



## **Virtual Colonoscopy is Feasible in Geriatric Patients-A Case Series**

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### **Author's contribution**

*This whole work was carried out by author JG.*

#### **Case Study**

**Received 13<sup>th</sup> March 2014**

**Accepted 8<sup>th</sup> April 2014**

**Published 17<sup>th</sup> April 2014**

### **ABSTRACT**

Virtual colonoscopy (VC) or computed tomographic colonography is now an established imaging test in the detection of colorectal cancer. Like other modern imaging tests VC requires highly compliant patients (rectal air insufflation, breath hold, imaging in supine and prone position). As patients are getting older VC is also requested in the elderly. In a case series of geriatric patients (mean age 83 years) undergoing VC after incomplete optical colonoscopy 92.7% of all colonic segments were adequately visualized. VC seems to be feasible in geriatric patients and has therefore replaced barium enema in this patient group after incomplete optical colonoscopy at our department.

**Keywords:** *Virtual colonoscopy; computed tomographic colonography; geriatric patients; feasibility.*

### **1. INTRODUCTION**

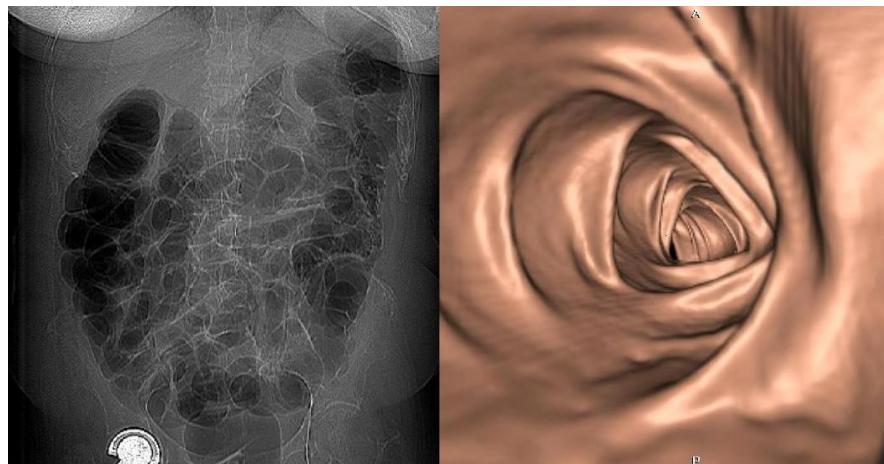
Virtual colonoscopy (VC) or computed tomographic colonography (CTC) is now an established imaging test in the detection of colorectal cancer. Like other modern imaging tests VC requires highly compliant patients (rectal air insufflation, breath hold, imaging in supine and prone position). As patients are getting older VC is also requested in the elderly patient. There is only little data on the technical feasibility of VC in geriatric patients [1-4]. We

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like to report the experiences in a small series of geriatric patients (older than 75 years) undergoing VC after incomplete optical colonoscopy.

## **2. CASE SERIES**

All VC in patients older than 75 years performed at the Department of Clinical Radiology between July 2011 and July 2012 were retrospectively reviewed. These VC where performed after an incomplete optical colonoscopy on inpatients. All patients received usual preparation for an optical colonoscopy ('wet preparation'). Patients were advised to stop solid food 2 days before examination, all kind of fluids were allowed. They received 2 litres of cleaning solution (MoviPrep®), one the day before and one the day of the examination. This was well tolerated by all patients. 9 patients with a mean age of 83 years (range 77-90 years) were identified. To minimize the stress for the patients VC was performed immediately after an incomplete optical colonoscopy. Only in one patient the examination was performed the following day and in this patient additional fecal tagging was performed (Gastrografin®, Bayer Healthcare, Leverkusen, Germany). After administration of butylscopolamine (Buscopan®, Boehringer Ingelheim, Ingelheim, Germany) a soft rectal catheter was inserted and manual air insufflation was performed. Air was insufflated until patients reported of a feeling of strong abdominal pressure, this was correlated with the distension on the CT-scanogramm. A 16-slice CT scanner was used (Toshiba Activion®, Toshiba medical systems, Tokyo, Japan). All patients were examined in prone and supine position using a low-dose CT scan with a slice thickness of 1 mm. All but one patient were examined without intravenous contrast media. The applied radiation dose was about 7mSv per scan. Examinations were read on a Vitrea® workstation (Vital Images, Minnetoka, U.S.A.) using volume rendered reconstructions (inner view GI®) and multiplanar reformations. With the volume rendered reconstructions the colon was examined using a 'fly through'- view in both directions, virtual dissection or computed aided detection was not used. Corresponding to the CT-colonography reporting and data system (C-RADS) the adequate visibility of the colonic wall was examined [5]. The colon was divided into 4 segments (cecum/ ascending colon, transverse colon, descending colon and sigmoid colon/ rectum). Of the 36 examined colonic segments only one segment was collapsed in both views. I.e. 97.2% of colonic segments were adequately distended (35 out of 36, Fig.1). Rectal air insufflation was tolerated by all patients. One patient only did not tolerate the prone position; this patient was scanned in 45 degree oblique position and in this patient all colonic segments were adequately distended. According to the C-RADS classification there were no significant polyps (>6mm) or colonic masses suggestive of cancers. Most patients showed diverticulosis, in 2 of the patients significant post inflammatory changes with a local thickened wall of the sigmoid colon were found. There were several important extra colonic findings with subsequent alteration of patient management (sacral insufficiency fractures, liver lesions, lung nodules and pleural effusions).



**Fig. 1. Virtual colonoscopy in an 86-year old woman after incomplete optical colonoscopy. The examination was well tolerated. As can be seen on the scout image (on the left) the whole colon is filled with air and well distended. A reconstructed image of colon is shown on the right**

### **3. DISCUSSION**

In this small patient series VC was feasible in geriatric patients older than 75 years and adequate colonic distension was achieved in 97.2% of examined colonic segments. This is in accordance to the study of Yuksel et al. on a considerable younger population (mean age 71 years compared to 83 years in this study). They reported about a technical adequate VC in 90% in their sample of patients older than 60 years [1]. They also reported that 11% of patients did not tolerate the prone position [1]. In accordance to this report one of our patients did not tolerate the prone position and a 45 degree oblique position was used and all colonic segments were adequately visualized. Yuksel et al. used a lateral decubitus position, but they did not report if colonic distension was successful. In another study on elderly patients with a mean age of 79.6 years Tolan et al. reported about the diagnostic performance of VC in elderly patients with a mean age of 79.6 years, but they did not comment on technical adequacy / colonic distension [2]. Further evidence of the feasibility in elderly patients can be derived from the large study of a medicare population (patients older than 65 years), in which only 3% of examinations where technically inadequate [3]. In this study the exact age of examined patients (mean age/range) is not reported, and the question if technical inadequacy increases with age was not addressed [3]. In a study on elderly patients (mean age for women 80 and for men 78 years) Keeling et al. reported about the feasibility of limited preparation VC. In this study 84% of the colonic segments were adequately visualized [4]. Despite the well known limitations in terms of generalizability of findings in case series, there are several important findings in this study. It seems that VC is feasible also in geriatric patients and even in old patients technical adequacy seems not to correlate with age. If the prone position is not tolerated, a different positioning (like 45 degree oblique) may also result in technical adequate studies. Therefore, after incomplete optical colonoscopy, VC has replaced barium enema because of its superior sensitivity at our department [6]. In the elderly the main goal of VC is to rule out colonic malignancy. If there are findings suggestive of cancer further diagnostics, for example another try of optical colonoscopy or eventually surgery, is needed. Management of polyps has undergone serious debate, and especially in the elderly with reduced life expectancy polyps less than

10mm are usually not significant. Even polyps larger than 10mm may be treated more conservatively with follow-up in the elderly. This is in contrast to younger patients, in whom usually optical colonoscopy and polypectomy is advised for polyps larger than 10mm [7]. Follow-up in a two-year period may also be performed with VC, preferably with a limited preparation algorithm [4]. But it has to be kept in mind that VC is not the imaging of choice in the very frail patient with immobility or fecal incontinence. In this clinical scenario a standard abdominal CT with application of oral contrast media only ('minimal preparation') should be performed. This 'minimal preparation' CT has shown a sensitivity of 94% in ruling out colonic carcinoma [8]. I.e. if VC fails in terms of bowel distension secondary signs of colonic malignancy may nonetheless be found on the scan, therefore cautious interpretation of the colon on the obtained scan is mandatory. Eventually a further CT scan with an enema may help in equivocal cases.

#### **4. CONCLUSION**

Despite the need for highly compliant patients, VC is also feasible in geriatric patients.

#### **CONSENT AND ETHICAL APPROVAL**

This retrospective case series was performed in accordance to the statute of the ethics committee of the affiliated University of Göttingen. Written consent has been obtained from patients for the publication of this case series.

#### **COMPETING INTERESTS**

The author declares that no competing interests exist.

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