Opioid-Free Anesthesia as a Part of Multimodal Anesthesia Approach in Modified Radical Mastectomy: A Case Report

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ABSTRACT

Introduction: The shift towards opioid-free anesthesia (OFA) reflects a growing effort to enhance patient safety and reduce opioid-related adverse effects, particularly in oncology surgeries such as modified radical mastectomy (MRM).

Case Description: We describe the anesthetic management of a 51-year-old female with infiltrating ductal carcinoma of the left breast who underwent MRM under an opioid-free anesthetic protocol. Induction was performed with propofol via target-controlled infusion (TCI), followed by intraoperative dexmedetomidine infusion for sedation and analgesia. An ultrasound-guided erector spinae plane (ESP) block at the T5 level was performed with 0.375% ropivacaine and dexamethasone to provide regional analgesia. Intraoperative hemodynamics remained stable, no rescue opioids were required, and blood loss was minimal. Postoperative pain control was achieved with a low-dose dexmedetomidine infusion, intravenous ketorolac, and oral paracetamol. The patient reported minimal pain (NRS 0–1/10), had no nausea, vomiting, or respiratory depression, and recovered uneventfully.

Conclusion: OFA offers oncological advantages by preserving immune function and reducing tumor-promoting factors, making it a promising alternative in cancer surgery. This report supports the feasibility and benefits of OFA in major breast cancer procedures, underscoring its role in enhancing recovery and potentially improving long-term oncologic outcomes.

Keywords: Breast cancer surgery, dexmedetomidine, erector spinae plane block, opioid-free anesthesia

Anestesi Bebas Opioid pada Mastektomi Radikal Termodifikasi: Sebuah Laporan Kasus

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ABSTRAK

Pendahuluan: *Peralihan menuju anestesi bebas opioid (Opioid-Free Anesthesia/OFA) mencerminkan upaya yang semakin berkembang untuk meningkatkan keselamatan pasien dan mengurangi efek samping yang terkait dengan opioid, khususnya dalam pembedahan onkologi seperti mastektomi radikal termodifikasi (MRM).*

Deskripsi Kasus: *Laporan kasus ini melaporkan manajemen anestesi pada seorang perempuan berusia 51 tahun dengan karsinoma duktal invasif payudara kiri yang menjalani MRM dengan protokol anestesi bebas opioid. Induksi dilakukan menggunakan propofol melalui target-controlled infusion (TCI), diikuti dengan infus deksmedetomidin intraoperatif untuk sedasi dan analgesia. Blok erector spinae plane (ESP) dengan panduan ultrasonografi dilakukan pada tingkat T5 menggunakan ropivakain 0,375% dan deksametason untuk memberikan analgesia regional. Hemodinamika intraoperatif tetap stabil, tidak diperlukan opioid tambahan, dan kehilangan darah minimal. Kontrol nyeri pascaoperasi dicapai dengan infus deksmedetomidin dosis rendah, ketorolak intravena, dan parasetamol oral. Pasien melaporkan nyeri minimal (NRS 0–1/10), tidak mengalami mual, muntah, atau depresi pernapasan, serta pulih tanpa komplikasi.*

Simpulan: *OFA menawarkan keuntungan onkologis dengan menjaga fungsi imun dan mengurangi faktor-faktor yang mendorong pertumbuhan tumor, menjadikannya alternatif yang menjanjikan dalam pembedahan kanker. Laporan ini mendukung kelayakan dan manfaat OFA dalam prosedur mayor pada kanker payudara, menegaskan perannya dalam mempercepat pemulihan dan berpotensi meningkatkan hasil onkologis jangka panjang.*

Kata Kunci: *Anestesi bebas opioid, blok erector spinae, deksmedetomidin, operasi kanker payudara*

INTRODUCTION

The field of anesthesiology continues to evolve with a growing emphasis on patient safety, comfort, and the minimization of side effects. One of the most significant changes in modern anesthetic practice is the reduction or elimination of opioids during surgery, a practice known as Opioid-Free Anesthesia (OFA). Traditionally, opioids have served as the cornerstone for intraoperative and postoperative analgesia, especially in major surgical procedures such as mastectomy. However, increasing awareness of opioid-related adverse effects, including respiratory depression, postoperative nausea and vomiting (PONV), paralytic ileus, urinary retention, hyperalgesia, immune suppression, and the risk of long-term dependence, has prompted clinicians to explore and adopt opioid-sparing strategies. Mounting evidence suggests that intraoperative opioid use can lead to postoperative hyperalgesia, chronic postsurgical pain (CPSP), and long-term opioid use, contributing to a global burden of opioid dependence estimated at 40.5 million people in 2017. In addition, the ongoing opioid epidemic and increasing opioid addiction has highlighted the need to limit exposure to these medications, even in acute surgical settings.[1]

In the perioperative management of cancer patients, attention is not only focused on short-term safety and comfort, but also on the potential long-term impact on cancer recurrence and metastasis. Recent studies have shown that the type and technique of anesthesia used during surgery can influence the course of cancer, including in patients with breast cancer. One of the most widely studied anesthetic factors is the use of opioids, which have historically been the mainstay of intra and postoperative pain control. However, recent preclinical and clinical evidence suggests that opioids may have significant immunosuppressive effects and potentially promote tumor progression. Activation of the μ-opioid receptor (MOR) by opioids has been associated with decreased natural killer cell function, increased angiogenesis, and increased VEGF expression, all of which create a tumor microenvironment more conducive to cancer cell growth and spread. In contrast, OFA approaches are being developed as an oncologically safer alternative, using combinations of agents such as propofol, NSAIDs, and dexmedetomidine, and regional techniques such as ESP block to control pain without compromising immune function. Against this background, the emergence of OFA as a multimodal approach becomes very relevant. Not only does it aim to avoid opioid side effects such as nausea, vomiting, and respiratory depression, OFA is also believed to contribute to creating a postoperative biological environment that is less conducive to cancer recurrence.[2]

Opioids have traditionally been the main agent for perioperative pain management, acting primarily through the classical opioid receptors: μ (MOR), κ, and δ receptors. Of these, the MOR plays a central role. MOR is a G protein-coupled receptor (GPCR) located on the cell membrane or within the nucleus, and its activation leads to a cascade of intracellular signaling. When an opioid agonist binds to MOR-1, it initiates G protein decoupling and activates inhibitory Gi proteins, which subsequently modulate ionic currents—increasing Na^+ and Ca^{2+} influx and promoting K^+ efflux—primarily via the cAMP/PKA pathway. Moreover, β-arrestin recruitment after MOR activation is associated with many unwanted side effects of opioids, such as respiratory depression and gastrointestinal dysfunction. This β-arrestin-mediated biased signaling can trigger independent intracellular cascades, further amplifying opioid effects beyond analgesia. Importantly, MOR activation also stimulates two critical intracellular pathways: the PI3K/AKT and Mitogen-Activated Protein Kinase (MAPK) routes, both of which are implicated in cell survival, proliferation, and potentially tumor progression (Figure 1).[3]

Given these molecular effects and their possible influence on cancer biology, there is growing concern that opioid use during oncology surgery may impair immune function, promote angiogenesis, and even facilitate tumor cell survival. As such, anesthetic techniques that minimize or eliminate opioid use, such as OFA, are gaining traction. These regimens incorporate non-opioid agents like propofol, dexmedetomidine, and regional blocks (e.g., ESP block), offering not only effective analgesia but also a potentially more favorable immunological profile. In this context, we present the case of a 51 year-old female with infiltrating ductal carcinoma of the left breast who underwent modified radical mastectomy (MRM) under an opioid-free anesthetic protocol, emphasizing the rationale, technique, and potential systemic implications of opioid avoidance in breast cancer surgery. This method reflects on the broader implications of opioid use in breast cancer surgery.

Breast cancer continues to represent the leading cause of cancer-related death among women worldwide, accounting for approximately 15% of all female cancer mortalities. While surgery remains the chosen treatment of breast cancer therapy, the perioperative period is increasingly recognized as a critical window during which the biological behavior of cancer may be influenced. During this period, surgical manipulation can inadvertently release tumor cells into the circulation, while anesthetic and analgesic choices may impact immune surveillance and inflammatory pathways.[4] Among these, opioids, long considered the standard for perioperative pain control, have come under scrutiny due to their potential to suppress immune function, particularly natural killer cell activity, promote angiogenesis, and possibly influence tumor recurrence and metastatic spread. The growing concern has prompted a shift in anesthetic strategies toward opioid-sparing or OFA approaches, especially in oncology surgeries such as modified radical mastectomy (MRM). OFA, incorporating agents like dexmedetomidine, propofol, and regional blocks (e.g., ESP block), aims to provide effective analgesia while preserving immune competence, potentially reducing the risk of cancer progression.[5]

OFA typically combines agents such as dexmedetomidine, ketamine, lidocaine, magnesium sulfate, and regional techniques such as nerve or fascial plane blocks. Among these, dexmedetomidine has garnered particular attention due to its unique profile: an alpha-2 adrenergic agonist with sedative, analgesic, anxiolytic, and sympatholytic properties. Dexmedetomidine not only provides sedation but also modulates the pain response by reducing sympathetic tone and suppressing the neuroendocrine stress response without causing respiratory depression—a significant advantage over opioids. The efficacy of dexmedetomidine-centered OFA protocols has been confirmed in multiple studies, including randomized controlled trials on laparoscopic surgery, demonstrating better intraoperative stability, reduced rescue opioid requirements, and improved postoperative pain scores. These findings are directly relevant to cancer surgeries such as MRM, where optimal analgesia and smooth recovery are essential. In this context, we report the anesthetic management of a 51-year-old female with infiltrating ductal carcinoma of the left breast, focusing on the implementation and efficacy of opioid-free anesthesia using dexmedetomidine, propofol TCI, and ESP block. This case aims to exemplify the clinical applicability and benefits of OFA in major oncology procedures.[6]

A comprehensive systematic review and meta-analysis published in Frontiers in Medicine examined the benefits and risks of OFA compared to traditional opioid-based anesthesia (OBA). The study analyzed 33 randomized controlled trials involving over 2,300 patients. OFA significantly reduced the incidence of PONV. Specifically, there was a 54% reduction in nausea and a 66% reduction in vomiting in the post-anesthesia care unit (PACU) compared to OBA.[7]

CASE DESCRIPTION

The patient, is a 51-year-old woman with no significant comorbidities, presenting with a newly discovered mass in her left breast, first noticed two weeks prior to hospital admission. The mass, described as firm and approximately the size of a quail egg, was not associated with pain, nipple discharge, or skin changes. There was no reported history of systemic symptoms such as fever, cough, or shortness of breath, and she denied any known drug or food allergies.

Her past medical history was unremarkable, with no history of chronic diseases such as diabetes mellitus, hypertension, or asthma. She had previously undergone a breast biopsy under general anesthesia without complications. She denied any history of smoking or alcohol consumption on physical examination, she appeared in good general health with normal vital signs: blood pressure 120/80 mmHg, heart

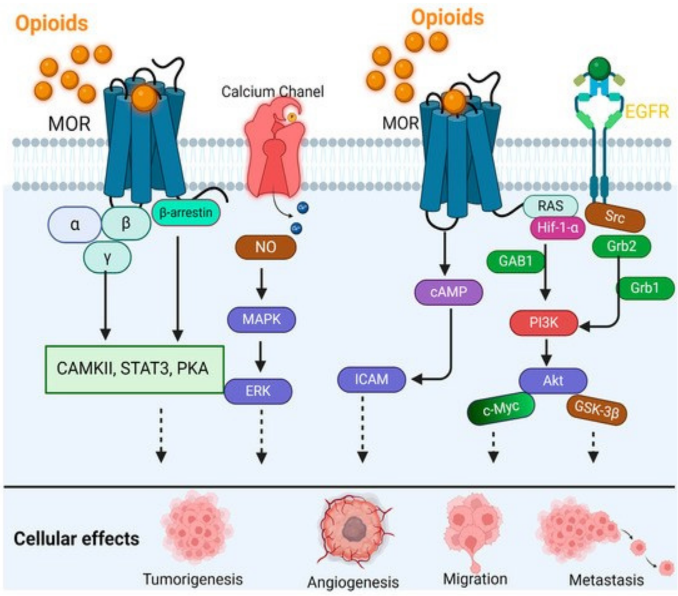

Figure 1. MOR signaling in cancer cells.[3]

rate 84 beats per minute, respiratory rate 16 breaths per minute, and oxygen saturation 99% on room air. Her body mass index (BMI) was 27.1 kg/m^2. Her physical activity level was consistent with 4-5 metabolic equivalents (METs), indicating the ability to perform light to moderate activities without symptoms. Neurologic and cardiopulmonary examinations were within normal limits, and her airway was assessed as Mallampati class II with good mouth opening and intact dentition.

Laboratory investigations revealed normal complete blood count, coagulation profile, and liver function tests. However, there was evidence of mildly impaired renal function, with a creatinine clearance (CCT) of 64 ml/min and findings of right-sided hydronephrosis on abdominal ultrasound. Chest radiography showed no signs of pulmonary metastases or cardiopulmonary abnormalities. Mammography and breast ultrasound confirmed a diagnosis of infiltrating ductal carcinoma of the left breast, graded as BI-RADS 6, and surgical management in the form of a modified radical mastectomy was planned.

Given the patient's stable condition, absence of significant comorbidities, and mild renal impairment, she was deemed a suitable candidate for opioid-free anesthesia. The preoperative plan included informed consent, preoperative fasting for 8 hours, and administration of preemptive analgesics: pregabalin 75 mg, paracetamol 1000 mg, and etoricoxib 90 mg given orally two hours before surgery. A large-bore intravenous line was established, and fluid warming devices were prepared. Blood products were cross-matched, and two units of packed red cells were reserved. Anesthesia was induced with propofol using a target-controlled infusion (TCI) in Schneider mode, titrated to achieve a target plasma concentration of 6 mcg/ml to ensure hypnosis. Dexmedetomidine was administered as a loading dose of 1 mcg/kg over 10 minutes to provide sedation and analgesia. Atracurium 30 mg was given intravenously to facilitate muscle relaxation, and lidocaine 90 mg was instilled intratracheally to blunt airway reflexes. Orotracheal intubation was performed using a 7.5 mm tube and proper tube placement was confirmed by auscultation and capnography. Following intubation, the patient was positioned in the right lateral decubitus position for regional anesthesia.

An ultrasound-guided ESP block was performed at the T5 level using a 50 mm stimuplex needle. The ultrasound probe was placed in a parasagittal orientation to identify the erector spinae muscle and the transverse process. After ensuring negative aspiration for blood or air, 20 ml of 0.375% ropivacaine mixed with 5 mg dexamethasone was injected into the fascial plane between the erector spinae muscle and the transverse process. Anesthesia was initiated with a loading dose of dexmedetomidine at 1 µg/kg IV administered over 10 minutes. At minute 8, propofol was started using target-controlled infusion (TCI) with a target effect-site concentration of 2–4 µg/mL. Two minutes later, at minute 10, a maintenance dose of dexmedetomidine was continued at 0.4 µg/kg/hour IV. At minute 11, lidocaine (1 mg/kg) was administered intratracheally, and atracurium (0.5 mg/kg) was given intravenously to facilitate neuromuscular blockade.

Intubation was performed at minute 15. Throughout the 120-minute intraoperative period, the patient's hemodynamic parameters remained relatively stable. Systolic blood pressure ranged between 138 and 154 mmHg, while diastolic pressure varied from 67 to 101 mmHg, with both showing a brief dip around the 100-minute mark. The heart rate remained bradycardic, ranging from 54 to 61 bpm, without any abrupt changes. Peripheral oxygen saturation (SpO_2) was consistently optimal at 98–99%, indicating adequate oxygenation. No rescue opioid administration was required, estimated blood loss was minimal, and the surgical duration was approximately three hours. For PONV prophylaxis, 8 mg of ondansetron was administered intravenously 30 minutes prior to extubation. Overall, the patient maintained a stable hemodynamic status intraoperatively without any signs of hemodynamic compromise (Figure 2).

Postoperative analgesia was maintained using a low-dose dexmedetomidine infusion at 1 ml/hour via syringe pump, IV ketorolac 30 mg every 8 hours, and oral paracetamol 500 mg every 6 hours. The patient reported minimal postoperative pain (NRS 0-1/10) and experienced no nausea, vomiting, or respiratory depression. She was monitored in the recovery room and later transferred to the ward in stable condition.

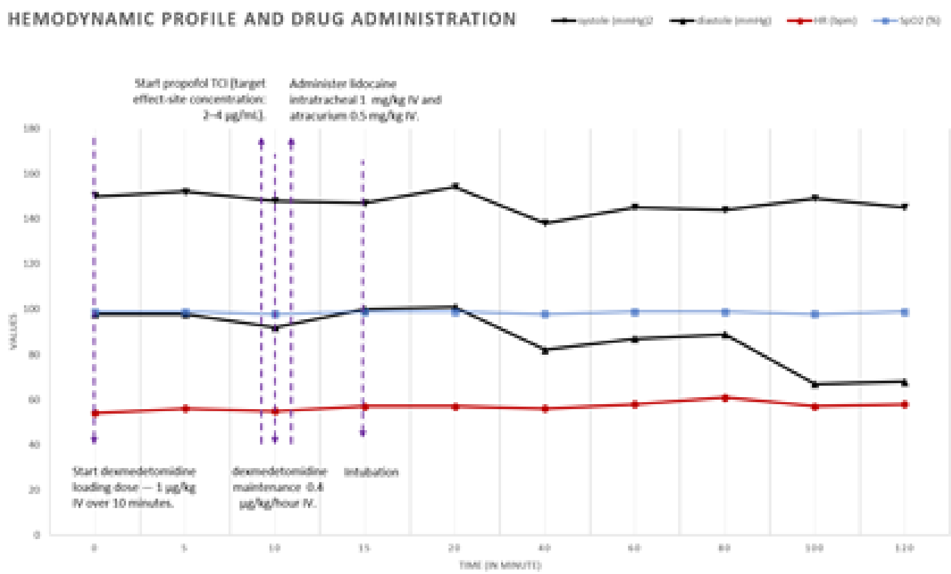

Figure 2. Hemodynamic profile and drug administration of the patient

DISCUSSION

The anesthetic management of breast cancer surgery is undergoing a significant transformation, with increasing interest in opioid-free anesthesia (OFA) as a strategy to enhance postoperative outcomes while mitigating the well-documented drawbacks associated with opioid use. The case of a patient undergoing modified radical mastectomy exemplifies this evolving paradigm, demonstrating the practical and clinical advantages of OFA using a combination of propofol TCI, dexmedetomidine infusion, and an ESP block. Recent studies, including those by Di Benedetto et al. and Assaf et al., underscore the efficacy of OFA in reducing postoperative pain scores, minimizing the need for rescue analgesics, and significantly lowering the incidence of PONV. In both investigations, patients managed with OFA protocols that incorporated regional blocks experienced not only superior pain control at various postoperative intervals (T0, 6, 12, and 24 hours), but also showed reduced morphine consumption, shorter time to extubation (TTE), and improved recovery profiles. Mechanistically, OFA achieves analgesia through a multimodal regimen that includes NMDA receptor antagonists such as ketamine and magnesium sulfate, which prevent central sensitization and reduce the risk of opioid-induced hyperalgesia. The ESP block, utilized in this case instead of a PECS or thoracic paravertebral block, offers comparable regional analgesia by targeting the thoracic spinal nerves, thereby minimizing the need for systemic analgesics. Additionally, dexmedetomidine serves both sedative and analgesic roles, helping to suppress sympathetic output, reduce stress hormone release, and maintain hemodynamic stability throughout the perioperative period.[8,9]

In our patient's case, the integration of OFA components—including preoperative pregabalin, paracetamol, and etoricoxib, along with intraoperative dexmedetomidine and ESP block—created a synergistic effect that effectively blunted the nociceptive response. The result was a smooth intraoperative course, no need for opioid rescue, stable cardiovascular parameters, and high postoperative comfort. The patient also required only standard prophylactic antiemetics and experienced no PONV, reflecting the consistent observation that opioid avoidance correlates with decreased gastrointestinal side effects, especially in high-risk female surgical populations. Moreover, both studies suggest that OFA does not compromise patient safety or satisfaction.

Di Benedetto et al. found comparable Quality of Recovery-40 (QoR-40) scores between OFA and opioid-inclusive anesthesia (OIA) groups, while Assaf et al. reported shorter TTE and fewer adverse events in their OFA cohort. These findings support OFA as not only a clinically effective but also a patient-centered approach, aligning well with enhanced recovery after surgery (ERAS) protocols. While larger prospective trials are necessary to fully establish the long-term benefits and generalizability of OFA in major oncology surgeries, the growing evidence—supported by real-world cases like this—indicates that opioid-free techniques offer a safe, effective, and potentially superior alternative to traditional opioid-based regimens. The implementation of OFA in breast cancer surgery thus represents a promising shift toward individualized, multimodal, and opioid-sparing anesthetic care.

In this case, a comprehensive opioid-free regimen was successfully implemented using dexmedetomidine, propofol, and an ESP block. This strategy aligned with the findings of Olata et al., where dexmedetomidine-based OFA was shown to significantly reduce intraoperative nociceptive responses, evidenced by lower fentanyl rescue rates, reduced qNox values, and improved postoperative pain scores compared to opioid-based protocols.[6]

Dexmedetomidine acts centrally to reduce sympathetic output and modulate the stress response through inhibition of the locus coeruleus. The continuous infusion of dexmedetomidine in this case provided a stable plasma concentration, contributing to hemodynamic stability and sustained nociception control throughout the procedure. Importantly, unlike fentanyl which was administered intermittently in opioid-based regimens, the use of dexmedetomidine avoids peaks and troughs in analgesia, which can otherwise trigger sympathetic surges or breakthrough pain.

As observed in the cited study, the incidence of intraoperative hypertension, hypotension, and tachycardia was not significantly different between OFA and OA groups, supporting the hemodynamic safety of dexmedetomidine even in prolonged surgeries. The addition of the ESP block provided an important regional component to this multimodal analgesia. The ESP block targets the dorsal rami of spinal nerves, effectively providing thoracic analgesia that is especially beneficial in mastectomy procedures. It further reduces the reliance on systemic analgesics and contributes to superior postoperative comfort, minimizing the need for rescue opioids even in the recovery phase.

The synergistic effect of dexmedetomidine and regional anesthesia is particularly relevant in oncology, where minimizing systemic drug burden is often desirable due to immunologic and pharmacologic considerations.[6]

One of the most compelling outcomes from the OFA approach in this patient was the avoidance of opioid-related side effects, such as PONV, sedation, and delayed return of bowel function. The use of ondansetron was prophylactic and not reactionary, indicating that nausea was effectively preempted. Moreover, the absence of respiratory depression allowed for smooth extubation and recovery, in line with ERAS protocols. In line with the findings from laparoscopic procedures, this case further supports that OFA with dexmedetomidine can be safely extended to breast surgeries, especially when paired with targeted regional blocks. While larger-scale studies are still required to generalize these findings across various surgical populations, this case underscores the feasibility and clinical value of opioid-free anesthesia in delivering high-quality perioperative care.

The OFA technique employed in this case closely mirrors the approach described by Sarma et al. in their series of five breast cancer surgeries, particularly in terms of achieving stable intraoperative hemodynamics without systemic opioids. In both settings, dexmedetomidine served as the cornerstone agent, administered as an infusion to blunt sympathetic responses and maintain cardiovascular stability. Despite variations in surgery duration—ranging from 110 to 140 minutes in the Sarma et al. series and approximately three hours in our case—hemodynamic profiles remained remarkably stable. In our patient, blood pressure showed only mild fluctuations, and bradycardia was steady and non-problematic, while in Sarma et al., transient elevations in heart rate and bispectral index (BIS) were successfully managed by titrating dexmedetomidine or adjusting volatile anesthetic depth. Both reports also incorporated ultrasound-guided ESP blocks to provide regional analgesia, further contributing to sympathetic control and reduced anesthetic requirement. However, a key difference lies in the airway management: while our case used orotracheal intubation under lidocaine pretreatment, Sarma et al. employed supraglottic airway devices (i-gel), possibly contributing to reduced stress responses during airway instrumentation. Additionally, while sevoflurane was used for anesthesia maintenance in Sarma's series, we opted for TCI of propofol, potentially offering smoother titration and hemodynamic predictability. Notably, both reports demonstrated successful application of OFA in MRM, supporting the feasibility of this technique in oncology breast surgery where minimizing opioid exposure may also have implications for cancer recurrence. Together, these findings emphasize the value of multimodal OFA strategies in preserving intraoperative cardiovascular stability while promoting enhanced recovery in breast cancer patients.[10]

The role of opioids in cancer surgery, particularly breast cancer, remains a subject of significant debate. Multiple preclinical studies have demonstrated that opioids such as morphine and fentanyl can suppress natural killer cell cytotoxicity, impair neutrophil recruitment, and disrupt lymphocyte proliferation. These immune effects are concerning in the perioperative period, a time when the immune system plays a crucial role in eliminating disseminated tumor cells. Additionally, opioids have been shown to promote angiogenesis by activating pathways such as MAPK/ERK and stimulating vascular endothelial growth factor (VEGF), which can facilitate tumor growth and metastasis. These findings support the rationale for avoiding opioids during the perioperative period, particularly in patients with high-risk malignancies like breast cancer. Despite these biologically plausible mechanisms, clinical data remain mixed. Some retrospective and prospective studies suggest no clear link between opioid use and breast cancer recurrence, while others report reduced recurrence with regional or opioid-sparing anesthesia. Notably, regional anesthesia techniques, such as paravertebral blocks (PVB) and ESP blocks, may mitigate the immunosuppressive effects of surgery and systemic opioids by decreasing both neuroendocrine stress responses and the need for opioid analgesics. In this case, OFA was implemented using dexmedetomidine, propofol TCI, and ESP block, resulting in stable intraoperative hemodynamics and effective analgesia without the use of systemic opioids. The patient experienced no postoperative nausea or vomiting and showed good early recovery.[5,11]

Although the definitive impact of opioids on cancer recurrence remains unresolved, this case adds to the growing clinical narrative that opioid-free anesthesia is not only feasible but may also provide immunological advantages in oncology surgery. As larger randomized controlled trials continue to investigate this relationship, anesthesiologists are increasingly justified in adopting multimodal, opioid-sparing strategies for patients undergoing breast cancer surgery.

Despite the favorable outcome observed in this case, several limitations must be acknowledged. First, this report represents a single patient experience and therefore cannot be generalized to all breast cancer patients undergoing modified radical mastectomy. The results may vary according to patient demographics, comorbidities, surgical complexity, and institutional resources. Moreover, the absence of long-term follow-up limits the ability to determine whether OFA has any effect on chronic pain development, cancer recurrence, or overall survival.

Another important consideration is the limited body of comparative evidence. Although randomized controlled trials and meta- analyses increasingly support the benefits of OFA, there is still heterogeneity in study protocols, drug combinations, and regional techniques, making direct comparisons difficult. In addition, OFA requires specialized equipment such as target-controlled infusion pumps, advanced monitoring, and expertise in regional anesthesia techniques like the erector spinae plane block. These resources may not be universally available, particularly in low-resource settings, which could affect the reproducibility of this approach. Finally, patient-specific variability, including genetic polymorphisms affecting drug metabolism or the presence of renal or cardiovascular impairment, may alter the efficacy and safety of OFA agents such as dexmedetomidine or lidocaine.

It is also important to recognize the potential side effects associated with OFA. The use of dexmedetomidine, while central to OFA protocols, can result in bradycardia and hypotension due to its sympatholytic action, which may be problematic in patients with conduction abnormalities or limited cardiac reserve. Sedation and delayed emergence are additional risks if dexmedetomidine or propofol infusions are not carefully titrated, potentially prolonging recovery. Regional techniques such as the erector spinae plane block, although generally safe, still carry risks of local anesthetic systemic toxicity, infection, hematoma, or block failure. Furthermore, the use of adjunct medications has its own safety considerations: NSAIDs such as ketorolac may precipitate renal impairment, gastrointestinal bleeding, or platelet dysfunction, while lidocaine, if absorbed systemically at high concentrations, can cause central nervous system toxicity or cardiac arrhythmias. Magnesium sulfate, commonly incorporated into other OFA regimens, may contribute to hypotension, muscle weakness, or delayed neuromuscular recovery. Finally, there remains the possibility that OFA may provide inadequate analgesia in certain patients, particularly those with high nociceptive input, chronic pain syndromes, or pre-existing opioid tolerance, thereby necessitating rescue opioid administration intra or postoperatively.[12,13]

CONCLUSION

Opioid-free anesthesia using propofol TCI, dexmedetomidine, and ESP block in breast cancer surgery demonstrated effective analgesia, stable perioperative outcomes, and a smooth recovery without opioid-related side effects, supporting its potential as a superior anesthetic approach that may also reduce cancer progression risks.

PATIENT CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The patient was informed about the nature of the case report, the purpose of publication, and the measures taken to ensure confidentiality. Identifying information has been omitted or anonymized to protect patient privacy.

CONFLICT OF INTEREST

Authors declare no conflict of interest in the writing of this article.

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