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Coronavirus Disease (COVID-19) Vaccination Associated Axillary Adenopathy: Imaging Findings and Follow-Up Recommendations in 23 Women

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In Recent News

 The New York Times

Women and the Covid-19 Vaccine: What You Need to Know

Can it affect mammograms or the timing of fertility treatments? What side effects should you look out for? Experts weigh in.

5 days ago



 New York Post

COVID-19 vaccine can impact mammogram with 'false positive'

Getting a mammogram soon after getting the COVID-19 vaccine? Be warned: The vaccine might cause your lymph nodes to swell, which may ...

5 days ago



 The Washington Post

A harmless vaccine side effect could mimic cancer in mammograms. Here's what to know.

Enlarged lymph nodes can be a side effect of vaccination for some people. As harmless as vaccine-swollen nodes are, those in the armpit may ...

1 month ago



Learning Objectives

By the end of this journal club, participants will be able to:

- Review the basic anatomy of the female breast and axillary lymph nodes
- Recognize the radiographic findings of benign vs. pathologic lymph nodes
- Formulate a differential for unilateral vs. bilateral axillary lymphadenopathy
- Understand BI-RADS assessment categories
- Provide a guideline for COVID-19 vaccinations and mammography

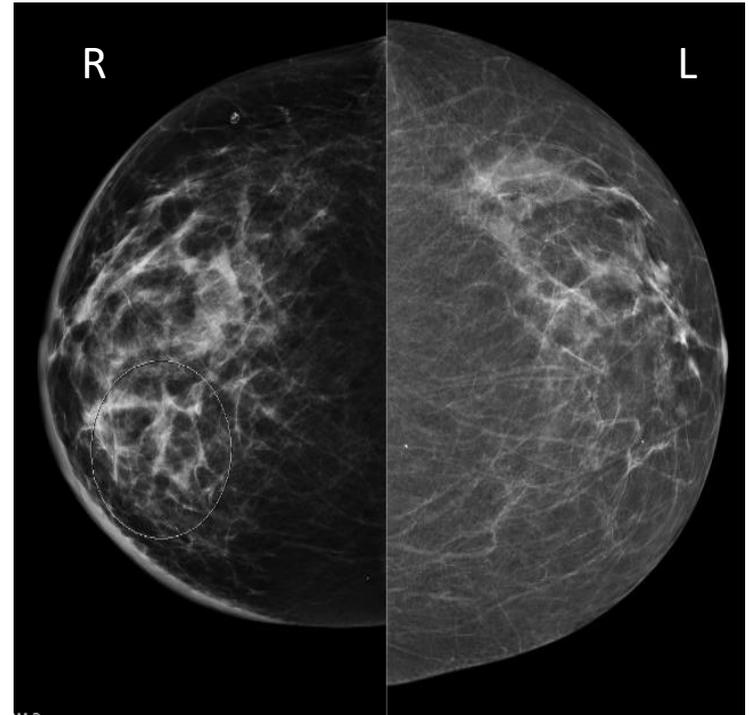
Module Outline

- I. Case
- II. Background
- III. Article Overview
- IV. Clinical Questions
- V. Key Points

Case Presentation

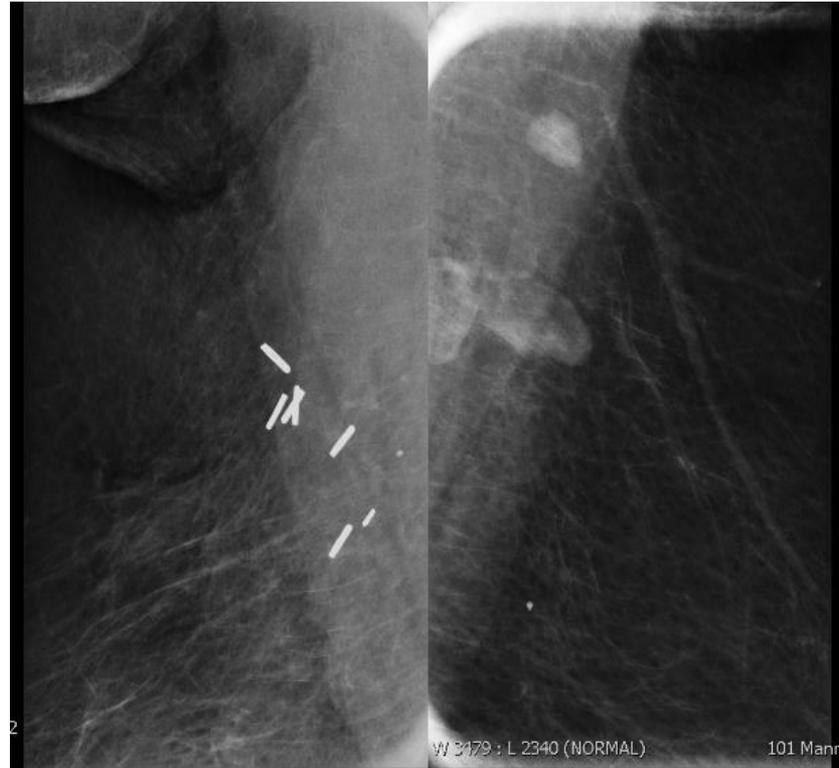
68-year-old female with a past medical history significant for right breast cancer status post breast conserving therapy and adjuvant chemotherapy and recent left arm COVID vaccination presents for her diagnostic mammogram

Case Imaging – Mammogram

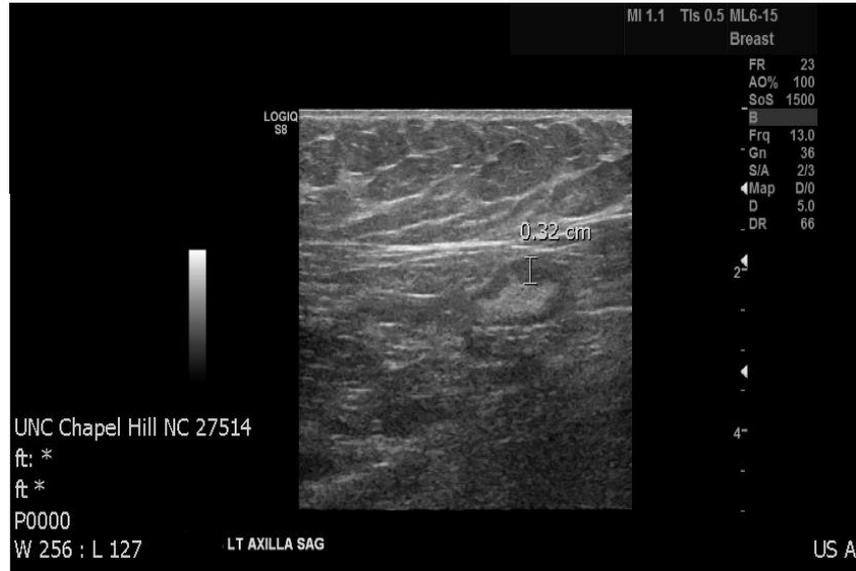


What do you notice about the mammogram?

Case Imaging – A Better Look



Case Imaging – Ultrasound



What is your impression of the ultrasound?

Do you have a differential for what is going on?

What would your recommendations be?

Case Resolution

- BI-RADS category 3 (probably benign)
- Short interval follow-up
 - Repeat mammography in 6 weeks to evaluate for decrease in size of left axillary lymph node

Case Questions

- What is the BI-RADS assessment scale?
- What are the features of a pathologic lymph node?
- What causes axillary lymphadenopathy?
- What should the recommendations be concerning mammograms and COVID-19 vaccinations?

Module Outline

I. Case

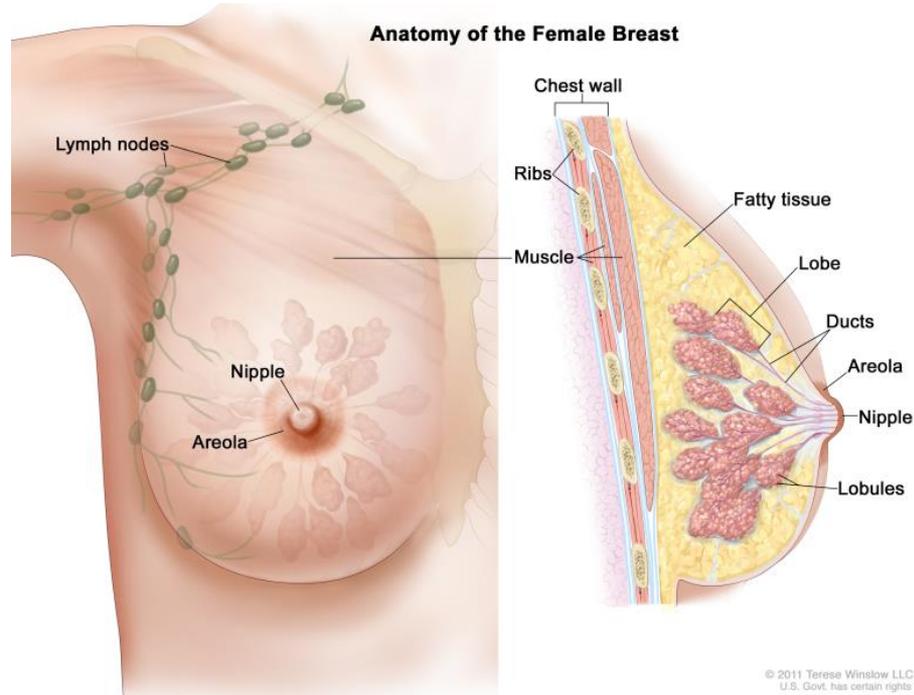
II. Background

III. Article Overview

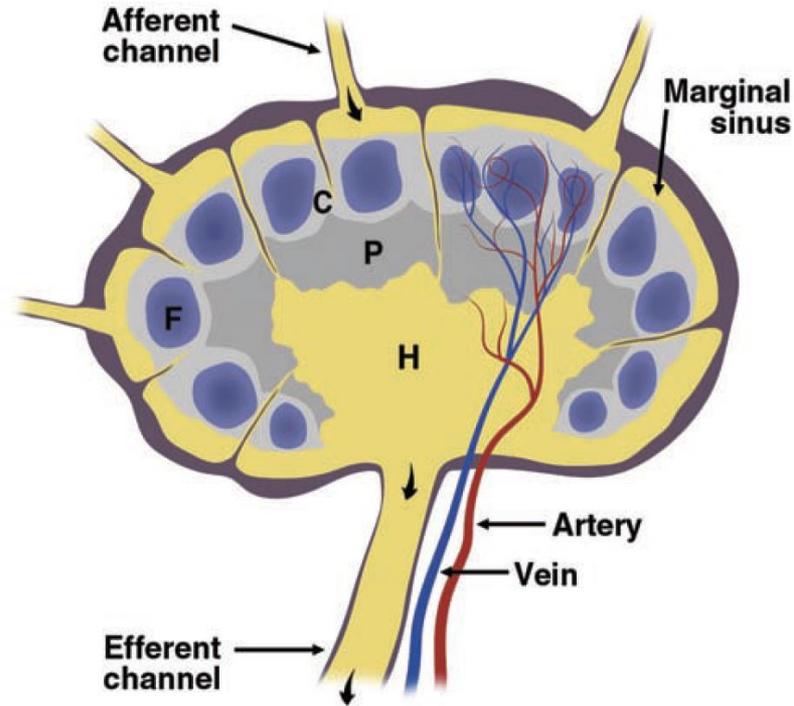
IV. Clinical Questions

V. Key Points

Anatomy of the Female Breast

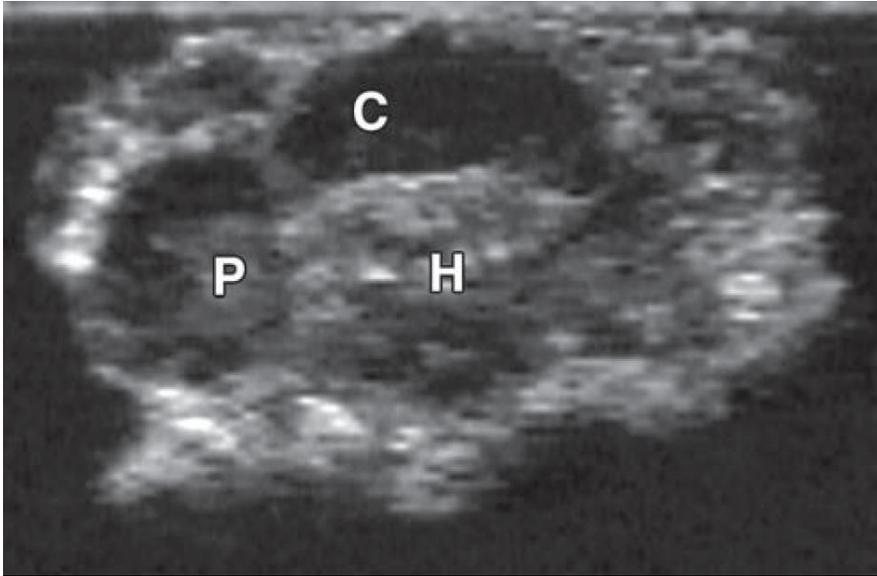


Anatomy of a Lymph Node



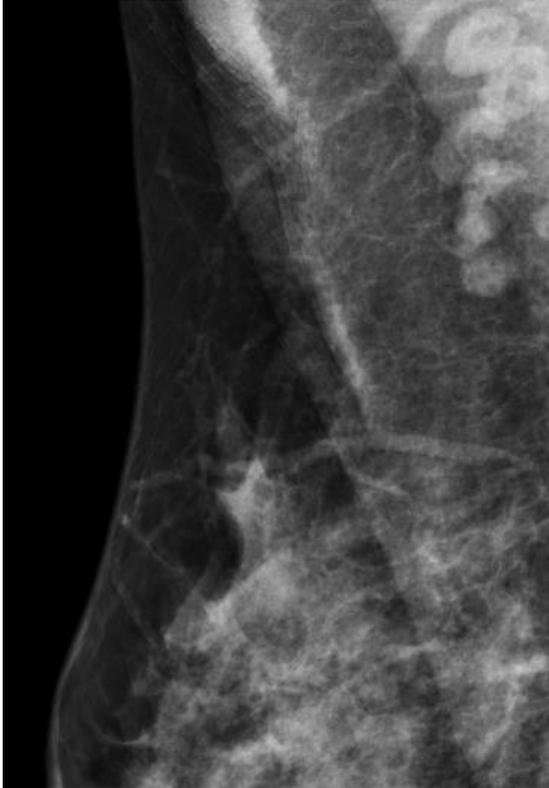
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Normal Ultrasonographic Appearance of Lymph Nodes



- C = cortex, P = paracortex, H = hilum
- Cortex appears hypoechoic with slightly hyperechoic paracortex
- Hilum is hyperechoic, representing central sinus, medullary cords, blood vessels, and fat

Normal Mammographic Appearance of Axillary Lymph Nodes



- Well-defined
- Relatively low density
- Fatty hila or a fatty center

Differential of Axillary Lymphadenopathy

- Bilateral

- Autoimmune diseases, such as rheumatoid arthritis, Sjögren syndrome, systemic lupus erythematosus, etc.
- Lymphoma
- Leukemia
- HIV and HIV-associated conditions
- Granulomatous diseases, such as sarcoidosis or tuberculosis
- Lymphoid hyperplasia from infections/inflammation, for instance with infectious mononucleosis
- Axillary nodal metastases from breast cancer (uncommonly), lung cancer, and melanoma

- Unilateral

- Benign

- Mastitis
- Cellulitis
- Tuberculosis
- Post-vaccination

- Malignant

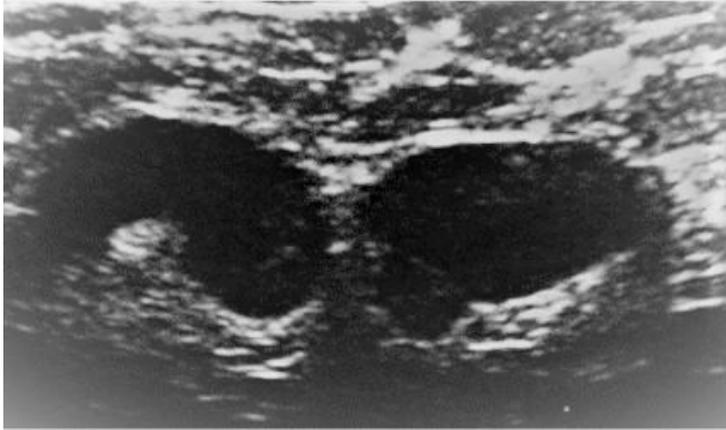
- Metastasis from breast malignancy
- Metastasis from melanoma
- Metastasis from primary malignancy in ipsilateral arm
- Lymphoma (uncommonly)

Mammographic Appearance of Pathologic Axillary Lymph Nodes



- Dense
- Large
- Round
- Loss of fatty hilum

Abnormal Sonographic Appearance of Axillary Lymph Nodes



- Larger size
- Rounded or irregular shape
- Loss of fatty hilum
- Cortical thickening

Breast Imaging-Reporting and Data System (BI-RADS)

BI-RADS® ASSESSMENT CATEGORIES

Category 0: Mammography: Incomplete – Need Additional Imaging Evaluation and/or Prior Mammograms for Comparison
Ultrasound & MRI: Incomplete – Need Additional Imaging Evaluation

Category 1: Negative } **0% PPV for malignancy** ➔ **Routine mammography screening**

Category 2: Benign }

Category 3: Probably Benign } **<2%** ➔ **Short interval follow-up or continued surveillance**

Category 4: Suspicious

Mammography
& Ultrasound:

Category 4A: Low suspicion for malignancy } **2-9%**

Category 4B: Moderate suspicion for malignancy } **10-49%** ➔ **Biopsy should be performed**

Category 4C: High suspicion for malignancy } **50-95%**

Category 5: Highly Suggestive of Malignancy } **>95%** ➔ **Biopsy should be performed**

Category 6: Known Biopsy-Proven Malignancy } **100%** ➔ **Surgical excision when clinically appropriate**

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Article Specifics

- I. **Purpose:** To promote radiologists' familiarity with this new phenomenon and to provide evidence-based guidelines in order to avoid unnecessary workup
- II. **Journal:** *American Journal of Roentgenology*, published online in February 2021
- III. **Study Type:** Retrospective study of electronic medical record from December 2020 to February 2021
- IV. **Cases:** 23 women displayed axillary adenopathy ipsilateral to the vaccinated arm on screening or diagnostic breast imaging
- V. **Data:** Type of vaccine, time between first dose and imaging, presentation, imaging showing abnormal node, number of abnormal lymph nodes, maximal lymph node cortical thickness (mm), follow up recommendations

Study Cohort

- Women with image-proven axillary adenopathy
- Detected during screening or diagnostic breast imaging from December 2020 to February 2021
- Recently received COVID-19 vaccination

Materials and Methods

- Axillary adenopathy was found during review of electronic medical record
- No new interpretations of the imaging were made

Materials and Methods (cont)

- What did the author classify as an abnormal lymph node?
 - For mammography, if the size, shape or density was disproportionate to others (ipsilateral and/or contralateral)
 - For ultrasound, based off subjective assessment of cortical abnormalities, including focal or diffuse thickening greater than 3 mm
 - Overall node size was not a criterion given lack of consensus for axillary node assessment on ultrasound
 - For MRI, if asymmetric in size and/or number to the contralateral axilla

Results

- 23 women (age 49 ± 21 years) with axillary adenopathy ipsilateral to the vaccinated arm
- Only 13% of women were symptomatic
- Median interval between vaccine and abnormal imaging was 9.5 days (range of 2-29 days)
- 57% of women had only one abnormal node
- The cortical thickness of the largest node was >6 mm in 13%

Table 1-Summary of 23 women with COVID-19 vaccination associated axillary adenopathy

Feature	n (%)
Type of vaccine	
Pfizer	12 (52)
Moderna	5 (22)
Not reported	6 (26)
Time between first dose and imaging ^a (d)	
2-6	7 (35)
7-13	7 (35)
14-20	5 (25)
>20	1 (5)
Presentation	
Symptomatic (axillary lump with possible tenderness)	3 (13)
Asymptomatic, screening	10 (43)
Asymptomatic, diagnostic (reason unrelated)	10 (43)
Modality demonstrating abnormal node	
Mammography	5 (22)
US	12 (52)
Mammography and US	4 (17)
MRI	2 (9)
Number of abnormal lymph nodes	
1	13 (57)
2	5 (22)
3	3 (13)
>3	2 (9)
Maximal lymph node cortical thickness (mm)	
4	10 (43)
5-6	10 (43)
>6	3 (13)
Imaging follow-up recommendation (weeks)	
No imaging follow-up (BI-RADS 2)	1 (4)
4-6 (BI-RADS 3)	5 (22)
7-12 (BI-RADS 3)	13 (57)
13-24 (BI-RADS 3)	3 (13)
US-guided biopsy (BI-RADS 4)	1 (4)

^aExcludes 3 patients for whom adenopathy was first detected after 2nd dose (interval of 1, 7, or 9 days after 2nd dose) 1

Results (cont)

- BI-RADS 2 was assigned in one woman
- BI-RADS 3 was assigned in 21 women
 - Median recommended ultrasound follow-up of 8 weeks (range of 4-24 weeks)
- BI-RADS 4 was assigned in one woman
 - The patient had left breast pain and past medical history of left breast cancer, ipsilateral to the vaccination
 - Ultrasound-guided core needle biopsy yielded reactive lymphoid process
- Follow-up imaging or biopsy was recommended in all but one patient

Discussion

- The largest known sampling of axillary adenopathy secondary to COVID-19 vaccinations seen on imaging
- Society of Breast Imaging recommends
 - Initial BI-RADS 0 assessment to allow further assessment of the ipsilateral breast
 - After appropriate diagnostic workup, consider a follow-up examination 4-12 weeks after the second dose (BI-RADS 3)
 - If axillary adenopathy persists, consider lymph node sampling to exclude malignancy
- Another recommendation would be to follow the affected axilla 4-to-12 weeks after the second dose with targeted ultrasound to demonstrate resolution

Discussion (cont)

- Axillary adenopathy ipsilateral to the vaccinated arm may be a reactive process
- Recommendations for follow-up imaging may not be warranted
- Incorporating the patient's COVID-19 vaccination history is critical to optimize management in women with otherwise normal breast imaging
- Concurrent assessment of the contralateral axilla for comparison may be helpful

Limitations

- Small study size Short study period Single institution
- Retrospective design
- Evolving information
- Only mentioned Pfizer and Moderna vaccinations
- Unaware of the total percentage of women with adenopathy after COVID-19 vaccinations
- No comparison between women with and women without vaccinations

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Clinical Questions Now. . .

- What percentage of women have unilateral axillary lymphadenopathy after COVID-19 vaccinations?
- How many callbacks are benign?
- Should women be turned away from screening if recently vaccinated?

Key Points

- On imaging, lymph nodes should be reniform, small, and retain their fatty hilum
- It is important to realize that unilateral reactive lymphadenopathy in the era of COVID-19 vaccinations may be normal
 - At the same time, malignancy should always be on the differential
- If possible, screening/nonemergent breast imaging should be postponed after COVID-19 vaccination to avoid abnormal results and unnecessary invasive workup

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