**Introduction**

Breast conserving surgery (BCS) followed by radiotherapy for breast cancer is equivalent to mastectomy in terms of overall survival which was evident from Randomised Controlled Trials with long term follow up.

The mainstay of conservative surgical treatment of breast cancer is to achieve a clear circumferential margin around the tumour with preservation of the cosmetic appearance of the treated breast.

Breast conserving surgery depends upon achieving clear pathological margins in one operation with minimum volume loss.

According to Rubio et al., 2003, the key advantages of Intra-operative Ultrasound (IOUS) for breast cancer surgery are: Allows for immediate documentation of removal of the suspect lesion. Causes no additional discomfort to the patient. Does not require preoperative localisation techniques, entire procedure conducted within the operating theatre. No radiation required. Can be utilised to assess margin status immediately after excision (i.e. specimen ultrasound).

**Patients and Methods**

**Study Design**

Prospective, controlled study

**Inclusion criteria**

Patients with solitary and multifocal T1-T2 lesions in the breast supposed to undergo breast conserving surgery with intra-operative pathological examination and postoperative pathological confirmation of the specimen to ensure adequate negative margins.

**Exclusion criteria**

Patients with breast masses having any contraindication for breast conserving surgery (multicentric lesions, metastasizing lesion, diffuse microcalcifications on mammography, history of previous therapeutic irradiation to the region of the breast, pregnancy especially first and second trimesters, persistently positive margins after multiple surgical attempts).

**Sample size (number of participants included)**

- 42 patients as case study: patients undergo breast conserving surgeries with IOUS guidance.
- 42 patients as control: patients undergo breast conserving surgeries without IOUS guidance.

Results of both groups will be assessed via pathological examination of the safety margins.

**Results**

Ultrasound margins ≥0.5 cm achieved adequate pathology margins of ≥0.2 cm in 95% of margins. Overestimation of pathology margins by ultrasound measurement was significantly affected by multifocality. Tumor size, palpability, invasive lobular histology, and presence of ductal carcinoma in situ (DCIS) did not cause significant overestimation of pathology margins by ultrasound.

<table>
<thead>
<tr>
<th>US Findings</th>
<th>Number of Patients</th>
<th>Pathologically Involved Margins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate Margins (≥ 5 mm)</td>
<td>30</td>
<td>2 (7%)</td>
</tr>
<tr>
<td>Close Margins (3-4 mm)</td>
<td>6</td>
<td>1 (17%)</td>
</tr>
<tr>
<td>Minimally Involved Margins (≥ 2mm)</td>
<td>4</td>
<td>1 (25%)</td>
</tr>
<tr>
<td>Involved Margins</td>
<td>2</td>
<td>1 (50%)</td>
</tr>
</tbody>
</table>

**Conclusion**

IOUS guided surgery allows:

- Excision of non palpable breast cancer.
- In situ verification of the excised lesion.
- More comfortable for the patient.
- Increased negative margins at the initial surgery not only in non palpable tumors but also in palpable ones.
- In Neo-adjuvant chemotherapy and pathological complete response or minimal residual disease, IOUS lesser the volume of excision & improve cosmetic results.