

Acquisition parameters in digital breast tomosynthesis

Åsne Sørlien Holen, Berit Hanestad, Solveig Hofvind

Purpose: To explore compression force, compression pressure, and mean glandular dose among women screened with digital breast tomosynthesis (DBT) and digital mammography (DM) in the Bergen Tomosynthesis Trial, as part of the Norwegian Breast Cancer Screening Program.

Methods and Materials: 12,844 women were screened with DBT (n=5776) or DM (n=7068), January-December 2016. The DBT acquisition consisted of nine low dose exposures per image projection. Study-based averages of various acquisition parameters including compression force (Newton, N), compression pressure (kilopascal, kPa), and mean glandular dose (MGD) per exposure (mGy) were analysed for women with four standard images. Mean values were calculated and compared between the two techniques using the two-sample t-test. Medians and ranges were also calculated.

Results: On average, compression force and pressure were significantly lower for DBT compared to DM (111.93 N versus 115.62 N, and 11.45 kPa versus 11.95 kPa, $p < 0.01$ for both). On average, DBT had a significantly higher MGD compared to DM (1.50 mGy versus 1.48 mGy, $p < 0.01$). Mean breast volume, fibroglandular volume and compressed breast thickness did not differ statistically significantly between DBT and DM, while mean volumetric breast density was significantly lower for DBT compared to DM (6.95% versus 7.15%, $p = 0.02$).

Conclusion: Compression force and pressure were lower for DBT compared to DM. No clinically relevant differences in MGD were observed. The lower compression values associated with DBT may have contributed to an improved screening experience for the women. Further studies are needed to evaluate the balance between compression, dose, image quality, and women's experiences of discomfort and pain.