May 20th, 12:30 PM

Computerized 3-dimensional Localization of a Video Capsule in the Abdominal Cavity: Validation by Digital Radiography

Neil B. Marya  
University of Massachusetts Medical School

Andrew Karellas  
University of Massachusetts Medical School

Abhijit Roychowdhury  
University of Massachusetts Medical School

See next page for additional authors

Follow this and additional works at: https://escholarship.umassmed.edu/cts_retreat

Part of the Analytical, Diagnostic and Therapeutic Techniques and Equipment Commons, Biomedical Devices and Instrumentation Commons, Gastroenterology Commons, Medical Biotechnology Commons, Radiology Commons, and the Translational Medical Research Commons

Marya, Neil B.; Karellas, Andrew; Roychowdhury, Abhijit; Foley, Anne; and Cave, David, "Computerized 3-dimensional Localization of a Video Capsule in the Abdominal Cavity: Validation by Digital Radiography" (2014). UMass Center for Clinical and Translational Science Research Retreat. 95.  
https://escholarship.umassmed.edu/cts_retreat/2014/posters/95

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Presenter Information
Neil B. Marya, Andrew Karellas, Abhijit Roychowdhury, Anne Foley, and David Cave

Comments
Abstract of poster presented at the 2014 UMass Center for Clinical and Translational Science Research Retreat, held on May 20, 2014 at the University of Massachusetts Medical School, Worcester, Mass.

Creative Commons License
This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.
Title: Computerized 3-dimensional localization of a video capsule in the abdominal cavity: validation by digital radiography

Authors: Neil Marya M.D\textsuperscript{1}, Andrew Karellas PhD\textsuperscript{2}, Abhijit Roychowdhury M.D.\textsuperscript{2}, Anne Foley\textsuperscript{1} and David Cave M.D\textsuperscript{1}.

Affiliations: 1. Department of Internal Medicine, University of Massachusetts-Worcester, Worcester, MA, United States.

Background: Video capsule endoscopy has become the gold standard for examining the small bowel and defining pathological lesions, however, localization of a specific lesion remains largely guesswork. We report the validation of a new 3D localization software using radiological localization in volunteers.

Methods: 30 volunteers with no known prior history of gastrointestinal disease swallowed the EC-10 video capsule. A sensor array with six radiopaque markers was placed on the anterior abdominal wall. Once the capsule was visualized to be in the small intestine using a real time viewer, five sets of low dose x-rays were taken every thirty minutes. Distances between sensor points and the capsule were measured on the x-rays to provide X, Y, and Z coordinates and compared with the distances calculated by the software from the same points.

Results: Data from 27 of the 30 subjects were suitable for analysis. There were three technical failures. Our study evaluated the accuracy of the “Capsule 3D Track function” which calculated the capsule position based on the signal strength received at the sensor array. The accuracy of the position was compared to the actual position of the capsule as determined by radiographic images obtained during the capsule’s transit through the small bowel. The average error for the software measurement for each of the three coordinates was: X -2.00 cm (SD 1.64 cm), Y -- 2.64 cm (SD 2.39 cm), and Z --2.51 cm (1.83 cm).

Conclusion: The localization error reported here is comparable to the existing system for localization, however, it provides localization across all three spatial dimensions which has never been achieved before. The potential utility of this technology is yet to be seen, however, as it needs to now be studied in a prospective clinical trial for patients with suspected small bowel pathology.