Standardised mammographic positioning and compression protocols for use within breast screening and symptomatic services

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Introduction

Mammography is the gold standard diagnostic tool for the screening and diagnosis of breast cancer[1]; however, it is associated with pain and discomfort[2]. The pain/discomfort is mostly due to positioning and the compression applied during the procedure. This phantom study is investigating a standardised method to reduce the pain and discomfort for mediolateral oblique (MLO) projection with regards to image receptor (IR) angulation.

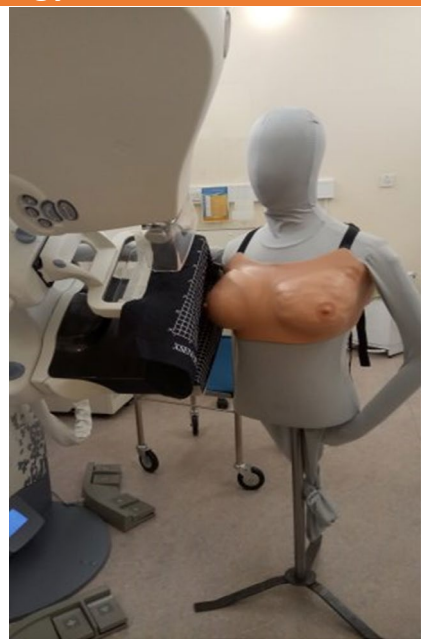
Rationale

Currently there are variations in the way patients are positioned for mammography and the amount of compression applied during the procedure[3]. In addition, there are sparse guidelines and published literature on mammographic positioning and the application of compression. It is suggested that for MLO projection, for an effective compression force balance and increased breast footprint, the sternal angle of individual client and IR should be parallel to each other[4].

The aim of this study is to establish a standardised positioning and compression protocol for MLO protocol. It is thought that getting the appropriate IR angle for individual client may reduce the concentration of pressure on some parts of the breast. Balanced pressure distribution throughout the whole breast could help reduce pain and discomfort.

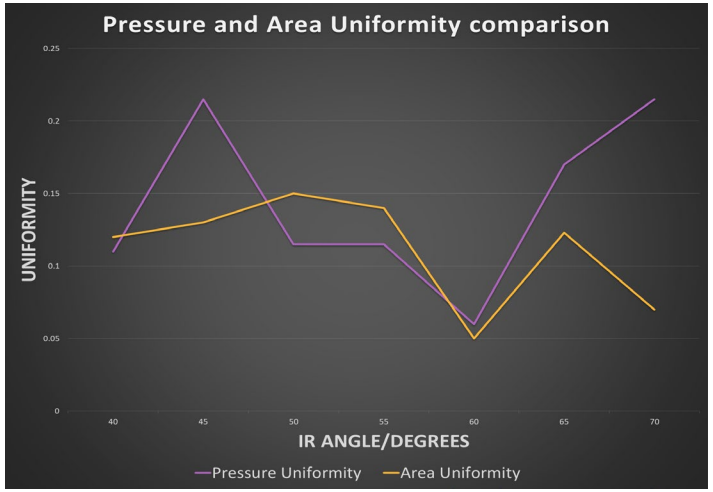
Methodology

To establish a structured and reproducible method of using the angle of the sternum to measure the correct angle of the IR for MLO projection, a digital inclinometer was used to measure the sternal angle of phantom model with silicone breast implant attachment. Six sets of compressions were made on the breast phantom with the IR at different angles, 40^0 to 70^0 at 5^0 angle increments. Compression force was kept constant for all compressions. Contact pressure and contact area footprint readings between breast/paddle interface and breast/IR interface were recorded using Xsensor pressure mapping system. Pressure uniformity (P.U) and area uniformity (A.U) between phantom breast/paddle interface and phantom breast/IR interface were then calculated. The sternal angle recorded for the phantom model was 60^0.



Results

The results indicated there was greater balance of pressure between breast/IR interface and breast/paddle interface at IR angle 60^0 compared the rest of IR angles investigated. P.U of zero indicates equal distribution of pressure from the IR and the paddle and IR angled at 60^0 recorded a P.U value of 0.21 which was the closest to zero from the P.U recorded for the various angles. A.U of zero indicates equal distribution of area footprint from the IR and the paddle and IR at 60^0 (Sternal angle for phantom model) produced the greatest area footprint balance with A.U of 0.05 compared to the other angles. At IR angled at 60^0, it is parallel to the sternal angle of the phantom model which was recorded at 60^0 on the inclinometer, and this is the angle which produced the greatest balance of pressure and area footprint.



Conclusion

The phantom study has shown that positioning the IR parallel to the angle of the sternum produces a greater balance of pressure distribution and improved breast surface area footprint. This could help spread force more evenly through the breast and could reduce the pain/discomfort experience during mammography.

Further work is needed in human to verify whether the data generated from the female breast phantom produces similar results on human female breasts.

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