30%. Laser vaporization was used in patients of the examined group. The method was used to vaporize the base of the tumor after endoscopic electroresection of its exophytic part. Relapse of the disease in the second group was observed in 5% of patients.

Conclusion: The use of diathermocoagulation (loop excision of the tumor) and high-intensity laser radiation of various wavelengths can reduce the relapse rate of the disease from 30 to 5%, making this intervention the operation of choice in the treatment of large villous adenomas of the colon.

***Keywords**: Villous Tumor; Loop Excision; Laser Vaporization; Staged Treatment*

Introduction

According to the endoscopic terminology recommended by the OMED, a tumor is a formation (exophytic mass) of any size and shape. This term is not recommended for use for exophytic formations with specific characteristics, such as: varicose veins, cyst, papule, fold, protrusion from compression. Minor tissue protrusions such as grain, nodule or papule are also not characterized by the term "tumor" [1].

Uryadov S.E. (2012) offered using the term "tumor" as descriptive, not suggesting a neoplastic microscopic examination. With a significant size of the formation, the presence of exophytic growth or ulceration, the term suggests the neoplastic nature of the formation.

According to Uryadov S.E. (2012) and Huber A.R. (2009) to diagnose a tumor such signs as: size, edge, surface and immediate surroundings of the formation should be taken into account. Wherein the "tumor" can be characterized as a formation on a broad base, having a villous surface with tree-like branches. Often the formation is covered with a thick layer transparent mucus [1,2].

According to Kovács M., *et al*. (2008), Menardo G (2004), villous tumors most often occur as solitary formations, less often multiple tumors may be observed in one patient. Vile tumors can be of various sizes - from 1.5 to 9 cm in diameter. The large size of the tumor does not always indicate its neoplastic origin. In appearance, vile tumors are nodular and creeping in shape. More often knobby form of tumor can be met. The formation is located on one or more walls of the intestine, depending on the size. Macroscopically, this form looks like a node protruding into the intestinal lumen. The base of the tumor is most often wide with or without a short stalk, less often it is stalk tumors. The creeping form of the tumor is less common, macroscopically has the appearance of a flat formation located on one or several walls of the intestine. In some cases, the tumor can occupy all walls, affecting the intestine circularly. Externally, the surface of the vile tumor has a reddish color due to the pronounced vascularization of its stroma. The surface of the tumor is represented by thin and delicate villi, which are easily injured upon contact. Bleeding caused by trauma to the tumor does not prove its malignant nature [4,5].

Lapteva EA (2013) pointed to the presence of endoscopic signs, evidence in favor of neoplastic degeneration of the vile adenoma of the colon. A combination of two or more next signs indicates a malignant transformation of the tumor: areas of compaction on the surface of the tumor, dense consistency of adenoma, surface ulceration, fibrin overlay, contact bleeding and surface tuberosity [6].

Iida Y., *et al*. (1994) drew attention to the clinical course of the disease in giant vile tumors, which is accompanied by dysproteinemia, serious disorders of water and electrolyte balance associated with the loss of protein and electrolytes with mucus. Clinical signs of complete or partial intestinal obstruction associated with intestinal intussusception may develop in large villous tumors. The clinical manifestation of benign formations of the rectum and colon is more pronounced in the presence of another pathology of the anorectal zone (anal fissure, hemorrhoids) [9].

Vile adenomas are characterized by a particularly high capacity for malignancy and recurrence. The precancerous nature of the villous tumors is obvious. According to the literature, there is a high risk of malignancy of villous tumors of the rectum and colon, and early diagnosis with modern treatment is an action to reduce the incidence of colon cancer.

In the world there are various methods of treating vile tumors of the rectum and colon (compression polypectomy with nickelide-titanium implants, as well as argon-plasma coagulation through a rectoscope and fibrocolonoscope, dissection in the submucosal layer) [9-11].

There are three methods of transanal excision of a villous tumor: bringing the tumor down below the anal sphincter with sufficient devulsion (feasible in the presence of a labile tumor stem); transanal excision of the tumor with a rectal mirror installed (the operation is indicated when the tumor is low and its mobility is limited) [12]; TEM (transrectal endoscopic microsurgery). The main stages of TEM are installation of an operating rectoscope; the supply of carbon dioxide into the intestinal lumen; marking the boundaries of the "single block"; dissection in the submucosal layer or mesorectum, tumor mobilization; removal of a tumor, treatment of a wound; suturing of a postoperative defect of the intestinal wall.

The sequence of removal of large vile tumors of the colon with colonoscope is as follows: the location of the tumor 1 - 2 cm from the distal end of the endoscope; creation of a hydraulic, protective cushion in the submucosal layer; capture of a part or all tumor at the base with a diathermic loop; tightening the loop on the tumor fragment; excision of the tumor (electro excision); removal of the sample [8]. In the patients with the above-described pathology, intrabdominal surgical interventions are performed, accompanied by postoperative complications in the form of anastomosis leakage, diffuse peritonitis, which significantly reduces the quality of patients life [8]. Removal of neoplasms within unchanged tissues, a single block is considered the most preferable [1,8]. Villous tumor, reaching large sizes, often have a pronounced sclerosis of the submucosa. The location of the tumor above the pelvic peritoneum, the presence of sclerosis of the submucosal layer limit the application of the listed techniques and require the development of new approaches in the treatment of large villous formations.

Aim of the Study

To develop and introduce into clinical practice a method of staged treatment of villous tumors of the colon based on using the combination of diathermocoagulation and high-intensity laser radiation.

Materials and Methods

The study was conducted on the basis of the Vitebsk Regional Clinical Specialized Center. The analysis of the work for the period from 1995 to the present is carried out. The objects of the study were patients with villous tumors of the rectum and colon. Tumors were removed using a Fotek LK-50 laser device (Mediola-Endo), a pulsed mode of energy generation (wavelength 1.064 μm and 1.34 μm, power - 20-25 W, pulse repetition rate at maximum radiation power - up to 50 Hz, maximum pulse energy - 1.2 J, pulse duration - 300 msec) and the OLIMPUS PSD-10 electrocoagulator. The main stages of endoscopic removal of large colon adenomas were: positioning of the tumor in relation to the endoscope (the tumor is located 1.5 - 2 cm from the distal end of the endoscope); one-stage or fragmentary excision of the exophytic part of the tumor with a diathermic loop; laser vaporization of the base of the tumor (a silica light guide is placed in a Teflon casing and then guided to the tumor through the biopsy channel of the endoscope); removal of the sample.

The patients are divided into 2 groups. The first (control) group included 80 patients (34 men and 46 women, the average age was 63 2.4 years), who were treated only using an endoscopic electric loop (Figure 1). The second (main) group consisted of 52 patients (22 men and 30 women, mean age 64 3.1 years), in their treatment a combination of two methods was used: endoscopic excision with an electric loop and laser vaporization of the tumor base. The villous tumors were rather large: from 2 to 8 - 9 cm in diameter. In some cases, the base of the tumor occupied up to half of the intestinal lumen, the length reached 8 - 9 cm. Depending on the size of the tumor, removal was performed in one stage or in several steps (multistage). In 32 cases, tumor excision was performed by means of its fragmentation during one procedure, in 20 cases, the tumor was removed in several stages.

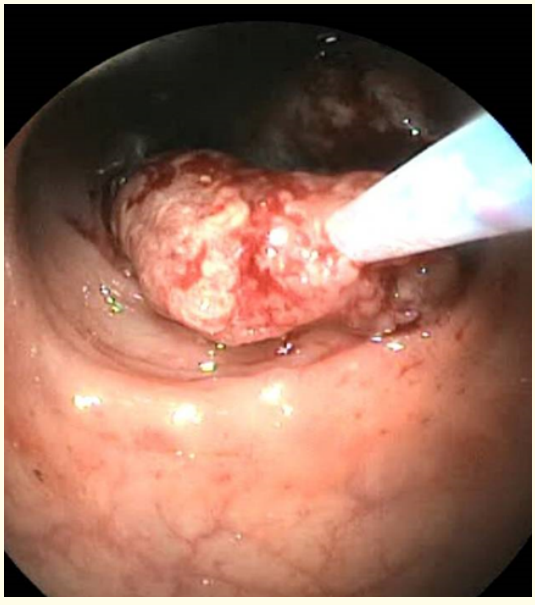

Figure 1: *Electroexcision of a villous tumor of the sigmoid colon using an endoscopic electrodiathermal loop.*

When carrying out laser vaporization, we were guided by the principle of "parallelism" in relation to the direction of the laser beam (i.e. the laser beam was directed to the intestinal wall not perpendicularly, but at an acute angle). This technique allows to avoid local tissue overheating, reducing the risk of possible perforation of the intestinal wall. This rule is especially important when the tumor is located above the pelvic peritoneum.

When performing laser vaporization, two wavelengths were used: 1.34 μm and 1.06 μm. Wavelength 1.34 μm was used mainly for vaporization of the base of the tumor, because the depth of energy penetration is limited to 1.5 - 2 mm. The wavelength of 1.06 μm was used for vaporization of tumor tissues located along the periphery of its base, since the depth of energy penetration was 3 - 4 mm (Figure 2). This approach allows for selective and careful vaporization of tissues in the area of the bottom and edges of the tumor base, which has different tissue heights.

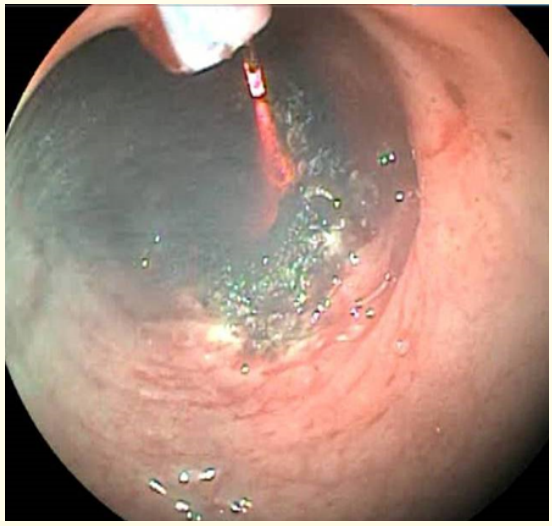

Figure 2: *Laser vaporization of the villous tumor of the sigmoid colon.*

By the stage of treatment, we mean the period of time during which the excision of the exophytic part of the tumor and the destruction of its base are carried out; this is achieved during the first hospitalization in one or more procedures (depending on the size of the tumor).

In the absence of complaints, patients were discharged from the hospital the next day. Control examination was prescribed depending on the area of the tumor base S (cm2), which was calculated by the formula:

$$N = S \times 2,$$

Where N is the number of days before the control examination.

With a base area of 4 cm^2, a control examination was carried out after 8 days; at 9 cm^2 - 18 days, etc. At the control examination, the state of the mucosal defect was assessed. The presence of villous tumor tissue is an indication for the next stage of laser vaporization. The basis for the end of the staged treatment was the identification of a "white" scar in the area of the former tumor.

Results and Discussion

In the first group of patients (80 people), tumors up to 2 - 3 cm in diameter in most cases were removed during one procedure. The lesions larger than 3 cm were removed during one or more procedures at the first hospitalization. The relapse rate in this group was 30%. Such a high percentage of recurrence can be explained by the presence of sclerosis in the submucosal layer. Cicatricial changes in the submucosal layer often develop when the tumor is larger than 3 cm. The sclerosis zone is most vulnerable to diatemocoagulation, since it is impossible to create a hydraulic cushion here. The heat energy of diathermocoagulation is better distributed in denser cicatricial tissues. The high risk of perforation due to an uncontrolled burn of the intestinal wall in the sclerosis zone limits the endoscopist in active actions, which is the reason for relapse. In patients of the first group, the tumor was most often removed during several procedures. The high percentage of relapse is explained by the technical features of diathermocoagulation. Uncontrolled depth of destruction, with this technique, poses a high risk of bowel perforation, especially when the tumor is located above the pelvic peritoneum. The risk of bowel perforation does not allow radical removal of the tumor using only electrocoagulation, even with repeated procedures.

Laser vaporization was used only in patients of the second group (42 people). The method was used to vaporize the base of the tumor after endoscopic electroresection of its exophytic part (Figure 3). Recurrence of the disease in the second group was observed in 5% of patients.

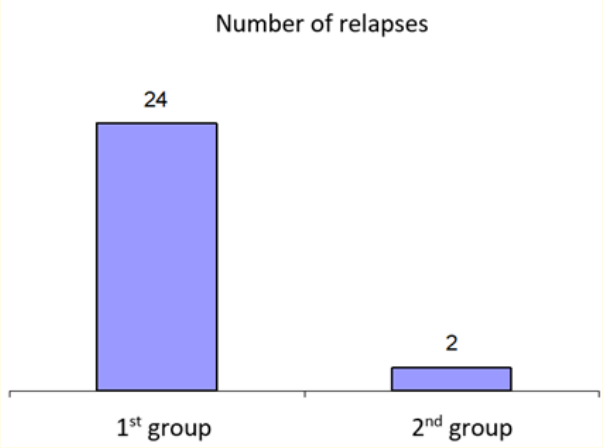

Figure 3: *The number of relapses to the control and main patient groups.*

These results were achieved thanks to the use of a pulsed crystalloid laser, which has the ability to control the depth of tissue destruction. This advantage allows the removal of the villous tumor tissue with less risk of bowel perforation.

A staged approach to the removal of colon villous tumors has made it possible to define the concept of recurrence.

Relapse is diagnosis of a tumor sometime after endoscopic identification of a “white” scar that is complete epithelialization without signs of tumor growth.

Creeping types of villous tumors in the second group of patients were removed mainly using laser vaporization; in the control group, only the technique of electroexcision with an endoscopic loop was used. Visually, better hemostasis in the removal of villous tumors was observed in patients of the main group with the combined use of high-energy laser radiation.

The intensity of the pain syndrome after the combined use of loop tumor extraction and laser vaporization of the bed was objectively less compared with the traditional removal of the villous tumor ($p < 0.05$). The nature and degree of discharge from the rectum after the use of diathermocoagulation had a pronounced serum-mucous character, with the complex use of laser radiation - a serum character (in most cases, the discharge was scarce). The degree of anal discomfort after surgery, the duration and nature of the first stool in the comparison groups did not differ significantly (Table 1).

Comparison criteria	1st group (control)	2nd group (main)
Number of patients	80	52
Intensity of pain syndrome on the first day, points, Me (CI 95%)	4.2 (3 - 5)	3.1 (1 - 4)
The nature and extent of rectal discharge	Serum-mucous, abundant	Serum, scarce
The degree of anal discomfort after surgery	Moderately pronounced	Moderately pronounced
Time and nature of the first defecation	Second day, mushy	Second day, mushy
Complications (number of cases)	Bowel perforation (1), bleeding (1)	Absent

Table 1: *Comparative assessment of the immediate results of endoscopic treatment of villous tumors in the comparison groups.*

Thus, the complex use of the method of endoscopic treatment of villous tumors of the colon using excisional loop adenectomy and high-intensity laser vaporization of tissue in the base area can really improve the results of treatment, increase the efficiency of local hemostasis, significantly reduce the frequency of so-called endoscopically unremovable tumors and the likelihood of performing highly traumatic organ-carrying operations. At the same time, the development of a method for combined staged endoscopic treatment of villous tumors of the colon made it possible to distinguish between such concepts as “stage of treatment of a villous tumor” and “recurrence of a villous tumor”. All of the above makes this version of the endoscopic manual the operation of choice in the treatment of large villous adenomas of the colon (especially their “creeping” forms).

Conclusion

1. Application of the developed combined method for the treatment of villous colon tumors using diathermocoagulation (loop excision of the tumor) and high-intensity laser radiation of various wavelengths can reduce the recurrence rate of the disease from 30 to 5%, making this intervention the operation of choice in the treatment of large villous adenomas of the colon (especially their “creeping” forms).

2. A decrease in the likelihood of recurrence of villous tumors of the colon when using the developed complex method of endoscopic treatment allows us to hope for a decrease in the overall incidence of colorectal cancer after wider introduction of this technology into the activities of healthcare institutions.

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