Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Managing the Risk of Delayed Breast Cancer Screening Versus COVID-19 Vaccination Associated Axillary Lymphadenopathy

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Articles in both medical journals and the lay press have alerted physicians and patients of finding reactive lymphadenopathy associated with recent COVID-19 vaccination. Lymphadenopathy related to vaccination is not new, as it has been associated with multiple vaccinations including influenza, human papilloma virus, smallpox, and Bacille Calmette-Guerin (BCG). However, the unprecedented speed and scope of mass vaccination for COVID-19 has resulted in both symptomatic and asymptomatic patients with axillary lymphadenopathy. The article by Faemann *et al.* demonstrated a 394% increase in predominantly subclinical lymphadenopathy compared with the two prior years, with 77.8% attributable to COVID -19 vaccination. Of these cases detected by screening ultrasound of the breast and axilla, 49% had visible adenopathy on their corresponding screening mammogram (1).

The National Comprehensive Cancer Network and the Society of Breast Imaging (SBI) have published guidelines to delay cancer screening exams until 4-6 weeks after vaccination if this does not unduly delay care when screening cannot be performed prior to vaccination. If abnormal lymph nodes are detected on a screening mammogram, the patient should undergo a call back examination with a diagnostic mammogram and/or ultrasound to better evaluate the findings. If the examinations suggest the lymphadenopathy is due to recent vaccination, the patient can undergo short term follow-up in three months to ensure resolution. In an update by the SBI published on March 9, 2021, the authors note that their approach is "by design a very conservative one, which stresses an abundance of caution. Individual practices may wish to develop their own guidelines based on their expertise, local resources, and institutional support" (2). Other recent studies suggest we designate these cases as a BI-RADS 2 (benign) finding with annual screening follow-up (3). This more "pragmatic" approach is consistent with the American College of Radiology BI-RADS recommendations for unilateral lymphadenopathy in the setting of a known inflammatory cause.

Another risk related to COVID is the delay in cancer diagnosis during the long period from March to June in 2020 when most medical facilities had stopped cancer screening examinations to preserve medical resources. This is likely to further exacerbate pre-existing health care disparities including access to both vaccination and screening examinations for underrepresented minority populations.

Instead of applying a "one size fits all" algorithm to these patients, we need to take a more nuanced and informative approach to better help these patients and their physicians manage these competing risks. The term "risk" refers to the possibility that something harmful may or may not occur. In common terms, risk is the probability or "odds" of something bad happening. The average probability of a woman of screening age from 40-79 years being diagnosed with a breast cancer while undergoing a single asymptomatic screening examination is approximately 4/1000 or 0.4%. This risk estimate would be far greater for the woman with a BRCA1 or BRCA2 gene mutation and far less for a young asymptomatic woman without a family history. The probability of being called back for any type of abnormality on a screening mammogram is approximately 10%. The probability of developing symptomatic palpable lymphadenopathy from the Moderna vaccine may be as high as 16% (4). We do know that the risk of finding asymptomatic lymphadenopathy following COVID vaccination on a mammogram is low, but certainly higher than the background risk without vaccination. In the study of Israeli women by Faemann *et al.*, 20.7% of their patients demonstrated ipsilateral lymphadenopathy attributable to vaccine associated lymphadenopathy, increased from the prior two years over the same time period of 6.4% and 5.7% (1).

In addition to probabilities, we have to consider the magnitude of the impact of a particular risk of delayed screening vs. delayed vaccination. The impact of having COVID for a

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woman greater than age 70 years of age with multiple medical morbidities would be far greater than a 40 year old woman without underlying health conditions. We must also better understand each person's individual risk profile—what capacity do they have for risk and what is their individual tolerance for risk? For one woman, undergoing a call back examination for evaluation of possible abnormal lymph nodes would be a small event, but for another woman, it may cause extreme anxiety, made worse by the prospect of waiting 3 months until a follow-up ultrasound confirms the resolution of the lymphadenopathy. Breast radiologists and breast imaging practices should understand individual patient preferences and practice culture to best determine the appropriate follow-up imaging strategy.

Four classic strategies to manage risk include avoidance, reduction, transfer to a third party (insurance) and acceptance. When risks such as contracting COVID or breast cancer cannot be completely avoided, other strategies must be employed to mitigate the damage. Since 1990, the mortality rate of breast cancer in the United States has decreased by 41% which has been attributed to advances in screening, treatment, and early detection (5). Both the Pfizer-BioNTech and Moderna COVID-19 vaccines are over 90% effective at preventing symptomatic disease (6). Women and their health care providers need to be educated with the most recent information available to best manage these competing risks. Fortunately, in the US and Israel, an increasingly higher percentage of women of screening age are now vaccinated for COVID 19 obviating the need to delay the known benefit of breast cancer screening.

REFERENCES

1. Faemann, et al. COVID-19 vaccination induced lymphadenopathy in a specialized breast imaging clinic in Israel: Analysis of 163 cases. Academic Radiology 2021; 28:1191–1197.
2. Society of Breast Imaging, SBI Recommendations for the Management of Axillary Adenopathy in Patients with Recent COVID-19 Vaccination. SBI-online.org website updated 3/9/2021. Accessed on 7/14/2021.
3. Lehman CD, et al. Unilateral Lymphadenopathy Post COVID-19 Vaccination: A Practical Management Plan for Radiologists Across Specialties. Journal of the American College of Radiology 2021.
4. Centers for Disease Control and Prevention, Local Reactions, Systemic Reactions, Adverse Events, and Serious Adverse Events: Moderna COVID-19 Vaccine.
5. Hendrick, et al. Breast Cancer Deaths Averted Over 3 Decades. Cancer 2019; 125:1482–1488.
6. Centers for Disease Control and Prevention, Interim Estimates of Vaccine Effectiveness of BNT162b2 and mRNA-1273 CIVUD-19 Vaccines in Preventing SARS-CoV-2 Infection Among Health Care Personnel, First Responders, and Other Essential and Frontline Workers—Eight U.S. Locations, December 2021-March 2021. April 2, 2021/70(13);495-500.