

Symptomatic Fibroadenoma Resolves Status Post Cryoablation

ROBERT C. WARD, MD; YIHONG WANG, MD, PhD; ANA P. LOURENCO, MD; MARTHA B. MAINIERO, MD

CASE

A 29-year-old African American female presented to her primary care physician for evaluation of a painful and palpable right breast lump at 11 o'clock, 6 cm from the nipple. She was referred to the breast imaging center where targeted ultrasound demonstrated a 3.2 cm oval circumscribed mass suggestive of a fibroadenoma; BI-RADS 4A – low suspicion for malignancy (**Figure 1A**). Ultrasound-guided biopsy was performed with clip placement in the center of the mass (**Figure 1B**). Two 12-gauge core specimens were placed in formalin and submitted for histologic evaluation.

Hematoxylin and eosin staining revealed a circumscribed mass with proliferation of both stromal and glandular elements with pericanalicular growth and mild increased bland stromal cellularity but no mitoses. These findings are consistent with a benign cellular fibroadenoma. (**Figures 2A, 2B**)

Given symptoms and desire for treatment, the patient was referred to a breast surgeon for consideration of surgical excision versus clinical observation with follow-up imaging as needed. She was also offered ultrasound-guided cryoablation. The patient elected cryoablation.

Ultrasound-guided cryoablation was performed with local anesthesia and ultrasound guidance in the breast imaging center. Once the cryoablation needle was placed in the geometric center of the fibroadenoma (**Figure 3A**), the treatment protocol began with a 5-minute freeze, an 8-minute passive thaw, followed by a second and final 5-minute freeze. Near the end of the first freeze, ice had almost entirely engulfed the fibroadenoma (**Figure 3B**). By the end of the second freeze, the fibroadenoma had been completely engulfed by ice. The patient was discharged home within 15 minutes of procedure completion and was able to resume normal activities immediately.

The patient returned for follow-up ultrasound imaging 9 months after cryoablation, which revealed the biopsy clip in place but complete resolution of the previously seen mass (**Figure 4**). The patient reported immediate relief of pain, gradual decreased palpability in the interim, and is currently asymptomatic.

Figure 1A. Ultrasound of the right breast at 11 o'clock, 6 cm from the nipple, demonstrates an oval circumscribed mass, measuring 3.2 cm in long axis (calipers).

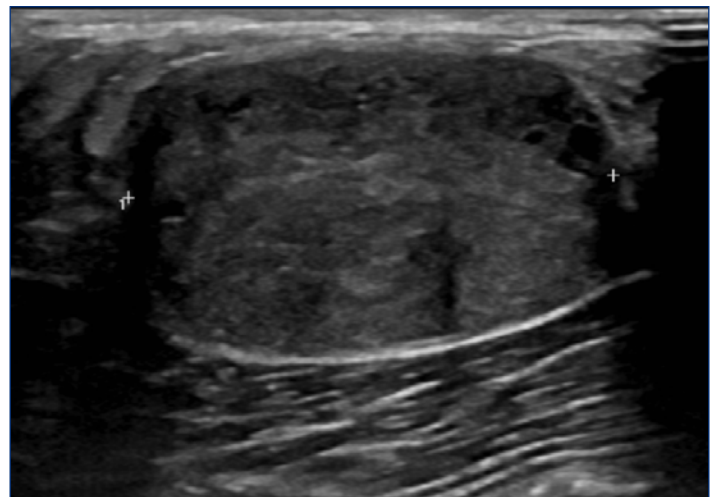


Figure 1B. Ultrasound-guided biopsy image demonstrates placement of a clip in the center of the mass (notched arrow). Histologic evaluation revealed a cellular fibroadenoma (**Figure 2A, 2B**).



Figure 2A. Hematoxylin and eosin stain at low power demonstrates a well circumscribed margin (thick notched arrow) and proliferation of both stromal and glandular elements. These findings are consistent with a fibroadenoma.

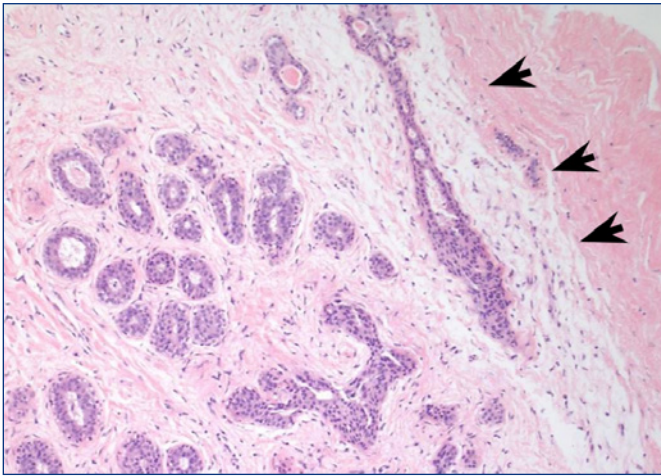
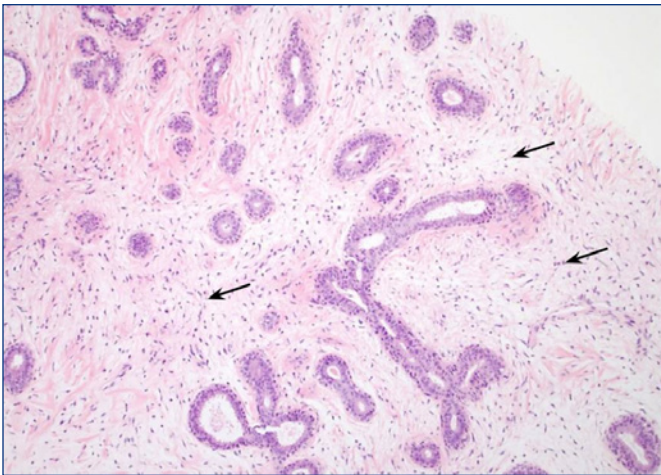


Figure 2B. Hematoxylin and eosin stain at low power demonstrates pericanalicular growth and mild increased stromal cellularity. The spindle shaped stromal cells are bland with no mitoses (thin notched arrow). These findings are consistent with a cellular fibroadenoma.



DISCUSSION

Ultrasound-guided cryoablation is a virtually painless, percutaneous, non-operative procedure that can be used to treat breast fibroadenomas¹⁻⁵ and breast cancer.⁶⁻⁹ A clinical perspective review article discussing the indications, risks, benefits, post-procedure anticipatory guidance, as well as technical aspects of the procedure and post-procedure imaging has been recently published.¹⁰ A Category I Current Procedural Terminology (CPT) code exists for cryoablation of breast fibroadenomas: 19105.

Fibroadenomas are an extremely common benign growth of the breast. No treatment is necessary for asymptomatic fibroadenomas. Treatment may be indicated for patients with symptoms, such as pain, palpability, and/or growth.²

Figure 3A. Ultrasound-guided placement of the cryoablation needle (solid arrow) through the long axis and geometric center of the biopsy-proven fibroadenoma. The distal tip of the needle was placed 0.8 cm beyond the margin of the mass (calipers) in order to center the mass within the growing ice ball.

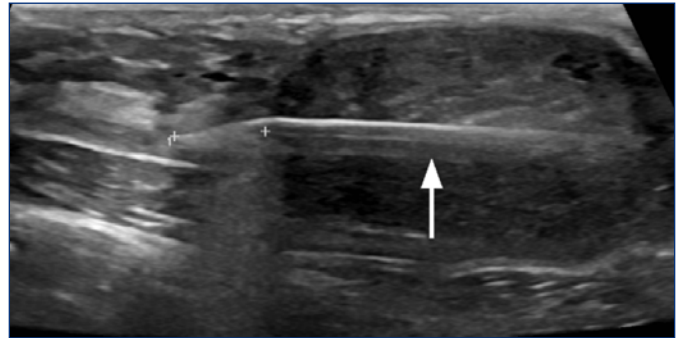


Figure 3B. - Intraprocedural ultrasound in short axis demonstrates the anechoic shadowing of the growing ice ball (notched arrow) nearly engulfing the entire fibroadenoma (open arrow) near the end of the first freeze. The ice ball completely engulfed the entire fibroadenoma by the end of the second freeze (not shown).

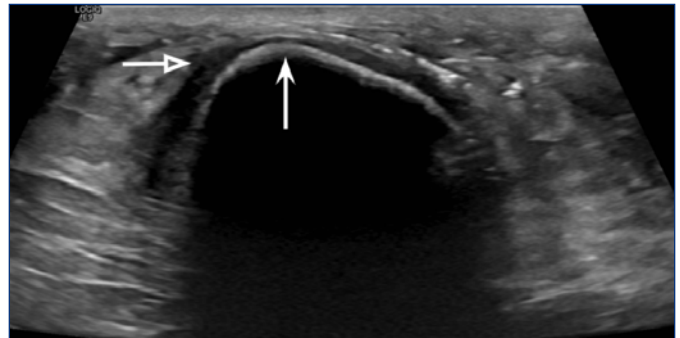
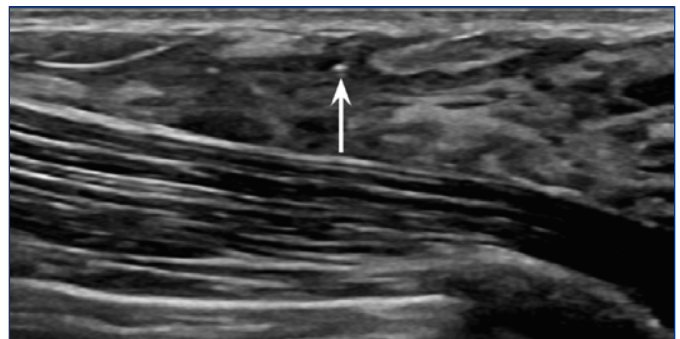


Figure 4. Ultrasound 9 months status post cryoablation demonstrates the echogenic focus of the biopsy mark clip (notched arrow) but no measurable mass.



Treatment options include hormone therapy, surgical excision, and ultrasound-guided cryoablation. Cryoablation may be particularly applicable for patients with multiple symptomatic fibroadenomas who have already undergone surgical excision or for those who prefer a nonsurgical treatment option. Notably, fibroadenomas in African American

women are twice as common, more likely to be multiple, and tend to occur at a younger age compared to Caucasian women.¹¹ An estimated 500,000 fibroadenomas are surgically excised every year.¹² The cost of surgical excision in a community hospital is approximately \$18,000 versus \$3,500 for cryoablation.¹³

The cryoablation system employed in this particular case utilizes closed-loop circulation of liquid nitrogen to create extremely cold temperatures surrounding the active tip of the cryoablation needle in order to kill targeted tissue. The procedure lasts less than 30 minutes and only requires local anesthesia. Patients are able to resume normal activities immediately after the procedure. Our patient experienced immediate relief of pain and gradual reduction to subclinical palpability within 9 months after undergoing cryoablation.

Reported in the literature, treated fibroadenomas show mean volume reduction of 73-89% within 12 months of the procedure.^{1,2} It has been our experience that fibroadenomas with cellular stroma and less collagen are more likely to demonstrate complete or near-complete resolution following cryoablation than fibroadenomas with less cellularity and more collagen. This histologic finding may help triage patients to surgery versus cryoablation in the future.

US-guided cryoablation is a feasible treatment option for women with symptomatic fibroadenomas.

References

1. Kaufman CS, Bachman B, Littrup PJ, Freeman-Gibb LA, White M, Carolin K, et al. Cryoablation treatment of benign breast lesions with 12-month follow-up. *Am J Surg*. 2004;188: 340-348.
2. Littrup PJ, Freeman-Gibb L, Andea A, White M, Amerikia KC, Bouwman D, et al. Cryotherapy for breast fibroadenomas. *Radiology*. 2005;234: 63-72.
3. Nurko J, Mabry CD, Whitworth P, Jarowenko D, Oetting L, Potruch T, et al. Interim results from the FibroAdenoma Cryoablation Treatment Registry. *Am J Surg*. 2005;190: 647-51; discussion 651-2.
4. Golatta M, Harcos A, Pavlista D, Danes J, Klein R, Simovich P, et al. Ultrasound-guided cryoablation of breast fibroadenoma: a pilot trial. *Arch Gynecol Obstet*. 2015;291: 1355-1360.
5. Sheth M, Lodhi U, Chen B, Park Y, McElligott S. Initial Institutional Experience With Cryoablation Therapy for Breast Fibroadenomas: Technique, Molecular Science, and Post-Therapy Imaging Follow-up. *J Ultrasound Med*. 2019; doi:10.1002/jum.14980
6. Littrup PJ, Jallad B, Chandiwalla-Mody P, D'Agostini M, Adam BA, Bouwman D. Cryotherapy for breast cancer: a feasibility study without excision. *J Vasc Interv Radiol*. 2009;20: 1329-1341.
7. Poplack SP, Levine GM, Henry L, Wells WA, Heinemann FS, Hanna CM, et al. A Pilot Study of Ultrasound-Guided Cryoablation of Invasive Ductal Carcinomas up to 15 mm With MRI Follow-Up and Subsequent Surgical Resection. *AJR Am J Roentgenol*. 2015;204: 1100-1108.
8. Simmons RM, Ballman KV, Cox C, Carp N, Sabol J, Hwang RF, et al. A Phase II Trial Exploring the Success of Cryoablation Therapy in the Treatment of Invasive Breast Carcinoma: Results from ACOSOG (Alliance) Z1072. *Ann Surg Oncol*. 2016;23: 2438-2445.
9. Machida Y, Shimauchi A, Igarashi T, Fukuma E. MRI Findings After Cryoablation of Primary Breast Cancer Without Surgical Resection. *Acad Radiol*. 2019;26: 744-751.
10. Ward RC, Lourenco AP, Mainiero MB. Ultrasound-Guided Breast Cancer Cryoablation. *AJR Am J Roentgenol*. 2019; 1-7.
11. Organ CH Jr, Organ BC. Fibroadenoma of the female breast: a critical clinical assessment. *J Natl Med Assoc*. 1983;75: 701-704.
12. Lakoma A, Kim ES. Minimally invasive surgical management of benign breast lesions. *Gland Surg*. 2014;3: 142-148.
13. Patterson SG. Cryoablation Cost Analysis. Spectrum Interventional Oncology Conference; 2018.

Authors

Robert C. Ward, MD, Rhode Island Hospital, Department of Diagnostic Imaging, Providence, RI.

Yihong Wang, MD, PhD, Rhode Island Hospital, Department of Pathology and Laboratory Medicine, Providence, RI.

Ana P. Lourenco, MD, Rhode Island Hospital, Department of Diagnostic Imaging, Providence, RI.

Martha B. Mainiero, MD, Rhode Island Hospital, Department of Diagnostic Imaging, Providence, RI.

Correspondence

Robert C. Ward, MD
Rhode Island Hospital
593 Eddy Street, Providence, RI 02903
401-444-5184, Fax 401-444-5017
rward@lifespan.org

IMAGES IN CLINICAL MEDICINE

Original, high-resolution images which have not been published elsewhere will be considered for publication. Submit 2-4 images.

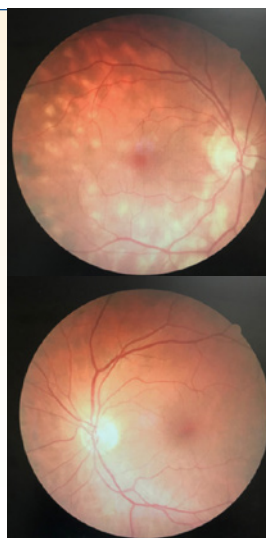
Submissions should include:

Brief title: 8 words or less

Content: Relevant clinical information, findings, clinical course, and response to treatment if initiated. Limit: 400 to 600 words

Legends: All labeled structures in the image should be described and explained in the legend. Any identifying information should be removed from the image.

Author information: Names, professional degree, academic/hospital affiliations, address, email and telephone number.



Send to:

RIMJ editors-in-chief
William Binder, MD
william_binder@brown.edu

Edward Feller, MD
edward_feller@brown.edu

Cc: Mary Korr, managing editor
mkorr@rimed.org