COMPARISON OF DEDICATED DIGITAL SPECIMEN RADIOGRAPHY WITH DIRECT DIGITAL SPECIMEN MAMMOGRAPHY IMAGES

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Introduction
Specimen radiography is a long established procedure for confirming the presence of both calcified and noncalcified targeted lesions after needle localization and surgical excision (1,2) and to confirm the presence of targeted microcalcification following core biopsy (3). With the digitalization of breast radiology it is possible to perform rapid digital specimen radiography with a standard direct digital mammography unit.

Prior to digital mammography specimen radiography has been performed on dedicated digital specimen equipment but with significant loss of sensitivity compared to screen/film mammography. Therefore these dedicated systems have been used for their rapidity but a film/screen system has been required in addition due to poorer image quality.

This study aims to compare the image quality obtained from a new generation digital specimen radiography system with the image quality from a standard direct digital mammography unit.

Methods
All surgical and core biopsy samples taken within our department during the study period were imaged with both a Direct Digital Radiography (DDR) units and a Digital Specimen Radiography System (DSRS).

The systems used in the study were Hologic Dimensions digital mammography and the Bioptics BioVision digital specimen radiography system.

WLE specimens were imaged without magnification on both systems. Biopsy specimens were imaged with magnification.

Two film readers assessed each set of images side by side.

For all specimens containing microcalcifications the number of microcalcifications was recorded as 0, <5, <10, <15, <20, >20.

In addition the visibility of each lesion was assessed on a 4 point scale where 1 signifies the lesion is not visible and 4 signifies the lesion is well seen.

Results
The total number of specimens was 97. Of these specimens 67 contained microcalcification, 23 masses, 4 distortions and 3 masses with calcification.

Table – 2. Crosstabulation of conspicuity of lesions containing microcalcification

<table>
<thead>
<tr>
<th>DIRECT DIGITAL RADIOGRAPHY SYSTEM</th>
<th>MICROCALCIFICATION</th>
<th>DIRECT DIGITAL MAMMOGRAPHY CONSPICUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Microcalcification</td>
<td>&lt;5</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Digital specimen x-ray</td>
<td>42</td>
<td>16</td>
</tr>
<tr>
<td>Direct Digital mammography</td>
<td>24</td>
<td>61</td>
</tr>
</tbody>
</table>

Fisher exact test
P-value = 0.0001

Table – 3. Fisher exact test for number of microcalcifications seen

<table>
<thead>
<tr>
<th>No. of Microcalcification</th>
<th>Less than 20</th>
<th>More than 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital specimen x-ray</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>Direct Digital mammography</td>
<td>43</td>
<td>24</td>
</tr>
</tbody>
</table>

Fisher exact test
P-value = 0.0001

Table – 4. Fisher exact test for conspicuity of lesions containing microcalcifications

<table>
<thead>
<tr>
<th>Microcalcification</th>
<th>Not well seen</th>
<th>Clearly visible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital specimen x-ray</td>
<td>3</td>
<td>58</td>
</tr>
<tr>
<td>Direct Digital mammography</td>
<td>19</td>
<td>42</td>
</tr>
</tbody>
</table>

Fisher exact test
P-value = 0.027

Conclusions
Significantly more microcalcification is demonstrated by the digital specimen x-ray system when compared with direct digital mammography.

Conspicuity of lesions is also shown to be significantly better with digital specimen x-ray. This provides increased confidence that a representative sample has been obtained at biopsy.

This potentially avoids the need to take further samples and can lead to increased diagnostic confidence at biopsy.

In addition, a digital specimen imaging modality avoids delay in the performance of specimen mammography in a busy breast imaging department.

References