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Is bigger better? Twenty-year institutional experience of atypical ductal hyperplasia discovered by core needle biopsy☆

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ABSTRACT

Objectives: The increasing accuracy of large-bore (11- or 8-gauge) vacuum-assisted core needle biopsies (VACNB) has challenged the commonly-accepted practice that surgery is needed for definitive diagnosis when atypical ductal hyperplasia (ADH) is found on VACNB. This study seeks to demonstrate the impact of increased VACNB caliber on the pathologic upgrade rate of ADH.

Methods: Patients diagnosed with isolated ADH by VACNB who subsequently underwent surgical excision at our tertiary medical center were retrospectively studied. Demographics, needle gauge, number of needle passes, and pathology results were analyzed.

Results: From June 1996 to June 2016, approximately 3740 VACNBs were performed. 139 patients were diagnosed with isolated ADH on VACNB and underwent surgical excision. 30 patients (22%) were upgraded to ductal carcinoma in-situ or invasive cancer; 17 upgrades (21%) from 11-gauge CNB vs. 13 upgrades (23%) from 8-gauge CNB ($p = 0.67$).

Conclusion: Increasing core needle biopsy size from 11 g to 8 g does not decrease the rate of pathologic upstaging at the time of surgical excision. Surgical excision of ADH is still required for complete diagnosis.

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Introduction

Atypical ductal hyperplasia (ADH) is a pathologic finding in up to 20% of breast biopsy specimens and signifies an increased risk of developing breast cancer.[1] The pathologic diagnosis of ADH exists on a spectrum between typical hyperplasia and low-grade ductal carcinoma in situ (DCIS).[2] Current guidelines recommend excisional biopsy when ADH is diagnosed on core needle biopsy (CNB) due to the risk of upstaging to DCIS or invasive ductal carcinoma (IDC) on surgical excision.[3] Currently reported upgrade rates of ADH range from 4 to 54%.[1]

ADH is generally defined as a non-invasive proliferative ductal lesion that has some, but not all features of low-grade DCIS. ADH may also be applied to lesions that do have all features of low-grade DCIS, but are limited in extent to two or fewer microscopic spaces or measure less than 2 mm in greatest dimension.[4] In addition, application of ADH is limited to lesions with only low-grade cellular atypia. High-grade lesions of any size are excluded and considered high-grade DCIS.

While current guidelines recommend surgical excision, controversy exists regarding the optimal management of ADH diagnosed on CNB. Several studies have attempted to define criteria for continued surveillance over excisional biopsy. Some have identified patient characteristics, such as age[5] or personal breast cancer history,[6] that confer a lower risk for carcinoma. Others have investigated characteristics of the biopsy specimen such as completeness of excision, degree of necrosis, and degree of atypia that conferred a lower risk of upgrade.[7,8] However, these findings have not been reproduced in large, prospective trials.

Evolving technology has led to more complete percutaneous sampling on CNB of suspicious breast lesions detected on imaging.

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These changes include advances in both imaging and biopsy technique. Advances in imaging include the use of tomographic synthesis[9] while advances in biopsy techniques include adoption of vacuum-assistance and progressively larger core needle sizes. These advances have the potential to improve the completeness of percutaneous sampling and therefore may affect the pathologic upgrade rate. We previously reported our institutional experience with pathologic upgrade rates with the use of an 11-gauge core.[10] The current study evaluates the impact of increased core size to an 8-gauge core.

Materials and methods

Data source

Our institution maintains a searchable database of all pathology samples. Pathology reports include patient name, age, gender, date of biopsy or resection, location of biopsy, specimen acquisition number, brief clinical history, gross description, final pathologic diagnosis, ordering physician, resident pathologist, and staff pathologist. Further patient information was extracted from the electronic medical record.

Study design and study participants

This was a retrospective cohort study of a prospectively maintained pathology database. A Natural Language Search of our institution's pathology registry was performed that queried the final diagnosis section of all surgical pathology reports for the phrase “atypical ductal hyperplasia” or “ADH″ from June 2006 to June 2016. The results were further reviewed to identify the source of the specimen and method of tissue acquisition. Pathology reports were then cross-referenced with the medical chart and clinical reports to confirm the diagnosis of ADH and to identify the final diagnosis after surgical excision.

Core needle samples that contained ADH in addition to DCIS, LCIS, or IDC were excluded from analysis. Additionally, samples from surgical biopsy without preceding core biopsy, patients with surgical biopsy performed at another institution, or patients lost to follow up were excluded. Pathologic upgrade was defined as a surgical specimen identifying DCIS or IDC in a patient whose CNB specimen diagnosed ADH as the most worrisome feature. Age at biopsy, needle gauge, number of needle passes, pathology results of core needle biopsy, and pathology results of open surgical biopsy were collected for each patient. Data was combined with a previously identified cohort of patients at our institution diagnosed with ADH on core needle biopsy from 1996 to 2006. Methods for identification of patients and data extraction were similar.[10]

Statistical analysis

Final diagnosis on surgical pathology was further analyzed according the patient age at biopsy and the number of core needle passes for each core size using ANOVA. Data was then stratified by the core needle biopsy size and the mean age and number of needle passes were compared using a *t*-test. The pathologic upgrade rate was calculated for each core needle size and compared using a Fisher Exact test. This study was approved by the local Institutional Review Board.

Results

From July 2006 until July 2016, 1860 CNBs were performed at our tertiary level medical facility. 170 patients were identified as having ADH as a feature of core needle biopsy. 109 patients were excluded based on the previously listed criteria. The final sample from this cohort included 61 patients; of these 56 patients were identified as having isolated ADH by 8-gauge core needle biopsy and five by 11-gauge core needle biopsy. Cohort demographics are listed in Table 1. Comparing age and number of needle passes, there was no significant difference between benign and malignant pathologies (Table 2).

When this cohort is combined with our previously reported cohort, from June 1996 until July 2016 a total of 140 patients were identified as having isolated ADH by core needle biopsy with subsequent surgical biopsy performed at our institution. 84 patients were identified as having isolated ADH by 11-gauge core needle biopsy and 56 by 8-gauge core needle biopsy. Characteristics of the combined cohorts are listed in Table 3. There was no significant

Table 1
Cohort demographics (2016 cohort).

Characteristics	(n = 61)
Mean Age (±SD)	57.9 (±12.2)
Excision Diagnosis	
Benign (n)	44.3% (27)
ADH/ALH (n)	29.5% (18)
DCIS (n)	26.2% (16)
IDC (n)	0.0% (0)

Table 2
Patient characteristics stratified by excision diagnosis (2016 cohort).

Characteristic (n = 61)	Benign	ADH/ALH	DCIS	p
Mean Age (±SD)	57.0 (11.5)	59.8 (14.3)	57.3 (11.2)	0.74[a]
11-gauge CNB	0	2	3	
8-gauge CNB	27	16	13	
Mean (±SD) Number of 8-gauge Passes	5.3 (2.7)	6.6 (3.5)	6.2 (3.1)	0.37[a]

[a] One-way analysis of variance (ANOVA).

Table 3
Combined cohort results.

	Core Needle Size		
	11	8	p
Mean Age (SD)	58 (8.7)	58 (12.4)	0.88[a]
Mean Number Passes (SD)	9.8 (4.0)	5.9 (3.0)	<0.001[a]
Number Upgraded (%)	17 (20.2%)	13 (23.2%)	0.68[b]

[a] Two-sample unpaired *t*-Test.
[b] Fisher Exact Test.

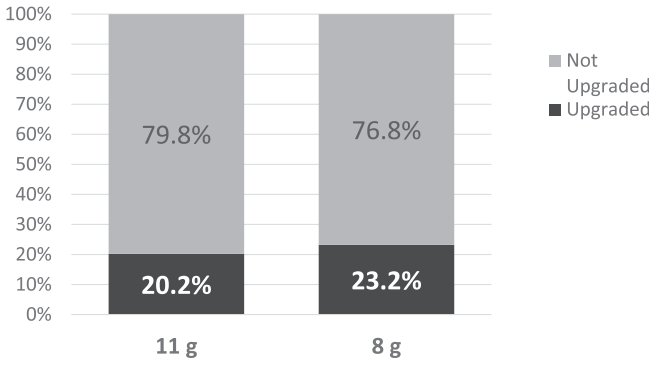

Fig. 1. Surgical upgrade rate by core needle size.

Table 4
Final diagnosis by core needle size (combined cohorts).

		Benign	ADH/ALH	DCIS	IDC	Upgraded	p
11-gauge CNB	Number (%)	21 (25%)	46 (55%)	12 (14%)	5 (6%)	17 (20.2%)	
	Mean Needle Passes	9.0	9.8	9.8	13.0		0.26[a]
8-gauge CNB	Number (%)	27 (48%)	16 (29%)	13 (23%)	0	13 (23.2%)	
	Mean Needle Passes	5.3	6.6	6.2	N/A		0.37[a]

[a] One-way analysis of variance (ANOVA).

difference in mean age or the percent of patients with pathologic upgrade on surgical excision. Fig. 1 depicts the pathologic upgrade rate stratified by core needle size. There were 5 patients with an upgrade diagnosis of IDC when an 11-gauge core was used while there were no patients upgraded to IDC when an 8-gauge core was used. There was a significant difference in the number of passes of the needle with a greater number of passes performed with an 11-gauge core compared to an 8-gauge core.

Discussion

This study reflects over 20 years of institutional experience with ADH diagnosed by CNB and reflects changes in practice and technology. In a previously published review of data from our institution from 1993 to 1996, we reported an upgrade rate of 36% at the time of surgical excision when stereotactic core needle biopsy was performed with a 14-gauge core.[11] The current data reflects additional advances in technology. From 1996 to 2006, image-guided breast biopsy was performed using VACNB with an 11-gauge core while from 2006 to 2016 an 8-gauge core was used in most cases. The pathologic upgrade rate from isolated ADH to DCIS or invasive cancer was similar in these two cohorts at 20.2% and 23.2% respectively. While the mean number of cores taken significantly differed between the two cohorts, the number of cores obtained within each cohort did not affect the diagnostic accuracy of the CNB (Table 4).

The management of suspicious breast lesions noted on imaging has clearly changed over the last 25 years. All suspicious lesions previously required a surgical biopsy for diagnosis. The development of image-guided percutaneous techniques has decreased the need for surgical biopsy in many cases,[12] but sampling error remains a concern, particularly with the diagnosis of ADH on core biopsy.[1] Technology has evolved in an attempt to reduce sampling error, first with introduction of vacuum-assisted biopsy, then with the introduction of larger cores now up to 8-gauge. Several studies have demonstrated a reduction in sampling error reflected by a decreased upgrade rate with 11-gauge cores compared to 14-gauge cores.[13–16] However, in line with our findings, multiple studies have demonstrated no further change in upgrade rate with an increase to either a 9-gauge or an 8-gauge core.[17,18]

The number of passes of the core is another consideration when evaluating for sampling error. There is no current consensus in the literature regarding the number of passes required for an adequate sample. Some studies have suggested that sample volume is related to surgical upgrade rate.[1,19] In our study there were fewer passes with an 8-gauge compared to an 11-gauge core, but the number of 8-gauge passes did not affect the upgrade rate within the cohort. Studies by Lourenco et al.[20] and Eby et al.[17] reported no difference in upgrade rate with 9-gauge vs. 11-gauge cores while reporting no difference in the number of samples taken with each size core. This suggests that it is not purely the volume of tissue that affects sampling error and supports the suggestion that the preservation of architecture within the sample affects diagnostic accuracy.

The limitations of this study include the inherent selection bias in any retrospective study. In addition, ADH exists on a spectrum between typical hyperplasia and low-grade DCIS. Despite attempts to develop standardized criteria for diagnosing ADH, there is significant variability among pathologists, which ultimately affects the upgrade rate at the time of surgical excision. Furthermore, in the current cohort, we did not correlate pathology with the associated mammographic imaging to assess for adequacy of sampling on CNB. This may have led to incomplete sampling of some lesions or more aggressive sampling of highly suspicious findings. This study also does not address the complication rate of CNB which was not assessed in the current study. It is possible that there is a difference in the rate of biopsy-related complications with change in core needle size, and this study does not evaluate the rate of complications of excisional biopsy. Finally, this study does not address long term outcomes including the need for future biopsies or cancer diagnosis.

The data suggests that current technology has maximized the sampling of suspicious lesions by percutaneous techniques allowing for near complete percutaneous excisional biopsy. Despite fewer passes of a larger core, the surgical upgrade rate was not significantly different. Despite larger cores, there remains some sampling error, and surgical excision should still be recommended for further evaluation of ADH diagnosed by CNB. Future directions should focus on identifying additional features of pathology or imaging that would signal a low risk lesion and allow for non-operative management of ADH.

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Disclosure

The views expressed are those of the authors and do not reflect the official policy or position of the Army, the Department of Defense, of the US Government.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.01.028.

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