Journal of the American Society of Cytopathology (2015) 4, 195–202

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jascyto.org/

ORIGINAL ARTICLE

Value of ultrasound guidance in cytopathologist-performed fine-needle aspirations of palpable lesions

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Received 3 November 2014; received in revised form 24 December 2014; accepted 24 December 2014

KEYWORDS
Fine-needle aspiration;
Ultrasound;
Palpation;
Cytopathologist-performed;
Needle guidance;
Cytopathology

Introduction Fine-needle aspirations (FNAs) of palpable masses are often performed by cytopathologists without ultrasound (US) guidance. Nonetheless, variations in the actual depth of palpable masses lead to occasional challenges. US guidance allows cytopathologists to visualize the mass and guide needle placement. This study retrospectively addressed the utility of US by comparing FNAs performed by cytopathologists on palpable masses with and without US guidance.

Materials and methods Cytopathologist-performed FNAs with and without US guidance from March 1, 2013 to July 1, 2014 were identified. The number of passes, location of lesions, and interpretations were recorded. Available slides were reviewed to determine the proportion of passes that contained diagnostic cellular material and cases in which diagnostic material was present on the first needle pass.

Results In this study, 134 palpation-guided FNAs and 118 US-guided FNAs were analyzed. The percentage of nondiagnostic cases was significantly lower for US-guided FNAs (2.5%) than for palpation-guided FNAs (12.7%; $P = 0.004$). The average number of needle passes was significantly lower for US-guided FNAs (2.9) than for palpation-guided FNAs (3.6; $P = 0.0002$). Twenty-two of 118 of US-guided FNAs (18.6%) and 6 of 134 palpation-guided FNAs (4.5%) were completed after only a single pass ($P = 0.0008$). The percentage of passes with diagnostic material was significantly higher for US-guided FNAs (73.6% versus 60%; $P = 0.0002$).

Conclusions For palpable masses, US-guidance adds value to cytopathologists in obtaining diagnostic cellular material more often on the first pass and with fewer passes overall than by palpation alone. This

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http://dx.doi.org/10.1016/j.jasc.2014.12.002

has a potentially beneficial impact on patient care owing to the increased precision and accuracy of needle guidance with ultrasonography.

Introduction

Fine-needle aspirations (FNAs) are routinely performed by cytopathologists on palpable masses without ultrasound (US) guidance. Nonetheless, the palpable lesions of interest can occasionally be difficult to target because of variations in their actual depth. Because palpability does not necessarily equate to superficiality, there can be instances during which initial needle passes reveal no diagnostic material due to insufficient depth of penetration by the needle. The use of ultrasonography allows the performer of the FNA to visualize a mass in relation to the surrounding tissue including major vascular structures. By ascertaining the depth and location of the lesion, US can be instrumental in guiding the placement of the needle during an FNA pass.

US-guided FNAs are often performed by a variety of clinical care providers such as radiologists and clinicians and over the past half century, US-guided FNA has become increasingly popular with respect to palpable FNA.[1] Although the literature on cytopathologist-performed US-guided FNAs is relatively sparse, the use of ultrasonography is becoming increasingly adopted by the cytopathology community.[2-6] These studies have addressed both palpable and nonpalpable masses at various anatomic sites, including lymph nodes, breast, thyroid, parathyroid, and salivary glands. Advantages of a cytopathologist-led US-guided FNA service include increased precision of needle targeting, lower sample inadequacy rates, real-time feedback on the efficacy of cell acquisition via rapid on-site evaluation (ROSE) of adequacy, preliminary diagnostic assessment, judicious procurement and triaging of additional material for necessary or anticipated ancillary studies based on that assessment, and, ultimately, timely diagnoses for efficient patient management. A recent systematic review has suggested that the best results are obtained with a "one-stop cytopathologist-led FNA service" for head and neck lesions.[1]

At our institution, cytopathologists have traditionally performed palpable FNAs in our FNA clinic until November 1, 2013, during which there was a transition to exclusively performing US-guided FNAs in our clinic. ROSE is employed for all of our cytopathologist-performed FNAs. In this study, we sought to retrospectively examine and compare the following parameters in cytopathologist-performed US-guided and palpation-guided FNAs: nondiagnostic rate, average number of needle passes for the given procedures, completion of the procedure after a single needle pass, and percentage of passes with diagnostic material. To our knowledge, this is the first study that addresses the comparative value of cytopathologists using US-guidance versus palpation alone during FNAs of palpable masses in this manner.

Materials and methods

The pathology laboratory information system at the University of Michigan was searched to identify consecutive cytopathologist-performed FNAs without US-guidance from March 1, 2013 to November 1, 2013 and with US-guidance from November 1, 2013 to July 1, 2014. Informed consent was obtained from each patient prior to the initiation of the FNA procedures. The FNAs were performed at the University of Michigan by the cytopathology fellows and/or cytopathology faculty. The cytopathology faculty cohort supervising the FNAs with and without US-guidance throughout the course of this study was the same. At our institution, fellows at the beginning of their fellowship training are initially oriented to FNA procurement technique via instructional videos on FNA technique and smear preparation. This is further supplemented by hands-on didactic training (provided by M.H.R.) in which fellows receive instruction, practice their technique, and are assessed for competency in smear preparation. Cytopathology faculty have received similar training during their fellowship training and have honed their expertise in FNA procurement technique during their years of experience. Next, prior to the initiation of US-guided FNAs, all faculty members and fellows trained in an institutionally established didactic education and simulation center training on phantoms. Faculty and fellows also practice technique on phantoms purchased by our laboratory. Five faculty members (M.H.R., X.J., J.C.P., A.H., and M.L.) also completed the Advanced Practical Pathology Program in Ultrasound-Guided Fine-Needle Aspiration Workshop offered by the College of American Pathologists. US-guided FNAs were performed using the Venue 40 BT12 ultrasound machine (GE Healthcare, Wauwatosa, Wis) and either the 12L-SC 8-13 MHz or L8-18i-SC 8-18 MHz linear transducers. Air-dried and alcohol spray−fixed smears were prepared on site; the needle pass number was indicated on each slide. The specific passes performed by the fellow or faculty were not documented. Needles were rinsed in RPMI media ultimately for the preparation of either ThinPrep (Hologic Inc, Marlborough, Mass) slides or cell blocks. Air-dried smears were Diff-Quik (StatLab Medical Products, McKinney, TX) stained on site for ROSE and preliminary diagnostic assessment.

For each case, the location of the palpable lesions, the number of needle passes, and diagnostic interpretations