Predictors of Pain Experienced by Women During Percutaneous Imaging-Guided Breast Biopsies

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Purpose: The purpose of this study was to evaluate pain experienced during imaging-guided core-needle breast biopsies and to identify factors that predict increased pain perception during procedures.

Methods: In this institutional review board–approved, HIPAA-compliant protocol, 136 women undergoing stereotactically or ultrasound-guided breast biopsy or cyst aspiration were recruited and provided written informed consent. Participants filled out questionnaires assessing anticipated biopsy pain, ongoing breast pain, pain experienced during biopsy, catastrophic thoughts about pain during biopsy, anxiety, perceived communication with the radiologist, chronic life stress, and demographic and medical information. Procedure type, experience level of the radiologist performing the biopsy, number of biopsies, breast density, histology, and tumor size were recorded for each patient. Data were analyzed using Spearman's ρ correlations and a probit regression model.

Results: No pain (0 out of 10) was reported by 39.7% of women, mild pain (1–3 out of 10) by 48.5%, and moderate to severe pain (≥4 out of 10) by 11.8% (n = 16). Significant ($P < .05$) predictors of greater biopsy pain in the probit regression model included younger age, greater prebiopsy breast pain, higher anticipated biopsy pain, and undergoing a stereotactic procedure. Anticipated biopsy pain correlated most strongly with biopsy pain ($\beta = .27$, $P = .004$).

Conclusions: Most patients report minimal pain during imaging-guided biopsy procedures. Women experiencing greater pain levels tended to report higher anticipated pain before the procedure. Communication with patients before biopsy regarding minimal average pain reported during biopsy and encouragement to make use of coping strategies may reduce patient anxiety and anticipated pain.

Key Words: Imaging-guided breast biopsy, breast pain, anticipated pain

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INTRODUCTION

Pain experienced by women during percutaneous imaging-guided breast biopsies is an important factor in the overall biopsy experience. Evaluating the degree of pain is important for ensuring that pain management techniques are appropriate and effective, providing patients with reasonable expectations about the biopsy experience, and may influence adherence to future mammographic screening [1]. In addition, effective pain management has potential financial implications. CMS recently finalized the details of a new reimbursement plan that adjusts payments on the basis of patient satisfaction [2]. The Hospital Consumer Assessment of Healthcare Providers and Systems survey used by CMS to evaluate patient satisfaction includes a question regarding pain management [2], suggesting that effective

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pain management is considered an important component of patient care that could eventually affect practice revenues.

Previous studies reported average pain scores during imaging-guided breast biopsy ranging from 2.0 to 5.8 out of 10 for multipass core-needle biopsies and 3.3 to 4.6 out of 10 for vacuum-assisted (VA) biopsies, on the basis of visual analog or fixed-interval rating scales given shortly after the procedure [3-10]. Although these mean pain levels are low to moderate, higher levels of pain have been identified among certain patient subsets. Research has found greater pain and discomfort to correlate with greater prebiopsy anxiety, biopsies performed during the luteal phase of the menstrual cycle, deeper lesions, longer procedures, greater number of procedures, and larger needle diameter [3,4,7-9]. Several studies have looked at the relationship between menopausal status and pain [4,10], finding no significant correlation.

There have been conflicting results regarding other pain predictors. Whereas one study showed that VA devices were more painful than multipass devices [3], another showed the reverse trend [6], and still another showed no correlation [9]. Similar discrepancies were found regarding the significance of lesion histology, patient age, breast density, and biopsy operator in predicting biopsy pain [4,7-10].

There have been no prior studies evaluating the impact of radiologist-patient communication, anticipated biopsy pain, or pain catastrophizing (ie, the tendency to focus on and exaggerate the threat value of painful stimuli and negatively evaluate one's own ability to deal with pain) on biopsy-related pain [11]. Higher anticipated pain, greater pain catastrophizing, and lower physician-patient communication have all been correlated with higher pain scores during or after other medical interventions [12-15], suggesting that these factors may affect pain experienced during breast biopsy.

Given the impact of pain on the overall biopsy experience, the purposes of this study were to (1) evaluate pain experienced by women during imaging-guided core-needle breast biopsy and cyst aspiration and (2) identify factors that predict increased pain perception during these procedures. Identifying patients prone to experiencing pain during procedures could facilitate implementation of directed pain-reducing interventions, improving the overall breast biopsy experience.

METHODS

Participants

From August 2010 through February 2011, 207 of 818 women at our breast center undergoing ultrasound-guided or stereotactically guided core-needle breast biopsy or ultrasound-guided diagnostic cyst aspiration were invited to participate in this prospective pilot study on the days of their procedures. Women were invited on the basis of the following inclusion criteria: (1) aged $\geq$21 years, (2) presented for a percutaneous imaging-guided diagnostic procedure, (3) were able to speak and read English, (4) were able to provide written informed consent, and (5) had not undergone imaging-guided breast biopsy in the previous 6 months. The study was HIPAA compliant and performed with institutional review board approval. Data from this patient population examining the impact of radiologist-patient communication on anxiety have been previously published [16], but that publication did not report any of the biopsy pain data herein.

Of 152 women providing informed consent, 16 participants were then excluded because 4 did not undergo biopsies, 1 had cognitive impairment interfering with questionnaire completion, and 11 did not complete the study measures, resulting in 136 women in this sample.

Procedures

As part of a larger ongoing study of patient adherence to mammography after biopsy, study participants completed written questionnaires immediately before and after biopsy, requiring approximately 10 min and 20 to 30 min, respectively. Of 284 questions, 113 pertained to this investigation of biopsy pain; prebiopsy questionnaires assessed ongoing breast pain, anticipatory biopsy pain, and prebiopsy anxiety. Postbiopsy questionnaires evaluated pain during biopsy, catastrophic thoughts about pain during biopsy, postbiopsy anxiety, and communication with the biopsy radiologist; sociodemographic and medical characteristics were also assessed.

In 82 women, ultrasound-guided core-needle biopsies were performed using 14-gauge (n = 67) or 18-gauge (n = 15) multipass devices (Achieve; Cardinal Health, Dublin, Ohio). Forty-one patients underwent stereotactic biopsies using 9-gauge VA probes (EVIVA; Suros, Indianapolis, Indiana) on a prone stereotactic table (Multicare Platinum; Lorad, Danbury, Connecticut). Thirteen women underwent cyst aspiration alone, using 18-gauge (n = 4), 19-gauge (n = 1), 20-gauge (n = 1), 21-gauge (n = 5), or 25-gauge (n = 2) needles. Two patients underwent both cyst aspiration and core biopsy.

During biopsy recommendation, patients received written and verbal biopsy information with guidelines to avoid aspirin and nonsteroidal anti-inflammatory agents. Seven breast imaging radiologists performed all procedures, with or without the assistance of residents or fellows. Local anesthetic was administered using the following general approach: <5 mL of 1% lidocaine was injected intradermally and subcutaneously using a 25-gauge needle, followed by injection of approximately 3 to 10 mL of lidocaine with epinephrine within and around the lesion using a 22-gauge needle. After the procedure, the biopsy site was compressed to achieve hemostasis. The procedure type, number of radiologists