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Original Research Article

COMPARISON OF BIPOLAR VESSEL SEALING SYSTEM AND CONVENTIONAL SURGERY IN AXILLARY LYMPH NODE DISSECTION FOR BREAST CANCER: A PROSPECTIVE STUDY

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ABSTRACT

Background: Axillary lymph node dissection (ALND) is a critical component of breast cancer surgery, but it is associated with complications such as seroma formation, hematoma, and prolonged drain output. This study compares the efficacy of the Bipolar Vessel Sealing System (BVSS) with conventional techniques in ALND.

Materials and Methods: A prospective study was conducted on 60 patients undergoing modified radical mastectomy. Patients were divided into two groups: Group A (BVSS) and Group B (conventional ALND). Outcomes measured included operative time, drain output, duration of drain placement, hospital stay, and postoperative complications.

Results: The BVSS group had significantly shorter operative times (58.17 ± 11.17 minutes vs. 125.83 ± 20 minutes, $p < 0.0001$), reduced drain output (427.23 ± 62.64 mL vs. 737.50 ± 105.99 mL, $p < 0.0001$), and shorter hospital stays (6.27 ± 0.69 days vs. 10.67 ± 1.74 days, $p < 0.0001$). Postoperative complications such as hematoma and seroma formation were also significantly lower in the BVSS group.

Conclusion: The BVSS is a safe and effective alternative to conventional ALND, reducing operative time, drain output, and postoperative complications, thereby improving patient outcomes.

Keywords: Bipolar Vessel Sealing System, Axillary Lymph Node, Breast Cancer

INTRODUCTION

Breast cancer is the most common cancer among women worldwide accounting for 685000 deaths worldwide. There were 2.26 million new cases of breast cancer in 2020.[1] In India among women breast cancer is the most common cancer and accounts for 14p.c. of all cancers.[2,3] For every 2 newly diagnosed with breast cancer, one women dies of it in inida.[2-5]

Axillary lymph node dissection (ALND) being a standard procedure for staging and local control. However, ALND is associated with complications such as seroma formation, hematoma, and prolonged drain output.

There are different surgical techniques and instruments compared in studies for axillary lymph node dissection ranging from traditional electro-cautery and thread ligation and harmonic scalpel.[6] Heavy post- operative drain output and seroma formation is the most common complication seen after modified radical mastectomy with axillary clearance using traditional thread ligation techniques.[7]

It has been suggested that a more efficient blood and lymph vessels sealing during lymphadenectomy may play a key role in reducing postoperative morbidity.[8] Studies have shown that the new Ligasure electro thermal bipolar vessel sealing system is safe to use in axillary clearance as an alternative to traditional methods and it reduces post-operative drain output and duration of drain till removal.[9]

The Bipolar Vessel Sealing System (BVSS) has been proposed as an alternative to conventional techniques, offering potential benefits in reducing postoperative morbidity. This study aims to compare the efficacy of BVSS with conventional ALND in terms of operative outcomes and postoperative complications.

MATERIALS AND METHODS

Study Design: A prospective, comparative study was conducted at a tertiary care hospital from December 2019 to November 2021. Sixty patients with breast cancer undergoing modified radical mastectomy were randomly assigned to either BVSS (Group A) or conventional ALND (Group B).

Inclusion Criteria: Female patients aged 18-80 years with unilateral breast carcinoma and clinical/radiological evidence of axillary lymph node involvement.

Exclusion Criteria: Patients with previous axillary surgery, scheduled for breast reconstruction, or undergoing sentinel lymph node biopsy.

Outcome Measures: Operative time, duration of ALND, total drain output, duration of drain placement, hospital stay, and postoperative complications (hematoma, seroma, flap necrosis).

Statistical Analysis: Data were analyzed using SPSS v26.0. Continuous variables were compared using the t-test, and categorical variables were analyzed using the chi-square test. A p-value < 0.05 was considered statistically significant.

RESULTS

Demographics: The mean age and BMI were comparable between the two groups ($p > 0.05$). Hypertension and diabetes mellitus were equally distributed ($p > 0.05$).

Operative Outcomes

- **Duration of Surgery:** The BVSS group had a significantly shorter operative time (58.17 ± 11.17 minutes) compared to the conventional group (125.83 ± 20 minutes, $p < 0.0001$).
- **Duration of ALND:** The BVSS group also had a shorter duration of ALND (12.73 ± 2.4 minutes vs. 30.73 ± 3.4 minutes, $p < 0.0001$).
- **Drain Output:** The BVSS group had significantly lower total drain output (427.23 ± 62.64 mL vs. 737.50 ± 105.99 mL, $p < 0.0001$).
- **Hospital Stay:** The BVSS group had a shorter hospital stay (6.27 ± 0.69 days vs. 10.67 ± 1.74 days, $p < 0.0001$).

Postoperative Complications

- **Hematoma Formation:** No hematomas were observed in the BVSS group, compared to 13.3% in the conventional group ($p = 0.03$).
- **Seroma Formation:** The BVSS group had a lower rate of seroma formation (10% vs. 36.7%, $p = 0.01$).
- **Flap Necrosis:** There was no significant difference in flap necrosis between the two groups ($p > 0.05$).

Table 1: Demographic and Clinical Characteristics

Variable	BVSS (n=30)	Conventional (n=30)	p-value
Age (years)	55.27 ± 11.4	56.47 ± 13.2	0.709
BMI	24.42 ± 1.55	24.08 ± 1.65	0.420
Hypertension	10 (33.3%)	9 (30%)	0.781
Diabetes Mellitus	8 (26.7%)	7 (23.3%)	0.766

Table 2: Operative and Postoperative Outcomes

Variable	BVSS (n=30)	Conventional (n=30)	p-value
Duration of Surgery (minutes)	58.17 ± 11.17	125.83 ± 20	<0.0001
Duration of ALND (minutes)	12.73 ± 2.4	30.73 ± 3.4	<0.0001
Total Drain Output (mL)	427.23 ± 62.64	737.50 ± 105.99	<0.0001
Hospital Stay (days)	6.27 ± 0.69	10.67 ± 1.74	<0.0001

Table 3: Postoperative Complications

Complication	BVSS (n=30)	Conventional (n=30)	p-value
Hematoma Formation	0 (0%)	4 (13.3%)	0.03
Seroma Formation	3 (10%)	11 (36.7%)	0.01
Flap Necrosis	0 (0%)	3 (10%)	0.07

DISCUSSION

The use of BVSS in ALND demonstrated significant advantages over conventional techniques, including reduced operative time, lower drain output, and shorter hospital stays. These findings are consistent with previous studies.

Seki et al. (2013),[10] conducted a Randomized controlled trial (RCT) at Keio University Hospital

among 61 patients. The mean duration of surgery was 180.9 ± 65.5 minutes in the BVSS group and 168.6 ± 30.3 minutes in the conventional ALND group (p = 0.67). The mean duration of axillary lymph node dissection was 65.6 ± 19.6 minutes in the BVSS group and 70.3 ± 21.6 minutes in the conventional group (p = 0.371).The mean total drain output was 365.3 ± 242.2 mL in the BVSS group and 625.1 ± 446.6 mL in the conventional group (p = 0.009). The mean number of days the drain was in situ was 6.4 ± 2.9 days in the BVSS group and 8.2 ± 3.8 days in the conventional group (p = 0.033).

M. Antonio et al. (2005),[11] stated in anRCT conducted at the University of Palermo, Italy, among 100 patients The mean duration of axillary lymph node dissection was 70.7 ± 24.66 minutes in the BVSS group and 70.6 ± 22.47 minutes in the conventional group (p = 0.98). The mean number of lymph nodes dissected was 17.98 ± 5.52 in the BVSS group and 15.34 ± 5.84 in the conventional group (p = 0.02).

These findings have shown BVSS to be effective in reducing postoperative complications such as seroma and hematoma formation. The shorter hospital stay and reduced drain output are particularly important, as they can lead to earlier initiation of adjuvant therapy, which is crucial for breast cancer patients.

The reduction in postoperative complications with BVSS may be attributed to its ability to effectively seal blood and lymph vessels, thereby minimizing lymphatic leakage and seroma formation. Although the initial cost of BVSS is higher, the reduction in hospital stay and postoperative complications may make it cost-effective in the long run.

CONCLUSION

The Bipolar Vessel Sealing System is a safe and effective alternative to conventional axillary lymph node dissection in breast cancer surgery. It reduces operative time, drain output, and postoperative complications, leading to improved patient outcomes and potentially lower overall healthcare costs.

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