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Sentinel Lymph Node Biopsy in Breast Carcinoma: A Tertiary Center Experience

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Authors' contributions

This work was carried out in collaboration between all authors. Author AM designed the study. Author FKA wrote the protocol and first draft of study. Author NYA collected the data. Author AOS did SPSS analysis. Author NHZ did data analysis, writing and literature review. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Objectives: To evaluate feasibility, accuracy and technique of sentinel lymph node biopsy in the management of early breast cancer.
Methods: A retrospective study of sentinel lymph node biopsy was done at King Abdulaziz University Hospital from June 2007– to –June 2013. Total of 110 patients were studied, these patients underwent lumpectomy + Sentinel lymph node biopsy. Patients records were studied by looking file, electronic records, OPD records and data was collected regarding previous surgery, location of mass in breast, size of mass, site of breast, pre or postmenopausal, previous axillary surgery, radiological evaluation, radiotherapy, type of surgery done, adjuvant or neo-adjuvant

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chemotherapy, gross margins, frozen section margins, new frozen section margins, permanent margins, reoperation, intra-operative radiotherapy[IOR], tumor type, lympho-vascular invasion, estrogen receptor[ER], progesterone receptor[PR], HER2, metastasis, stage of disease, tumor size, no. of lymph nodes, sentinel lymphnode dissection [SLD] done, number of sentinel lymph node, sentinel lymph node [SLN] frozen section, SLN permanent, completion axillary lymph node dissection [ALND], skin necrosis, numbness, wound infection.

Results: Majority of patients were Saudis (64.5%). 9.1% had previous surgery. Pre menopausal were 43.6% and post menopausal 56.4%. Left breast was involved in 60% and right breast in 40% of cases. Upper outer quadrant was involved in 51.9%9%. Size of mass was less than 1 cm in 14.8% cases, 1-2.9 cm in 43.5%, 3-4 cm in 13%, more than 4 cm in 10.2%. Previous axillary surgery was done in 3.7% cases. Radiological evaluation of axilla was done in 68.2%. Lumpectomy plus sentinel lymph node biopsy was done in 96.4% and lumpectomy and axillary lymph node dissection was done in 1.8% cases, and unspecified BCS in 1.8%. Neo-adjuvant chemotherapy was given in 3.6% and adjuvant chemotherapy in 80% of cases Intra-operative radiotherapy was done in 29.1%. Invasive ductal carcinoma was found in 77.3%, DCIS in 10%, invasive lobular carcinoma in 7.3%, mucinus on 2.7%, medullary in 0.9%, LCIS in 0.9% cases. Lympho-vascular margins were positive in 20.9%. ER were positive in 69.1%, PR were positive in 60%. HER-2 was positive in 26.4% cases. Tumor size was T1 42.7%, T2-42.7%, T3-5.5%, T4-0.9% and carcinoma in situ in 6.4% cases. Lymph nodes were N1-33.6%, N2-4.5%, N0-60.9%. MI-0.9% and MO -98.2%. Sentinel Lymph node biopsy was done in 98.2% of cases. Number of Sentinel lymph nodes retrieved was assessed, two LN in 21.8%, three in 18.2%, one in 17.3%, four in 16.4%, five in 13.6%, six in 6.4%, seven in 1.8%. SLN on frozen section had positive for malignancy in 25.5%, while on permanent section they were positive in 38.2%. Completion axillary dissection was done in 34.5%. Skin necrosis was found in 2.2%, numbness was found in 4.4%, wound infection was in 2.2%.

Conclusion: Methylene blue is effective and safe in the detection of sentinel lymph node in patients with breast cancer and it has low cost and readily available.

Keywords: Sentinel lymph node; breast cancer; axillary dissection.

1. INTRODUCTION

Breast cancer in females has increased in population in last decade. In developed countries breast cancer affects one in every eight women in their life time [1]. Breast cancer screening, chemotherapy and hormonal therapy has lead to improved 5 year survival at 90% [2]. Modern technology has helped to diagnose more subclinical cases of breast cancer. Early breast cancer accounts for 60% of all cases of breast cancer [3]. Mammography has detected many cases of early breast cancer and with uninvolved axillary lymph nodes [4]. Sentinel lymph node biopsy has resulted in avoiding the complications of axillary lymph node dissection[ALND]. ALND can be avoided in two third to three fourth cases of breast cancer [2,5,6]. Complications of ALND include numbness, pain, limitation of shoulder movement and lymph-edema [7,8,9,10]. Many factors effect prognosis of breast cancer and axillary lymph nodes status is one of them [11,12]. T he chances of involvement by metastatasis of other axillary lymph nodes reaches up to 40% if sentinel lymph node is positive of malignancy [13]. Sentinel lymph node biopsy remains a central stage for breast conservation surgery. In our study we have done sentinel lymph node biopsy using a meticulous technique and using methylene blue.

2. METHODS

A retrospective study of sentinel lymph node biospy was done at King Abdulaziz University Hospital from January 2007 – to January 2013. Patients records were studied by looking file, electronic records, OPD records and data was collected regarding previous surgery, location of mass in breast, size of mass, site of breast, pre or postmenopausal, previous axillary surgery, radiological evaluation, radiotherapy, type of surgery done, adjuvant or neo-adjuvant chemotherapy, gross margins, frozen section margins, new frozen section margins, permanent margins, reoperation, intra-operative radiotherapy[IOR], tumor type, lympho-vascular invasion, estrogen receptor [ER], progesterone receptor [PR], herceptin receptor [HER2], metastasis, stage of disease, tumor size, no. of lymph nodes, sentinel lymph node dissection[SLD] done, sentinel lymph node [SLN] numbers, SLN frozen section, SLN permanent, completion axillary lymph node dissection

[ALND], skin necrosis, numbness, wound infection. Hospital ethical committee permitted to review hospital records of these patients. Enrollment criteria were early breast cancer [AIJCC-5 th edition- T1, T2, N0, M0]. Exclusion criteria were multifocal, multicentric cancer, axillary metastasis on pre-operative ultrasound, advanced breast cancer, previous breast biopsy, radiation and allergic reaction to methylene blue dye.

2.1 Operative Technique

Under general anesthesia after cleaning and draping, a size 23 needle with 20 ml syringe was used for methylene blue injection. Methylene blue was diluted 1:1 with saline and 5-7 ml of the solution was used. Injection of 5-7 ml of this solution was done in sub-areolar region of involved breast. Care was taken not to inject it intradermally. Gentle massage of breast was done in the direction of axillary tail for about 10 minute in all cases. Lumpectomy was done and transverse incision was made just below hairline in axilla and search of blue lymph node was done in axilla of involved breast. If any blue node was found then it was excised and sent for frozen section. Search was done for more blue nodes and if found, then they were sent for frozen section. If frozen section was positive then axillary dissection was performed.

3. RESULTS

Saudis were 64.5%, Yemeni 10%, Egyptians 9.1%, Palestinian 5.5%, Syrians 2.7%, Jordanians 1.8%. 9.1% had previous surgery. Pre menopausal were 43.6% and post menopausal 56.4%. Left breast was involved in 60% and right breast in 40% of cases. Upper outer quadrant was involved in 51.9%, upper inner quadrant in 13.9%, retro-areolar in 12.7%, lower inner quadrant in 6.4%, lower outer in 3.6%, supra-areolar in 1.8%, and infra-areolar in 0.9%. Size of mass was less than 1 cm in 14.8% cases, 1-2.9 cm in 43.5%, 3-4 cm in 13%, more than 4 cm in 10.2%. Previous axillary surgery was done in 3.7% cases. Radiological evaluation of axilla was done in 68.2%.

Lumpectomy plus sentinel lymph node biopsy was done in 96.4% and lumpectomy and axillary lymph node dissection was done in 1.8% cases, and unspecified BCS in 1.8%. Neo-adjuvant chemotherapy was given in 3.6% and adjuvant chemotherapy in 80% of cases. Gross margins were positive in 17.3% and frozen margins were positive in 28.2%. New margin on frozen section were positive in 3.6% and negative in 79.1%. Permanent section histology showed positive margins in 5.5% and negative in 94.5% cases (Fig. 1). Re-operation was done in 7.3%. Intra-operative radiotherapy was done in 29.1%.

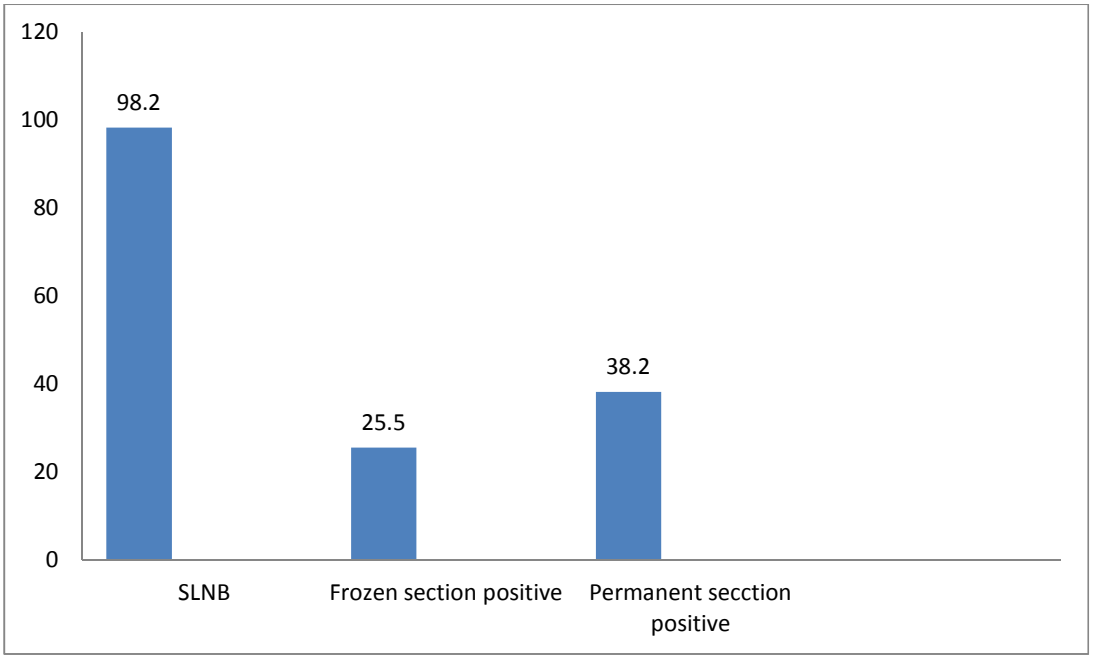

Fig. 1. Sentinel lymph node biopsy

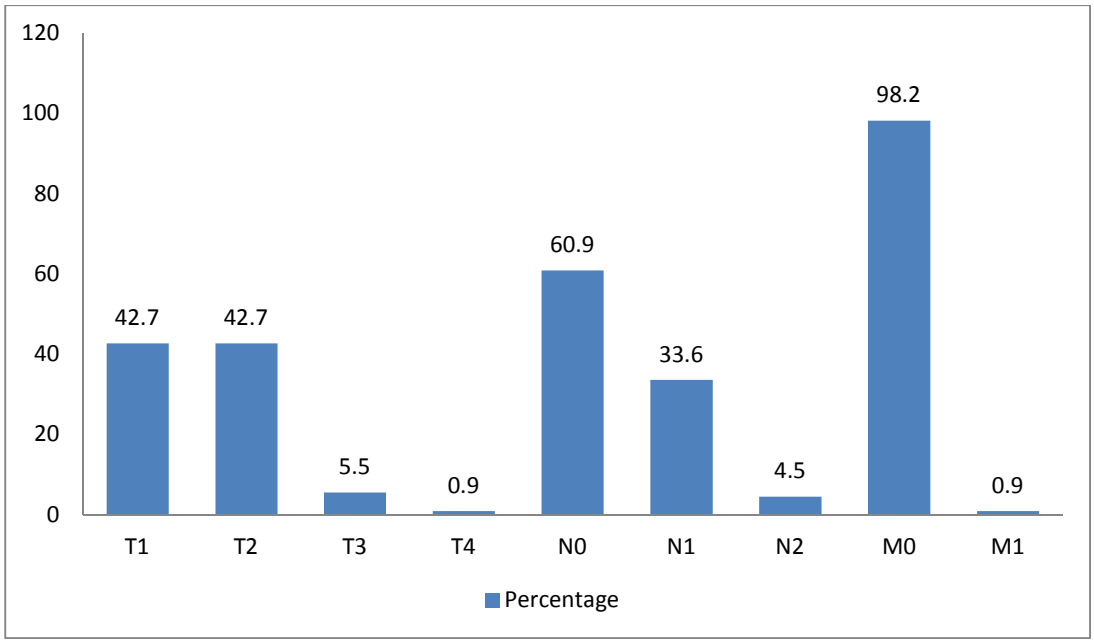

Fig. 2. TNM classification

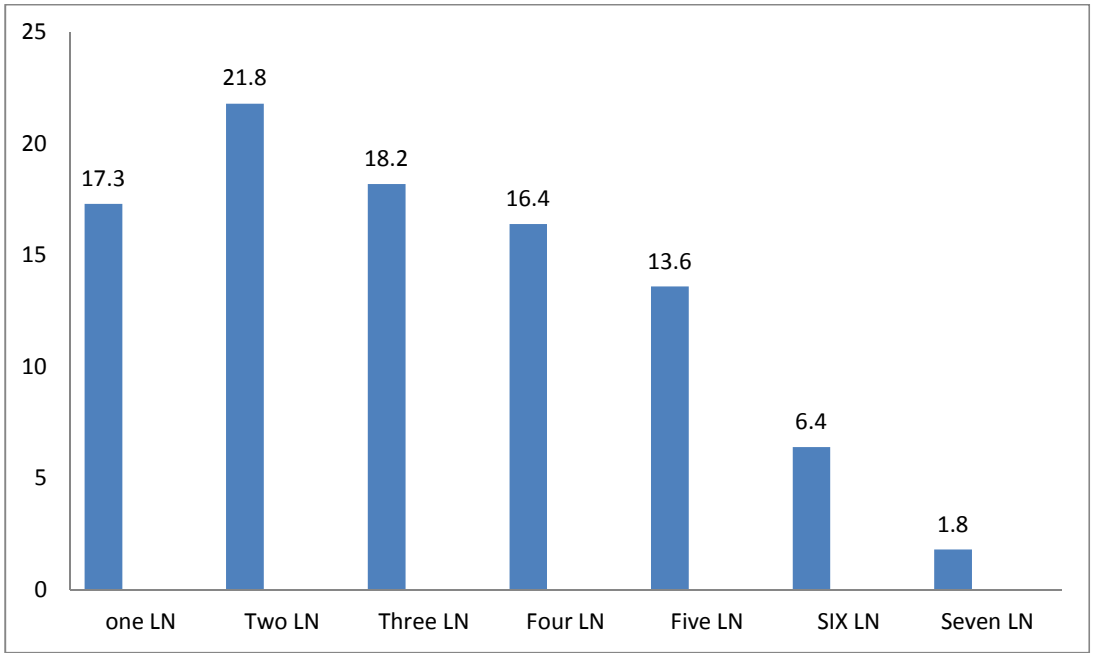

Fig. 3. Lymph nodes retrieved

Invasive ductal carcinoma was found in 77.3%, DCIS in 10%, invasive lobular carcinoma in 7.3%, mucinus on 2.7%, medullary in 0.9%, LCIS in 0.9% cases (Fig. 5). Lympho-vascular margins were positive in 20.9%. ER were positive in 69.1%, PR were positive in 60%. HER-2 was positive in 26.4% cases (Fig. 4). Tumor size was T1-42.7%, T2-42.7%, T3-5.5%, T4-0.9% and carcinoma in situ in 6.4% cases. Lymph nodes were N1-33.6%, N2-4.5%, N0-60.9%, MI-0.9% and MO -98.2% (Fig. 2).

Sentinel Lymph node biopsy was done in 98.2% of cases. Number of Sentinel lymph

nodes retrieved was assessed, two LN in 21.8%, three in 18.2%, one in 17.3%, four in 16.4%, five in 13.6%, six in 6.4%, seven in 1.8%, (Fig. 3). SLN on frozen section had positive for malignancy in 25.5%, while on permanent section they were positive in 38.2%. Completion axillary dissection was done in 34.5%.

Skin necrosis was found in 2.2%, numbness was found in 4.4%, wound infection was in 2.2% (Fig. 6).

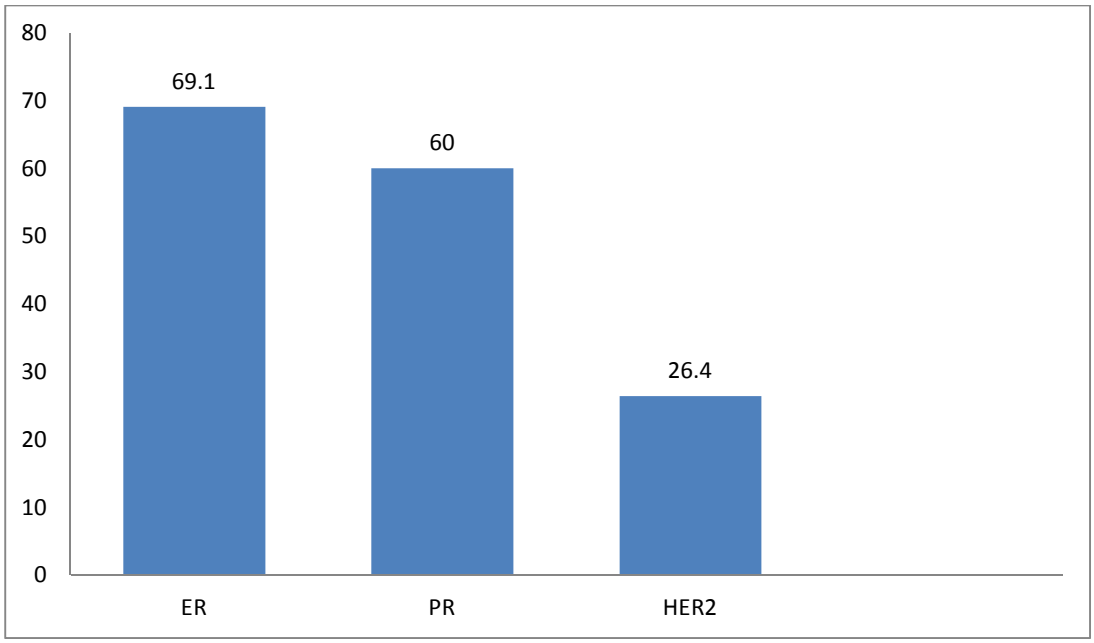

Fig. 4. Receptors status

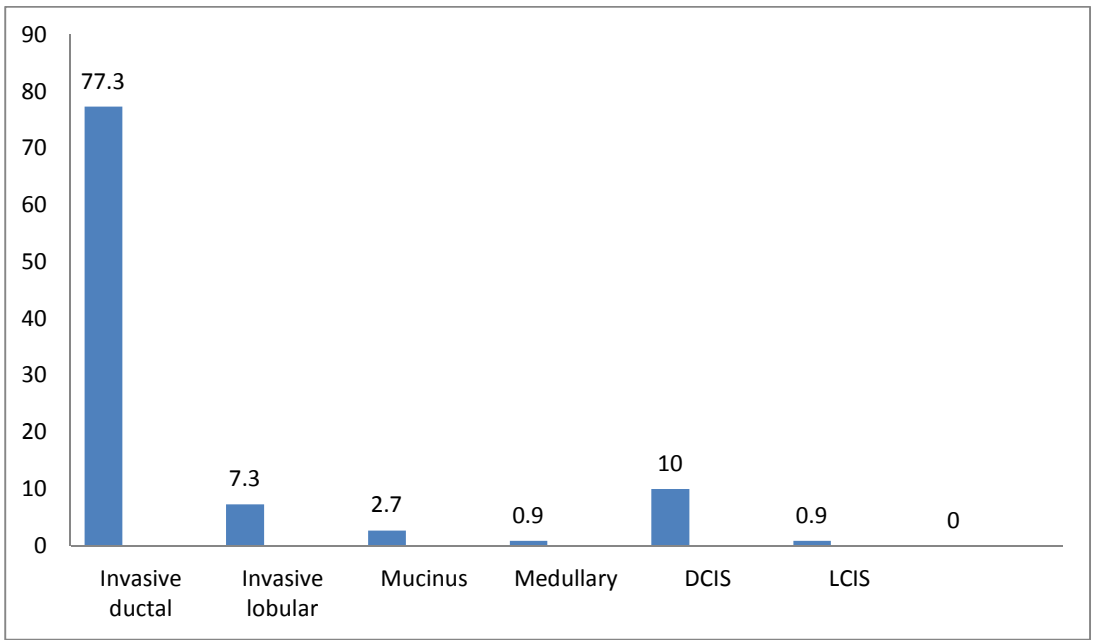

Fig. 5. Histopathology

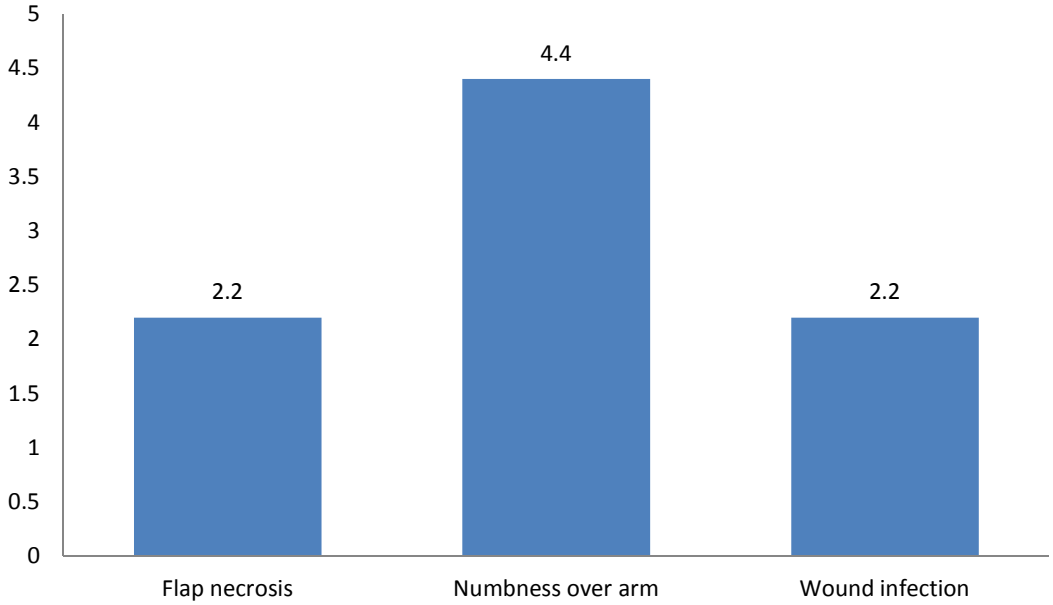

Fig. 6. Complications (flap necrosis, numbness over arm, wound infection)

4. DISCUSSION

Prognosis of conservative breast surgery depends on many factors and the status of axillary lymph nodes plays an important role [14]. About 70-80% are node negative, so routine axillary dissection is not required [15]. Lymph-edema occurs in 3-12% of cases [16,17] and late complications like frozen shoulder and sensory loss are known complication with axillary dissection [18,19]. Morbidity associated with axillary lymph node dissection can be minimized with the use of sentinel lymph node biopsy. Various materials are used for SLNB like radioactive colloid, blue dye (isosulfan blue) and methylene blue. Technique of injection is critical in getting lymph nodes yield. About 3-5 ml of dye is injected around periphery of tumor or subareolar. Breast massage is carried for 5 minutes with the aim to dilate lymphatics [20,21]. Side effects of methylene blue include skin necrosis, induration, erythema and pulmonary edema [22,23]. These side effects can be minimized by diluting it (1:17 or 1.25 mg/ml) [24].

Sentinel Lymph node biopsy was done in 98.2% of our cases using methylene blue dye. This shows that it has high sensitivity. Various studies reported rate of SLNB in 74-94% [25,26,27]. Identification rate by Pramar et al. [28] of sentinel lymph node using blue dye is 77%. Our identification rate of sentinel lymph node of 98.2% is higher, which is due to meticulous technique of dye injection and step wise search of sentinel lymph node in axillary lymph node basin. Number of Sentinel lymph nodes retrieved was also assessed, it was two LN in 21.8% of cases, three in 18.2%, one in 17.3%, four in 16.4%, five in 13.6%, six in 6.4%, seven in 1.8%. Detection of more than one lymph node again shows meticulous technique and visualization of methylene blue containing lymph nodes. Massaging of breast has contributed for the detection of multiple lymph nodes [20]. SLN on frozen section were positive for malignancy in 25.5%, while on permanent section they were positive in 38.2%. So 12.7% who were negative on frozen section but on permanent section they were positive for malignancy. All the patients must be followed for permanent section as some of the negative of frozen section may become positive on permanent section which may alter the course of treatment. Our results are comparable to the study of Hashmi et.al where Lymph nodes were positive in permanent section in 40% of cases [29]. Poling et al. [30] studied 1,940 cases of frozen section evaluation of SLNB. 23.8% of frozen section who were negative was found to be positive in permanent section while in our study only 12.7% cases who were negative on frozen section turned to be positive on permanent section. Refinment of sectioning technique of lymph nodes for frozen section will increase in detection of malignant cells in sentinel lymphnodes and will avoid second surgery for axillary dissection.

Completion axillary dissection was done in 34.5% of our cases.

Skin necrosis was found in 2.2%, numbness was found in 4.4%, wound infection was in 2.2%. Complications were minimal in our cases which again stresses the fact that sentinel lymph node is a safe procedure and it avoids axillary dissection which carries significant morbity.

5. CONCLUSION

Sentinel Lymph node biopsy holds a central position in conservative breast surgery and it avoids axillary lymph node dissection. Methylene blue is effective and safe in the detection of sentinel lymph node in patients with breast cancer and it has low cost and readily available.

CONSENT

It is not applicable.

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