Computed Tomographic Virtual Colonoscopy

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Virtual computed tomographic virtual colonoscopy (VCT) utilizes radiographic images obtained by CT technology for the purpose of rendering two and three-dimensional images of the colon. The technique is rapidly evolving and appears promising and an adjunct method to perform screening examinations for colorectal cancer. Patients still require a mechanical bowel preparation to remove solid stool and a period of time on a clear liquid diet. The colon is insufflated via a transanally placed tube using room air.

The patient is imaged and a computerized software program extracts the images of the insufflated colon, generates an automated centerline for navigation and subtracts the opacified residual fluid in the lumen. The observer is then able to perform a virtual "fly-thru" of the colon. Use of both two and three-dimensional visualization optimizes identification of polyps and other lesions.

Early evaluations of VCT have been limited, based primarily upon the use of two dimensional views. The recent study by Pickhardt et al (NEJM 2003; 349:2191-2200) reported a sensitivity of 93.8% for polyps >7mm and 88.7% for adenomatous polyps at least 6mm in diameter. The sensitivity and specificity in this study was equivalent to optical colonoscopy. VCT identified two malignant polyps, one of which was missed at optical colonoscopy. The authors also commented that the rate of extra-colonic lesions in an average risk patient is <50% of high risk groups which reduces the potential for unnecessary investigations as a result of the VCT. Another report by Iannaccone et al (Radiology 2003; 229:775-781) reported 100% sensitivity for cancers, 100% for polyps >1cm, and 83% for polyps 6-9 mm. These authors were able to reduce the radiation exposure by using a multi-detector device (1.8-2.4 mSv compared to 4.4-6.7 mSv in

other studies). Taylor et al (Radiology 2003; 229:782-790) reported an absence of hemodynamic changes during VCT compared to a 30 fold increase in hypotension and a higher rate of bradycardia with optical colonoscopy.

VCT appears to offer significant promise as a screening modality in moderate risk populations. It avoids the need and risks for sedation, avoids the risk of instrument perforation with optical colonoscopy, and compares favorably for time consumption (15 minutes for image acquisition and at best, under ideal circumstances, 15 minutes for interpretation). Optimal VCT requires a multi-detector CT scanner for high speed and better resolution. The downside is that patients require mechanical bowel preparation and those with a suspected lesion will either need to be referred for an optical colonoscopy or arrangements will need to be made for on-demand colonoscopy of positive tests. Further data is required to support full transition of screening for colorectal cancer to VCT. The additional CT resources, technicians and radiologists will be significant as well.

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