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UDC 611.345:616 – 006:616 – 072.1

### **COLON TUMORS: ENDOSCOPIC DIAGNOSTICS**

*ABSTRACT. Colonoscopy is a primary method of colon tumors diagnostics with the confirmation of the diagnosis with the help of biopsy. The article presents analysis of the work of the Endoscopy Department on detection of colorectal cancers and colon polyps.*

*Current approaches to the organization and conduct of endoscopic studies, aimed at early diagnostics of precancerous changes in the forms of colon cancer and practiced in the Department, presume a total colonoscopy and the use of special additional diagnostic techniques for identifying abnormal formations of even the smallest sizes. Visual assessment of the risk of the disease progression is based on histology prediction exteriorly, taking into consideration both the type of the growth and the structure of the lesion's surface, measured with magnification endoscopy.*

*Qualitative examination for the purpose of endoscopic diagnostics requires the use of a phased methodology. An ideal bowel preparation will let detect even the smallest non-polypoid lesion. Identification of areas characterized by abnormal structure using standard visualization without image processing or chromoscopy in order to identify minor changes in the color of the mucous membrane and subepithelial capillaries. The appearance of lesions was identified according to the Paris classification categories. Evaluation of the microarchitectonics of the epithelial surface of the lesion was carried out using magnification in combination with chromoscopy or endoscopy with increased image sharpness. Determination of the type of patchwork pattern was used to predict the most likely histological structure. The diagnosis and choice of treatment should be defined taking into account the morphological structure of the lesion and its localization. The most important aspect of colorectal cancer prevention is conducting regular screening colonoscopy examinations for persons over 45 years of age.*

*KEY WORDS. Endoscopic diagnostics, colon cancer, colorectal tumors, polyps according to localization.*

Non-malignant and malignant colon tumors are among the most well-spread forms of the disease. According to the Moscow Herzen Scientific-Research Institute of Oncology among all the 522410 malignant tumors detected in Russia in 2011 7.3% are found in the stomach, 6.4% in the colon, and 4.9% in the rectum and rectosigmoid junction [1].

In Tyumen region out of 3110 cancer patients in 2011 9.5% accrues to the colon cancer and 7.7% to the rectum cancer; the age peak for the colorectal cancer is 50-85 and the disease increase is by 28.5%.

It is especially worrying that out of 100 newly diagnosed colon cancer patients 70 people die; 40% of such patients die in the first year after the diagnosis. It is

explained by the fact that 71.4% colorectal cancer patients and 62.4% rectum cancer patients have advanced forms of cancer (III-IV stages).

It is well known that the majority of colorectal tumors develop from adenomatous polyp therefore timely endoscopic diagnostics is an effective way of colorectal cancer prevention [2].

The endoscopic department of the Tyumen Consultation and Diagnostic Center (hereinafter Center) performed 5996 colon examinations in 2010-2012: rectosigmoidoscopy — 3969; colonoscopy — 2027; with samples of material for the cytomorphological examination — 620; the average percentage of the cytomorphological examinations is 31.4%. According to the results of the survey the total percentage of the patients with colon polyps out of all the screened patients is 15.2% (2011) and 6.9% (2012).

Gastro-and colonoscopic examinations are carried out in the Center With the help of the high-class digital endoscope Evis Exera II Olympus CV-180. The Evis Exera (II series 180) video system offers the best endoscopic image. It has HDTV format which ensures clear and bright video images of the gastrointestinal tract mucosa with high definition. It also lets distinguish between inflammations and pre-tumor pathologies and early forms of tumors. This apparatus allows visualizing of capillary vessels, structures of the mucosa and other objects of the examined organs with high definition. The equipment is also indispensable in treatment effectiveness assessment.

If necessary we can conduct a close examination of the changed tissue using the zooming function and NBI (spectral visualization of the vascular structure of the tissue). This function lets differentiate the vasculature and other structures due to image reproduction in the narrow range of light waves.

According to the polyp localization we have singled out the following groups of patients:

- polyps in the rectum — 21.5%;
- polyps in the sigmoid colon — 44.6%;
- polyps in the descending colon — 6.2%;
- polyps in the transverse colon — 10.7%;
- polyps in the ascending colon — 9.2%;
- and polyps in the blind intestine — 7.8%.

According to the histological type there is the following polyp distribution:

- hyperplastic polyps (24.7%);
- tubular adenoma (44.6%);
- adenoma with dysplasia (30.7%).

Benign tumors developing from the adenoid tissue, the so called adenomas, or adenomatous (glandular) polyps account for 90-92% out of all the benign colon tumors. For example, a 75-year old patient complained of blood in his feces during several months and rare pains in the left iliac area. Colonoscopy detected a polyp of 3 cm in diameter on a long stalk in the middle of the sigmoid colon. Histological study defined a tubular adenoma with high grade dysplasia, without stalk infiltration.

As part of preventive colonoscopy a 60-year old woman was diagnosed with a polyp on stalk in the sigmoid colon. However the patient denied any symptoms. The histological survey revealed a tubular adenoma without signs of dysplasia.

Lipomas (fatty tumors) of the colon (not epithelial tumors) are rarely detected. As a rule lipomas are non-symptomatic, especially when they are less than 2-3 cm, and are visualized during colonoscopy. A large lipoma may cause stomach pains and changes in defecation; rarely invagination. For instance, in the past medical history of a 58-year old male patient the cause of death of his 60-year old mother is colon cancer. Besides, there were histories of different malignant tumors among his several distant relatives. Colonoscopy was suggested due to the genetic risk of colorectal cancer. A slight subglandular tumor with a smooth surface, soft during biopsy, was revealed.

A 69-year old man underwent colonoscopy because of periodic pains in the left lower part of the abdomen. The laboratory tests and ultrasound examination of the abdominal cavity organs detected a tumor, about 3 cm in diameter, near the hepatic flexure. The histological examination showed presence of fatty tissue.

A 20-year old patient underwent colonoscopy followed by removal of two hyperplastic polyps in the mucosa of the anal canal 12 years ago; after that periodically he had blood in his stool. In 2012 colonoscopy revealed polypoidal masses in the mucous membrane (MM) in the iliac colon and ileocecal valve. The histological examination defined follicular lymphoid hyperplasia.

Special attention should be paid to the familial polyposis of colon (FPC). It is an innate disease when the colon has a number of adenomas. The average age of the patients who develop cancer against the background of FPC is about 20 years younger than the other patients diagnosed with colon cancer. Malignant tumors with FPC are often multiple, synchronous. The typical symptoms are absent. The fact that the patients are diagnosed as a result of family screenings is justified. The most frequent signs are diarrhea, mucus release and blood in stool. FPC is a precancerous stage which at any moment can develop into cancer.

The total percentage of colorectal cancer patients (CCP) out of all the people screened in the Center is 1.7% in 2011; 1% in 2012. As for cancer localization, rectum prevails – 56.8%; sigmoid colon – 21%; descending colon – 3.2%; transverse colon – 2.1%; ascending colon – 12%; and blind gut – 4.9%. As for the histological structure, over 90% is malignant carcinomas, tubular-papillary with various degrees of differentiation; villous malignant adenomas – 8% and solid adenocarcinoma – 2%.

The majority of the colorectal cancers follow the succession: adenoma – cancer developing from adenomatous polyps:

- 1) adenomatous polyp;
- 2) focal malignization without invasion;
- 3) early invasive cancer;
- 4) ulcer cancer.

In order to diagnose early colon cancer, colonoscopy with magnification, which unites elements of macro- and microscopy, is very important. Modern approaches to

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the organization and performance of endoscopic examinations aimed at the diagnostics of pre-cancer changes of the early colon cancer forms presuppose total colonoscopy and a number of special additional diagnostic methodologies which allow detection of pathological tumors of the smallest sizes. The most effective is coloring of the mucous membrane in the colon with special substances during the endoscopic examination – chromocolonoscopy. A simple and available method is the contrast method of chromoscopy with the use of indigo carmine 0.1-0.2%. This coloring material is not consumed by the epithelial cells and spreads on the mucous surface in the colon highlighting its irregularities and creating a visual contrast between the unchanged tissues and pathological parts.

The new methods of the magnification endoscopy and narrow-band imaging let closely examine any minimal changes in the mucous membrane of the gastrointestinal tract. Their high specificity and sensitivity in the diagnostics of structural changes in the tissues in the early cancer forms and precancerous conditions of the colon epithelium make it possible to consider them “optical biopsy”.

Narrow band imaging is a new optical diagnostic methodology based on the use of special optical filters narrowing the light wave spectrum. The light filter let achieve a detailed image of the vascular pattern of the tissues, its changes typical for the pathological areas of inflammatory genesis as well as pre-cancer diseases and early forms of cancer and create an effect of virtual chromoscopy. Endoscopic ultrasonography is the most effective way of examination of colorectal tumors as it provides a means for the estimation of their echostructure and foundation zone, presence and depth of the tumor invasion as well as the condition of the regional lymph nodes [3; 120-121].

Diagnosis of tumors is based on a number of classifications:

- Duke staging system (CE. Dukes) developed for the colon cancer. According to this classification two main pathomorphological features are considered: depth of the tumor invasion into the intestinal wall and metastases in the regional lymph nodes (stages A.B.C.).

- Dukes in the modification of Aster et Coller presupposes six colorectal cancer stages (A, B1, B2, B3, C1, C2, D).

- TNM staging system – international colorectal cancer classification suggested by the International Anti-Cancer Association with the use of symbols (Tumor, Nodulus, Metastases).

- Pit pattern classification. Nowadays S. Kudo’s (1994) classification is widely accepted which is based on the surface study of 1676 polypoid colorectal tumors and their division into 5 types with subtypes. This classification has a special practical value as on its basis due to the study of the correlation *type pit pattern* and histological structure of the neoplasm, we can give recommendations concerning treatment tactics.

According to these recommendations neoplasms of type II do not require any additional diagnostic and treatment measures. *Pit patterns* III (s, L) and IV have an increased malignant potential of the tumors. Consequently, an active endoscopic

tactics is suggested – polypectomy or resection/dissection of the neoplasm. *Pit pattern* of type V is always a sign of colorectal cancer; type Vi is typical of minimally invasive cancer; type Vn corresponds to advanced cancer and presupposes appropriate surgery.

S.A. Kholdin (1955) suggested a classification based exclusively on the macroscopic image of the tumor and direction of its growth. According to S.A. Kholdin's classification there are the following cancer forms:

- exophytic:
  - polypoid;
  - villous-papillar;
  - nodular;
- endophytic
  - ulcer;
  - diffuse-infiltrative;
- diffuse, infiltrative (fibrous and colloid type);
- epidermoid (anoperineal region).

According to Paris endoscopic classification of the superficial neoplastic lesions in the gastrointestinal tract, stomach and colon (2002) laterally spreading tumors (LST) are superficial neoplasms of over 1 cm growing on the surface of the mucous membrane in the colon. Here are some examples of clinical cases of colorectal cancer diagnostics.

A 79-year old patient complained of irregular stool during the year (alternative diarrhea and constipation) without any blood in it. For the last few weeks he experienced loss of weight and general weakness. Computer tomography of the abdominal cavity revealed multiple metastases in the liver. According to colonoscopy there is a tumor in the proximal colon which encompasses the whole circumference and narrows the opening. The histological examination stated a moderately differentiated adenocarcinoma.

A 67-year old man complained of performance impairment, pain in the left side of the abdomen and periodic diarrhea. According to colonoscopy there is an obstructing circular tumor in the sigmoid colon. The histological examination revealed adenocarcinoma.

A 59-year old man, active, for the first time complained of periodic fresh blood in his stool for several weeks; no anemia is diagnosed. According to colonoscopy there is tumor rectum in the rectum within 2-3 cm from the anus. The histological examination revealed adenocarcinoma.

A 47-year old woman experienced periodic brightly red blood in her stool in the last three months. She denied any pain while defecation. The endoscopic examination revealed a small tumor, less than 1/3 in circumference, within 8 cm from the anal canal. In the transition area towards the normal mucosa there are multiple areas of infiltration. The histological examination revealed adenocarcinoma.

A 84-year old man complained of pain in the stomach for several weeks. As a result of the ultrasonic examination of the abdominal cavity there is a suspicion of a

malignant tumor in the blind gut. Colonoscopy clearly visualizes a hole of the vermicular appendix. A tumor is defined in the blind gut with the inclusion of the ileocecal valve.

Thus, colonoscopy influence on cancer prevention depends on reliability in colorectal neoplasia diagnostics when the tumor does not spread outside the sub-mucous membrane and is potentially curable [4; 193-194]. Visually the disease risk progression estimation is based on the histological prediction according to its appearance taking into consideration both the type (growth direction) and structure of the affected surface assessed with the help of magnification endoscopy.

The quality examination for the sake of endoscopic diagnostics requires a step-by-step methodology as the only protection from overdiagnosis, pathology omission and unjustified treatment [6].

The first step is ideal preparation of the colon as any hard or liquid substance that may keep on the surface of the mucous membrane can mask small non-polypoid neoplasia.

The second step is detection of the areas with irregular structure of the mucous membrane in the colon with the help of standard visualization without the imaging technology or chromoscopy. At this stage non-polypoid neoplasia can be easily omitted if the technician is not well trained or has not enough experience in detecting insignificant color changes of the mucous membrane and sub-epithelial capillary vessels within the affected zone.

The third step is characteristics of the neoplasm. Its appearance is identified according to the categories of the Paris classification. NBI is the standard criterion for the classification of the vascular pattern in non-neoplasms and neoplasms. Estimation of the microarchitectonics of the epithelial surface of the neoplasm is carried out with the application of magnification combined with chromoscopy or endoscopy with improved definition. Definition of the pit pattern type is used to predict the most probable histological structure.

The fourth step is diagnosis itself and choice of the treatment tactics with consideration of the morphological structure and localization of the neoplasm. Treatment tactics presupposes a choice between observation, endoscopic resection or surgery.

The most important prevention aspect in colorectal cancer is regular screening colonoscopy of all persons over 45 years of age.

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