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Comparison of Artificial Intelligence/Machine Learning algorithm in reporting Computed Radiography (CR) and Digital Radiography (DR) Mammography studies

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PURPOSE

Systems utilising Artificial Intelligence (AI)/Machine Learning (ML) have shown to be highly accurate and useful in reporting mammography studies. Digital radiography (DR) mammography has become routine practice in most of the developed world and these AI/ML platforms have largely been trained in DR datasets. In many developing nations, Computed Radiography (CR) mammography is still in practice. We compare the accuracy of an AI system in picking up abnormalities between a CR and a DR mammography study.

METHOD AND MATERIALS

Mammography images from a tertiary referral centre and a teleradiology unit catering to numerous institutes, between Jan 2019 to Feb 2020 were collated. Both CR (computed radiography) and DR (digital radiography) images were available. Images were divided into training and testing groups randomly and the training dataset was annotated by a team of senior radiologists. AI/ML system was trained to differentiate any abnormal findings (both benign and malignant). Cases from testing sets were reported by four radiologists and compared against the performance of the AI/ML generated reports. Any case with discrepancy between radiologist and AI/ML report was then reported by a panel of senior radiologist and consenus opinion was generated.

RESULTS

A total of 18908 examinations were available, of these 7675 were CR (41%). Testing set consisted of 9960 (70% of these were CR). Randomly selected 3042 cases were reported by 4 radiologists, of these 603 (20%) were CR and 2439 were DR. Two radiologists reported 100 CR cases to specifically assess the performance of the AI/ML system. The sensitivity of the AI/ML system in reporting CR and DR was 97% vs 98% respectively. The specificity and accuracy of both CR and DR were similar at 93 and 95% respectively. There was no significant difference in the performance of the system based on the scoring of two radiologists in the CR dataset.

CONCLUSION

There is no significant difference in the interpretation of CR or DR dataset by the indigeneously developed AI/ML system. High levels of accuracy were seen in both types of films with.

CLINICAL RELEVANCE/APPLICATION

An AI/ML system needs to be trained in both CR and DR datasets to achieve best results. Artefacts related to repeated use of the processing cassette in CR does not pose a major challenge to AI/ML systems which are trained appropriately.