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Dexamethasone: A simple solution for post-thyroidectomy pain and nausea

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Abstract

Postoperative pain and nausea and vomiting (PONV) are common complications following thyroidectomy. This prospective, double-blind study evaluated the efficacy of a single dose of dexamethasone in mitigating these postoperative adverse effects. Sixty patients undergoing thyroidectomy were randomized into two groups: a dexamethasone group and a control group. The dexamethasone group received a single dose of 8 mg intravenously, while the control group received saline. Postoperative pain was assessed using a visual analog scale (VAS), and PONV was recorded. The results demonstrated that dexamethasone significantly reduced both postoperative pain and the incidence of PONV. These findings suggest that a single dose of dexamethasone is a simple, safe, and effective strategy for improving postoperative outcomes in thyroidectomy patients.

Keywords: Thyroidectomy; Postoperative Pain; Postoperative Nausea and Vomiting; PONV; Dexamethasone; Analgesia; Antiemetic

1. Introduction

Thyroidectomy is a surgical procedure that often leads to postoperative nausea and vomiting (PONV), with an incidence of up to 70-80% when no preventive measures are taken [1,2],. Additionally, patients may experience moderate to severe pain.

PONV and pain are major sources of postoperative discomfort. Moreover, PONV can increase the risk of postoperative bleeding, airway obstruction, and the need for additional surgery, emphasizing the importance of preoperative prevention.

Dexamethasone is widely used to prevent PONV during surgery. Numerous studies have shown its effectiveness when administered at the start of general anesthesia [3,4].

While the analgesic effects of dexamethasone have been investigated, the results have been inconsistent. Skjelbred et al. first demonstrated the analgesic effect of glucocorticoids on acute pain in 1982 [5].. Since then, various clinical trials have explored this effect and the optimal dosage.

The primary goal of our study was to evaluate the impact of a single dose of dexamethasone on postoperative pain and nausea and vomiting.

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2. Material and methods

This prospective, observational, double-blind study was conducted at the Anesthesiology Department of the Med V Military Instruction Hospital in Rabat, Morocco.

After obtaining ethical approval from the local ethics committee and informed consent from participants, patients classified as American Society of Anesthesiologists (ASA) physical status I and II, scheduled for total or partial thyroidectomy for benign disease under general anesthesia, were included. Patients under 18 years of age, those with insulin-dependent diabetes mellitus, thyroid malignancy, a history of prior cervical surgery, chronic pain, a history of postoperative nausea and vomiting (PONV) after minor surgery, or those who had received antiemetic treatment within 48 hours prior to surgery were excluded.

Included patients were randomized into two groups: a dexamethasone group, where a single dose of 8 mg dexamethasone diluted in 10 ml was administered intravenously, and a control group, where 10 ml of saline was administered intravenously. The randomization sequence was computer-generated and concealed in sealed envelopes. Upon entering the operating room, a nurse opened the envelope and prepared the assigned solution. All administrations were performed by the anesthesiologist, who was blinded to the solution type, after the completion of anesthesia induction. On the day of surgery, after preoperative fasting, patients underwent standard monitoring, including electrocardiography, pulse oximetry, and non-invasive blood pressure monitoring. A peripheral intravenous catheter (18G) was inserted, and volume replacement with isotonic saline (250 ml) was initiated. After preoxygenation, anesthesia was induced with fentanyl (2.5 µg/kg) and propofol (3 mg/kg). After successful mask ventilation, a dose of cisatracurium (0.15 mg/kg) was administered. Tracheal intubation was attempted 3 minutes later. Following intubation, patients were mechanically ventilated. Anesthesia maintenance was provided using a mixture of isoflurane (1%) and nitrous oxide (50%). Thirty minutes before the end of the procedure, postoperative analgesia was provided to all patients with paracetamol (1 g/6 hours). Extubation was performed in the post-anesthesia care unit.

The primary outcome measure was postoperative pain assessed using the visual analog scale (VAS). This assessment was performed at 0, 4, 8, 12, 24, and 48 hours postoperatively. Ketoprofen and morphine were used as rescue analgesics. For patients with a VAS score > 3, a slow intravenous infusion of ketoprofen (100 mg) was administered. The maximum dose of ketoprofen was limited to 200 mg over 24 hours. If additional analgesia was required, morphine was titrated (0.2 mg bolus). Secondary outcomes included the need for rescue analgesics, postoperative nausea and vomiting, the need for antiemetics, and postoperative complications. Postoperative nausea and vomiting were assessed using a 4-point ordinal scale (0 = no nausea, 1 = mild nausea, 2 = moderate nausea, 3 = vomiting). In case of postoperative nausea and vomiting, antiemetic treatment (droperidol or ondansetron) was administered.

Statistical analysis was performed using SPSS for Windows, version 13 (SPSS, Inc., Chicago, IL, USA). Qualitative variables were analyzed using the Chi-square test, quantitative variables using the Student's t-test, and continuous variables using analysis of variance (ANOVA). A p-value < 0.05 was considered statistically significant.

3. Results

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4. Discussion

This study confirms the analgesic and antiemetic effects of dexamethasone in elective thyroidectomy. The mechanism underlying postoperative nausea and vomiting (PONV) after this type of surgery is not fully understood. Some clinical and experimental studies hypothesize that mechanical and humoral stimulation of chemoreceptors during surgical manipulation of the cervical region is the cause of PONV [1,6]. The preventive effect of dexamethasone on PONV is now well-established. This effect was previously demonstrated by a meta-analysis conducted by Henzi et al. in 2000 [7]. Since then, a series of studies have corroborated this result in both children and adults. Moreover, the effect of dexamethasone is additive to that of droperidol and 5-HT3 receptor antagonists such as the setrons [8,9]. The mechanism by which glucocorticoids act on nausea and vomiting is not completely understood, but it is probably partly related to the central and peripheral inhibition of inflammatory mediators and the inhibition of 5-HT3 receptors [10]. Setrons can be used for the prevention of PONV; however, their use is limited by their high cost and side effects. Our study confirms the reduction in the incidence and severity of PONV, as well as the need for antiemetics after thyroidectomy in patients who received 8 mg of dexamethasone after induction.

Thyroidectomy is a surgery associated with moderate postoperative pain. In one study, the mean VAS score after thyroidectomy was 5, and 48% of patients had a VAS score greater than 6 [11]. The results of previous studies evaluating the analgesic effects of corticosteroids postoperatively remain controversial. While the analgesic effect has been confirmed in some types of surgery such as dental surgery and laparoscopic cholecystectomy [12], other studies have found no benefit to the use of dexamethasone in the prevention of postoperative pain after minor surgery [13]. Our study found that a single dose of dexamethasone decreased postoperative pain scores and limited the need for analgesics in the first 48 postoperative hours. Our results are in line with a meta-analysis showing a reduction in pain scores and analgesic consumption with the use of dexamethasone in thyroidectomy during the first 24 postoperative hours [14].

The analgesia produced by corticosteroids results from several mechanisms. By inhibiting phospholipase A2, steroids block the action of cyclooxygenases and lipoxygenases, and thus the synthesis of prostaglandins and leukotrienes, which play a role in inflammatory and painful processes [15]. Other effects contributing to analgesia include the inhibition of neuropeptide release from nerve endings and the transmission of nociceptive signals by C fibers and ectopic discharges of injured nerves [16]. The decrease in vasodilation and capillary extravasation attenuates edema and pain related to increased pressure in closed tissue compartments [17] and inhibits leukocyte mediators of inflammatory hyperalgesia [15].

The major concern regarding the use of steroids for the prophylaxis of pain and PONV is the occurrence of side effects such as infections, delayed wound healing, and glucose intolerance observed after long-term corticosteroid therapy [18]. In a study involving 102 patients evaluating a single dose of dexamethasone in thyroidectomy, the authors noted a significantly higher incidence of hyperglycemia in the dexamethasone group compared to the control group only in the first eight postoperative hours, without other complications [19]. On the other hand, two meta-analyses evaluating

the perioperative administration of high doses of corticosteroids found no adverse effects [7,20]. In our study, no side effects were noted.

5. Conclusion

This study provides strong evidence for the efficacy of a single dose of dexamethasone in reducing both postoperative pain and nausea and vomiting in patients undergoing thyroidectomy. The drug's dual analgesic and antiemetic properties make it a valuable adjunct to standard perioperative care. By implementing this simple and cost-effective intervention, clinicians can significantly improve patient comfort and recovery following thyroidectomy. Further research may explore optimal dosing strategies and the potential synergistic effects of dexamethasone with other antiemetic agents.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Sonner JM, Hynson JM, Clark O, Katz JA. Nausea and vomiting following thyroid and parathyroid surgery. J Clin Anesth 1997; 9 :398– 402.

[2] Apfel CC, Laara E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting: conclusions from cross validations between two centers. Anesthesiology 1999; 91: 693–700.

[3] Gan TJ, Meyer TA, Apfel CC, Chung F, Davis PJ, Habib AS et al. Society for Ambulatory Anesthesia. Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. Anesth Analg 2007; 105:1615-28.

[4] Apfel CC, KortillaK, Abdalla M, Kerger H, Turan A. Vedder I et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med 2004; 350: 2441-51.

[5] Skjelbred, P. and P. Lokken, Post-operative pain and inflammatory reaction reduced by injection of a corticosteroid. A controlled trial in bilateral oral surgery. Eur J Clin Pharmacol 1982 ; 21:391-6.

[6] Fukuda H, Koga T. Stimulation of glossopharyngeal and laryngeal nerve afferents induces expulsion only when it is applied during retching in paralyzed decerebrate dogs. Neurosci Lett 1995; 193:117-120.

[7] Henzi I, Walder B, Tramèr MR. Dexamethasone for the prevention of postoperative nausea and vomiting: a quantitative systematic review. Anesth Analg 2000; 90:186-94.

[8] Engelman E, Salengros JC, Barvais L. How much does pharmacologic prophylaxis reduce postoperative vomiting in children? Calculation of prophylaxis effectiveness and expectedincidence of vomiting under treatment using Bayesian meta-analysis. Anesthesiology 2008; 109:1023-35.

[9] Habib AS, El-Moalem HE, Gan TJ. The efficacy of the 5- HT3 receptor antagonists combined with droperidol for PONV prophylaxis is similar to their combination with dexamethasone. A meta-analysis of randomized controlled trials. Can J Anaesth 2004; 51: 311-9.

[10] Suzuki T, Sugimoto M, Koyama H, Mashimo T, Uchida I. Inhibitory effect of glucocorticoids on human-cloned 5-hydroxytryptamine3A receptor expressed in xenopus oocytes. Anesthesiology 2004; 101: 660-5.

[11] Andrieu G, Amrouni H, Robin E, Carnaille B, Wattier JM, Pattou F et al. Analgesic efficacy of bilateral superficial cervical plexus block administered before thyroid surgery under general anaesthesia. Br J Anaesth. 2007; 99: 561–566.

[12] Bisgaard T, Klarskov B, Kehlet H, Rosenberg J. Preoperative dexamethasone improves surgical outcome after laparoscopic cholecystectomy: a randomized double-blind placebo-controlled trial. Ann Surg 2003; 238: 651–660.

[13] Lee Y, Lai HY, Lin PC, Lin YS, Huang SJ, Shyr MH. A dose ranging study of dexamethasone for preventing patient-controlled analgesia- related nausea and vomiting: a comparison of droperidol with saline. Anesth Analg 2004; 98:1066–1071.

[14] Chen CC, Siddiqui FJ, Chen TL, Chan ES, Tam KW. Dexamethasone for Prevention of Postoperative Nausea and Vomiting in Patients Undergoing thyroidectomy: Meta-analysis of Randomized Controlled Trials. World J Surg 2012; 36: 61–68.

[15] Barnes PJ. Molecular mechanisms and cellular effects of glucocorticosteroids. Immunol Allergy Clin North Am 2005; 25: 451-68.

[16] Johansson A, Bennett GJ. Effect of local methylprednisoloneon pain in a nerve injury model. A pilot study. Reg Anesth1997; 22 : 59-65.

[17] Holte K, Kehlet H. Perioperative single-dose glucocorticoid administration: pathophysiologic effects and clinical implications. J Am Coll Surg 2002;195: 694-712.

[18] Schimmer BP, Parker KL. Adrenocorticotropic hormone; adrenocortical steroids and their synthetic analogs; inhibitors of the synthesis and actions of adrenocortical hormones. In: Hardman JG, Limbird LE, Molinoff PB, et al, eds. Goodman and Gillmann's the Pharmacological Basis of Therapeutics. 10th ed. New York, NY: McGraw-Hill; 2001:1649–1677.

[19] Feroci F, Rettori M, Borrelli A, Lenzi E, Ottaviano A, ScatizziM. Dexamethasone prophylaxis before thyroidectomy to reduce postoperative nausea, pain, and vocal dysfunction: a randomized clinical controlled trial. Head Neck 2011; 33:840–846.

[20] Sauerland S, Nagelschmidt M, Mallmann P, Neugebauer EA. Risks and benefits of preoperative high dose methylprednisolone in surgical patients: a systematic review. Drug Saf. 2000; 23: 449–461.