Arab Journal of Gastroenterology 18 (2017) 235–237

Contents lists available at ScienceDirect

Arab Journal of Gastroenterology

journal homepage: www.elsevier.com/locate/ajg

Short communication

# Value of water enema computed tomography in elderly symptomatic patients

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ARTICLE INFO

*Article history:*
Received 7 June 2017
Accepted 21 November 2017

*Keywords:*
Colonoscopy
Water enema computed tomography
Colon polyps
Colon cancer

ABSTRACT

*Background and study aims:* Colonoscopy remains the gold standard for the examination of the colon. However, its use in the elderly is not well tolerated, and there is often a need for general anaesthesia, thus increasing the risk, especially if there are co-morbidities. Water enema computed tomography has been suggested to be a satisfactory alternative as a non-invasive, fast and effective means for the diagnosis of colorectal supra-centimetric lesions.

*Background and study aims:* The aim of our study was to assess the performance of water enema computed tomography as first-line examination by calculating its negative predictive value (NPV) for the diagnosis of supra-centimetric lesions in symptomatic elderly referred to colonoscopy.

*Patients and methods:* This was a prospective study including 57 symptomatic patients older than 65 years. All patients were explored by water enema computed tomography at first, followed by colonoscopy, and responded to a questionnaire on the tolerance to the preparation and both procedures.

*Results:* The mean age of patients was 73 years. The M:F sex ratio was 1.59. The most frequent indication for colonoscopy was bowel disorders associated with abdominal pain (30%). Water enema computed tomography allowed the diagnosis of tumours (n = 2), polyps (n = 6), diverticulosis (n = 7), inflammatory wall thickening (n = 1) and extra-colic lesions (n = 28). NPV of water enema computed tomography for supra-centimetric lesions was 96.5%. Sensitivity and specificity were 87.3% and 98%, respectively. However, for sub-centimetric lesions, water enema computed tomography had a low sensitivity estimated at 6%, specificity at 89.9%, positive predictive value at 91.9% and NPV at 27.7%.

*Conclusion:* Water enema computed tomography has proven to be a valuable and non-invasive method indicated as a first-line examination in case of colonic symptoms in the elderly to diagnose supra-centimetric lesions.



## Introduction

Colonoscopy is limited by its relative invasiveness and the risk of higher complications in the elderly [1]. Moreover, the examination may not be successful because of either inadequate bowel preparation or poor tolerance and compliance [2].

New methods to image the colon have been developed in recent years. Among them, water enema computed tomography (WE-CT) can be a satisfactory alternative for the elderly [3].

We aimed to compare the results and tolerance of WE-CT with colonoscopy as a first-line examination in the imaging of the colon in symptomatic elderly for the diagnosis of supra-centimetric lesions.

## Patients and methods

### Patients

We conducted a prospective study including 57 patients over the age of 65 years, with colonic symptoms, for which colonoscopy is indicated. Patients were recruited from the out-patient gastroenterology clinic of Mongi Slim Hospital of La Marsa, Tunis, Tunisia over a period of 9 months, from 1 July 2014 to 31 March 2015.

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https://doi.org/10.1016/j.ajg.2017.11.006
1687-1979/

The exclusion criteria were: WE-CT performed as part of an assessment or monitoring of a known colonic disease including CRC and WE-CT performed following an incomplete colonoscopy, anal incontinence, during emergency and in cases with contraindications to intravenous iodinated contrast agent.

### *Methods*

Epidemiological, clinical and biological data were collected from patients. Patients were instructed for a colonic preparation based on polyethylene glycol before both examinations (colonoscopy and WE-CT). All patients initially underwent a WE-CT, followed by colonoscopy without general anaesthesia. Subsequently, a questionnaire on the tolerance of the preparation and the conduct of these two examinations was filled. For each patient, a comparison of the results of the two examinations was made.

Bowel preparation was evaluated using Boston bowel preparation scale (BBPS) [4].

All our examinations were carried out by AQUILION 64, with 64 detectors and 128 cuts scanner (TOSHIBA, JAPAN). All patients initially had scout acquisition in radio mode, followed by an abdominal helical acquisition without and with injection of low-osmolality iodinated contrast agent in the portal time at 70 s. Imaging of the chest was done in 3 patients: For staging in two patients and to investigate a suspected chest mass in another patient.

### *Statistical analysis*

The data were analysed using Epi info 3.5. We initially carried out a descriptive study by calculating absolute and relative frequencies for qualitative variables. We calculated averages, medians and standard deviations for quantitative variables. We also compared the WE-CT results to those of colonoscopy, a reference examination, to demonstrate the diagnostic value and tolerance of WE-CT. Comparisons of two averages were made using Student's *t*-test for independent series. Percentage comparisons on independent series were made by the Pearson's Chi-square test and Fisher's exact test. The diagnostic value of CT colonography with reference to colonoscopy was studied by calculating its sensitivity, specificity, and positive and negative predictive values (NPV). In all statistical tests, the significance level was set to <0.05.

## Results

### *Patient characteristics*

Characteristics of included patients are presented in Table 1.

**Table 1**
General characteristics of patient included in the study.

| Parameters | N (%) |
|---|---|
| Male | 35 (61) |
| Mean age (years) | 73 |
| Autonomy | 43 (76) |
| Co-morbidities | |
| Cardiovascular | 39 (68.4) |
| Diabetes | 12 (21) |
| Pulmonary | 17 (29.8) |
| Tumour | 8 (14) |
| ASA (American Society of Anaesthesiologists) score | |
| ASA I | 9 (16) |
| ASA II | 18 (32) |
| ASA III | 20 (35) |
| ASA IV | 10 (17) |
| Anti-coagulant/antiplatelet therapy | 28 (49) |
| Symptoms | |
| Abdominal pain + bowel disorders | 17 (30) |
| Rectal bleeding | 5 (9) |
| Intestinal transit disorder | 12 (21) |
| Deterioration of general condition | 2 (3) |
| Anaemia | 3 (5) |
| Sub occlusive syndrome | 2 (3) |
| Bloating | 8 (14) |
| Haemoccult + | 1 (2) |
| Abdominal pain | 7 (13) |

**Table 2**
Colonoscopy and WE-CT data.

| | Colonoscopy data | WE-CT data |
|---|---|---|
| Pathological | 25 (43.8%) | 9 (16%) |
| Lesions | | |
| Polyps (n) | 23 | 6 |
| ≤5 mm | 9 | 0 |
| 6–9 mm | 8 | 1 |
| 10–19 mm | 5 | 4 |
| ≥20 mm | 1 | 1 |
| Diverticulosis | 4 | 7 |
| Neoplastic processes | 2 | 2 |
| Angiodysplasia | 1 | 0 |
| Dolichocolon | 17 | 4 |
| Inflammatory wall thickening | 0 | 1 |
| Supra-centimetric lesions | | |
| Polyps | 6 | 5 |
| Neoplastic processes | 2 | 2 |
| Location of supra-centimetric lesions | | |
| Polyps | LC 4/RC 2 | LC 3/TC 1/RC 1 |
| Tumour processes | RC 1/LC 1 | RC 1/LC 1 |

LC: left colon; RC: right colon; TC: transverse colon.

### *Colonoscopy data*

Preparation for colonoscopy was considered good (BBPS score 7) in 86% of cases. Colonoscopy was completed in 75% of the patients. Pathological lesions were found in 25 patients (43.8%). There were polyps in 68% of cases, followed by diverticulosis (16%), neoplastic processes (8%), angiodysplasia (4%) and dolichocolon (4%) (Table 2). The supra-centimetric lesions identified in colonoscopy were polyps (n = 6) and neoplastic lesions (n = 2). Colonoscopy was considered highly discomfortable in 58% of the cases.

### *WE-CT data*

The results of the descriptive study showed that CT colonography allowed the diagnosis of the following: 2 neoplastic processes, 7 cases of diverticulosis, 1 inflammatory wall thickening and 6 polyps. These were 5 sessile supra-centimetric polyps, with an average size of 19.5 mm, and a single polyp of 9.1 mm. CT colonography also revealed extra-colonic lesions in 28 patients (49%), 3 of whom were of high importance (stromal tumour of the small intestine, suspicious pulmonary mass and chronic liver disease) (Table 2). The water distension of the colon was judged to be good, average and poor in 79%, 15% and 6% of cases, respectively.

### *Analytical study*

WE-CT and colonoscopy results were consistent for supra-centimetric lesions in 55 of 57 cases. WE-CT had a statistically significant diagnostic value in terms of sensitivity and specificity, estimated at 87.3% and 98%, respectively, with an estimated NPV of 96.5%.

**Table 3**
Distribution of lesions according to the different values of sensitivity, specificity, NPV and PPV.

| Types of lesions | Se | Sp | NPV | PPV |
|---|---|---|---|---|
| Supra-centimetric polyps | 66.7% | 100% | 96.2% | 100% |
| Sub-centimetric polyps | 6% | 89.9% | 27.7% | 91.9% |
| Neoplastic processes | 100% | 98.2% | 100% | 66.6% |
| Diverticulosis | 99.8% | 94.3% | 100% | 57% |

In malignant lesions, specificity and sensitivity were 98.2% and 100% respectively, NPV was 100% and positive predictive value (PPV) was 66.6%. Similarly, for supra-centimetric polyps, the sensitivity and specificity of WE-CT was estimated to be 66.7% and 100%, respectively, with a NPV of 96.2%.

However, for sub-centimetric lesions, WE-CT had a low sensitivity, estimated at 6%, PPV at 91.9%, NPV at 27.7% and specificity at 89.9%.

Thus, the NPV of WE-CT for the detection of lesions of any size is estimated at 67.2%, and its specificity and sensitivity are estimated at 97% and 30.3%, respectively.

Table 3 summarises the different sensitivity, specificity, NPV and PPV when $p < .05$.

The discomfort associated with the course of the WE-CT was low in 70%, moderate in 25% and high in 5% of the cases. Almost all patients (92%) had a preference for WE-CT compared to colonoscopy.

## Discussion

In our study, the sensitivity and specificity of WE-CT in the detection of supra-centimetric lesions were estimated to be 87.3% and 98%, respectively, with an NPV of 96.5%. These results are consistent with data from the literature [5–7] (Table 4). Nevertheless, WE-CT has some limitations, mainly its low sensitivity for detecting sub-centimetric and flat lesions [8,9]. Our results with these lesions demonstrated a sensitivity of 6% and an NPV of 27.7%. Thus, WE-CT does not constitute a screening test for precancerous lesions and must lead to a colonoscopy to confirm a diagnosis in case of doubt [10].

WE-CT is of great interest in the elderly, with a high NPV for supra-centimetric lesions, with satisfactory patients' compliance and optimal conditions particularly for patients with contraindications for colonoscopy. It is also simple to use, requiring no sophisticated interpretation software [10,11]. Furthermore, WE-CT enables the diagnosis of various extra-colonic lesions, which can explain the symptoms in the elderly [11,12]. Indeed, in our study, 25 patients demonstrated extra-colonic lesions without associated colonic lesions.

The existence of co-morbidities appears to be important in the decision to refer for WE-CT. WE-CT can replace colonoscopy in the majority of patients, which is particularly important as the risk of failure of colonoscopy correlates with age and patients' co-morbidities. In some countries, religious and cultural barriers may be a reason for refusing colonoscopy by some patients [14].

A good colonic preparation which is a prerequisite for the success of colonoscopy does not constitute a limiting factor for a reliable interpretation of the WE-CT [5,13]. The choice of techniques should be guided by clinical examination, patient's age, personal and family risk factors, general condition and degree of cooperation, and availability of both techniques. In our study, all patients were scheduled to undergo colonoscopy at least few hours after WE-CT.

This could lead to interpretation bias if we consider that non-colonic preparation is the rule for this examination. For WE-CT, emptiness of the colon is certainly beneficial but not indispensable. It can be reduced to distal evacuation enema 1 h before the examination. Interpretation of the examination can be done even if the patient is unprepared. However, a clean colon reduces interpretation time and decreases the number of false positives, related mainly to faecal residues.

**Table 4**
Diagnostic value of water enema CT from supra-centimetre lesions.

| Study (year) | Sensibility | NPV |
|---|---|---|
| Ridereau-Zins et al. (2010) | 98.6% | 99.1% |
| Soyer et al. (2012) | 99% | 99.7% |
| Our study | 87.3% | 96.5% |

Our study is limited by the small sample size, which may explain the low rate of detected polyps.

We conclude that WE-CT can be proposed as first-line examination modality for colonic symptoms in elderly patients and should be considered only in patients with high co-morbidities and high risk for general anaesthesia.

Randomised prospective, multicentre studies should be conducted to confirm the place of WE-CT in the management of symptomatizing elderly.

## Conflict of interest

The authors declare that there are no conflicts of interest.

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