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Erector Spinae Plane Block and Improved Perioperative Outcomes in Breast Brachytherapy

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Background

Breast cancer is the leading cause of both cancer and cancer-related death in females in the United States [1]. Breast brachytherapy has emerged as an adjunct and monotherapy in this population. Studies have found improved outcomes with adjuvant brachytherapy with decreased mortality and reduction in recurrence [2, 3]. With the growing implementation of breast brachytherapy, anesthetic management of these patients needs to be optimized. This patient population often requires multiple hospital visits for treatments and may have multiple comorbidities that increase the risk of perioperative complications. Regional anesthesia is commonly used as the principal technique for brachytherapy gynecologic and urologic cases, but data is lacking on the efficacy of adjuvant use of regional anesthesia for breast brachytherapy procedures [4].

Estimated age-standardized mortality rates (World) in 2018, worldwide, females, all ages

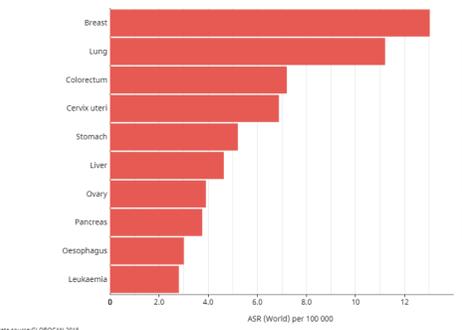


Figure 1: Cancer Related Mortality Rates in Females Worldwide

Estimated number of new cases in 2018, United States of America, all cancers, females, all ages

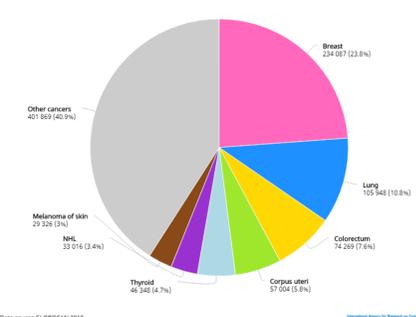


Figure 2: Incidence of Cancer in Females in US

Purpose

This study aimed to evaluate the efficacy of erector spinae plane (ESP) blocks for perioperative pain management in respect to overall pain scores, opioid usage and length of stay in breast brachytherapy cases. We hypothesized that the use of ESP blocks would be associated with reduced postoperative pain scores, decrease opioid requirements and length of stay.

Materials and Methods

A retrospective pilot study was completed with patients that underwent breast brachytherapy interventions in an ambulatory setting. As per institutional guidelines, this study was reviewed by Virginia Commonwealth University (VCU) Health Medical Center IRB board, and it is exempt from IRB review requirements as per Virginia Commonwealth University's (VCU) Office of Research and Innovation policy as the study is devoid of patient identifiable information and consists of a population not generalizable outside of VCU.

Materials and Methods Continued

From a group of 49 patients, we randomly selected 11 patients without perioperative ESP blocks as a control group and 3 patients with perioperative ESP blocks for a total of 14 participants. Patient demographic information was collected including age (years), body mass index (BMI) and American Society of Anesthesiology Class (ASA 1-4).

	ESP Block Group	Control Group
Age	59	60
BMI	40.7	29.4
ASA	2.67	2.1

Table 1: Patient Demographics

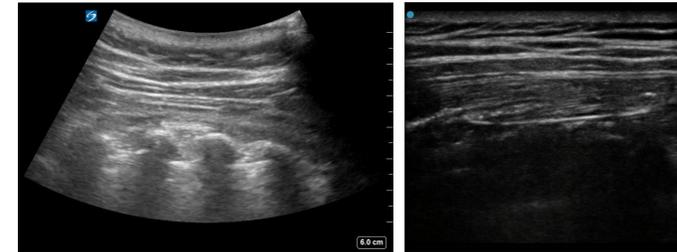


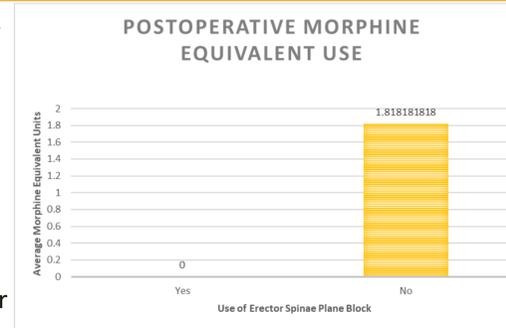
Image 1 & 2: Ultrasound approach to ESP

Upon arrival to the preoperative assessment area, eligible patients were identified and after discussion with the patient and surgeon, ESP blocks were offered to appropriate patients. Patients in the ESP cohort received an ultrasound-guided erector spinae plane block either unilaterally or bilaterally depending on the laterality of the procedure. These patients received 0.25% ropivacaine as a single shot injection under continuous ultrasound guidance with sterile technique. Study participants proceeded under general anesthesia or monitored sedation depending on the anesthetic plan appropriate for each patient for their surgical procedure.

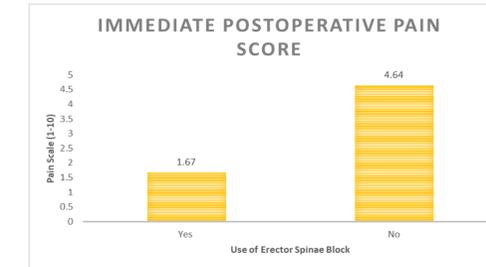
After the surgical procedure, patients were monitored in the Radiation Oncology recovery area, where pain scores were documented by nursing staff with verbal quantitative values (scale 0-10, 0 being no pain and 10 being the worst pain). Opioid use was documented intraoperatively in the anesthesia charting and postoperatively by nursing staff, and these values were converted to average morphine equivalents to evaluate pain control. Time from the patient's procedure to discharge were recorded. Unpaired t-test analyses were done to compare the control group versus the sample population to look for statistical significance in pain scores in the postoperative period, overall opioid use and length of stay after procedures.

Results

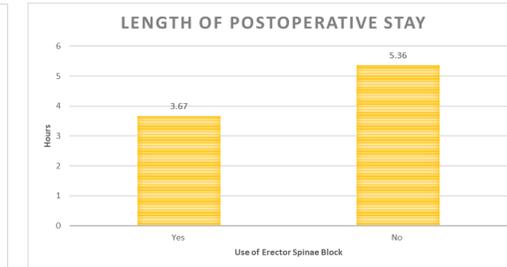
Postoperative morphine equivalent consumption was significantly lower in the ESP group compared to the control group (mean of 0 vs. 1.82, respectively; $p = 0.02$; Graph 1). Average immediate postoperative pain score was significantly lower for the ESP group compared to the control group (mean of 1.67 vs. 4.64, respectively; $p = 0.025$, Graph 2). Average pain score at time of discharge was lower for the ESP group compared to the control group but not statistically significant (mean of 1.67 vs. 2.73, respectively; $p = 0.23$). Lastly, length of stay was significantly lower in the ESP group compared to the control group (mean of 3.67 vs. 5.36, respectively, $p = 0.036$, Graph 3).



Graph 1: Postoperative Morphine Equivalent Use; Average postoperative equivalent use was significantly lower in study group (0) versus control group (1.82); $p = 0.02$.



Graph 2: Immediate Postoperative Pain Score; Average immediate postoperative pain score was significantly lower in study group (1.67 out of 10) versus control group (4.64 out of 10); $p = 0.02$.



Graph 3: Length of Postoperative Stay; Average hours of postoperative stay was significantly lower in study group (3.67 hours) versus control group (5.36 hours); $p = 0.03$.

Discussion

ESP blocks have been well documented in providing analgesia for rib fracture patients as well as larger breast reconstruction and mastectomy surgeries; however, there has been little to no data for its utilization in breast brachytherapy or in ambulatory care centers. Our literature review revealed that use of ESP blocks in elective, inpatient, breast cancer surgery could reduce postoperative opioid use by as much as 65% in the first 24 hours [5, 6]. Our study, while limited in number of subjects, showed a similar trend in reduction of postoperative opioid use after breast brachytherapy treatment. With the prevalence of breast brachytherapy as part of treatment of breast cancer, our data analysis shows promise for further expansion of this regional technique. Given that this is a novel approach to anesthesia management in breast brachytherapy, our study was limited with a small sample size as a pilot study. In the future, having a more robust study size with additional quality metrics would allow for a more complete characterization of this approach to anesthesia management in breast brachytherapy.

Conclusions

The use of erector spinae plane block in the setting of breast brachytherapy is a novel technique that can help significantly reduce opioid use in the postoperative setting as well as reduce the length of recovery in the post-anesthesia recovery unit. Anesthesia management and regional techniques for breast brachytherapy require further research as an increasing number of patients are enrolling in this treatment modality. Erector spinae plane blocks appear to be an effective means of pain management, but additional research is required to determine if it becomes a staple technique for breast brachytherapy cases.

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