The impact of AI-assisted interpretation on breast ultrasound: current and emerging clinical applications

1. **Women with dense breast tissue**
   often require an alternative to mammography for diagnosis.
2. **Ultrasound (US)**
   is a widely available and effective supplementary method.
3. **Artificial Intelligence (AI) algorithms**
   have been developed to assist in the interpretation of US scans of the breast.
4. **These algorithms analyze the images**
   captured by handheld device and provide automatic analysis.
5. **Enable clinicians to better identify and characterize breast abnormalities.**

Introduction and Objective(s)

1

Objective

Our aims is to highlight both current and emerging clinical applications of AI in handheld breast US.

2

Impact Illustration

Illustrate the effects of original and artificially enhanced AI on the interpretation of breast US.

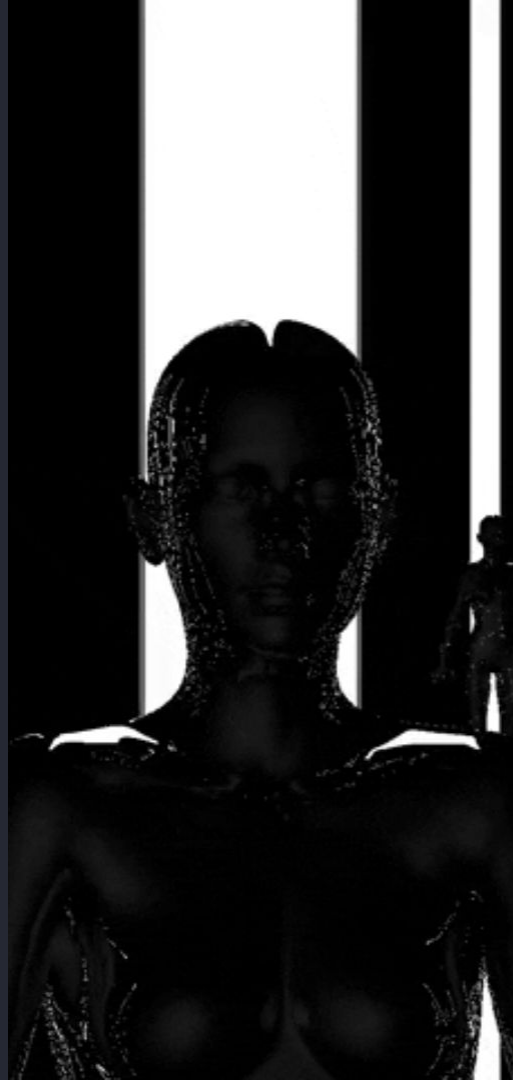
Method(s)

Retrospective Pictorial Essay

Retrospective pictorial essay of clinical cases selected from our digital archive of ultrasound breast lesions.

AI Applications Description

Description of clinical AI applications and bibliographic review.



Clinical Cases

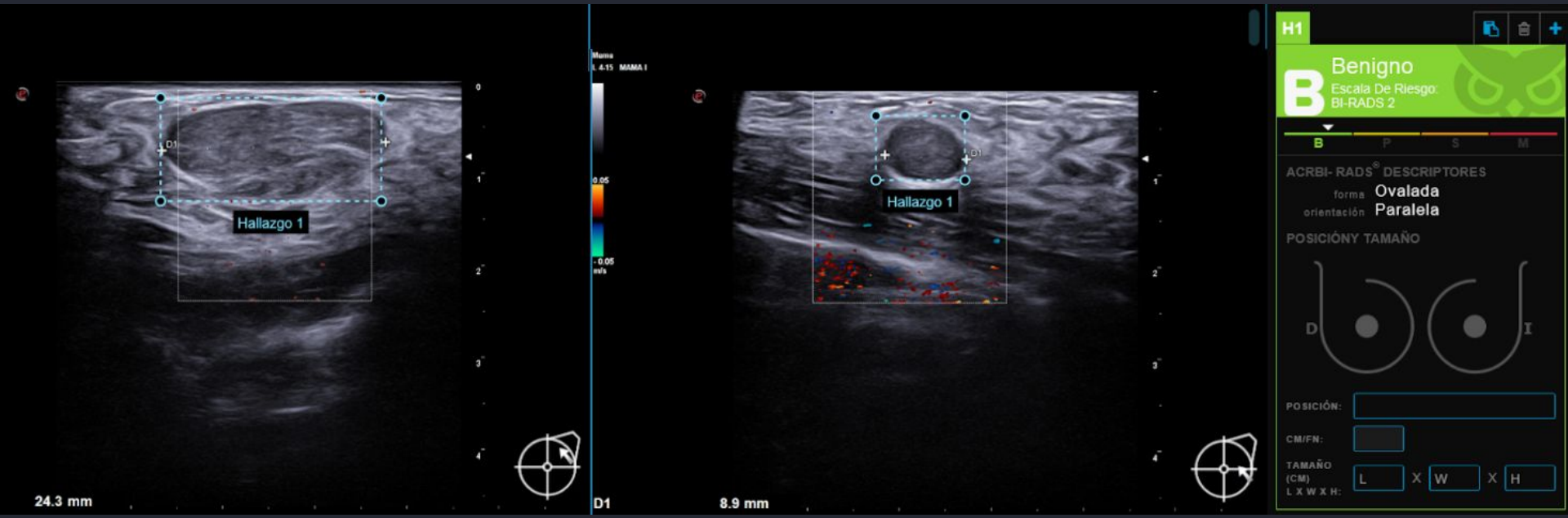
1 —— Case 1

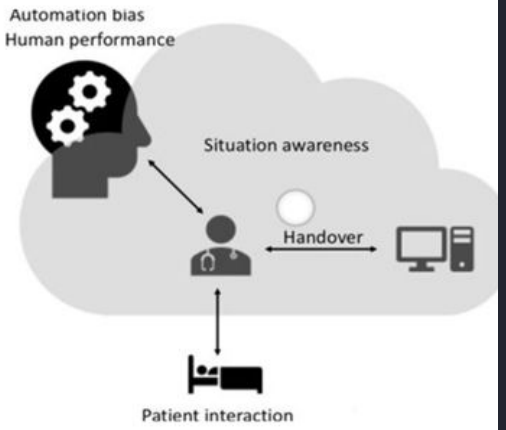
28-year-old woman with palpable mass in the UOE of the left breast. US findings: solid, hypoechoic, well-circumscribed mass 24 mm in size.

The experienced radiologist classified the lesion as BIRADS 3.

The KOIOS AI DS platform classifies it as BIRADS 2.

A second incidental finding was identified in the 3 o'clock position of the left breast with similar results.





Discussion

1 Impact of original AI-based interpretation

AI algorithms can help radiologists detect breast cancer that may be overlooked.

2 Challenges and Considerations

The interaction between humans and AI will influence the impact of AI on patient care.

3 Consistency in Recommendations

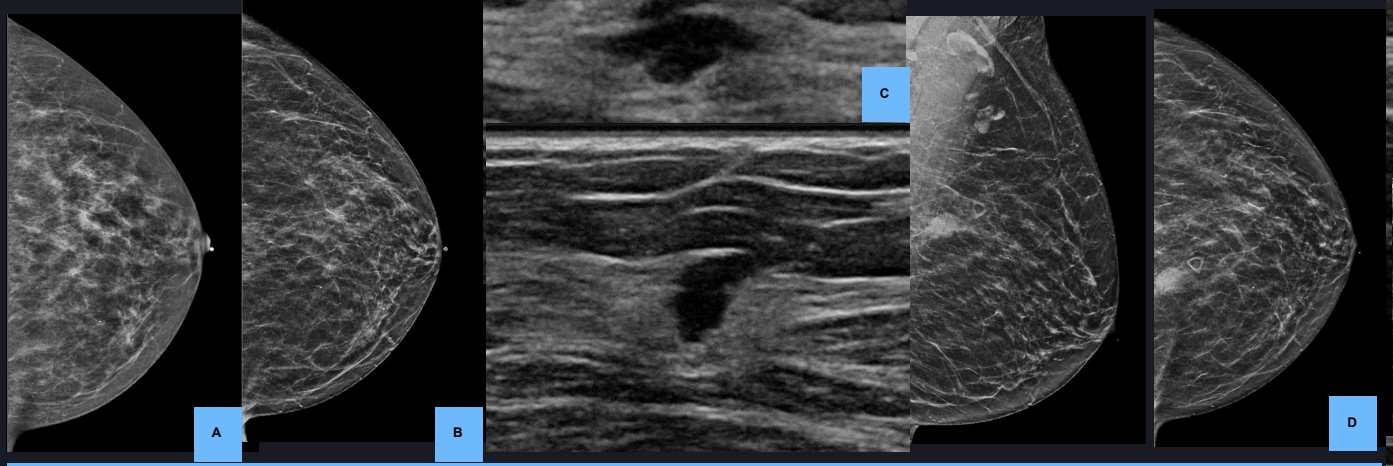
AI applications can improve the consistency of breast management recommendations by reducing intra- and inter-observer variability.

4 Impact on Patient Care

This can lead to earlier intervention, better outcomes for patients and potentially a reduction in healthcare costs.

New Challenges

New challenges concern the prediction of tumor biology and molecular subtypes of breast cancer, the prediction of axillary nodal metastases and AI breast US in low resource settings.



A) 2019, negative screening mammography in a 45 yo female B) 2020, subtle central and posterior focal asymmetry of the left breast. C) Ultrasound additional diagnosis showed cystic areas, which the radiologist classified as BIRADS 2.D-E) 9 months later, the patient consulted with a clinically palpable area with mammographic (asymmetries with increased density) and ultrasonographic (two irregular solid nodules) correlation .Ultrasound-guided biopsy revealed invasive breast carcinoma.
F) Retrospective analysis of the clinical case using the AI DS platform revealed suspected malignancy in the initial ultrasound images. The use of this technology would have allowed us to diagnose malignancy earlier and more efficiently.

Conclusions

1 Potential Clinical Role

AI-based detection has the potential to play an important clinical role in handheld breast US.

2 Utilization in Clinical Practice

There is evidence that breast ultrasonography may soon be used in clinical practice to detect, characterize and classify breast lesions and determine prognosis.

3 Human Validation

Radiologists and healthcare professionals play a crucial role in reviewing and validating AI-generated findings to make informed decisions for patient care.