Mitigating the Impact of Coronavirus Disease (COVID-19) Vaccinations on Patients Undergoing Breast Imaging Examinations: A Pragmatic Approach

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Reports of patients with axillary adenopathy identified on breast imaging after coronavirus disease (COVID-19) vaccination are rising. We propose a pragmatic management approach based on clinical presentation, vaccination delivery, and imaging findings. In the settings of screening mammography, screening MRI, and diagnostic imaging workup of breast symptoms, with no imaging findings beyond unilateral axillary adenopathy ipsilateral to recent (within the past 6 weeks) vaccination, we report the adenopathy as benign with no further imaging indicated if no nodes are palpable 6 weeks after the last dose. For patients with palpable axillary adenopathy in the setting of ipsilateral recent vaccination, clinical follow-up of the axilla is recommended. In all these scenarios, axillary ultrasound is recommended if clinical concern persists 6 weeks after vaccination. In patients with a recent breast cancer diagnosis in the pre- or peritreatment setting, prompt recommended imaging is encouraged as well as vaccination (in the thigh or contralateral arm). Our recommendations align with the *ACR BI-RADS Atlas* and aim to reduce patient anxiety, provider burden, and costs of unnecessary evaluation of enlarged nodes in the setting of recent vaccinations and, also, to avoid further delays in vaccinations and breast cancer screening during the pandemic.

The first COVID-19 vaccines were delivered in December 2020, and more than 40 million doses had been delivered by February 2021. With only 9% of the population vaccinated, reports of incidental (subclinical) axillary adenopathy identified on the side of vaccination were increasing rapidly in breast imaging clinics [2]. Management recommendations were diverse and included biopsy, immediate additional imaging with ultrasound, short-interval imaging, and clinical follow-up [3].

Anticipated high rates of false-positive recalls for additional imaging and/or biopsy of transient reactive nodes can be reduced by following the management recommendations set forth by the *ACR BI-RADS Atlas,* 5th edition, for unilateral axillary adenopathy in the setting of a known inflammatory cause [4]. Since 2013, the *ACR BI-RADS Atlas* has supported a benign assessment (BI-RADS category 2) as appropriate for unilateral axillary adenopathy if a known inflammatory cause is identified. The mammography section of the *ACR BI-RADS Atlas* notes, "A review of the patient's medical history may elucidate the cause for axillary adenopathy, averting recommendation for additional evaluation" [5]. Subsequently, the FAQ (frequently asked questions) section notes that "if a benign cause is elucidated, a benign (BI-RADS category 2) assessment would be appropriate" [4].

COVID-19 vaccinations in the arm are a well-documented cause of inflammatory unilateral axillary adenopathy. A total of 10.2% of patients reported palpable adenopathy after the first vaccination with the Moderna COVID-19 vaccine (ModernaTX) and 14.2% of patients after the second [6]. Patients vaccinated with the Pfizer-BioNTech BNT162b2 vaccine also had increased rates of adenopathy compared with those receiving a placebo [7].

The recent Society of Breast Imaging considerations for the management of axillary adenopathy in patients with recent COVID-19 vaccination suggest that centers obtain information on the timing and side (left vs right arm) of prior vaccinations. Furthermore, the Society of Breast Imaging advocates for efforts to minimize patient anxiety by using lay language to reassure patients that enlarged nodes are an expected response to the vaccine. In the absence of known COVID-19 vaccination, the Society of Breast Imaging suggests BI-RADS category 0 as-

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sessment and diagnostic workup with short-interval follow-up 4–12 weeks after vaccination, to reduce unnecessary biopsies. Consideration of scheduling screening examinations to be performed before the first COVID-19 vaccine dose is administered or 4–6 weeks after administration of the second COVID-19 vaccine dose is suggested only if these measures do not "unduly delay care" [3].

In our practice, we manage patients with incidental unilateral axillary adenopathy identified on breast imaging after COVID-19 vaccination based on clinical presentation: asymptomatic for screening, symptomatic breast and/or axilla for diagnosis, or recent breast cancer diagnosis in the pre- or peritreatment phase (Table 1). When patients present for mammography, ultrasound, or MRI, the technologist documents COVID-19 vaccination status (first or second dose and dates received) and the side (left or right) and location (arm or thigh) of the vaccination.

In the specific setting of screening mammography or screening MRI, with no other finding beyond unilateral axillary adenopathy on the same side of the COVID-19 vaccination given in the deltoid muscle within the prior 6 weeks, we include the following information in the screening mammography or screening MRI report:

> In the specific setting of a patient with documented recent (within the past 6 weeks) COVID-19 vaccination in the ipsilateral arm, axillary adenopathy is a benign imaging finding. No further imaging is indicated at this time. If there is clinical concern that persists more than 6 weeks after the patient received the final vaccine dose, axillary ultrasound is recommended.

HIGHLIGHTS

Key Finding

- *A pragmatic management approach based on clinical presentation, vaccination delivery, and imaging findings can address axillary adenopathy identified on breast imaging after COVID-19 vaccination.*

The following lay language is also communicated to the patient in a letter:

> The lymph nodes in your armpit area that we see on your mammogram are larger on the side where you had your recent COVID-19 vaccine. Enlarged lymph nodes are common after the COVID-19 vaccine and are your body's normal reaction to the vaccine. However, if you feel a lump in your armpit that lasts for more than 6 weeks after your vaccination, you should let your healthcare provider know.

For patients with signs or symptoms in the breast or axilla, we also use 6 weeks as the cutoff point for defining recent vaccination. For patients with palpable axillary adenopathy without breast signs or symptoms, clinical follow-up of the axilla is recommended (BI-RADS category 2). If clinical concerns persist for more than 6 weeks after the final vaccine dose is received, axillary ultrasound is recommended (with mammography performed either

TABLE 1: Breast Imaging Management of Axillary Adenopathy in the Setting of Recent Ipsilateral Deltoid COVID-19 Vaccination

Patient Population	Principles	Imaging Finding(s)
Asymptomatic (due for screening mammography or MRI; all risk categories)	Encourage screening of all patients regardless of vaccination status. At the time of imaging, the technologist documents vaccination status (first or second dose, location [leg or arm], side, and date).	1a. In the setting of documented recent COVID-19 vaccination, isolated ipsilateral axillary adenopathy is a benign imaging finding (BI-RADS category 2). No further imaging is indicated at this time. If there is clinical concern that persists > 6 weeks after the final vaccine dose, axillary US is recommended. In the 1a setting, vaccination status, imaging findings, and recommendations will be documented in the imaging report and communicated to the patient in lay language.
Symptomatic (in breast and/or axilla)	Encourage diagnostic imaging of all patients with breast signs and/or symptoms regardless of vaccination status In the setting of documented recent COVID-19 vaccination, the presence of palpable ipsilateral axillary adenopathy after vaccination, and the absence of breast signs and/or symptoms, clinical follow-up of axilla is recommended. If clinical concerns persist for > 6 weeks after the final vaccine dose is received, axillary US is recommended, with mammography performed either if the patient is due for mammography or at the discretion of the radiologist. At the time of imaging, the technologist documents vaccination status (first or second dose, location, side, and date).	2a. Palpable isolated unilateral adenopathy present for > 6 weeks after vaccination is managed in accordance with the standard protocol for imaging management of unilateral adenopathy (US with or without mammography). 2b. Unilateral adenopathy on the side where vaccination occurred is identified incidentally during diagnostic imaging workup for breast signs and/or symptoms. 2bi. BI-RADS category 2 (no suspicious imaging finding in the breast); follow recommendation in 1a. 2bii. BI-RADS category 4 or 5 (suspicious imaging finding in the breast); management is at the discretion of the attending procedural radiologist based on suspicion of lesion, appearance of adenopathy, pathology results, or a combination of these.
Current (pre- or peritreatment) breast cancer	Encourage recommended imaging regardless of vaccination status; encourage vaccine injection in contralateral arm or anterolateral thigh At the time of imaging, the technologist documents vaccination status (first or second dose, location, side, and date).	3a. Unilateral adenopathy on side (arm) where vaccination occurred and side where breast cancer is located; biopsy vs imaging or clinical follow-up at discretion of surgeon and/or medical or radiation oncologist in consultation with radiologist.

Note—Recent coronavirus disease (COVID-19) vaccination was defined as COVID-19 vaccination occurring within the past 6 weeks. US = ultrasound.

if the patient is due for such examination or at the discretion of the interpreting radiologist). Palpable unilateral adenopathy that lasts longer than 6 weeks after vaccination is managed in accordance with American College of Radiology BI-RADS recommendations for the management of unilateral adenopathy in the absence of known infectious or inflammatory cause.

Adenopathy identified incidentally on the side where vaccination occurred during diagnostic imaging workup for other breast signs or symptoms is considered a BI-RADS category 2 finding if no suspicious findings are detected in the breast. In the setting of suspicious findings in the breast (BI-RADS category 4 or 5), management of the ipsilateral adenopathy is at the discretion of the attending procedural radiologist based on suspicion of the breast lesion, the appearance of the adenopathy, and pathology results.

For patients with a recent breast cancer diagnosis who present in the pre- or peritreatment setting, we encourage prompt recommended imaging regardless of vaccination status and also encourage injection in the contralateral arm or anterolateral thigh. For patients with unilateral adenopathy on the side of the vaccinated arm and the side with breast cancer, core biopsy versus imaging or clinical follow-up is at the discretion of the breast surgeon and/or the medical or radiation oncologist in consultation with the radiologist.

The COVID-19 pandemic has reduced breast cancer screening and detection because of government mandated closures, the shift in resources from primary care to COVID-19 care, and patient reluctance to visit health care centers. Drastic declines in screening mammography and breast cancer diagnoses are well documented across multiple health care institutions because of the pandemic [8]. This disruption of breast cancer screening is likely to result in a significant increase in the number of cancers diagnosed at late stages [9] and an increased demand for cancer screening procedures as delayed tests are rescheduled.

In this setting, we believe our model can avoid reducing or delaying vaccinations and can avoid further reduced or delayed breast cancer diagnoses based on confusion among patients and/or their providers. Our management paradigm is aligned with the *ACR BI-RADS Atlas* recommendations and is based on three key principles: encouraging COVID-19 vaccination; reducing and/or eliminating delays, cancellations, and rescheduling of breast imaging examinations; and reducing unnecessary additional imaging and/or biopsy of benign transient reactive adenopathy in the setting of recent ipsilateral deltoid muscle vaccination. Advance preparation with vaccination documentation added to intake forms will help support appropriate management of patients who undergo imaging after COVID-19 vaccination. As we navigate through this phase of the pandemic in which vaccination programs are expanding, and as more data become available, we will continue to refine our patient management paradigm to guide best practices for our patients.

References

1. CDC website. COVID data tracker. covid.cdc.gov/covid-data-tracker/#vaccinations. Accessed February 10, 2021
2. Society of Breast Imaging (SBI) website. Membership communications from SBI Connect Open Forum. Mail@ConnectedCommunity.org and connect.sbi-online.org. Accessed February 10, 2021
3. Grimm L. Destounis, Dogan B, et al.; Society of Breast Imaging Patient Care and Delivery Committee. SBI recommendations for the management of axillary adenopathy in patients with recent COVID-19 vaccination. swww.sbi-online.org/Portals/0/Position%20Statements/2021/SBI-recommendations-for-managing-axillary-adenopathy-post-COVID-vaccination.pdf. Accessed February 10, 2021
4. D'Orsi CJ, Sickles EA, Mendelson EB, et al. *ACR BI-RADS Atlas, Breast Imaging Reporting and Data System*, 5th ed. American College of Radiology, 2013
5. Sickles EA, D'Orsi CJ, Bassett LW, et al. ACR BI-RADS mammography. In: D'Orsi CJ, Sickles EA, Mendelson EB, et al. *ACR BI-RADS Atlas, Breast Imaging Reporting and Data System*, 5th ed. American College of Radiology, 2013
6. CDC website. Local reactions, systemic reactions, adverse events, and serious adverse events: Pfizer-BioNTech COVID-19 vaccine. www.cdc.gov/vaccines/covid-19/info-by-product/pfizer/reactogenicity.html. Last reviewed December 13, 2020. Accessed February 10, 2021
7. CDC website. Local reactions, systemic reactions, adverse events, and serious adverse events: Moderna COVID-19 vaccine. www.cdc.gov/vaccines/covid-19/info-by-product/moderna/reactogenicity.html. Last reviewed December 20, 2020. Accessed February 10, 2021
8. London JW, Fazio-Eynullayeva E, Palchuk MB, Sankey P, McNair C. Effects of the COVID-19 pandemic on cancer-related patient encounters. *JCO Clin Cancer Inform* 2020; 4:657–665
9. Sharpless NE. COVID-19 and cancer. *Science* 2020; 368:1290