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ORIGINAL ARTICLE

Virtual colonoscopy: Technical guide to avoid traps and pitfalls

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KEYWORDS

Virtual colonoscopy;
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3D navigation.

Abstract The study aims to clarify the ideal technique of virtual colonoscopy and how to avoid pitfalls.

Patient and methods: 200 patients were referred for VC screening.

Results: 3D VC false positive results were as follows: Pseudopolyps due to fecal residue (17.5%), under-distended colon (2%), segmental spasm (1%), respiratory motion artifacts (3%), prominent colonic haustrations (8.5%), prominent ileocecal valve (4.5%), prominent appendicular stump (0.5%) and false pits due to shine-through (1.5%). 3D false negative results were proved secondary to fecal residue (1.5%), retained fluid (2.5%), colonic under-distention (5%), prominent colonic folds (1%) and sessile polyps (1%).

2D navigation: There were no false positive results. 3.5% false negative results were due to different combinations of fecal residue (3%), fluid (2%), under-distended colon (1%), prominent colonic haustrations (2.5%) and sessile polyps (1%). Finally, true positive results were proven in 40% of 3D and 47.5% of 2D navigations, true negative: 29.5% in 3D and 49% 2D. False positive results were proven in 19.5% of 3D, false negative results: 11% 3D and 3.5% 2D. 3D 78.4%, 2D 93% sensitivity and 3D 60.2% & 2D 100% specificity records.

Abbreviations: AGH, Al-Mana General Hospital; CO_2, carbon dioxide; C-RADS, CT Colonography Reporting and Data System; CT, computed tomography; MSCT, Multislice CT scan; ROI, Region of interest; SSD, shaded-surface-display; VC, virtual colonoscopy; 2D, two dimensions; 3D, three dimensions.

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Conclusion: Many overestimating or underestimating VC pitfalls could be avoided, through mastering the technique and being more familiar with different navigation methods and these technical pitfalls.

1. Introduction

Colorectal malignancy is the third (after lung and breast) leading cause of deaths from neoplastic diseases, worldwide. In the United States, it has similar records if men and women are estimated separately; however it is the second leading cause if estimation for both sexes is done in combination. 150,000 is the average annual record of newly diagnosed cases in USA, which caused 56,000 deaths in 2005, being the second highest record of deaths from malignancy. Also, the lifetime risk factor to develop colon cancer is 6% and lifetime risk factor to die from colon cancer is 2.5%. The incidences of colorectal cancer in the Arab world are relatively low, considering indices of patients older than 40y; however, there are some upcoming higher scores as regards patients of younger age groups (1–4).

Colorectal carcinoma can be described as preventable disease, as there are many precancerous colonic diseases e.g. colonic polyposis. If these precancerous polyps were early detected and controlled, this will significantly reduce colon cancer morbidity and mortality incidences. The known premalignant

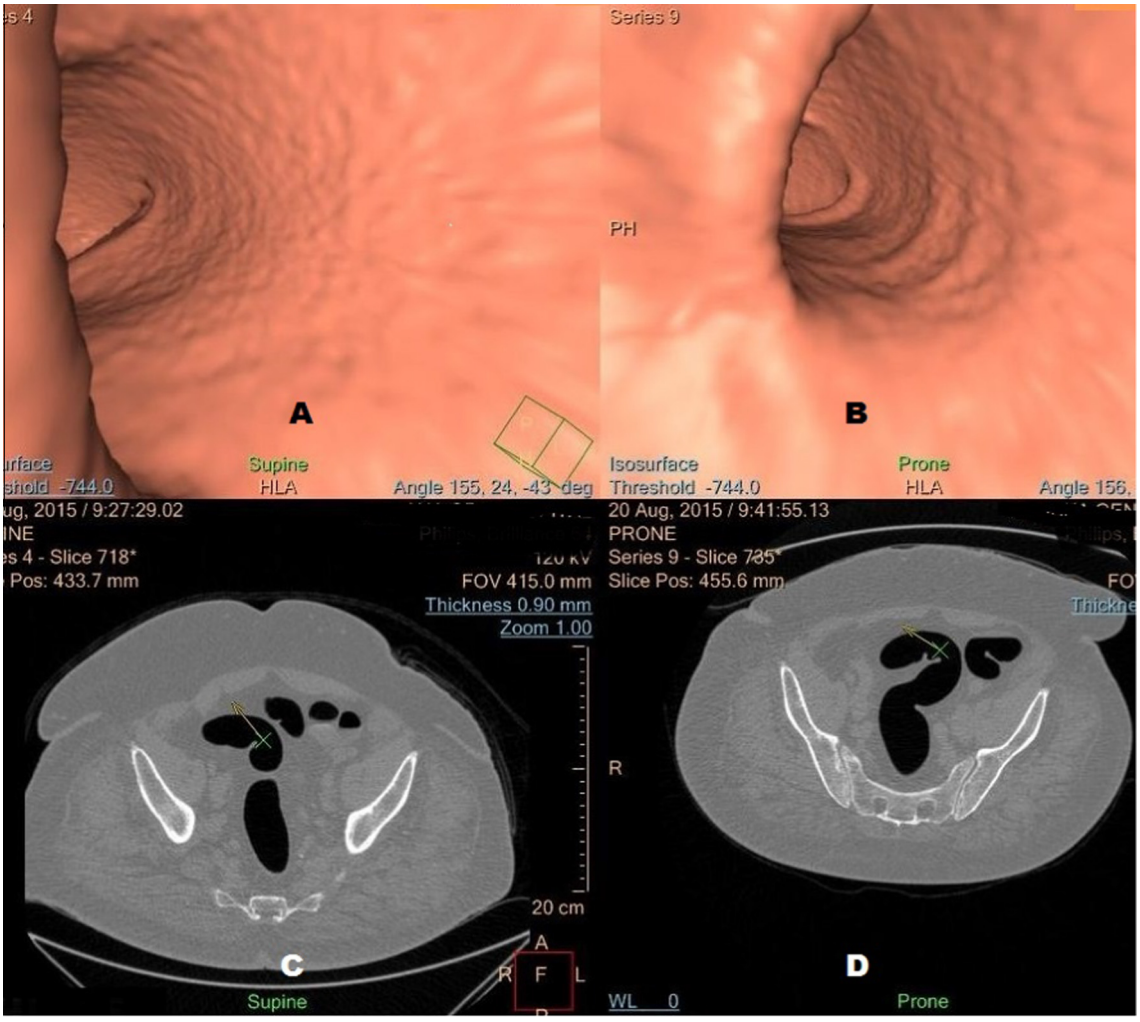

Fig. 1 Comparative 3D virtual colonoscopy navigation images at the same site of the sigmoid colon in supine (A) & prone (B) positions with corresponding 2D supine (C) and prone (D) images.