CT colonography with rectal iodinated fluid tagging: tagging quality, patient acceptance and examination time compared with oral fluid tagging.

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Authors: P. Bemi\textsuperscript{1}, L. Faggioni\textsuperscript{1}, A. Mantarro\textsuperscript{1}, R. Scandiffio\textsuperscript{2}, E. Neri\textsuperscript{1}, C. Bartolozzi\textsuperscript{1, 4}Pisa/IT, \textsuperscript{2}pisa/IT
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Purpose

CT Colonography is gaining widespread acceptance as a minimally invasive tool for the evaluation of the large bowel in case of incomplete colonoscopy, intolerance to colonoscopy and for colorectal cancer screening. Optimal patient preparation (including insufflation and fecal/fluid tagging) is crucial to maximize diagnostic quality [1]. Several tagging regimens have been proposed that enable differentiation between fecal/fluid residues and colonic polyps. No definite consensus still exists about the most effective tagging scheme (i.e. which agent, dose, administration protocol, etc.).

Oral tagging with iodinated agents has been reported to provide greater homogeneity of intraluminal CT density than barium-based protocols [2,3]. Sodium amidotrizoate and meglumine amidotrizoate (Gastrografin) is an iodinated contrast agent often used for oral tagging. It has a variable compliance: it may taste bitter, it may induce diarrhea, etc. It is generally safe; however, rare anaphylactoid reactions after oral administration of Gastrografin have been reported in a blunt trauma patient without bowel disease [4,5] and in a patient with pseudomembranous colitis [6]. Moreover a small amount (#3%) of Gastrografin is absorbed through the enteric mucosa after oral administration and discharged through the urinary tract [7]. Moreover, the colonic enhancement depends on contrast medium transit time through the small bowel, and enhancing small bowel may disturb colonic assessment.

To improve the patient's acceptance of CT Colonography and reduce examination time, we tested the introduction of contrast material through the rectal probe instead of an oral assumption.

The purpose of our study was therefore to compare patient’s acceptance and overall examination time of CT colonography with rectal and oral iodine tagging.

Methods and Materials

Forty patients (26 male, 14 female, age 48-83 years old, mean 61) underwent CT colonography with iodine tagging for colorectal cancer screening. Out of them, 20 were administered oral iodinated contrast material three hours prior to CTC (group 1), while in the remaining 20 iodine was introduced rectally immediately before the examination (group 2). In order to eliminate bias on patient acceptability deriving from emotional reaction to the CT Colonography outcome, all patients selected for the study were completely negative (no polyps, not even diverticula). In both cases, a residue-free diet plus low dose of Macrogol® after every meal was prescribed starting 3 days before CTC. In the first group a fluid tagging preparation was employed, consisting of 50mL diatrizoate dimeglumine (GastrografinTM, Bracco Diagnostics, Milan, Italy) administered orally,
diluted into 500mL of water, three hours before carbon dioxide insufflation. In the second group immediately before CTC, all patients received an enema of 50mL diatrizoate dimeglumine diluted in 300mL of warm tap water, followed by automatic insufflation of an average of 3L (minimum: 2L; maximum: 4L) of carbon dioxide. Patients were asked to turn themselves on the CT table to ensure homogeneous distribution and mixing of contrast medium. Tagging of all colonic segments was preliminarily assessed on scout views. An antispasmodic agent (hyoscine butylbromide; Buscopan) was administered prior to colonic insufflation to relieve colonic spasm and patient discomfort. All data were acquired on a 64-row MDCT scanner (LightSpeed VCT, GE Medical Systems, Milwaukee, WI) in the supine and prone position with the following parameters: tube voltage 120 kV, tube current 50-80mA depending on patient size, rotation time 500 ms, beam pitch 1.375:1, detector configuration 64 × 0.625mm, reconstructed slice thickness 1.25mm, reconstruction increment 1mm, standard reconstruction kernel. Homogeneity of luminal enhancement (expressed in Hounsfield units) in the various colonic segments and overall examination time were recorded. Two weeks after CTC, all patients received a phone interview to assess their compliance to the examination. Patient acceptance related to bowel preparation, insufflation, and patient condition 24 hours after CTC was rated using a Likert scale (1=poor through 5=excellent).

**Results**

Intraluminal enhancement was homogeneous and comparable (p>0.05) with both tagging protocols. Patient acceptance was also similar between rectal and oral tagging (bowel preparation, mean score 4.75±0.44 vs 4.45±1.05; insufflation mean score 4.80±0.52 vs 4.60±0.60; post-CTC condition mean score 4.95±0.22 vs 4.70±0.57; overall acceptance mean score 4.85±0.37 vs 4.55±0.60, respectively; p>0.05). Overall examination time was significantly shorter with rectal tagging (18.3±3.5 vs 215.6±10.3 minutes, p<0.0001). No adverse reactions with rectal and oral tagging occurred in this study.

**Conclusion**

The oral administration of hyperosmolar iodine-based regimens provided a homogeneous tagging of both fluid and solid residues. The study of Iannaccone et al. showed that by adding Gastrografin to regular meals (180 mL ×6 meals), the sensitivity for the identification of colorectal polyps with size greater or equal to 8 mm reached 95.5%. In this study the cathartic drug was not administered because Gastrografin is an ionic agent and consequently hyperosmolar, so it draws liquids from the bowel into the lumen directly resulting in a double outcome: bowel cleansing and fecal tagging [8]. However, the oral administration of iodinated contrast media outside of hospital is not recommended, because it can cause, although rarely, some side effects that
can range from mild reactions such as diarrhea, nausea, or vomiting to more severe reactions. Even if orally administered a small amount of contrast (#3%) is resorbed by the mucosa and can be found in the bloodstream. Such resorption causes an increase of eosinophilia, preparing the patient to potential allergic reactions. As a matter of fact, the contrast medium more frequently used for fluid tagging is Gastrografin. Because of its characteristic, it draws liquids from the bowel into the lumen directly, and it quite frequently causes disturbances of water and electrolyte balance.

For the above reasons Neri et al. conceived the same-day preparation. It consists in a low-residue diet and in a reduced cathartic preparation with a mild laxative (PEG macrogol 3350) at each of the three main meals, starting 2 days before CTC. On the day of CTC, patients ingested a 50-ml dose of sodium diatrizoate and meglumine diatrizoate solution (total iodine load 18.5 g) diluted in 500 ml water 3 h before CTC in the hospital under physician’s control. Same-day fluid tagging provides an optimal fluid tagging and is completely tolerated by the patient [9].

In a study by Campanella et al. 3 different iodine-based fecal tagging bowel preparations were compared. Considering preparation quality alone a 2-day regimen of meal-time administration of iodine and phospho-soda was the best regimen, but the same-day preparation provided the best balance between bowel preparation quality and patient acceptability [10]. However, same-day fluid tagging with iodixanol has some inconveniences: the patients have to drink Gastrografin diluted in 500mL of water and have to wait 3 hours in the waiting room of the radiology department with surges of diarrhea due to the cathartic preparation performed. To overcome this a solution may be the introduction of contrast medium (Gastrografin) through the same probe of insufflation immediately before CT Colonography. To ensure homogeneous distribution and mixing of contrast it's convenient to ask patients to turn themselves on the CT table and to assess preliminarly the enhancement of all colonic segments on scout view images. Barium, rectally injected, can be used as an alternative, but tagging is often inhomogeneous making it difficult to identify solid residual faeces.

In conclusion, our data show that, compared with oral tagging, fluid tagging by means of iodinated enema allows for significant reduction of examination time with comparable tagging quality and patient acceptance.

References


**Personal Information**

Pietro Bemi MD.
Department of Diagnostic and Interventional Radiology, University Hospital of Pisa, Italy.

E-mail: pietro.bemi@gmail.com