Clinical efficacy of anesthesia with intensive care nursing in attenuating postoperative complications in patients with breast cancer

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Abstract

Objective: Complications frequently occur in patients with breast cancer after surgery. Anesthesia nursing plays an important role in decreasing complications for such patients. Thus, this study investigated the effects of anesthesia with intensive care nursing (AICN) on complication rates in patients with breast cancer after surgery.

Methods: Eighty-two patients with breast cancer were recruited in this study. Complications were compared between the anesthesia with usual nursing care (AUCN) and AICN groups.

Results: The results demonstrated that AICN decreased the rates of incision infection, drug extravasation, and catheter exposure, as well as pain and inflammation scores, compared with the findings in the AUCN group. AICN improved the time to orientation and decreased the incidence of nausea, anxiety, depression, and vomiting versus AUCN. In addition, AICN shortened the time to awakening after anesthesia compared with the effects of AUCN. Furthermore, AICN shortened hospital stay and increased survival rates. Notably, AICN improved health-related quality of life as measured using the EORTC QLQ-C30 questionnaire.

Conclusion: AICN provided more benefits and better postoperative outcomes than AUCN, suggesting its utility for minimizing complications in patients with breast cancer after surgery.

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Introduction

Breast cancer is the most prevalent malignancy in women globally, and subsequent treatment is often associated with a considerable psychological burden and reduced quality of life. Breast cancer remains one of the most common cancers among women in China, and surgery is the most popular treatment option for these patients. Patients with breast cancer experience significant emotional distress, emotional changes, anxiety, and depression following diagnosis. Negative emotions before surgery can lead to depression, anxiety, and fear for patients with breast cancer. In addition, most patients with breast cancer experience postoperative pain, inflammation, and complications, which lead to nausea, anxiety, depression, and vomiting. These reports indicate that accurate and comprehensive preoperative and postoperative intensive nursing is lacking in patients with breast cancer. Therefore, more efforts are needed to provide intensive nursing for patients with breast cancer before and after surgery.

Anesthesia with intensive care nursing (AICN) is a specialized form of nursing in the recovery/postoperative setting. Clinically, AICN is crucial for clinically treated patients, helping to alleviate anxiety and depression. The effectiveness of specialized nursing could decrease anxiety and stress among patients with breast cancer and other gynecologic cancers. Previous findings indicated that hospitals should employ specialist nurses, and special attention should be paid to the care of clinically treated patients. Specialized nursing contributed to the recovery of low self-esteem in a post-mastectomy patient with schizophrenia. A complex nursing intervention consisting of complementary and alternative medicine increased quality of life in patients with breast and gynecologic cancers undergoing chemotherapy. However, the efficacy of AICN has not fully clarified in postoperative patients with breast cancer.

The aim of this study was to evaluate dysphoria and complications associated with postoperative risks in patients with breast cancer. This study evaluated the effects of community-based AICN on health-related quality of life; risks of incision infection, drug extravasation, and catheter exposure; and pain and inflammation scores in patients with breast cancer after surgery. This study also aimed to propose nursing strategies for decreasing complications among patients with breast cancer after surgery.

Materials and methods

Participants

Patients who underwent mastectomy for breast cancer at Mudanjiang Affiliated Hongqi Hospital of Medicine University from May 2014 to June 2017 were recruited. The inclusion criteria were as follows: female gender, ≥28 years old, and body mass index ≤32 kg/m². The exclusion criteria were a history of cancer or breast surgeries and pregnancy. All enrolled participants underwent preoperative needle biopsy to confirm the diagnosis and computed tomography. All patients provided written informed consent. All patients received preoperative care (preoperative visit, medical observation, and anesthetic
instruction) before surgery.14 This study was approved by the ethics committee of Mudanjiang Affiliated Hongqi Hospital of Medicine University (clinical trial registration number: CHMDJAHMU20140511X).

**Interventions (surgical procedures, AICN, and anesthesia with usual care nursing [AUCN])**

Patients with breast cancer underwent surgery with or without an axillary procedure. All procedures were performed as described previously.15–17 In brief, patients intravenously received 1000 mg of cefazoline (Kefzol, Eurocept, Ankeveen, Netherlands) 30 minutes prior to surgery. In the operating room, hemodynamic and bispectral index monitoring were applied. General anesthesia was induced with 2.0 mg/kg propofol. All surgical procedures were performed by a breast surgeon. Continuous absorbable braided 3/0 sutures and dermal 4/0 sutures were used to close the subcuticular layer (Vicryl, Ethicon, Johnson & Johnson, New Brunswick, NJ, USA) and dermis (Monocryl, Ethicon), respectively. Surgical wounds were dressed with Cutiplast sterile adhesive dressings (Smith & Nephew, Watford, UK). All patients received a single dose of intravenous antibiotics as recommended.18 All patients were assigned to receive AUCN or AICN. The following variables were monitored in the AUCN group: temperature, wound infection, time to orientation, incision infection, drug extravasation, catheter exposure, nausea, dysphoria, anxiety, depression, vomiting, and hospital stay. In addition to all items monitored in the AUCN group, AICN included the following components: talking with patients, aimlessly walking, night nursing provided by a special care nurse, professional physical massage, sensorial language, and paraverbal and rewording techniques to promote comfort/well-being according to the patients’ choice of a safe place or leisure activity. Complications were recorded for all patients.

**Outcomes**

The primary outcomes of complications in postoperative patients with breast cancer were evaluated in this study. The pain score was measured on day 5 after surgery as described previously.19 The inflammation score was measured as described previously.20 Survival was compared between the AUCN and AICN groups after 2 years of follow-up. Patient satisfaction was recorded using EORTC QLQ-C30.21 Briefly, EORTC QLQ-C30 includes five functional scales (physical, role, cognitive, emotional, and social functioning) three symptom scales (pain, fatigue and nausea/vomiting), six single items (e.g., constipation, diarrhea, insomnia), and a global health status scale. Scores for each scale range from 0 to 100. Survival was recorded as the disease-free survival rate after 36 months.

**Statistical analysis**

Data are expressed as the mean ± SD. Data were analyzed using SPSS 16.0 software (SPSS, Chicago, IL, USA). Significant differences were analyzed using the Mann–Whitney two-tailed test. \( P < 0.05 \) denoted statistical significance.

**Results**

Eighty-two patients with breast cancer were randomly assigned to receive AUCN \((n = 40)\) or AICN \((n = 42)\) after surgery. No significant differences in characteristics were observed between these groups, excluding the more frequent receipt of chemotherapy by patients in the AUCN group \((P = 0.048)\), as presented in Table 1.
The results illustrated that AICN shortened the time to awakening (42.5 min vs. 57.5 min, \( P = 0.036 \)) and improved the time to orientation (45.5 min vs. 62.6 min, \( P = 0.025 \)) after anesthesia compared with the findings for AUCN. AICN additionally decreased the rates of incision infection (\( P = 0.012 \)), drug extravasation (\( P < 0.001 \)), and catheter exposure (\( P < 0.001 \)). Patients in the AICN group exhibited lower rates of nausea (7.1% vs. 20%, \( P < 0.001 \)), dysphoria (9.5% vs. 17.5%, \( P < 0.001 \)), anxiety (3.0% vs. 5.2%, \( P = 0.032 \)), depression (12.4% vs. 20.4%, \( P = 0.025 \)) and vomiting (4.8% vs. 12.5%, \( P = 0.020 \)) than those in the AUCN group (Table 2).

This study evaluated the effects of AICN and AUCN on complications in patients with breast cancer after surgery. Compared with the findings for AUCN, AICN was associated with lower pain (2.75 vs. 4.0, \( P = 0.034 \), Figure 1) and inflammation scores (3.75 vs. 5.75, \( P = 0.013 \), Figure 2). Meanwhile, AICN shortened postoperative hospital stay (9.0 vs. 7.0, \( P = 0.045 \), Figure 3) and improved survival versus AUCN (81% vs. 70%, \( P = 0.022 \), Figure 4).

Finally, the health-related quality of life of patients with breast cancer was evaluated between the AUCN and AICN groups. The global quality of life (58.5 vs. 50.2, \( P = 0.036 \)), physical functioning (75.8 vs. 60.1, \( P = 0.013 \)), emotional functioning (70.4 vs. 52.4, \( P = 0.006 \)), and social functioning scores (64.8 vs. 52.7, \( P = 0.026 \)) were improved by AICN. AICN was linked to lower severity of insomnia (32.8 vs. 42.5, \( P = 0.035 \)) and higher patient satisfaction (8.5 vs. 6.5, \( P = 0.042 \)) than AUCN (Table 3).

### Table 1. Baseline patient characteristics.

| Characteristic          | AUCN       | AICN       | \( P \) |
|-------------------------|------------|------------|--------|
| Number (%)              | 40 (48.8)  | 42 (51.2)  | >0.05  |
| Age, years              | 44.2 ± 6.5 | 45.8 ± 7.6 | >0.05  |
| BMI, kg/m²              | 23.2 ± 7.8 | 21.6 ± 8.4 | >0.05  |
| Anxiety S-AI, mean (SD) | 7.5 ± 3.4  | 8.2 ± 3.6  | >0.05  |
| Depression BDI, mean (SD)| 32.6 ± 6.6 | 34.91 ± 7.20 | >0.05  |
| Dysphoria, N (%)        | 32 (80)    | 36 (85.7)  | >0.05  |
| Disease stage           | 1          | 1          |        |
| Tumor type              | HER2+      | HER2+      |        |
| Tumor location          |            |            |        |
| Left breast, N (%)      | 18 (45.0)  | 20 (47.6)  | >0.05  |
| Right breast, N (%)     | 22 (55.0)  | 22 (52.4)  | >0.05  |
| Surgical method, N (%)  |            |            |        |
| Conservative surgery    | 15 (37.5)  | 16 (38.1)  | >0.05  |
| Modified mastectomy     | 14 (35.0)  | 16 (38.1)  | >0.05  |
| Mastectomy + SLNB       | 11 (27.5)  | 10 (23.8)  | >0.05  |
| Therapy, N (%)          |            |            |        |
| Hormonal therapy        | 20 (50.0)  | 22 (52.4)  | >0.05  |
| Chemotherapy            | 12 (30.0)  | 10 (23.8)  | 0.048  |
| Radiotherapy            | 8 (20.0)   | 10 (23.8)  | >0.05  |

AUCN, anesthesia with usual care nursing; AICN, anesthesia with intensive care nursing; BMI, body mass index; S-AI, State-Trait Anxiety Inventory; BDI, Beck Depression Inventory; SLNB, sentinel lymph node biopsy.
Breast reconstructive surgery can improve patients’ emotional relationships and social functioning after mastectomy, and postoperative intensive care nursing targeting these variables results in rapid responses during hospital stay.22 Previously reported findings suggested that timely AICN is important for the health-related quality of life for patients with breast cancer after surgery.23 In this study, we investigated the effects of AICN on complications among patients with breast cancer after surgery.

**Discussion**

Breast reconstructive surgery can improve patients’ emotional relationships and social functioning after mastectomy, and postoperative intensive care nursing targeting these variables results in rapid responses during hospital stay.22 Previously reported findings suggested that timely AICN is important for the health-related quality of life for patients with breast cancer after surgery.23 In this study, we investigated the effects of AICN on complications among patients with breast cancer after surgery.

### Table 2. Efficacy of AICN in patients with breast cancer after surgery.

| Characteristic                  | AUCN         | AICN         | P     |
|--------------------------------|--------------|--------------|-------|
| Time to awakening (minutes)    | 57.5 ± 10.8  | 42.5 ± 8.6   | 0.036 |
| Time to orientation (minutes)  | 62.6 ± 14.3  | 45.5 ± 12.5  | 0.025 |
| Incision infection, N (%)      | 7 (17.5)     | 4 (9.5)      | 0.012 |
| Drug extravasation, N (%)      | 10 (25.0)    | 6 (14.3)     | <0.01 |
| Catheter exposure, N (%)       | 7 (17.5)     | 2 (4.8)      | <0.01 |
| Nausea, N (%)                  | 8 (20.0)     | 3 (7.1)      | <0.01 |
| Dysphoria, N (%)               | 7 (17.5)     | 4 (9.5)      | 0.013 |
| Vomiting, N (%)                | 5 (12.5)     | 2 (4.8)      | 0.020 |
| Incision infection, N (%)      | 7 (17.5)     | 4 (9.5)      | 0.012 |
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| Vomiting, N (%)                | 5 (12.5)     | 2 (4.8)      | 0.020 |
| Anxiety S-AI, mean (SD)        | 5.2 ± 1.6    | 3.0 ± 1.8    | 0.032 |
| Depression BDI, mean (SD)      | 20.4 ± 5.2   | 12.4 ± 4.7   | 0.025 |

AUCN, anesthesia with usual care nursing; AICN, anesthesia with intensive care nursing; S-AI, State-Trait Anxiety Inventory; BDI, Beck Depression Inventory.

**Figure 1.** Pain scores in the anesthesia with intensive care nursing (AICN) and anesthesia with usual care nursing (AUCN) groups. *P < 0.05 vs. AUCN.

**Figure 2.** Inflammation scores in the anesthesia with intensive care nursing (AICN) and anesthesia with usual care nursing (AUCN) groups. *P < 0.05 vs. AUCN.

**Figure 3.** Postoperative hospital stay in the anesthesia with intensive care nursing (AICN) and anesthesia with usual care nursing (AUCN) groups. *P < 0.05 vs. AUCN.
The current study revealed that AICN improved complication rates during hospitalization and after discharge compared with the effects of AUCN in patients with breast cancer after surgery.

Currently, nursing is highly specialized, and continuous efforts are required to promote competency in the nursing profession to meet elevated expectations related to cost-effectiveness, high-quality nursing services, and the societal demands placed on nurses. The use of the Roy Adaptation Model helps nurses focus on the role of clinical nursing and its applications in patients undergoing breast-conserving surgery. In breast cancer surgery, the type of anesthesia influences the risks of oxidative stress and inflammation, changes in the levels of molecular regulators, and disease outcomes, and regional anesthesia was revealed to be beneficial for decreasing and attenuating tumor recurrence and inflammation in patients with breast cancer.

The mean postoperative hospital stay for patients undergoing breast surgery is approximately 10 days. Our results illustrated that the mean postoperative hospital stays for patients undergoing breast surgery were 9 and 7 days in the AUCN and AICN groups, respectively. Based on specific knowledge regarding anesthesia nursing,
we analyzed complications between these groups. As expected, patients in the AICN group displayed lower risks of incision infection, drug extravasation, and catheter exposure than those in the AUCN group. Notably, lower rates of nausea, dysphoria, anxiety, depression, and vomiting were observed in the AICN group. However, this study did not perform a sample size calculation, and thus, the limited number of patients may have affected the statistical significance of our results. Therefore, we plan to conduct additional research using larger populations and a sample size calculation.

Postoperative complications after breast cancer surgery have received substantial attention given their associations with survival. The study results demonstrated that patients in the AICN group had lower pain and inflammation scores than those in the AUCN group. In addition, AICN shortened hospital stay and the time to awakening and improved the time to orientation in postoperative patients with breast cancer. An unanticipated finding was that survival rate was higher in the AICN group than in the AUCN group. This study also uncovered that AICN increased global quality of life, emotional functioning, cognitive functioning, and social functioning scores and reduced the severity of insomnia and the financial burden compared with the effects of AUCN. It is expected that AICN results in a larger decrease of APRs because mastectomy is a more invasive surgery than lumpectomy.

In conclusion, this controlled trial in patients undergoing surgery for breast cancer illustrated that AICN can significantly reduce the risk of complications compared with the outcomes of AUCN. The use of AICN resulted in significantly improved patient satisfaction; reduced rates of nausea, dysphoria, anxiety, and depression; and increased survival. The current data suggest that AICN can result in improved outcomes for patients with breast cancer after surgery.

Declaration of conflicting interest
The authors declare that there is no conflict of interest.

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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