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CONTRAST MAMMOGRAPHY

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Dr. Manuel Salvador Tarrasón

Medical Director and CEO at IMAGINE Diagnostic Imaging Centre

The IMAGINE Diagnostic Imaging Centre ***(CDI IMAGINE)*** *is a Radiodiagnostic Centre or Service founded on 5 February 1973 by Dr. Rafael Salvador Monte, who was Head of Service at* ***Hospital Valle Hebron and Hospital Germans Trias i Pujol*** *and is dedicated to the Diagnostic Imaging of Women's Pathology, with extension to other fields of diagnosis throughout the 49 years of its existence.*

Currently the ***CDI IMAGINE*** *centre is directed by Dr. Manuel Salvador Tarrasón, professor at the* ***UNIR****, previously at the* ***UIC*** *and* ***UAB****, and who created the breast units of the* ***Hospital General de Catalunya*** *(1993-2003) and* ***Clínica Corachán*** *(2003-2009). He is the author of the first work on breast elastography in Spain, and of numerous works on breast diagnosis and interventionism in the last three decades, with extensive experience in breast MRI.*

In the field of breast diagnostics, we pioneered multiple modalities and techniques such as simple mammography in 1970, Xeromammography in 1980, breast ultrasound in 1982, conventional stereotactic biopsy in 1990, digital stereotaxy in 1999, digital mammography in 2001 and breast elastography in 2004. In 2019 we acquired a state-of-the-art mammography machine with Tomosynthesis and Tomobiopsy AMULET Innovality from Fujifilm which we enhanced with contrast mammography in 2021.

For many years, breast cancer screening has been carried out by means of an annual mammography. All breast cancer screening campaigns since the late 1960s have been carried out with annual screening. It is important to note here that breast cancer tumours double in size between 250 and 450 days (Moskovitz 1980), and this is the very reason why they should be screened annually and not more or less frequently.

For many years now, ultrasound (complementary) has been an extraordinarily useful tool for ruling out pathology in those areas of dense glandular tissue, which are currently defined as type C and D in the ACR classification. This is currently the most widespread pattern in check-ups carried out both in Spain and in the rest of Europe and the USA.

Initially conventional mammography became digital at the beginning of the 21st century and has coexisted with the conventional mammography for a few years. Currently, FFDM (digital mammography) coexists with tomosynthesis, which appeared in the first decade of this century, but has been widespread since 2008-2010 and is now present in all centres dedicated to breast pathology, such as ours.

Breast MRI, which began at the end of the 80s, did not have actual growth until the 90s, but always with the reservations of being a complex, expensive and uncomfortable exploration, and with the necessary introduction of IV contrast, except in breast implant studies.

Undoubtedly, breast MRI (magnetic resonance imaging) resolves certain situations in which mammography is excessively dense and ultrasound shows other limitations. It is currently indicated in some situations, for example in patients with BRCA 1 and BRCA 2 in whom mammography (even with tomosynthesis) and ultrasound have certain limitations, or may have them.

Against this backdrop of breast imaging, contrast-enhanced mammography, also known as spectral contrast-enhanced mammography, has recently emerged. First studied in 2011, it is being developed in some research centres between 2015 and 2018 with very promising results.

There is a widespread tendency in professional circles to believe that contrast-enhanced mammography does not improve the results of breast MRI. Conclusions, for example, from the discussion at RSNA 2021 in the CEM (Contrast Enhancement Mammography) Session.

If we add to the results, the agility and low relative cost compared to MRI, its great usefulness and benefit for patients cannot be doubted. The same (or better) results are obtained as with MRI but without the discomfort of the resonator and the prone position that the patient must maintain for at least 30 minutes. In addition, they are not spared the intravenous injection of contrast, which in the case of MRI is gadolinium, and which leaves a small amount in the body. In contrast, the iodinated contrast in contrast mammography is eliminated in its entirety in little more than an hour.

In practice, all of this means that, with contrast mammography and in little more than 20 minutes, we obtain the image that indicates the uptake points or areas of suspicion, the ultrasound scan that confirms the image of suspicion and the possible performance of a core needle biopsy of the lesion, ultrasound-guided or by stereotaxy. But, in addition, with the knowledge of the extent of the lesion we have the confirmation of other lesions in both breasts. Multicentricity, multifocality or bilaterality can be ruled out or confirmed without having to wait more days, without having to reschedule the patient, without having to spend more days to obtain the diagnosis and ruling out check-ups after 6 months due to diagnostic doubts, with the advantage of ruling out unnecessary biopsies.

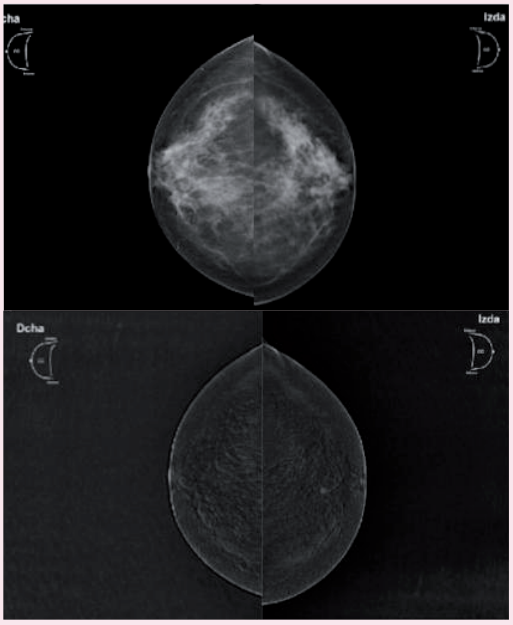
When we considered the application of the new technology, we were aware of some initial European and American studies that showed encouraging and even brilliant results published in leading journals such as Radiology in April 2021.

We decided to apply the technology according to the protocols we had developed in recent years for the indication of breast MRI, given the similarity of results and contributions of both technologies as studied until the beginning of 2021.

At the beginning we observed that the technique was like "illumination" of dense areas, with some signs of suspicion, whether mammographic, palpation or ultrasound. In fact, it gave us confirmation of suspicious lesions, some of which had already been diagnosed on mammography or ultrasound with mammography, and even with tomosynthesis in some cases. Undoubtedly, a portion of the axilla or axillary extension remains out of the field, which is completed with ultrasound. It would undoubtedly provide a plus in line with expectations.

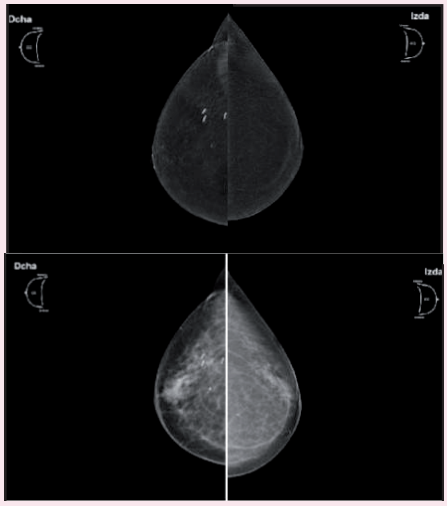
Analysing the case studies, it is worth noting that:

1.- The technique makes it possible to speed up the management of patients. The patient does not have to wait for an MRI scan complementary in cases where the lesion is positive because it is proven to be unique and oncological treatment can be safely initiated.



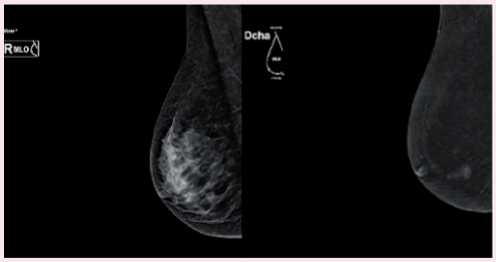
Single lesion in the left breast.

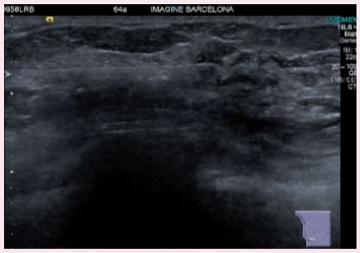
2.- Malignancy is ruled out in cases where the lesion is palpable, although in more than one case we performed a biopsy to confirm these initial results, which have always been confirmed as negative in all our cases.



Bilateral negativity.
Intervened by CDIS. Metal stitches.
It shows no residual lesion in CSE of MD.
There are no catchment areas.

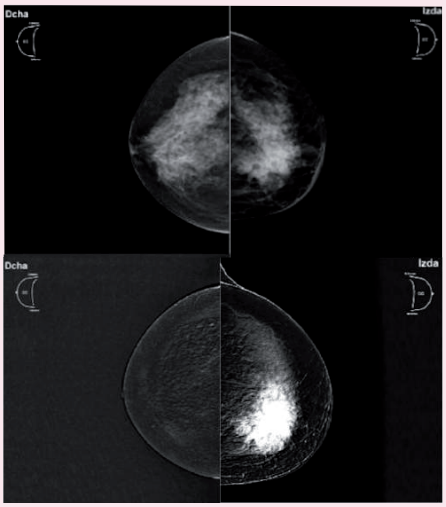
3.- Shows "hidden" lesions on both mammography and ultrasound. If one or two unilateral lesions are diagnosed between mammography and ultrasound, a contralateral lesion may be hidden. It can be localised and its positivity confirmed.





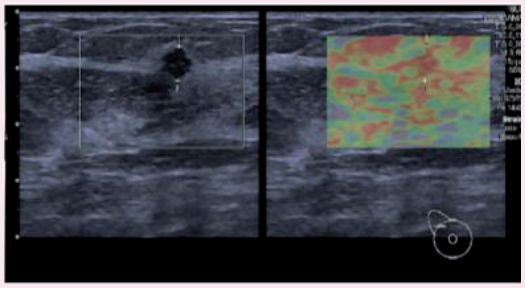
Concealed lesion.
Hidden image in the glandular tissue
in mammography and ultrasound.
Clearly visible on Contrast Mammography.
Result: Infiltrating ductal carcinoma.

4.- Determines the extent of the lesion much more accurately than mammography and ultrasound in cases where breast density is significant and ultrasound does not show hypoechogenicity or academic disruption.

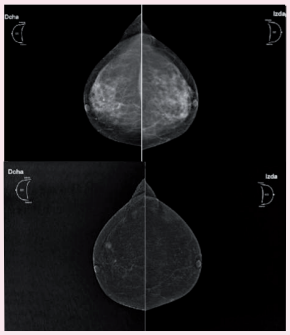


Extent of the lesion Dense breasts.
Lesion in the sinus of the left glandular tissue.
Extension: 7 cm. Infiltrating ductal carcinoma.

5.- In situations where mammography and ultrasound are unable to determine signs of malignancy in a lesion already detected as possibly benign (BIRADS 3), contrast mammography can define it as suspicious or highly suspicious, as well as determining that it is unique in both breasts.



Suspicious lesion on Contrast Mammography alone



In mammography we did not highlight
any suspicious lesions.
On ultrasound, well-defined nodule,
without shadow.
In MpC it captures only the (suspicious)
nodule.
Result: Ca. Triple negative

Conclusions

• Contrast mammography is an advance, an "upgrade" in the study of the early detection of cancer. It detects more, with greater diagnostic accuracy and greater lesion extension.

• Its application rules out malignancy almost immediately.

• 60% reduction in 6-month follow-ups and diagnosis of BIRADS 3.

• It reduces the number of biopsies performed without it by 40%.

• Its agility allows us to manage patients more quickly in early diagnosis.

• The certainty of the findings allows us to save a lot of time in the initiation of treatment for oncological patients.

• The application of the technology (mammography with contrast) takes only 5 minutes longer than the traditional mammography + breast ultrasound.

• Undoubtedly, its application will show a logarithmic increase in the coming years due to the ease of its application and the convenience it offers the patient compared to MRI, with similar diagnostic results but with an agility reminiscent of the appearance of Google as a search engine.

Recommendations

In short, a technique that contributes a great deal to the early diagnosis of breast cancer, both in terms of its management and in terms of patient safety with regard to a certain result.

- It requires an effort in its implementation because its effective application requires a knowledgeable reading, meticulous timing and the need for the patient's cooperation. The patient must not move at all for 4 seconds and must maintain close collaboration with the technician for the test to be carried out correctly.

- It should be applied in cases where there is a history of breast cancer in the patient's own or close family members and especially in the case of dense breasts.

- It can be applied in cases of dense breasts, but with some clinical, ultrasound, history or examination possibility, even if there is no history.

- It can be applied in cases with a clear history even if the breast is not dense, type B cases.

- There is no reason to deny its application in any case. There are cases of very light fatty breasts that may hide a small cancerous lesion that the technique could reveal.