

Analysis of Artifacts on MRI from Electronic Identification Enablement in Silicone Gel Implants

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Sir:

We read with interest the article by Kurz et al,¹ in which they express their concerns regarding the balance between the benefits and drawbacks of radio frequency identification device (RFID)-enabled breast implants. As indicated, this technology represents a higher level of traceability. Unlike typical product cards, the code in the RFID can never be lost or misplaced, providing accurate device tracking and identification.^{2,3} Studies during the Poly Implant Prothèse product recall showed that almost one in four women lacked device information to determine they were at risk, an avoidable flaw with this 100% accurate and noninvasive option.⁴ Moreover, with immediate access to implant information, surgeons can improve preoperative planning for revision surgery. Having the implant details before the procedure aids in appropriate sizing, procedure planning, and improved outcomes.³

Kurz et al¹ acknowledge the benefits that come with RFID technology but are legitimately concerned by the presence of artifacts on the magnetic resonance imaging (MRI) due to the metallic ferrite core. In fact, artifacts associated with metal are a known impact due to magnetic susceptibility differences between substances. These can be minimized by strategically selecting the pulse sequence (Fig. 1) or simple considerations, such as increasing the frequency encoding bandwidth or reducing the slice thickness. In this context, it is fundamental to establish anatomical and methodological precisions and appropriately determine whether MRI for early cancer detection or surveillance is a recommended practice.²

Screening or breast imaging surveillance is consistently recommended. However, MRI is not the front-line modality, and is supplemental only in high-risk groups.⁵ Full-field digital mammography and digital breast tomosynthesis

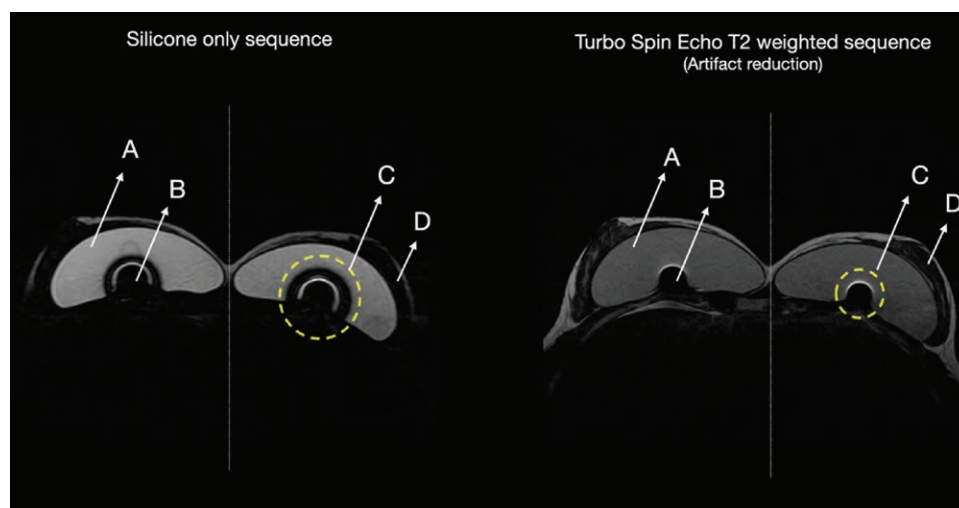


Fig. 1. Comparison of a silicone only (left) and a turbo spin-echo T2-weighted sequence (right), showing substantial artifact reduction. A, silicone gel implant; B, RFID microchip; C, area of the RFID artifact; and D, breast tissue.

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have been progressively adopted as the modality of choice for breast cancer screening, and adding ultrasound to any of the previous improves cancer detection rate.⁴ Another consideration is that the breast tissue is anterior to the breast implant, and the RFID-related artifact is in the back of the implant, consequently impacting only the thoracic wall.^{2,3} In our previous experience, MRI follow-up was not impaired, and additional imaging exams can be performed, such as ultrasound or mammogram to obtain an adequate analysis of the parenchyma.² Additionally, the vast majority of tumor recurrences are detected by mammography or examination, as palpable masses.⁶ Thus, understanding the loco-regional distribution of

recurrence is important given the expected location of the artifact. A chest wall recurrence may involve skin, muscle, and fascia beneath the site of the original breast tumor, as well as thoracic lymph nodes. These are less frequent than skin or subcutaneous recurrences, and can be detected by noticeable symptoms, ultrasound, and even positron emission tomography and computed tomography, which has high sensitivity and specificity to detect locoregional recurrence, and is recommended in asymptomatic patients with rising tumor markers.²

In conclusion, MRI has higher sensitivity than other imaging modalities for cancer detection. The question that remains is whether asymptomatic patients who follow routine surveillance recommendations glean true benefit from a limited chest wall area examination by means of MRI, considering its challenges. MRI is very costly and rarely covered by insurance, depending on the country; there are available concomitant imaging alternatives; and further, there remains a specificity debate. This quandary may better represent the true crossroad between the benefits and risks of the RFID-enabled technology.

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DISCLOSURE

Dr. Munhoz serves as a consultant/board member for Establishment Labs, Holdings, Inc.

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