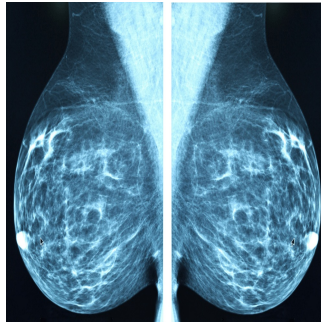

Impact of Digital Breast Tomosynthesis on Breast Cancer Detection



Breast cancer remains the most commonly diagnosed cancer among women worldwide, and its early detection is critical for improving treatment outcomes and reducing mortality. Traditional mammography, while effective, is limited by its two-dimensional (2D) nature, often leading to false positives, false negatives, and a high recall rate due to overlapping breast tissue. Over the last decade, digital breast tomosynthesis (DBT) has emerged as an advanced imaging technique that offers three-dimensional (3D) visualisation of breast tissue. By producing thin slice images of the breast, this technology reduces the issue of tissue overlap, improving lesion detection accuracy. A comprehensive study conducted over ten years compares DBT with digital mammography (DM) regarding cancer detection rates, tumour characteristics, and the impact on screening outcomes. The findings provide valuable insights into how DBT has transformed breast cancer screening.

Increased Cancer Detection and Reduced Recall Rates

One of the primary advantages of DBT over DM is its superior ability to detect more cancers at screening. The data collected from a decade of screening at Yale University shows that DBT had a higher cancer detection rate compared to DM. Specifically, DBT detected 5.3 cancers per 1000 screenings, compared to only 4 cancers per 1000 screenings with DM. This improvement can be attributed to DBT's 3D imaging capabilities, which allow radiologists to examine breast tissue in thin sections, minimizing the confusion caused by overlapping structures, a common issue with traditional mammography.

Moreover, the recall rate for DBT was significantly lower than for DM, with a 7.2% recall rate for DBT versus 10.6% for DM. This reduction in recall rates is significant as it implies fewer unnecessary patient follow-ups, reducing anxiety and the cost associated with false positives. The enhanced clarity provided by DBT reduces the likelihood of ambiguous findings that necessitate further imaging or biopsy.

Tumour Characteristics and Staging

A key concern in breast cancer screening is whether increased detection rates result in the identification of low-grade, non-life-threatening cancers that might lead to overdiagnosis and overtreatment. However, the data suggests that DBT positively impacts identifying clinically significant cancers. While the ratio of invasive cancers to ductal carcinoma in situ (DCIS) remained relatively similar between DBT and DM, DBT was associated with detecting more advanced tumours at a lower rate than DM.

Advanced cancers, defined as tumours larger than 20 mm, or those with positive lymph nodes or distant spread, were less frequently detected with DBT (32.6%) compared to DM (43.6%). Furthermore, the study highlighted that incident cases detected by DBT (those found during follow-up screenings) were associated with smaller invasive tumours and fewer cases of lymph node involvement compared to prevalent cases. This finding is crucial because detecting smaller tumours earlier can prevent cancer from progressing to more advanced stages, potentially improving patient outcomes and survival rates.

DBT and the Reduction of Interval Cancers

Interval cancers—cancers detected between regular screening intervals—are another important metric in evaluating the effectiveness of a breast cancer screening modality. These cancers are often more aggressive and discovered at an advanced stage because they are missed during routine screening. The study revealed no significant difference in the interval cancer rates between DBT and DM, with rates of 0.2 and 0.14 per 1000, respectively.

However, despite the similar interval cancer rates, the study emphasised that DBT screenings were more likely to detect invasive cancers at an earlier stage, particularly during incident screenings. The ability of DBT to detect smaller, earlier-stage cancers during follow-up screenings suggests that DBT might help in reducing the number of aggressive cancers that progress between regular screening appointments. This points to a potential for long-term improvements in breast cancer outcomes, as earlier detection is generally associated with better prognosis.

Conclusion

Over the past decade, digital breast tomosynthesis has shown itself to be a transformative tool in breast cancer screening. Its ability to detect more cancers while reducing recall rates has made it a valuable improvement over traditional digital mammography. Moreover, DBT's effectiveness in identifying invasive cancers at earlier stages, particularly during incident screenings, supports its role in reducing the proportion of advanced cancers. Although there is no significant reduction in interval cancer rates, the benefits of DBT in detecting cancers earlier and with greater precision offer the potential for improved patient outcomes and a reduction in unnecessary follow-ups. As long-term data continues to accumulate, DBT may become the preferred method of screening for breast cancer globally, offering enhanced accuracy and better long-term outcomes for women undergoing routine breast cancer screening.

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