Dexamethasone as Prophylaxis of Postoperative Nausea and Vomiting in Cardiothoracic Surgery: Systematic Review and Meta-Analysis

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ABSTRACT

Introduction: Postoperative nausea and vomiting (PONV) remain common and distressing complications following surgery, particularly after high-risk procedures such as cardiothoracic surgeries. Dexamethasone, a corticosteroid with anti-inflammatory and antiemetic effects, has been widely investigated for its role in PONV prevention. This study aimed to evaluate the efficacy of dexamethasone in reducing the incidence of PONV among patients undergoing cardiothoracic surgery through a systematic review and meta-analysis.

Methods: The systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Randomized Controlled Trials (RCTs) comparing dexamethasone with placebo or no intervention in cardiothoracic surgery were included. The primary outcome was the incidence of PONV within 24 hours postoperatively; secondary outcomes included the need for rescue antiemetics and the occurrence of adverse effects such as hyperglycemia or infection. Statistical analysis was conducted using Review Manager 5.4, with heterogeneity assessed by the I^2 and Q/df tests.

Results: Four RCTs published between 2018 and 2023 were included, showing low risk of bias and symmetrical funnel plots. The pooled analysis demonstrated a statistically significant reduction in PONV with dexamethasone (OR= 0.57, 95% CI= 0.41–0.80, p= 0.001, I^2= 9%, Q/df= 0.98).

Conclusion: Dexamethasone significantly reduces the incidence of PONV in patients undergoing cardiothoracic surgery with consistent findings across studies. Further large-scale RCTs are needed to confirm long-term safety and optimize clinical protocols.

Keywords: Cardiothoracic surgery, corticosteroid, dexamethasone, meta-analysis, postoperative nausea and vomiting

Deksametason sebagai Profilaksis Mual dan Muntah Pascaoperasi pada Bedah Kardiotoraks: Tinjauan Sistematis dan Meta-Analisis

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ABSTRAK

Pendahuluan: *Postoperative nausea and vomiting (PONV) merupakan komplikasi umum dan mengganggu setelah pembedahan, terutama pada prosedur berisiko tinggi seperti bedah kardiotoraks. Deksametason, kortikosteroid dengan efek antiinflamasi dan antiemetik, telah banyak diteliti untuk perannya dalam pencegahan PONV. Penelitian ini bertujuan untuk mengevaluasi efektivitas deksametason dalam menurunkan kejadian PONV pada pasien yang menjalani pembedahan kardiotoraks melalui tinjauan sistematis dan meta-analisis.*

Metode: *Tinjauan sistematis ini dilakukan berdasarkan pedoman Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020. Studi yang disertakan adalah Randomized Controlled Trials (RCT) yang membandingkan pemberian deksametason dengan plasebo atau tanpa intervensi pada pasien bedah kardiotoraks. Luaran utama yang dianalisis adalah kejadian PONV dalam 24 jam pertama pascaoperasi, sedangkan luaran sekunder meliputi kebutuhan antiemetik tambahan dan efek samping seperti hiperglikemia atau infeksi. Analisis statistik dilakukan menggunakan Review Manager versi 5.4 dengan uji heterogenitas I^2 dan Q/df.*

Hasil: *Empat RCT yang diterbitkan antara tahun 2018–2023 memenuhi kriteria inklusi dengan risiko bias yang rendah dan diagram funnel yang simetris. Analisis gabungan menunjukkan penurunan kejadian PONV yang bermakna secara statistik pada kelompok deksametason dibandingkan kontrol (OR = 0,57; 95% CI = 0,41–0,80; p = 0,001; I^2 = 9%; Q/df = 0,98).*

Kesimpulan: *Deksametason secara signifikan menurunkan insiden PONV pada pasien yang menjalani pembedahan kardiotoraks, dengan hasil yang konsisten di seluruh studi. Diperlukan uji klinis acak berskala besar lebih lanjut untuk mengonfirmasi keamanan jangka panjang dan mengoptimalkan penerapan klinis.*

Kata Kunci: *Bedah kardiotoraks, deksametason, kortikosteroid, meta-analisis, postoperative nausea and vomiting*

INTRODUCTION

Postoperative nausea and vomiting (PONV) are among the most common complications following surgery, with a general incidence of 20–30%, rising to over 60% in high-risk patients.[1] In cardiothoracic surgery specifically, PONV incidence has been reported between 40–50%, contributing significantly to patient discomfort, delayed recovery, prolonged hospital stays, and increased healthcare costs. PONV can also lead to more serious complications such as aspiration pneumonia, electrolyte imbalances, and wound dehiscence.[2]

Although prophylactic antiemetics are routinely used in non-cardiac surgery, their application in cardiac surgery remains debated. Agents like droperidol and ondansetron, while effective, have been associated with QT interval prolongation and potential arrhythmias, raising safety concerns in this vulnerable population.[3]

Dexamethasone, a synthetic glucocorticoid, offers an alternative due to its dual anti-inflammatory and antiemetic properties.[4] Meta-analyses have shown that a single perioperative dose of dexamethasone (4–8 mg IV) can reduce the incidence of PONV by approximately 40–50%, with a favorable side effect profile. For example, studies in general surgical populations report odds ratios between 0.5 and 0.6 for PONV reduction, and large-scale trials such as the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) study have confirmed its clinical efficacy without significant increases in adverse events.[5]

Despite promising results, the evidence for dexamethasone's role in cardiothoracic surgery remains limited. Therefore, this systematic review and meta-analysis aims to evaluate the efficacy and safety of dexamethasone in preventing PONV specifically in high-risk cardiothoracic surgery patients, to inform evidence-based perioperative care.

METHOD

This systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines.

Research Question

The study aimed to determine whether perioperative administration of dexamethasone reduces the incidence of PONV compared with placebo or no treatment in patients undergoing cardiothoracic surgery.

Search Strategy

A systematic search was performed in MEDLINE (Ovid), Embase (Elsevier), Cochrane Central (Wiley), and ClinicalTrials.gov databases for studies published between January 2018 and April 2025. Search terms combined "dexamethasone," "postoperative nausea and vomiting," and "cardiothoracic surgery." Reference lists of relevant articles were also screened manually. The selection process followed PRISMA flow methodology (Figure 1).

Eligibility Criteria

Studies were included if they were randomized controlled trials (RCTs) involving adult patients aged 18 years or older who underwent cardiothoracic or major thoracic surgery. The intervention group received dexamethasone at any dose or via any route, and was compared with a control group receiving placebo, saline, or standard care. Eligible studies were required to report the incidence of PONV within 24 hours after surgery and to be published in English with full text available.

Exclusion criteria included non-randomized or animal studies, combined antiemetic regimens containing dexamethasone, studies not reporting PONV as an outcome, and duplicate or incomplete data. One retrospective cohort study by Umari et al. that met the outcome criteria was included for qualitative analysis and sensitivity comparison but excluded from quantitative pooling to preserve methodological rigor.[21]

Study Selection and Data Extraction

Two reviewers independently screened titles and abstracts, followed by full-text assessment for eligibility. Disagreements were resolved through discussion. Extracted data included author, publication year, study design, number of participants, surgical type, anesthesia technique, dexamethasone dose and timing, and postoperative outcome measures.

Quality and Bias Assessment

The methodological quality of randomized trials was assessed using the Cochrane Risk of Bias 2 (RoB 2) tool, while the Newcastle–Ottawa Scale (NOS) was applied for the retrospective cohort. Publication bias was evaluated using a funnel plot to assess distribution symmetry.

Characteristics of Included Studies

Four studies met inclusion criteria in this systematic review.[19, 17, 20, 21] Three were double-blind randomized controlled trials and one was a retrospective cohort study. Dexamethasone doses ranged from 0.1–0.2 mg/kg or a fixed dose of 8 mg administered intravenously, either preoperatively or intraoperatively. Control groups received saline or standard antiemetic therapy. All RCTs employed a double-blind design, ensuring that both participants and investigators were unaware of the treatment allocation. Sample sizes across studies varied, reflecting differences in study design and patient population characteristics.

Outcome Measures

The primary outcome was the incidence of PONV within the first 24 hours after surgery. Secondary outcomes included the need for rescue antiemetics and the occurrence of adverse effects such as hyperglycemia, wound infection, or delayed recovery.

Statistical Analysis

Meta-analysis was conducted using Review Manager (RevMan) version 5.4. Effect sizes were calculated as odds ratios (ORs) with 95% confidence intervals (CIs). Statistical heterogeneity was evaluated using Cochran's Q test, the Q/df ratio, and the I^2 statistic, with I^2 values of <25%, 25–50%, and >50% representing low, moderate, and high heterogeneity, respectively. A fixed-effect model was applied when heterogeneity was low (I^2 <25%). Statistical significance was defined as $p < 0.05$. Forest plots were generated to visualize individual study estimates and the pooled overall effect size and summarized if possible.

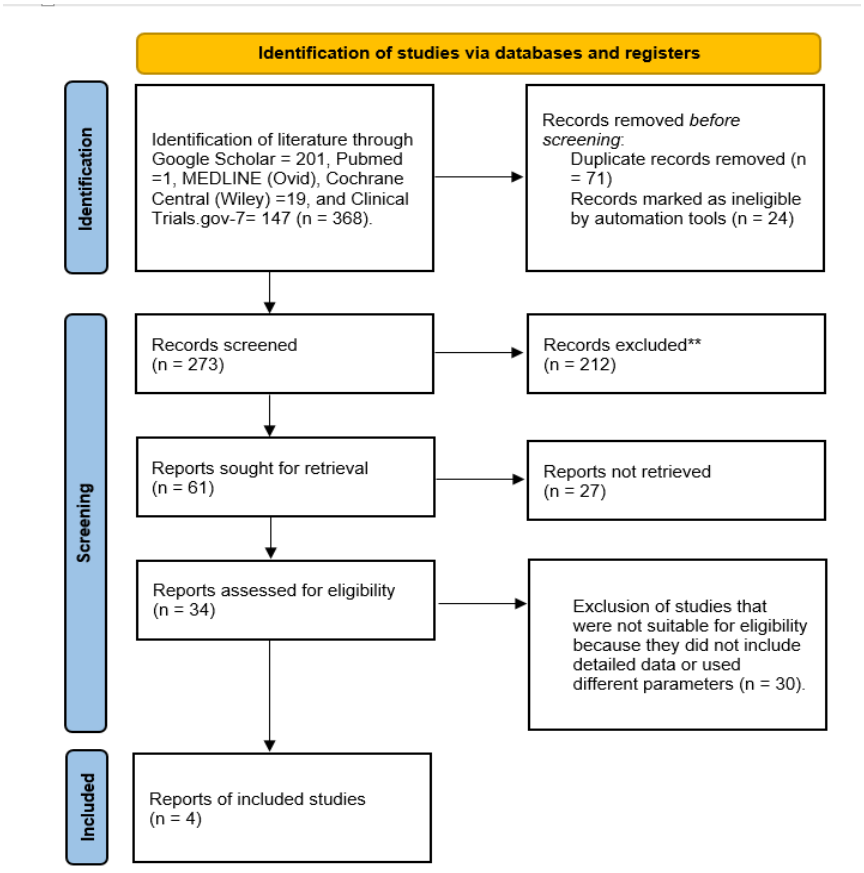

Figure 1. Flowchart of studies included in the systematic review

A total of four studies, comprising 720 patients in the dexamethasone group and 681 in the control group, were included in the meta-analysis. Each study included in this meta-analysis was systematically reviewed to evaluate methodological quality, patient characteristics, intervention consistency, and outcomes. Joung et al. conducted a randomized, double-blind, placebo-controlled trial in patients undergoing thoracotomy and found that intravenous dexamethasone at a dose of 0.1 mg/kg significantly reduced the incidence of PONV compared with saline, without an increased risk of hyperglycemia or infection.[19] Asehnoune et al. performed a large multicenter, double-blind RCT among patients undergoing thoracotomy under general anesthesia. Administration of dexamethasone at 0.2 mg/kg (maximum 20 mg) effectively reduced postoperative complications, including PONV, and was associated with faster recovery and no increase in postoperative infection.[17] Similarly, Murphy et al. investigated the use of small-dose dexamethasone (8 mg IV) in elective cardiac surgery and demonstrated both an improvement in quality-of-recovery scores and a significant reduction in the need for rescue antiemetics.[20] Meanwhile, Umari et al. conducted a retrospective cohort study in patients undergoing minimally invasive thoracic surgery such as lobectomy, segmentectomy, or wedge resection, and found that dexamethasone 8 mg was as effective as ondansetron 4 mg in preventing PONV, with comparable safety profiles.[21] Across these four studies, the direction and magnitude of the effect consistently favored dexamethasone in reducing PONV incidence. Despite variations in surgical type, anesthesia method, and dexamethasone dosage, the overall findings remained uniform. The low heterogeneity (I^2 = 9%) and symmetrical funnel plot further supported the consistency and reliability of the pooled estimate. Collectively, these results demonstrate that perioperative dexamethasone provides a significant and consistent antiemetic benefit in patients undergoing high-risk cardiothoracic surgery.

The pooled analysis demonstrated a significant reduction in PONV among patients receiving dexamethasone compared with placebo. The overall odds ratio (OR) was 0.57 (95% CI: 0.41–0.80; p = 0.001), indicating that dexamethasone reduced the risk of PONV by approximately 43% compared with control (Figure 2). Since the 95% confidence interval did not cross the line of no effect (OR = 1), the difference was statistically significant.

Heterogeneity among the included studies was low (Chi^2 = 3.30, df = 3, p = 0.35; I^2 = 9%), suggesting consistent findings across trials. The Q/df ratio of 1.1 further supported the homogeneity of the results. Therefore, a fixed-effect model was applied. The funnel plot (Figure 3) showed symmetrical distribution of the studies, indicating no evidence of publication bias. Overall, these findings demonstrate that perioperative administration of dexamethasone significantly reduces the incidence of PONV in patients undergoing high-risk cardiothoracic surgery, with consistent results and minimal between-study variability.

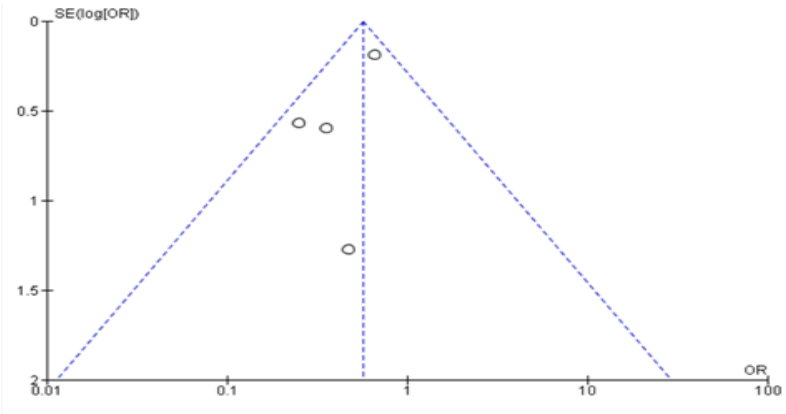

Figure 2. Funnel plot of the use of dexamethasone

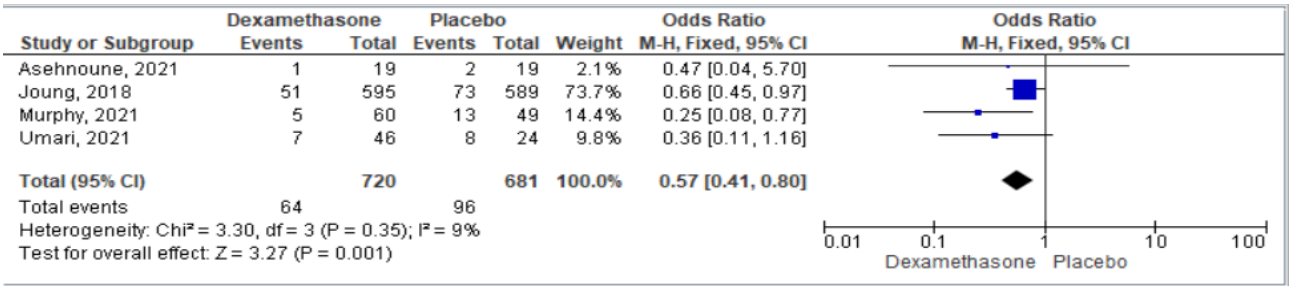

Figure 3. Forest plot of the use of dexamethasone vs placebo in the incidents of PONV

DISCUSSION

Postoperative nausea and vomiting (PONV) remains one of the most common and distressing complications following general anesthesia, affecting patient recovery and satisfaction. PONV is defined as the occurrence of nausea, vomiting, or retching within 24 hours after surgery and occurs in approximately 30% of all surgical patients, with rates rising to up to 80% in high-risk populations.[6]

In pediatric populations, the incidence ranges between 13% and 42%, depending on the type of procedure and anesthesia used.[7] Risk factors for PONV include female sex, non-smoking status, history of motion sickness or prior PONV, use of volatile anesthetics, nitrous oxide, postoperative opioids, and certain high-risk surgeries such as laparoscopic or gynecologic procedures.[8]

The economic and clinical burden of PONV is substantial. Studies have shown that patients experiencing PONV are twice as likely to have unplanned hospital admissions postoperatively.[4] Moreover, the presence of PONV can delay discharge from post-anesthesia care units by an average of 25–30 minutes, contributing to increased healthcare costs and reduced throughput efficiency.[9] In a study across multiple centers, the mean cost associated with PONV management was estimated at $75–$100 per patient, including antiemetic use and extended recovery time. In severe cases, vomiting can result in dehydration (15–20% incidence among affected patients), electrolyte imbalance, aspiration pneumonia (1–2%), and wound dehiscence (reported in 3–5% of abdominal surgery cases).[10]

Furthermore, PONV has psychosocial implications. About 50% of patients report that PONV is more distressing than postoperative pain, and 30% of patients would be willing to pay out-of-pocket for effective prophylaxis.[11] These figures highlight the perceived burden from the patient's perspective, making effective management crucial for patient-centered care. Recent advancements advocate for risk-stratified prophylactic regimens, where patients with multiple risk factors receive combination antiemetic therapy to reduce PONV incidence by up to 50–60%.[12]

The pathophysiology of PONV in cardiothoracic surgery is multifactorial and involves a complex interplay of physiological stressors. One significant contributor is the prolonged duration of surgery, which leads to extended exposure to anesthetic agents and surgical stress, both of which stimulate central vomiting pathways, thereby increasing the risk of PONV. Additionally, cardiothoracic procedures are often associated with gut hypoperfusion due to intraoperative hemodynamic changes.

This reduced blood flow can cause gastrointestinal ischemia, leading to the release of emetogenic substances that activate vagal afferents and stimulate the vomiting center in the brain. Furthermore, the endogenous catecholamine surge induced by surgical stress results in elevated levels of adrenaline and noradrenaline. These catecholamines can stimulate the chemoreceptor trigger zone and further activate the vomiting center, while also exacerbating gastrointestinal dysmotility. Collectively, these factors elevate metabolic demands and significantly contribute to the high incidence of PONV observed in patients undergoing cardiothoracic surgery. The resulting nausea and vomiting not only impair patient

Tabel 1. Analysis of outcome

Author	Title	Population	Design	Method	Results					
					Ne	Yes	No	Nc	Yes	No
Joung et al., [19]	Preoperative dexamethasone for acute post-thoracotomy analgesia: a randomized, double-blind, placebo-controlled study	Nonemergent cardiac surgery performed using median sternotomy	Prospective, randomized, double-blind study	Dexamethasone via a 0.1 mg/kg intravenous vs Saline	19	1	18	19	2	17
Asehnoune et al., [17]	Effect of dexamethasone on complications or all cause mortality after major non-cardiac surgery: multicentre, double blind, randomised controlled trial	Thoracotomy under general anesthesia	Double blind, randomised controlled trial	Dexamethasone 0.2 mg per kilogram of actual body weight max 20mg vs Saline	595	51	544	589	73	516
Murphy et al., [20]	Small-dose dexamethasone improves quality of recovery scores after elective cardiac surgery: a randomized, double-blind, placebo-controlled study	CABG	Randomized, double-blind, placebo-controlled	Dexamethasone (8-mg to 2 ml total volume) vs Saline	60	5	55	49	13	36
Umari et al., [21]	Dexamethasone and postoperative analgesia in minimally invasive thoracic surgery: a retrospective cohort study	Elective lobectomy, segmentectomy, or wedge resection surgery	Retrospective cohort study	Dexamethasone 8 mg vs ondansetron 4 mg	46	7	39	24	8	16

comfort but can also lead to complications such as aspiration, delayed recovery, and increased morbidity.[4]

Dexamethasone, a synthetic glucocorticoid, is widely recognized for its potent anti-inflammatory and immunosuppressive properties. It is commonly used to treat conditions such as asthma, arthritis, allergic reactions, skin disorders, and various malignancies. In the context of anesthesia, dexamethasone has become an essential pharmacological agent, particularly in the prevention and management of PONV.[13]

Mechanistically, dexamethasone acts by binding to intracellular glucocorticoid receptors, leading to the modulation of gene transcription and suppression of pro-inflammatory cytokines such as interleukin-1 (IL-1), interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and prostaglandins. These biochemical effects help reduce the inflammatory response associated with surgical trauma, which is believed to trigger PONV through peripheral and central pathways.[14] In addition to its antiemetic action, dexamethasone has been found to prolong the duration of peripheral nerve blocks, which enhances postoperative analgesia. This prolongation may occur through vasoconstriction at the site of injection, reducing the systemic absorption of local anesthetics, or through direct effects on nerve membranes and modulation of spinal cord transcription factors such as nuclear factor kappa B (NF-κB). When administered intravenously or epidurally, dexamethasone can also reduce opioid consumption, thereby lowering the incidence of opioid-induced nausea and vomiting (OINV).[15]

This meta-analysis demonstrated that dexamethasone significantly reduces the risk of postoperative nausea and vomiting (PONV) in high-risk cardiothoracic surgery patients, with an overall odds ratio (OR) of 0.57 [95% CI: 0.41, 0.80]. This indicates that dexamethasone lowers the likelihood of experiencing PONV by

43% compared to placebo. The fact that the 95% confidence interval does not cross 1 confirms the statistical significance of this protective effect. The Z-score of 3.27 (P = 0.001) further reinforces the robustness of this result.

The analysis of heterogeneity revealed a Chi^2 value of 3.30 with 3 degrees of freedom (P = 0.35) and an I^2 of 9%, indicating low heterogeneity and consistency among the included studies. This suggests that the beneficial effect of dexamethasone on PONV prevention shows promise and warrants further validation in larger trials across different patient populations and study designs within the cardiothoracic surgical setting.

The funnel plot, used to assess publication bias, appears relatively symmetrical. This suggests that there is no strong evidence of publication bias, although the small number of included studies (only four) limits the power of this assessment. The distribution of studies is balanced around the vertical line, indicating that small-study effects are unlikely to skew the results.

These findings are in alignment with prior large-scale clinical trials such as the DREAMS trial 16, which demonstrated that a single intravenous dose of dexamethasone significantly reduced postoperative vomiting and the need for rescue antiemetics following major gastrointestinal surgery. Similarly, Asehnoune et al. confirmed dexamethasone's efficacy in lowering PONV incidence without increasing adverse events in a broad surgical population.[17]

Numerous studies have demonstrated that dexamethasone significantly reduces the incidence of PONV when administered preoperatively. Its antiemetic efficacy is partly attributed to its long duration of action, allowing continued protection against nausea and vomiting in the postoperative period. The benefits of dexamethasone in PONV prevention also include enhanced patient comfort, faster recovery, and potential reductions in the length of hospital stay and overall healthcare costs.[18]

The body of evidence examining dexamethasone's role in perioperative care highlights its clear efficacy in reducing PONV, yet its impact on analgesic consumption and other recovery metrics appears more nuanced. Joung et al., in a randomized, double-blind study of 40 patients undergoing thoracotomy, demonstrated that a single low preoperative dose of dexamethasone (0.1 mg/kg IV) did not significantly reduce opioid consumption within 24 or 72 hours post-surgery, nor did it improve pain scores at rest or during coughing. Similarly, secondary outcomes including rescue analgesic use, quality of recovery, and length of hospital stay showed no statistical difference between dexamethasone and placebo groups. These findings suggest that while dexamethasone may have antiemetic properties, a single low dose might not be sufficient to enhance analgesic outcomes or overall recovery in thoracotomy patients.[19]

In contrast, Asehnoune et al. conducted a large multicenter randomized controlled trial with a broad population undergoing major non-cardiac surgery. Their results confirmed the safety of dexamethasone, showing no increase in adverse events such as infections or hyperglycemia. Importantly, dexamethasone significantly reduced the incidence of PONV, reinforcing its role as a reliable antiemetic agent. However, no significant effect was observed on the composite primary outcome of major postoperative complications or all-cause mortality at 30 days, indicating that while dexamethasone enhances patient comfort by mitigating PONV, it does not necessarily influence long-term morbidity or survival.[17]

Murphy et al. provided additional insight into recovery quality after cardiac surgery, finding that small-dose dexamethasone improved patient-reported quality of recovery scores (QoR-15). Patients reported reductions in nausea, pain, and fatigue, which collectively contributed to a better overall postoperative experience. These findings imply that even if opioid consumption is not markedly decreased, dexamethasone may exert beneficial effects on subjective recovery quality, likely mediated by its anti-inflammatory and antiemetic properties.[20]

Further supporting dexamethasone's analgesic benefits, Umari et al. demonstrated in a retrospective cohort of minimally invasive thoracic surgery patients that perioperative dexamethasone administration was associated with significantly reduced opioid consumption and lower pain scores postoperatively. This

study also noted shorter hospital stays and fewer opioid-related side effects in the dexamethasone group, suggesting that in less invasive surgical settings, dexamethasone may have a more pronounced impact on analgesia and recovery acceleration.[21]

Collectively, these studies underscore the multifaceted role of dexamethasone in perioperative management. While its antiemetic effect is well-established and consistently replicated across different surgical populations, its influence on analgesic consumption and pain control appears variable, potentially influenced by factors such as surgical invasiveness, dexamethasone dosing, timing, and patient characteristics. The anti-inflammatory properties of dexamethasone, including the modulation of cytokines like IL-6 and TNF-α, likely contribute to these clinical effects by attenuating the systemic inflammatory response to surgery, which is particularly relevant in thoracic and cardiac procedures characterized by high inflammatory burden.

Beyond its well-established anti-inflammatory and antiemetic effects, dexamethasone exerts complex regulatory actions on catecholamine metabolism and the stress response, which likely contribute to its overall perioperative impact. The literature reveals that dexamethasone's influence on adrenal catecholamine synthesis and plasma levels is highly dose- and context-dependent.

Under basal, non-stressed conditions, high doses of dexamethasone stimulate phenylethanolamine N-methyltransferase (PNMT), the key enzyme converting norepinephrine to epinephrine in the adrenal medulla, thereby increasing adrenal catecholamine stores and synthesis independently of corticosterone levels 22. This suggests that dexamethasone can potentiate the body's capacity to respond to stress by priming catecholamine production.

However, during physiological stress, dexamethasone suppresses endogenous corticosterone production and downregulates PNMT expression. Despite this, adrenal catecholamine levels may paradoxically rise due to direct neural stimulation that overrides hormonal control mechanisms, with plasma epinephrine levels showing a biphasic response, rising with low doses but potentially declining at higher doses of dexamethasone. These dose-dependent effects highlight dexamethasone's nuanced modulation of the neuroendocrine stress axis, which may explain some variability in clinical outcomes related to stress and inflammation.[23]

Further complexity arises from dexamethasone's regulation of enzymes involved in catecholamine metabolism which it can inhibit catechol-O-methyl transferase, which degrades catecholamines, while activating monoamine oxidase, affecting the turnover and availability of catecholamines and their metabolites.[24] This enzymatic modulation may prolong or alter catecholamine action, influencing cardiovascular and metabolic responses during and after surgery.

Clinically, these interactions translate to important considerations. Dexamethasone has been implicated in raising blood pressure partly through catecholamine-mediated vasoconstriction, necessitating caution in patients with cardiovascular disease. Such effects underscore the need for individualized risk assessment when incorporating dexamethasone into perioperative protocols.[25]

Meta-analysis of 37 studies with over 4,600 surgical patients shows that dexamethasone does not significantly increase the risk of postoperative infections (OR 1.01, 95% CI 0.80–1.27) and its effect on wound healing is unclear due to limited data (OR 0.99, 95% CI 0.28–3.43). It may cause a mild, short-term increase in blood glucose in non-diabetics (mean increase 13 mg/dL) and a greater rise in diabetics (mean increase 32 mg/dL). Overall, dexamethasone's benefits in preventing PONV outweigh these manageable side effects, supporting its safe use in surgical patients.[5]

In synthesis with its antiemetic and anti-inflammatory roles, dexamethasone's modulation of catecholamine dynamics may enhance patient resilience to surgical stress, reduce inflammatory sequelae, and improve recovery quality, as observed in studies across thoracic, cardiac, gastrointestinal, and non-cardiac surgeries. However, the biphasic and context-dependent nature of its effects on catecholamines invites further research to

optimize dosing and timing strategies tailored to patient-specific stress responses.

Dexamethasone is an effective prophylactic agent for PONV in high-risk cardiothoracic surgery patients. The low heterogeneity and absence of strong publication bias further strengthen the reliability of these findings. However, since the number of studies is limited, future research with larger sample sizes is recommended to confirm these results.

This meta-analysis is limited by the small number of included randomized controlled trials (n=4), which reduces the generalizability and statistical power of the findings. Although heterogeneity was low (I^2=9%), the limited number of studies restricts the reliability of publication bias assessment using a funnel plot. Additionally, variability in dexamethasone dosing, timing, and surgical protocols may affect the consistency of outcomes. Data on secondary endpoints such as recovery quality, length of stay, and long-term adverse effects were also limited, warranting further large-scale, standardized trials.

CONCLUSION

Perioperative dexamethasone significantly reduces the incidence of postoperative nausea and vomiting in high-risk cardiothoracic surgery patients and may be safely considered as part of a multimodal prophylactic strategy

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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