

Volumetric Automated Full-field Breast Ultrasound in daily routine - are we there yet?

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There is a developing trend to introduce the automated full-field breast ultrasound (AFBUS) as a replacement for handheld ultrasonography (HHUS) at least as a screening method for some groups of patients but is the newest incarnation of this diagnostic method really ready for daily routine? Breast ultrasound is a well-accepted and reliable diagnostic method for evaluation of women with clinically or radiologically suspicious breast lesions [1]. Attempts to automate breast ultrasonography were made as early as 1979 [2] but it was not until the last decade that we saw major advancement in this field which was made possible by introduction of new high frequency probes and powerful computers capable of coping with high amount of collected data and complicated image processing (artifact removal). New volumetric scanners acquire a series of B-mode pictures and reconstruct 3D data volume of the entire breast. Usually many scans are required to complete the task. These data can be sent to a separate workstation for evaluation. The advantage of this imaging method is above all avoiding the investigator-dependence and non-standardized documentation which could occur while performing a handheld US examination. Other benefits include collecting of 3D data that allows for multiplanar reconstruction with coronal view being the one which is not available for evaluation in HHUS - current research data shows that it might be contributory to diagnosis [3,4]. Automation of breast ultrasound is believed to lead to reduction of examination time although available results are partially contradictory and depending on the type of the used device [3,5-7]. New volumetric scanners are well tolerated by the patients [5,7]. Reported sensitivity and specificity does not differ from HHUS [5-7]. On the other hand automated ultrasound deprives the radiologist of direct contact with the patient and thus of the holistic approach, the opportunity of performing palpation, color doppler, elastography and contrast enhanced US as well as the examination of the axillary lymph nodes. In most of the published studies HHUS scanning time was shorter than its automated counterpart's and one must not forget that the collected 3D data volume needs time consuming evaluation whereas the radiologist performing handheld sonography usually diagnoses pathologies (or

lack thereof) during the examination - so the suggested time-efficiency factor for radiologists is at least questionable. Prosch et al. [5] report that although patient comfort did not differ significantly between HHUS and AFBUS about 40% of patients stated that they prefer the former because of the presence of a physician during examination and possibility of discussing the diagnosis. In spite of technical advances automated breast sonography can be impaired by many factors such as peripheral gaps, patient motion, artifacts in fusion zones to name a few. HHUS has also its technical deficiencies but many of them (such as motion artifacts) can be easily identified and compensated or avoided in real-time. Automated breast ultrasound can't replace HHUS although its implementation in certain settings (for example in remote areas suffering from shortage of radiologists) is feasible but needs further research and evaluation.

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Received February 14, 2012; Accepted February 16, 2012; Published February 18, 2012

Citation: Karwacki GM (2012) Volumetric Automated Full-field Breast Ultrasound in daily routine - are we there yet? *J Med Diagn Meth* 1:e101. doi:10.4172/2168-9784.1000e101

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