Benign Intraparenchymal Scarring in the DBT Era

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With the advent of Digital Breast Tomosynthesis (DBT or 3D mammography), we are much more sensitive to architectural distortion in the breast than we ever were with 2D mammography.

We were very early adopters of DBT, installing our first 3D mammography unit in our Tully Breast Imaging Center in October, 2012. We went all in, and decided shortly after it was approved, that we were going to use 3D Mammography for all of our breast imaging patients, regardless of age, breast density, or history.

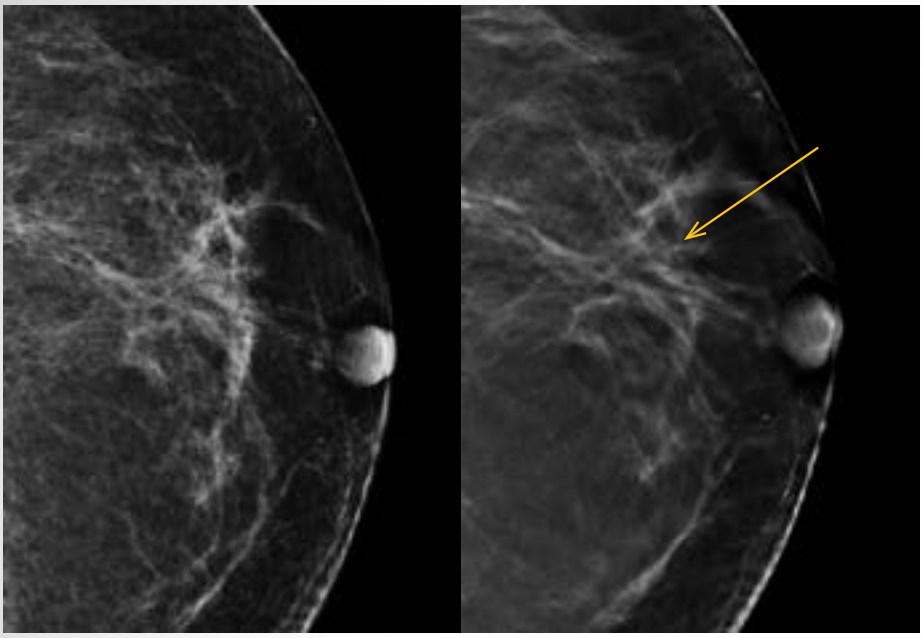
When we started with Tomosynthesis, no one really knew what to expect in terms of sensitivity. We had heard that we would be seeing more architectural distortion, but we weren't sure what that meant. No one really knew in the very beginning how much more architectural distortion we'd find. During training we learned that we might find more radial scars.

Very early on in our DBT experience, we found more radial scars than we had found historically with 2D mammography. To our surprise, we also found that we were seeing architectural distortion, associated with scarring from benign excisions that may have been performed many years earlier, that we may never have seen on 2D (Case 1, Fig. 1).

Interestingly, when we look back at mammography from 5 or 7 years ago, where a scar marker had been used, we can confirm this area of architectural distortion as the site of a benign scar, and not worrisome (Case 1, Fig. 2). On the other hand, if we don't have prior studies where the scar was marked, or cannot confirm it as a benign surgical site, we need to view this as an area of architectural distortion that requires further workups and sometimes even biopsies.

As a result, the use of skin marking has become increasingly important.

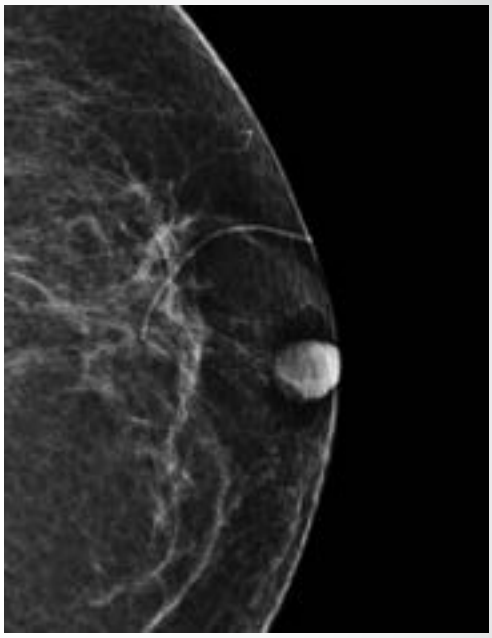
Case 1, Fig. 1. 46 year old female presenting for screening mammogram with DBT in 2014. Patient history notes resection of clogged duct in 2009.



Normal 2D FFDM

Close up of subareolar architectural distortion seen only on 3D mammography.

Case 1, Fig.2. Same patient now with scar marker at site of surgical scar



Scar marker confirms newly seen distortion on 3D mammography corresponds to remote benign surgical excision

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Coming full circle to the importance of marking scars.

For me, and I believe many breast imaging radiologists, the use of skin markers has been cyclic.

There was a point earlier in my career where I wanted everything marked – for example, every scar, every mole – and then I went through a phase where I wanted markers only on new palpable abnormalities.

It's very difficult to create rules and tell the technologist, particularly a new technologist, what to mark in advance, and so I erred on the side of using fewer rather than more skin markers.

As we are more sensitive to subtle findings within the breast with 3D mammography, we have become increasingly reliant on skin marking to help us distinguish old from new causes of distortion.

We have found this particularly relevant with the marking of scars at the site of prior excisional biopsies. The conventional thinking is that we don't usually see benign scars within the parenchyma, as they tend to heal very nicely and are often not visible a few years down the road.

However, with the advent of Digital Breast Tomosynthesis, we have found this not to be so, and we are seeing many more sites of scarring at the sites of benign surgery than we have ever seen before, even if the surgery was done many years ago and not seen in any of the intervening mammography.

So now, we have come back full circle to marking skin scars.

A common scenario, an "aha" moment

Because we always read a patient's mammogram while she is still here, we look back at her prior mammograms to try to determine the cause of the architectural distortion we see with DBT. We often have to go back quite a few years.

The 'aha' moment for me, was when we realized we were actually working people up for architectural distortion, only to find that when we referred to their old film-screen or digital mammography, that if we looked back far enough, we could find the images from the localization and excision or with the scar marker confirming the site. Sometimes we needed to go back as many as 5 or 10 years (Case 2, Figs. 1-5).

We may have not focused on benign intraparenchymal scarring in the 2D era, but it is obvious that we see it frequently in the DBT era, so marking all scars is significantly more important.

For a while we were marking most of the scars and then, for whatever reason, we got away from marking scars. It wasn't unusual to go back and look at a mammogram from 5 or more years ago and see that scar was marked in both projections, and that the architectural distortion we were seeing on DBT is right at the crosshair. Then we'd look back even 2 years further and see that this is where the wire localization excision was.

With time, the intraparenchymal scar seemed to go away, the incision healed, the changes in the breast stopped being visualized, and the skin scar faded so we stopped marking.

Now all of a sudden, 6 years after surgery we see architectural distortion that we haven't seen for 5 years with 2D imaging.

Since the skin scar is the only externally visible mark left behind from an excisional biopsy, it's really important that we mark those scars to know that we're looking at that surgical distortion rather than a distortion that could be breast cancer.

Another "aha" moment – the patient history matters

We have known since medical school that accurate history matters and information matters.

It's not uncommon that women, many women, have breast biopsies. Fortunately most breast biopsies are benign, and many women who get breast cancer have also had benign biopsies in the past. For this reason it's vitally important to know what's where and which is which.

In our practice, we emphasize the importance of getting a really accurate history about any prior breast biopsy or operation, and documenting this information – including the site of scar – in the medical record. Sometimes patients forget, and having this on record is extremely helpful.

Ongoing communication between technologists and radiologists matters

One of the things we do differently at our center is look at mammograms while the patient is here and give them their results. We don't get to all of them because we do offer weekend and nighttime mammograms during radiologist off-hours, but we look at well over 90% of the screening mammogram studies in real-time.

We have a lot of women who choose to come to us for their mammograms from other places. We always have

them bring, or try to acquire, their prior mammography and it's interesting because they may have forgotten they had surgery.

Our challenge, when we look at prior outside mammography, is that we have to go through that history again.

When we identify a distortion, we can have that conversation with our technologist and say, "Wait a minute, where's the marker?" or "Does she have a scar?" The technologist can then go back and ask the patient, or we can go back and talk to her together, about previous surgeries.

It's not uncommon when we have those conversations that a woman might say, "Yes, my scar's in the opposite breast." What we see as an area of architectural distortion could be a benign surgical scar, a radial scar, or breast cancer. So it's a different discussion when we have that detailed history.

Patients need to be their own best advocate because no one knows their history or their body as well as the patient themselves. I can ask questions, but ultimately, patients need to be their own best advocate.

If we're going to give a message directly to the patient, it should be know your history.

You always want to identify the clinical imperative.

One of the challenges we face as breast radiologists is deciding that there is some architectural distortion that we need to work up. You never want to say there's an architectural distortion in the breast and not have an explanation for it.

For comparison purposes, let's say you have a cough and shortness of breath. Although it may just be a viral URI, your physician has to make sure you don't have a potentially fatal pulmonary embolus. That's called the diagnostic imperative. In breast imaging not missing a developing breast cancer, not ignoring architectural distortion are our clinical imperatives.

With breast imaging, the diagnostic imperative is breast cancer.

So in our discipline, when a patient presents with architectural distortion, our obligation is to make sure that that architectural distortion is not breast cancer – either by proving it's benign by looking under a microscope, or by proving it's benign because someone has already been there and looked at it under a microscope.

Once we identify architectural distortion, we can't stop until we know what it is.

That's our clinical and professional obligation and DBT just finds many, many, more areas of architectural distortion – both benign and non-benign.

That being said, I don't consider those to be the false positives. The industry considers false positives as biopsies or interventions performed that turn out not to be cancer. In the strictest sense, that is true.

However, if someone has an architectural distortion, they're going to get worked up. If it cannot be attributed to a previous benign surgery and it winds up being biopsied and excised and it's not breast cancer, I'm not unhappy and don't consider this a "bad false positive." Better yet, I like to consider them "happy" negatives rather than false positives.

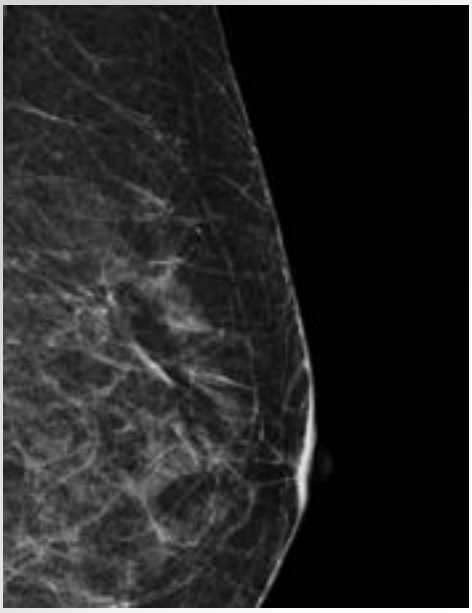
But we don't measure the happy negatives. People talk about the anxiety from false positives and unnecessary biopsies – but that's what makes them screening tests.

Sadly, if 100% of what we biopsied was breast cancer, and we only did mammography on women with breast cancer – then boy, we'd be missing a lot of breast cancer.

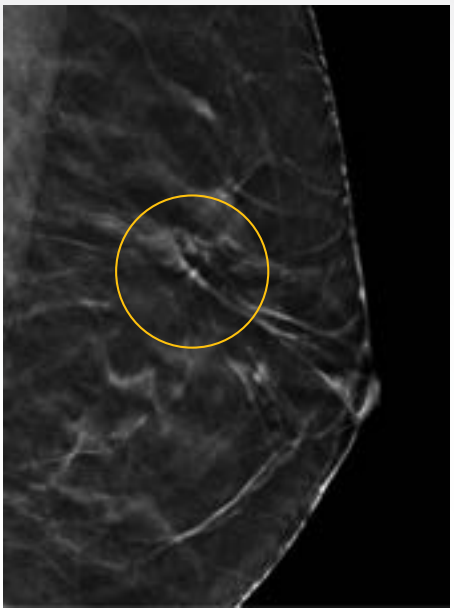
So how can we be more accurate with Intraparenchymal scarring in the DBT era?

By using all the tools at our disposal: open communication between physician, technologist, and patient, known patient history, and marking all post-surgical scars.

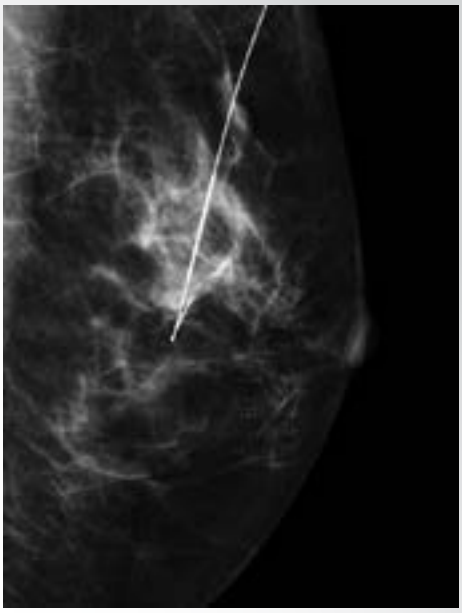
Case 2, Fig.1. 2015 Mammogram, Left MLO, 2D view. No abnormalities noted.



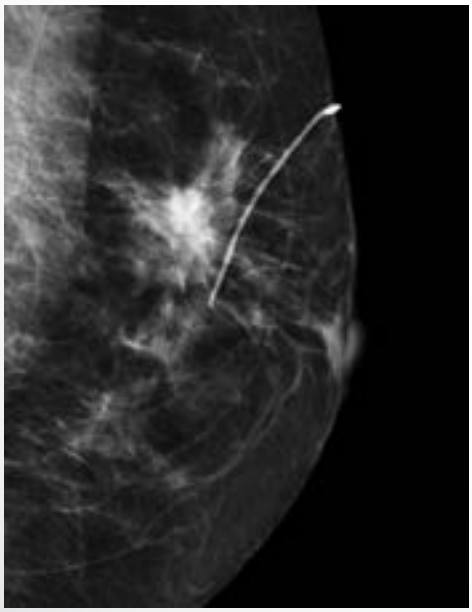
Case 2, Fig. 2. 2015 Mammogram, Left MLO, 3D view. 3D slice shows architectural distortion not seen on 2D.



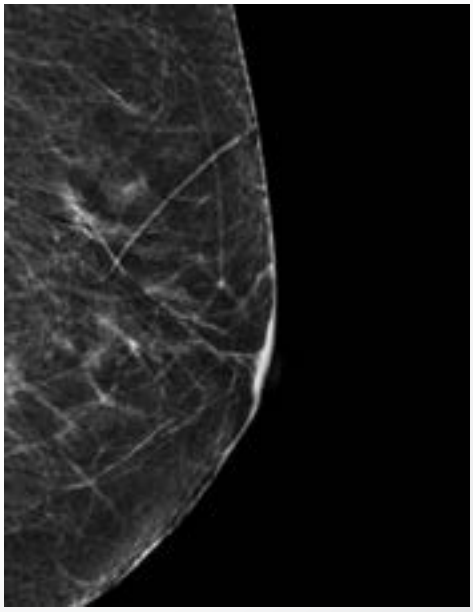
Case 2. Fig 3. Review of patient's record shows wire localization and excision for fat necrosis in 2005



Case 2, Fig. 4. Left MLO 2007. Digital mammogram with scar marker applied at excision site two years after benign surgery



Case 2, Fig 5. 2015 combo study, 2D Image. Scar marker on site of prior benign surgical excision correlating with distortion seen on 3D image. No further workup needed.



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About the Author:

Dr. Gruen is the director of Women's Imaging, and the co-director of the breast care program at Stamford Health in Stamford Connecticut. Dr. Gruen is fellowship trained in Oncologic Imaging with expertise in breast and body imaging. He was one of the first in the state to perform MR guided breast biopsies, and is a nationally regarded expert and frequent consultant on all aspects of breast radiology. He is a member of both the American College of Radiology Committee on Economics of Breast Imaging and the newly formed Patient and Family-Centered Care Commission. Dr. Gruen is the first diagnostic radiologist in the country to be appointed an inspector for the National Accreditation Program for Breast Centers (NAPBC); and he serves as a member of the Connecticut Hospital Association Task force on Radiation Safety. Dr. Gruen was inducted as a Fellow of the American College of Radiology in 2015.

Dr. Gruen attended Cornell University Medical College, after which he completed an internship and residency at The New York Hospital-Cornell Medical Center, followed by a post-doctoral fellowship at Memorial Sloan-Kettering Cancer.

Dr. Gruen received his Masters of Business Administration in 2012 from the Isenberg School of Management at the University of Massachusetts, with a focus on healthcare and management.

Dr. Gruen is a regional and national expert on all aspects of breast imaging, including 3D mammography; screening and diagnostic ultrasound; breast MRI; high risk assessment and evaluation; management of complex cases; and minimally invasive breast biopsy. He is a frequent lecturer, locally, nationally and on social media, on all aspects of breast cancer and women's health.

Stamford Health is at the forefront of breast care, and was the first in the region to embrace Digital Breast Tomosynthesis (3D mammography), with its improved diagnostic accuracy, for all patients.

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