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Subjective image quality assessment of a novel endoscopic image enhancement system of the bladder: preliminary results of a nation-wide survey study
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Introduction: Improving image quality of cystoscopy represents a challenge, especially in the management of patients with non-muscle-invasive bladder cancer (NMIBC). Several imaging modalities have been developed in an attempt to improve the diagnostic yield of classic white-light imaging (WLI), i.e., the "gold standard" for the identification of suspicious bladder lesions and detection of primary/recurrent NMIBC. The aim of the study was to assess the subjective quality of a novel digital image enhancement system (IES) of bladder endoscopy through a nation-wide survey.

Methods: Six patients scheduled for an outpatient diagnostic cystoscopy at our department on April 2015 were randomly selected to participate in the study. After giving informed consent, each patient was submitted to cystoscopy using a cysto-urethral fiberscope (Karl Storz, Tuttingen, Germany) in conjunction with IMAGE I Storz Professional IES platform (SPIES™; Karl Storz, Tuttingen, Germany). By suppressing the red portion of the spectrum, SPIES enhances specific wavelengths (blue and green) building a three-color image from these spectral components. By adding different colors such as orange or violet to the blue- and green-colored image, different options for visualization (image types) become available (CLARA, CHROMA, SPECTRA A and SPECTRA B). The best enhancement method may be chosen in different clinical situations if high contrast is desired or in case of visual interferences at cystoscopy. Two representative images of the encountered pathology were selected per patient and captured using WLI and SPECTRA B modes simultaneously (Picture 1). Non-processed images were in a within pair random-per-modality fashion placed in an on-line survey platform (http://goo.gl/forms/pQ6UaeXTx9). All registered members of the Hellenic Urological Association (HUA) were officially invited by two consecutive e-mails to participate in the survey. Participants were asked blindly to the image mode used, to score each image using absolute category rating (ACR) on a scale ranging from 1 (bad quality) to 5 (excellent quality). The test was performed using the double stimulus continuous quality scale (DSCQS) method as the standard for subjective quality tests. Mean opinion scores (MOS) were analyzed using the Statistical Package for Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) with a two-tailed p ≤ 0.050 indicating significance.

Results: 634 HUA members have considered the invitation to participate in this on-going study to date. This preliminary analysis is based on the data provided during the initial four-week survey period. 134 participants (mean age: 43.1 ± 9.4 years) have responded to date (n = 1608 answers). 54 (40.3%) declared a previous experience with advanced endoscopic imaging techniques (photodynamic diagnosis, narrow-band imaging, optical coherence tomography). MOS for the IES and the WLI group was 4.1 (95% confidence interval [CI], 4.0-4.2) ± 0.9 and 3.2 (95% CI, 3.1-3.3) ± 0.9, respectively (p < 0.001).

Conclusion: Preliminary results of this nation-wide survey show that SPIES-based cystoscopy provides a better subjective viewing experience compared to conventional WLI-based cystoscopy. The clinical relevance of this finding in the management of patients with pathologies such as NMIBC warrants further testing in clinical trials.

References:
Figure 1