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Virtual colonoscopy - CT colonography our experiences

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Introduction:

Virtual colonoscopy (VC) produces two-dimensional images and a detailed 3-D model of the abdomen and pelvis to view the bowel in a way that simulates travelling through the colon as in a conventional colonoscopy (CC). Thus the procedure is called a VC.

The most common methods for diagnosing colorectal polyps and cancer are flexible sigmoidoscopy, barium enema examination, and conventional colonoscopy. For total colon examination, a barium enema or colonoscopy is performed. Colonoscopy is more effective than barium enema examination for polyp detection and also offers the opportunity to perform biopsy and remove polyps. However, being an invasive examination, colonoscopy has some important disadvantages, such as patient pain and discomfort and the frequent need for sedative and/or analgesic medication. Furthermore, colonoscopy is associated with a risk of perforation, and in 5%–15% of patients, colonoscopy fails to depict the entire colon.

By Journal of Cancer, 2013, VC is a validated colorectal cancer test that provides an additional minimally-invasive screening option which is likely to be preferred by some patients. Important examination prerequisites include adequate colonic cleansing and distention. Tagging of residual material aids in the differentiation of true polyps from stool. Low radiation dose technique should be employed routinely for screening studies. Readers must be skilled in the use of both 2D and 3D interpretation methods.

Aim:

The aim of this paper is to present our experience from technical and clinical aspect, based on the VC examinations performed at our clinics.

Material and method :

A thin tube is inserted into the rectum so that air to be pumped to inflate the colon for better viewing.

In VC no sedation is needed which lowers the risk of adverse reactions.

VC provides clearer and more detailed images than a conventional x-ray using a barium enema.

Further, about 1 in 10 patients does not have a complete right colon evaluation completed with CC even with an experienced colonoscopist. In addition to poor bowel preparation, an experienced colonoscopist may be unable to complete the colonoscopy and intubate the cecal pole for a variety of reasons like-redundant colon, colonic spasm, marked diverticulosis, obstructing masses or strictures, and angulation or fixation of colonic loops, most commonly due to previous pelvic surgery.

When colonoscopy is incomplete, double-contrast barium enema examination is performed to complete the inspection of the nonvisualized part of the colon. However, double-contrast barium enema examination can be associated with considerable patient discomfort and may not be tolerated on the same day as colonoscopy.

Data from the National Polyp Study Work Group, in which comparison was made between paired colonoscopy and double-contrast barium enema examination, indicated that the latter depicted only 48% of adenomas greater than 10 mm in diameter, 53% of adenomas 6 –9 mm in diameter, and 32% of adenomas 5 mm or smaller in diameter.

VC is a reasonable alternative to double-contrast barium enema examination in patients with incomplete colonoscopy.

Endoluminal lesions not visualized at endoscopy are categorized according to size: A lesion is defined as a mass if its diameter at VC is 20 mm or larger, as a large polyp if its diameter is 10 mm or larger but smaller than 20 mm, and as a medium polyp if its diameter is 6 –9 mm. Diminutive lesions (≤ 5 mm) are not included (in this study).

VC provides a secondary benefit of revealing diseases or abnormalities outside the colon.

Results:

Concerning overall patients' impression of problems or discomfort in connection with the examination, our experience shows that most patients consider colonoscopy to be more difficult. VC is usually regarded as "not painful" compared with colonoscopy, and a larger proportion of patients rate pain as higher during colonoscopy than during VC. Discomfort from air filling of the colon is the major complaint about VC.

In VC polyps smaller than between 2 and 10 millimetres in diameter may not show up.

VC is not recommended for patients with active Crohn's disease, ulcerative colitis, inflammatory bowel disease or diverticulitis, because of increased risk of perforating the colon.

VC is considered the "gold standard" because it permits complete visualization.



Figure 1 CT colonography performed at the PHI University Clinic of Radiology, Skopje, in a 85 year - old patient with constipation and anemia. The three-dimensional endoluminal view of colon detects a polyp on wide basis.

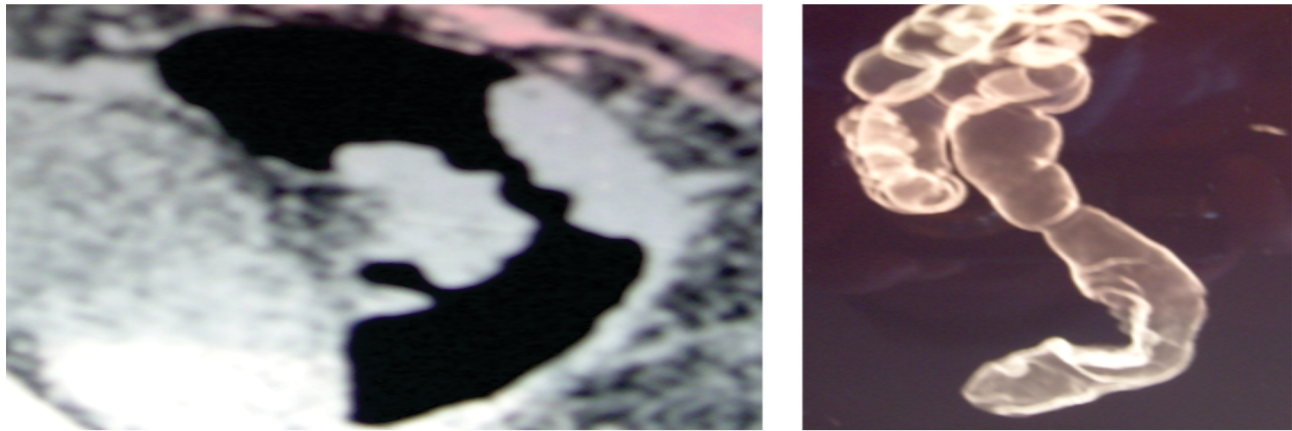


Figure 2 CT colonography performed at the PHI University Clinic of Radiology, Skopje, in a 85 year- old patient. The two dimensional sagittal CT image reveals a circumferential rectum cancer confirmed by biopsy. The reformatted picture "in space", reveals a polyp on a broad basis distal to the tumor. The application of iv contrast allows detection of metastatic disease. In this review no meta-stases were identified.

Discussion:

The American Cancer Society (ACS) recommends that women and men undergo screening for colon cancer or polyps beginning at age 50. ACS suggests VC as an option once every five years. Individuals at increased risk or with a family history of colon cancer may start screening at age 40 or younger and may be screened at shorter intervals. Risk factors for the disease include a history of polyps or having a family history of colon cancer. Signs and symptoms of colon cancer include a persistent change in bowel habits, the presence of blood in the stool, abdominal discomfort or pain, bloating and unexplained weight loss.

Results of a prospective study, held from 2004 to 2008 at two centers, are revealed in 2010 regarding colorectal and extracolonic interpretation in 10 286 outpatient adults (5388 men, 4898 women; mean age, 59.8 years) undergoing screening VC.

All histologically proved, clinically unsuspected cancers detected at VC have been identified at retrospective review of the medical records. The stage of disease, treatment, and clinical outcome have been analyzed. Benign neoplasms (including advanced colorectal adenomas), symptomatic lesions, and tumors without pathologic proof have been excluded.

In this way it has been possible to determine retrospectively the detection rates, clinical stages, and short-term patient survival for all unsuspected cancers identified at screening VC, including both colorectal carcinoma (CRC) and extracolonic malignancies.

Unsuspected cancer has been confirmed in 58 (0.56%) patients (33 women, 25 men; mean age, 60.8 years), which included invasive CRC in 22 patients (0.21%) and extracolonic cancer in 36 patients (0.35%). Extracolonic malignancies had included renal cell carcinoma ($n = 11$), lung cancer ($n = 8$), non-Hodgkin lymphoma ($n = 6$), and a variety of other tumors ($n = 11$).

Cancers in 31 patients (53.4%) have been stage I or localized. At the most recent clinical follow-up (mean, 30.0 months \pm 11.8 [standard deviation]; range, 12–56 months), three patients (5.2%) had died of their cancer.

Thus the overall detection rate of unsuspected cancer has been approximately one per 200 asymptomatic adults undergoing routine screening VC, including about one invasive CRC per 500 cases and one extracolonic cancer per 300 cases. Detection and treatment at an early presymptomatic stage may have contributed to the favorable outcome.

A study presented in 2011, had been designed to retrospectively evaluate the frequency of recommendations for additional imaging (RAI) and for important extracolonic findings among a cohort of seniors (age ≥ 65 years) and nonseniors (age < 65 years) undergoing low-dose VC. The percentage of patients with at least one extracolonic finding was 55.4% (113 of 204) for non-seniors and 74.0% (185 of 250) for seniors ($P < .0001$). The percentage of patients in which an RAI was suggested was 4.4% (nine of 204) for nonseniors and 6.0% (15 of 250) for seniors, which was not significantly different ($P = .450$). Thus extracolonic findings were more frequent in seniors than in nonseniors; however, there was no significant difference in the frequency of RAIs between the two groups.

Nowadays, the results of concurrent large studies have demonstrated that the diagnostic performance of VC approaches that of optical colonoscopy for detection of colorectal polyps that are 1 cm or larger. Owing to continued technical advances and the results of a number of comparative studies, the American Cancer Society now endorses VC as a recommended method for colorectal cancer screening.

Conclusions:

The major reason for performing VC is to screen for polyps or cancers in the large intestine in their early stages, so that they can be removed.

Polyp size is a critical biomarker for clinical management. Larger polyps have a greater likelihood of being or of becoming an adenocarcinoma. To balance the referral rate for polypectomy against the risk of leaving potential cancers in situ, sizes of 6 and 10 mm are increasingly being discussed as critical thresholds for clinical decision making (immediate polypectomy versus polyp surveillance) and have been incorporated into the consensus CT Colonography Reporting and Data System (C-RADS).

The term "polypoid lesions" refers to both sessile and pedunculated polyps. These polyps account for the vast majority of cases, including most advanced adenomas and cancers. Flat lesions represent a subset of sessile polyps that, as the name implies, have a nonpolypoid or plaque-like morphology. A polyp height that is less than half of the width has been commonly used as a morphologic descriptor. Endoscopic detection of nonpolypoid lesions may be increased by the use of advanced endoscopic techniques, such as chromoendoscopy and narrow-band imaging.

VC is considered less painful and less difficult overall than colonoscopy and is the preferred examination for the patients.

Same-day VC can be performed after incomplete colonoscopy. VC has a complementary role in the detection of colorectal cancer and large (≥ 10 -mm) polyps in the endoscopically nonvisualized part of the colon after incomplete colonoscopy.

Studies suggest that VC is an alternative or complement to current methods in clinical practice.

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Endovascular treatment of intracranial aneurysm - our eleven years experience

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Introduction: Spontaneous rupture of cerebral aneurysms typically results in subarachnoid hemorrhage and 10 % of patients die before reaching the hospital. Greatest risk to life is aneurysm re-bleeding although cerebral vasospasm makes a significant contribution to overall morbidity and mortality. The primary goal of treatment of cerebral aneurysms is to prevent future rupture. The best available data suggest that previously unruptured aneurysms carry a risk of hemorrhage of about 1-2 % per year, depending of size, location and other risk factors. The presence of multiple aneurysms and a family history of subarachnoid hemorrhage also raise the risk of rupture. Once an aneurysm has ruptured, the chance of re-hemorrhage dramatically increases. In 1991, Guglielmi detachable coil (GDC) embolization was introduced as an alternative method for treating selected aneurysm patients

Goal of EVT is complete exclusion of the aneurysm from the flow of blood.

Technological advances in endovascular treatment devices have also improved this method of treatment (assisted coiling- balloon, stent, flow- diverter, liquids itc.)

The relative risk of death or significant disability at one year for patients treated with coils was 22.6 percent lower than in surgically-treated patients (ISAT). The only multi-center prospective randomized clinical trial - considered the gold-standard in study design - comparing surgical clipping and endovascular coiling of ruptured aneurysm is the International Subarachnoid Aneurysm Trial (ISAT).

In our University Clinic of Radiology EVT with coil started 2005.

Material and Method: At our clinic 158 patient witch underwent endovascular treatment of 176 intracranial aneurysm ruptured and unruptured from Jun 2010- Jun 2016. Interventions made by our protocol under general anesthesia. On anterior circulation, internal carotid and branches 129 and posterior, vertebrobasilar system 47. Endovascular treatment was mostly just coiling and small part stent assisted and five cases only with flow diverter.