

**Results:** In 53 cases (38%) we found at least one metastatic Non-SLN. All the selected nomograms showed values greater than the 0.70 threshold, and our model reports a value equal to 0.77 (CI = 0.69–0.86 and ER = 0.28), and equal to 0.72 (CI 0.63–0.81, ER = 0.28) after the validation. With a 5% cutoff value, sensitivity was 98% and specificity 9%, for a cutoff of 10%, 96% and 2%, respectively.

**Conclusions:** All the nomograms were good discriminator; however the alternative developed model shows the best predictive accuracy in this Italian BC sample. We still confirm that these models, very accurate in the institution of origin, require a new validation if used on other populations of patients.

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#### Factors in Decision Making of Breast Conservation in Early Breast Cancer: a Study in Northern India

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**Background:** Breast cancer is the commonest cancer in urban Indian female and second commonest in rural Indian female. Breast conservation surgery (BCS) followed by radiotherapy (RT) to breast has not been widely adopted in our country. Aim of present study is to evaluate factors responsible in decision making regarding type of surgery in early breast cancer (clinical stage I, II).

**Material and Method:** Patients with stage I, II breast cancer who had definitive surgical procedure (BCS or Mastectomy) and were either on RT or follow up were eligible treated at department of Surgery CSM medical university hospital from July 2007 to July 2011. A questionnaire was prepared to assess various factors responsible for decision making regarding surgery:

1. Patients related: age (< or >60 yrs), literacy status, anxiety of recurrence of tumor.
2. Adjuvant RT related: non availability of RT facility in city of patients, waiting period of RT in the hospital (6–10 weeks), anxiety of RT as painful treatment, duration of RT (6 weeks).
3. Interaction between surgeon and patients related: decision making of surgery (made by surgeon alone, surgeon and husband together, patients alone), time spent in communication between surgeon and patients (<15 minute, 15–30 minute, 30–60 minute).
4. Patient satisfaction related: Satisfaction with cosmetic body images, overall satisfaction with outcome of treatment.

**Result:** Sixty patients of stage 1 and 2 out of 182 patients were eligible and answered the questionnaire (BCS n = 10, Mastectomy n = 50).

Mean age was 38 years. 100% were literate in BCS group while 60% were literate in mastectomy group. Anxiety of tumor recurrence after BCS was 100% in mastectomy group while 20% in BCS group. 80% in Mastectomy group not opted BCS because of facilities of radiotherapy was not available in their city. Significant waiting period of RT after surgery and duration of RT (6 weeks) were found to be a factor in decision for mastectomy in 66%, 50% respectively. 100% in mastectomy group had anxiety of RT as a painful treatment while 80% in BCS group. Anxiety regarding duration of RT was 80% in BCS group while 40% specifically preferred mastectomy as they may be spared of RT. 100% in BCS group told that surgeon had spent more time while 20% in mastectomy group told surgeon spent less time. In all patients of BCS group decision was taken by both doctor, husband, 40% decision in mastectomy group were taken by doctors alone and rest 60% were taken by both surgeon and husband. Patients were satisfied in both groups with overall treatment. But 40% patients were not satisfied with body image in mastectomy group.

**Conclusion:** Significant factors which influenced the decision regarding BCS were anxiety regarding recurrence, non availability, waiting period of RT facility in their city. Significantly two factors duration of RT treatment leading to work loss hours and after mastectomy they may be spared of RT were observed not described earlier.

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#### Feasibility of 3D Intraoperative Freehand SPECT Probe Imaging for Radioguided Tumour Excision and Sentinel Node Biopsy in Breast Cancer

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**Background:** The purpose of this study is to evaluate the feasibility of 3D intraoperative imaging with a freehand single photon emission computed

tomography (SPECT) probe to guide tumor excision and sentinel node biopsy in patients with impalpable breast cancer.

**Methods:** The study was designed to evaluate 20 patients with impalpable breast cancer scheduled for radioguided occult lesion localization (ROLL) using an intratumoural radiocolloid deposit or radioactive iodine 125 seed (radioactive seed localization, RSL) with or without sentinel node biopsy. In case of ROLL, the radiocolloid (99mTc-nanocolloid) was intratumourally injected (40MBq) guided by ultrasound. When a sentinel node biopsy was also performed, a dose 120MBq was injected, followed by lymphoscintigraphy at 15 minutes and 3 hours post injection for sentinel node identification. In case of RSL, a 125I-seed (8.5MBq) was implanted in the tumour prior to neoadjuvant chemotherapy (2–4 months before operation) guided by ultrasound. Intraoperatively, a device combining a spatial localization system and two tracking targets fixed respectively on the gamma probe and on the patient was used. 3D images were generated and displayed in real time following a protocol based on freehand SPECT probe movements.

**Results:** To date, 11 patients with an average age of 63 years (range 51–73) have been included (6 ROLL, 2 ROLL+SNB and 3 RSL). Freehand SPECT enabled visualization of the preoperatively marked primary lesions in all 11 patients. During surgery, freehand SPECT also provided distance estimations to the lesions, facilitating their retrieval. Freehand SPECT image acquisition took 131.5s for ROLL, 155.5s for ROLL+SNB and 69.2s for RSL on average. *Ex-vivo* real time display of the radioactivity in the excised tissue specimen in relation to the margins of the specimen was performed in all patients. Histopathologic margins were tumour negative in all 11 cases, in accordance with the *ex-vivo* images.

**Conclusion:** 3D intraoperative imaging using freehand SPECT may add valuable information to perform minimally invasive radioguided surgery in breast cancer. This technique may also be of value in other radioguided surgical applications involving tumour excision and sentinel node biopsy.

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#### Transparent Plastic Device; a New Tool for Near Infrared Guided Indocyanine Green Sentinel Node Biopsy in Breast Cancer

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**Background:** A novel method of using near infrared (NIR) guided indocyanine green (ICG) for sentinel lymph node biopsy (SLNB) in breast cancer has shown true potential. However, one of the major limitations of using this method has been the inability to transcutaneously visualize the sentinel lymph nodes (SLNs). A new compression technique using a transparent plastic device (TPD) has emerged as a possible solution in resolving this aforementioned problem. The aim of this study was to compare the usefulness of the TPD in SLNB of patients with breast cancer using NIR guided ICG and radiocolloid (RC) method.

**Materials and Methods:** A group of 28 consecutive breast cancer patients underwent SLNB using RC. From this group, the next 15 patients underwent NIR guided ICG without the TPD, while the next 13 patients underwent NIR guided ICG with the TPD. The number of patients with visible fluorescent path and nodes was recorded. Furthermore, the number of transcutaneous SLNs detected by the fluorophore and the total number of SLNs detected by fluorophores and/or RC were noted.

**Results:** In the first group without the TPD, RC method and NIR guided ICG method detected a total number of (mean = 1.6; range = 1–4) and (mean = 2.16; range = 1–4) SLNs respectively. In this group, NIR guided ICG allowed visualization of SLNs transcutaneously in 2/15 patients (13.3%). In the second group with the TPD, RC method and NIR guided ICG method detected a total number of (mean = 1.69; range = 1–3) and (mean = 2.15; range = 1–5) respectively. With the utilization of the TPD, NIR guided ICG allowed transcutaneous visualization of the SLNs in 12/13 patients (92.3%).

**Conclusions:** The simple employment of the TPD allowed for much higher transcutaneous visualization of the SLNs. However, it did not affect the total number of nodes harvested. Although further research is required, use of TPD seems to be a crucial component in optimizing the NIR guided ICG SLNB in breast cancer patients.

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#### Oncological Safety of the Peri-areolar Incision for Wire Guided Excisions of Breast Lesions

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**Background:** In breast conserving surgery the challenge to combine safe excision and excellent cosmesis for benign and malignant lesions continues. Oncological safety is paramount; however a highly visible scar on the breast can cause psychological distress to the patient. The aim of this study was to investigate the oncological safety of using the peri-areolar

incision for all wire guided breast excisions regardless of location within the breast.

**Material and Methods:** A list of all patients who had wire guided breast excisions between 2001 and 2011 was compiled from theatre records. Patients' notes, histology and imaging were reviewed.

**Results:** 227 wire guided excisions were carried out by a single surgeon using the peri-areolar approach. The mean age of patients with cancer was 59.5 years ( $\pm 9.77$ y), and those with benign disease was 53.0 years ( $\pm 10.45$ y). Forty seven (20.5%) lesions were located in the upper inner, 95 (42.1%) in the upper outer, 40 (17.7%) in the lower outer, 34 (15%) in the lower inner quadrant and 5 (4.7%) centrally. 156 (68.7%) cases were carcinoma and/or carcinoma in situ, 62 (27.3%) were benign and in 9 (4%) cases histology was inadequate.

Of those with cancer, sixteen (10.3%) patients went on to have a mastectomy after initial breast conserving surgery, due to the multifocal disease. Thirty two (20.5%) patients underwent re-excision of margins, of which 16 (50%) contained no cancer and 16 (50%) did contain cancer. Of this subgroup of patients who had re-excisions, 1 had further margins excised and 4 had a mastectomy for multifocal disease. In total 43 (27.6%) of patients required a second operation, and 5 (3.2%) required a third operation. There were no patients requiring a fourth operation.

There were 2 patients with local recurrence. Both had DCIS with full excision of the tumour. Mean time from first operation to recurrence was 20.6 months. Both patients underwent mastectomy and are currently disease free.

**Conclusions:** Using the peri-areolar incision not only gives a superior cosmetic result, but also give excellent outcomes in terms number of therapeutic operations required and recurrence. We recommend that the peri-areolar incision can be used for all quadrants of the breast.

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#### **Surgical Conservation Therapy in Breast Cancer Combined with Intraoperative Radiotherapy – a New Challenge for Surgery**

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**Background:** The popularity of intraoperative radiotherapy (IORT) in breast cancer conservation therapy is increasing. IORT may be used in surgical conservation therapy as a boost to the bed of the resected tumour and it is defined as 'the best gold standard'.

The aim of the study was to present the author's own experience in the application of IORT as a boost to the bed in breast cancer conservation therapy.

**Material and Methodology:** From May 2008 to March 2010 118 patients with breast cancer underwent conservation therapy with IORT applied to the tumour bed. On average the observation period was 22.81 months. Different aspects of surgical procedure were subjected to analysis as preparation for IORT (ROLL/SNOLL, sentinel node biopsy, tissue margins, resected tissue volume). The results of oncological treatment in the presented period were evaluated. The toxicity of the technique was evaluated by means of the LENT-SOMA scale and the cosmetic effect – by means of the Harris/Limbergen scale.

**Results:** IORT requires modified surgical procedure during operation. Appropriate, wide dissection of tissues around the tumour and subsequent resection with intraoperative examination guarantee achieving correct margins. Thanks to the intraoperative examination in the analysed group as many as 40 patients (33.7%) had their margins radicalised. The evaluation of the volume of resected tissues did not reveal differences between palpable lesions and the non-palpable lesions where the SNOLL technique was applied. Thanks to the intraoperative sentinel node biopsy 16 patients avoided another surgery. No relapse of the neoplastic process was diagnosed during the period of observation subject to analysis. Late toxicity was specified as grade zero in 50 patients (42.4%). Due to the ambiguous and suspicious image in radiological examinations 6 patients (5.08%) underwent resection of the lesion or biopsy. Good or very good cosmetic effect was achieved in 80% of the patients.

**Conclusions:** IORT as a boost is a technique ensuring very good results of treatment of patients with breast cancer both in terms of the oncological aspect and the cosmetic effect. The technique is characterised by a small number of complications. However, it requires certain modification of the surgical procedure during the operation and consideration of such accompanying techniques as ROLL/SNOLL, sentinel node biopsy and intraoperative examination.

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#### **Does Immediate Breast Reconstruction Technique Influence True Local Recurrence Rate After Skin-sparing Mastectomy?**

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**Background:** Skin-sparing mastectomy (SSM) followed by immediate reconstruction (IR) is a generally accepted oncosurgical treatment. However, association between local recurrence and breast reconstructive techniques has not been widely investigated yet. Therefore, we determined local recurrence rate of breast cancer patients treated with SSM and IR with autologous flaps or implant-based techniques.

**Methods:** 207 patients (Stage0–IIIB) underwent SSM and IR (1995–2000) for invasive cancer (n = 153) or DCIS (n = 54) were followed-up for 111.9 [8–163] months. Reconstructive techniques were the following: LD: 70, LD+implant: 38, implant only: 54, DIEP: 29, TRAM: 8, SIEA: 5, SGAP: 3. Statistical associations were calculated by two proportions Z-test.

**Results:** 6 patients (2.9%) were detected with true local recurrence in 10 years. While 5 patients developed local recurrence with implant only reconstruction, only 1 was diagnosed with the same after autologous reconstruction (p = 0.038). However, a comparison of implant-based (LD & LD+implant) to autologous techniques showed no significant association (p = 0.07).

**Conclusion:** Implant only reconstructions may be associated with higher local recurrence rate after SSM, although the overall detected events were relatively few. These data however urge further investigations to determine whether implant reconstructions increase local recurrence rate.

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#### **Safety of Fat Grafting in Secondary Breast Reconstruction After Cancer**

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**Background:** Fat grafting is largely used to correct soft-tissue defects in any region of the human body. This study analysed its safety when the technique is used to correct defects after breast-cancer reconstruction.

**Material and Methods:** A total of 158 patients who underwent 194 breast fat grafting procedures were analysed. Almost all patients (98%) had a personal history of breast cancer: conservative surgery or mastectomy with breast reconstruction. In all cases, fat grafting was performed according to the Coleman's technique by a single surgeon.

**Results:** Immediate complications included liponecrosis and infection in seven cases (3.6%) that required only daily dressings and oral antibiotics administration. In cases of fat grafting after conservative surgery, only four patients (5.9%) showed minor alterations in the postoperative mammograms, consisting of the appearance of benign images.

**Conclusion:** Breast fat grafting can be a good solution to repair defects after breast-cancer treatment and reconstruction, and can reduce the indication for more extensive surgeries such as myocutaneous flaps. Postoperative complication rates are very low and there is little alteration in follow-up mammograms. Two points remain unclear—how much of the fat is absorbed after grafting and the potential risk of local 'dormant' tumour cells being stimulated to induce a local recurrence.

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#### **Sentinel Lymph Node (SLN) Biopsy in Early Breast Cancer Guided by Indocyanine Green (ICG) Fluorescence Imaging Method – Preliminary Experience and Ongoing Trial**

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**Background:** SLN biopsy with radioisotope (RI) and blue dye method are being used successfully for axillary staging in breast cancer patients. These methods show good results but some drawbacks are remaining. Indocyanine green (ICG) fluorescence imaging method is being evaluated as a new method for SLN biopsy in breast cancer allowing both transcutaneous visualization of lymphatic vessels and intraoperative identification of SLN without using a radioactive methodology.

**Material and Methods:** Thirty women with clinically node negative breast cancer received subdermal peritumoral injection of ICG for fluorescence detection of SLN using a near-infrared camera (1 patient had bilateral injection). All of them also received (99m) Tc-labelled sulphur radiocolloid for SLN scintigraphy. All patients underwent SLN biopsy. SLN was first identified with the fluorescence method and then reconfirmed with the standard method (RI method). Detection rate, sensitivity and clinical feasibility between the 2 methods were the study endpoints.