Cytopathology + More | Assessing needle core biopsy adequacy—survey of practices

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May 2016—In the era of personalized medicine[1] it is paramount to collect samples that will have sufficient material not only for an accurate diagnosis but also in many cases for prognostication or eligibility for targeted therapy or both. This may involve use of immunohistochemistry, flow cytometry, microbiological culture studies, and molecular studies. Fine needle aspiration and needle core biopsies (NCB) are used routinely for diagnosis of mass lesions from various sites in the body, and both FNA and/or cell blocks and NCB have been used successfully for these purposes.[2,3] Cytopathologists and cytotechnologists are familiar with immediate assessment of FNA smears for adequacy or diagnosis or both. Less is known about the use of touch imprint of NCB in current clinical practice. Drs. Gupta and Wang4 found that procurement of NCB of visceral organ lesions increased from 5.5 percent to 31 percent over 10 years in their institution, with touch imprints constituting 52 percent of all "cytologic" specimens from the liver, kidney, and lung. Given that up to 15 percent of NCB from image-guided transthoracic core biopsy procedures have been reported to have been inadequate specimens for diagnosis,[5-10] intraprocedural assessment of touch imprints from NCB is often requested to ensure sample adequacy. Such assessments may also allow the clinician to receive a diagnosis in real time.

The aim of this article is to evaluate the changing landscape of cytology. A voluntary supplemental questionnaire was sent in 2015 to laboratories participating in the CAP NGC Education Program to determine practice patterns around the use of touch imprint of NCB. Multiple answers were possible for some questions (the total percentage of answers may therefore not add up to 100 percent in all questions). Some of the survey results are shared here.

Almost half the respondents (403/844; 47.7 percent) performed rapid on-site evaluation (ROSE) of touch imprint of NCB from various body sites including the lung (368/392; 93.9 percent), liver (340/392; 86.7 percent), and lymph nodes and/or spleen (303/392; 77.3 percent). ROSE of the touch imprint of NCB was usually performed at the CT scan (383/398; 96.2 percent) and ultrasound (324/398; 81.4 percent) suites. The pathologist was usually on site (75 percent); less commonly, the touch imprint specimen was transported to the laboratory (26.5 percent) for intraprocedural assessment.

Preparation of the touch imprint was performed by cytotechnologists (193/388; 49.7 percent), the pathologist (176/388; 45.4 percent), and less often by laboratory aides (101/388; 26 percent). Surgical pathologists (309/381; 81.1 percent) and/or cytopathologists (218/381; 57.2 percent) commonly performed the immediate assessment. Cytotechnologists did not perform independent assessment of touch imprint of NCB for specimen adequacy without pathologist oversight in most laboratories (313/381; 82 percent).

Techniques used to prepare the touch imprint included touching the NCB on the slide (196/388; 50.5 percent), rolling the NCB on a slide (177/388; 45.6 percent), and, rarely (12/388; 3.1 percent), a crush preparation. The most common stain used was the modified Romanowsky stain (Diff Quik) on air-dried slides. The NCB was commonly submitted to the laboratory in formalin (61.1 percent). The majority of laboratories accessioned the entire case

(touch imprint and NCB) as a surgical specimen (211/388; 54.4 percent), followed by accessioning the entire case as a cytology specimen (110/388; 28.4 percent). Less often, the touch imprint was accessioned as a cytology specimen and the NCB as a surgical specimen (60/388; 15.5 percent).

The immediate adequacy report of the touch imprint was usually provided orally at the time of the procedure by most respondents (358/381; 94 percent), and two-thirds of laboratories (237/381; 62 percent) included in the final report a statement of the adequacy assessment. Most commonly (334/381, 87.6 percent), a single report was rendered that included the immediate assessment details, the touch imprint and NCB findings, and the final diagnosis. Less often, two separate reports were rendered (51/381, 13.4 percent): one for the touch imprint cytology/adequacy and another for the NCB, and the majority of these respondents cross-referenced the two reports.

The wider use and acceptance of touch imprints of NCB may be related to the invention and adoption of a coaxial NCB system that allows multiple cores to be collected through a single puncture. Cytomorphology noted on touch imprint preparation differs from that seen in FNA smears and involves a learning curve.[4,11] Intuitively, the process of acquiring material is different in the two procedures: Aspiration is an active process, which generally yields a cell-rich preparation without much stroma, compared with NCB, which is a relatively passive process and includes cells and stromal elements in the same specimen. Hahn, et al.,[11] found that compared with the touch imprint, smears made from aspirated tissue were generally composed of widely scattered smaller cell clusters with more single cells while the touch imprint slides usually contain much larger and more cohesive cell groups, revealing more architectural detail. In most instances, however, the individual cellular features are equally apparent. In our practices we have noted that it is better to prepare the touch imprint along the short axis of the slide to allow for less drag and tumor shedding on the slide. Others[12] have shown that an increasing percentage of tumor cells are shed on touch imprint smears and lost from the biopsy with increasing length of the drag, which has an impact on the material available for molecular testing and other ancillary studies. Tong, et al.,[13] in a study of 1,100 NCB with associated touch imprints, found a marked difference in cellularity between NCB and touch imprint in 84 of their cases. Four of the 84 cases (4.8 percent) had diagnostic cells in either NCB or TI, but not in both. As we all know, an NCB can look adequate grossly while the touch imprint is extremely paucicellular, especially with fibrotic tumors. Hahn, et al.,[11] and Chandan, et al.,[14] have shown that FNA and touch imprint of NCB are comparable techniques in abdominal and lung biopsies, respectively. The sensitivity, specificity, positive predictive value, and negative predictive value of imprint smears in lung cancer were 89 percent, 100 percent, 100 percent, and 68 percent, respectively, in a study of CT-guided lung NCB and touch imprint cytology by Paulose, et al.[15] In a study by Schneider, et al.,[16] univariate analysis showed that CT-guided NCB specimens provided a significantly higher number of samples sufficient for molecular testing than CT-guided FNA specimens (67 percent versus 46 percent; $p = .007$). Obtaining a sufficient FNA specimen depended on the tumor size and the individual performing the biopsy.[16] Cytology material, especially cell blocks, was found suitable and preferred over smear preparations for molecular analysis for acquired genetic alterations in two genes that encode epidermal growth factor receptor (*EGFR)* and anaplastic lymphoma kinase (*ALK*) in published clinical practice guidelines for molecular testing of lung cancers.[17]

In summary, at least half the laboratories surveyed perform immediate assessment of touch imprint of NCB for adequacy and specimen triage. The majority of respondents provided a single report that included the ROSE, the touch imprint cytology, and NCB interpretations. Pathologists need to be cognizant of the differences between FNA smears and touch imprint of NCB. For instance, billing codes for touch imprints are different from those used for FNAs, both for ROSE and for final interpretation. The morphological differences between touch imprints and FNA need to be appreciated and learned when using the touch imprint/NCB method. Extensive “touching” when preparing touch imprint from NCB depletes precious specimen material, leading to an increase in “inadequate” specimens for molecular testing. As pathologists, we are the “guardians of the tissue” and it is therefore our responsibility to develop appropriate triage methods in our laboratories, be it with FNA or NCB touch imprints, so

we can better help our patients by doing more with less.

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