

## Original article

# Utility of short-interval follow-up mammography after a benign-concordant stereotactic breast biopsy result



Sean Maldonado <sup>a</sup>, Nishant Gandhi <sup>a</sup>, Tony Ha <sup>a</sup>, Patrick Choi <sup>a</sup>, Iraj Khalkhali <sup>a, c</sup>, Babak N. Kalantari <sup>a, c</sup>, Christine Dauphine <sup>b, c, \*</sup>

<sup>a</sup> Department of Radiology, Harbor-UCLA Medical Center, David Geffen School of Medicine at UCLA, 1000 West Carson St, Torrance, CA, 90502, United States

<sup>b</sup> Department of Surgery, Harbor-UCLA Medical Center, David Geffen School of Medicine at UCLA, 1000 West Carson St, Torrance, CA, 90502, United States

<sup>c</sup> Los Angeles Biomedical Research Institute, 1124 West Carson Street, Torrance, CA, 90502, United States

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## ABSTRACT

**Background:** There is currently no clear consensus recommendation for the use of short-interval follow-up mammography after a benign-concordant breast biopsy (BCBB), and practice patterns vary widely. The objectives of this study were to evaluate whether a short-interval follow-up mammogram provided clinical utility after stereotactic BCBB and to examine the costs associated with this surveillance strategy. **Methods:** A retrospective review of women who underwent a stereotactic breast biopsy yielding benign-concordant results between January 2005 and October 2014 was performed to evaluate findings on subsequent imaging, to calculate compliance with recommended short-interval imaging, and to examine whether subsequent imaging revealed an abnormality at the site of the initial stereotactic BCBB. A cost analysis was performed utilizing Medicare reimbursement rates to calculate projected and actual costs of short-interval follow-up imaging after stereotactic BCBB.

**Results:** Of the 470 stereotactic BCBB performed, a short-interval mammogram was completed in 207 (44.0%), 9 (4.3%) of which had suspicious mammographic findings at the initial biopsy site, and 6 subsequently underwent biopsy, with none resulting in malignant or high-risk pathology. The cost of short-interval mammographic follow-up (n = 207) was calculated at \$28,541.16.

**Conclusions:** This study provides evidence that 6-month follow-up mammography has low clinical utility and unnecessarily increases costs after stereotactic BCBB. A safe and more cost-effective strategy may be resumption of routine mammography at 12 months post-biopsy.

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## 1. Introduction

There is currently no clear consensus recommendation for the use of short-interval follow-up mammography after a benign-concordant breast biopsy (BCBB). National Comprehensive Cancer Network (NCCN) guidelines recommend either a 6–12 month post-biopsy mammogram or to return to routine screening after a BCBB [1]; however, others have questioned the yield of performing follow-up mammography earlier than 12 months [2]. The American College of Radiology (ACR) has no follow-up imaging recommendations for a BCBB result [3]. Furthermore, a national survey of

practice patterns revealed that, in the absence of unambiguous guidelines, practices vary widely, with most institutions having developed their own protocol for post-biopsy follow-up imaging after a BCBB [4,5]. Generally, in the United States, these protocols indicate one of four imaging follow-up strategies: 1) routine unilateral diagnostic mammogram at 6 months post-biopsy, 2) selective unilateral diagnostic mammogram at 6 months post-biopsy, 3) routine unilateral diagnostic mammogram at 12 months post-biopsy, or 4) a return to screening mammography.

At our institution, patients with stereotactic BCBB were routinely recommended a 6-month post-biopsy diagnostic unilateral mammogram until 2015 when a pilot investigation of a small patient cohort revealed no interval findings on short-interval imaging. The objectives of this study were to evaluate whether a short-interval follow-up mammogram provided clinical utility after a benign-concordant stereotactic breast biopsy result and to examine the costs associated with this surveillance strategy.

; BCBB, benign-concordant breast biopsy.

\* Corresponding author. 1000 West Carson St. Box #25, Torrance, CA, 90502, United States.

E-mail address: [cdauphine@dhs.lacounty.gov](mailto:cdauphine@dhs.lacounty.gov) (C. Dauphine).

## 2. Methods

Institutional review board approval was obtained prior to the initiation of this study. Women who underwent a stereotactic breast biopsy at Harbor-UCLA Medical Center between January 2005 and October 2014 were identified using a prospectively maintained database of breast biopsy procedures. Patients with a Breast Imaging-Reporting and Data System (BI-RADS) Category 4 mammogram and whose subsequent biopsies resulted as benign and concordant with their imaging findings were included in this study. Subjects were excluded if the initial stereotactic biopsy resulted in a cancer diagnosis or atypical hyperplasia. Those who subsequently proceeded to surgical excision for any reason within six months of the stereotactic procedure were also excluded.

For study subjects, a retrospective electronic health record review was conducted to collect findings from initial imaging, pathology results generated from the initial biopsy, and all follow-up breast imaging and procedures performed in order to establish whether subsequent imaging revealed an abnormality at the site of the initial stereotactic BCBB. The time interval between the initial stereotactic biopsy and subsequent post-biopsy imaging was collected to determine the rate of compliance with returning for short-interval surveillance mammography, defined as between 2 and 9 months following the date of biopsy. This data is reported in number of lesions followed instead of number of patients, as some patients had more than one BCBB.

A cost analysis was performed utilizing the Medicare reimbursement rate for a digital diagnostic unilateral mammogram (CPT code 77065) [6]. The projected cost of short-interval follow-up was calculated by multiplying the number of patients with 'intent to follow' by the average Medicare reimbursement rate. The actual cost of short-interval follow-up was determined by multiplying the number of 6-month follow-up mammograms performed by the average Medicare reimbursement rate.

Stereotactic breast biopsies were performed utilizing a 7- or 10-gauge vacuum-assisted core needle biopsy system (EnCor, Bard Biopsy Systems, Tempe, AZ) and a prone stereotactic table (Lorad, Hologic, Bedford, MA). In all cases, a radiopaque clip was placed, and a unilateral mammogram was obtained to evaluate appropriate targeting and clip placement. In cases where the target was microcalcifications, a specimen radiograph was performed to determine adequate sampling. If a concern for under-sampling was noted, additional samples were retrieved. Concordance of pathology results with imaging findings and clinical follow-up recommendations were determined prospectively and in real time by a multidisciplinary group that met weekly and included at least one radiologist, one breast surgeon, and one pathologist. The protocol described above remained stable and unchanged for the duration of the study period.

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## 3. Results

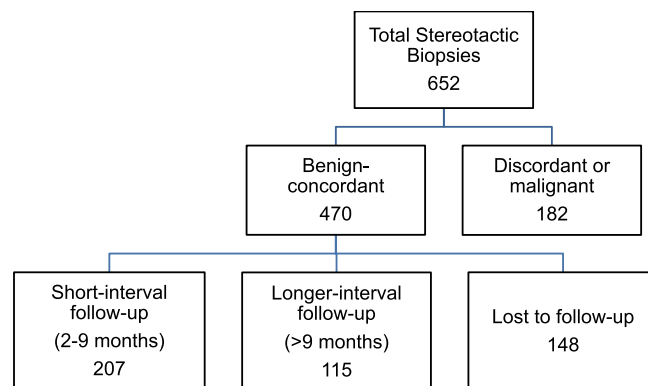
There were 652 stereotactic biopsies performed between January 1, 2005 and October 31, 2014. Of these, 470 (72.1%) biopsies yielded a benign-concordant result, for which a 6-month follow-up mammogram was recommended. Table 1.

A short-interval mammogram was completed for 207 (44.0%) of the stereotactic BCBB performed. For those patients who missed their scheduled short-interval follow-up study, 49 (10.4% of the study group) had a mammographic follow-up between 10 and 18 months, 66 (14.0%) after 18 months, and 148 (31.5%) had no record of a follow-up mammogram in our system. Fig. 1.

Of the 207 short-interval mammograms performed, 9 (4.3%)

**Table 1**  
Initial mammographic findings and pathology results after benign-concordant stereotactic biopsy.

	n (%)
Mammographic Findings	
Calcifications	394 (83.7%)
Mass	42 (8.9%)
Focal asymmetry	23 (4.9%)
Architectural distortion	12 (2.5%)
Pathology results	
Fibrocystic Change	334 (70.9%)
Fibroadenomatous Lesion	29 (6.2%)
Other benign breast tissue	108 (22.9%)



**Fig. 1.** Classifications of concordance and imaging follow-up in study population.

demonstrated a suspicious finding at the initial biopsy site, and 6 subsequently underwent biopsy. None of these biopsies resulted in malignant or high-risk pathology.

Of the 115 first post-biopsy mammograms performed later than 9 months after the procedure, 5 (4.3%) demonstrated suspicious findings at the prior biopsy site, and all underwent biopsy of those findings. All of these biopsies demonstrated benign pathologic results.

The projected cost of short-interval follow-up mammography in our BCBB study cohort ( $n = 470$ ) was calculated at \$64,803.60, based on the Medicare reimbursement rate of \$137.88 for a diagnostic unilateral digital mammogram. The actual cost of short-interval mammographic follow-up ( $n = 207$ ) was calculated at \$28,541.16.

## 4. Discussion

In this study, routine recommendation of a 6-month mammographic follow-up after stereotactic BCBB did not detect any clinically significant lesions at the initial biopsy site and instead led to significant increases in health care costs for the 43% of patients that complied. Furthermore, the 24% that presented for their first post-biopsy follow-up mammogram closer to one year or later also did not have a clinically significant lesion detected, demonstrating no impact in our group of the short-interval mammogram follow-up.

The rationale for performing a short-interval follow-up mammogram at around six months is primarily based on the concern of undersampling at the time of biopsy, thereby resulting in a false-negative histologic result. If a malignant lesion was missed during biopsy, a short-interval mammogram could theoretically detect the missed lesion earlier. Otherwise, an inadvertently missed malignancy could potentially grow a significant amount or metastasize regionally if left unchecked for a year.

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