

Multimodal Analgesia in Outpatient Head and Neck Surgery

A Feasibility and Safety Study

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IMPORTANCE Perioperative analgesia strategies that rely solely on narcotics may contribute to adverse effects and concerns about opioid abuse or dependence. Multimodal analgesia protocols incorporating nonnarcotic agents may reduce the need for postoperative narcotic use.

OBJECTIVE To evaluate the feasibility and safety of a multimodal analgesia protocol for outpatient head and neck surgical procedures and to identify the association of the multimodal analgesia protocol with postoperative pain perception scores and patient satisfaction.

DESIGN, SETTING, AND PARTICIPANTS Retrospective evaluation of prospectively collected data on adults who underwent outpatient thyroid, parathyroid, and parotid surgery between July 2016 and February 2017 at the head and neck surgery service of a tertiary care hospital using a multimodal analgesia strategy with use of immediate preoperative acetaminophen and gabapentin, and intention to treat with a nonnarcotic postoperative outpatient analgesia strategy.

MAIN OUTCOMES AND MEASURES Overall patient satisfaction scores, Overall Benefit of Analgesia Score (OBAS), and median resting and peak pain scores were recorded. Incidence of reliance on a narcotic-based postoperative outpatient analgesia strategy and adverse events related to altered analgesia strategy were identified.

RESULTS Sixty-four patients (48 [75%] female; mean [SD] age, 54.6 [14.3] years) underwent outpatient thyroid, parathyroid, or parotid surgery with use of a multimodal analgesia protocol. On a 10-point rating scale, patients reported low resting pain perception scores (median, 2 [range, 0-8]) and peak pain scores (median, 4 [range, 0-9]). The OBAS assessment for composite effectiveness of analgesia indicated a favorable median score of 1 (range, 0-10; permissible range, 0-28, with lower scores better). Thirty-nine (61%) patients were able to avoid postoperative narcotic use on discharge. Fifty-six (88%) patients reported "high" or "very high" satisfaction with the multimodal analgesia strategy. No complications related to bleeding, hematoma, significant adverse events, or readmissions were observed.

CONCLUSION AND RELEVANCE A multimodal analgesia strategy was feasible and safe in patients undergoing outpatient head and neck surgery and may reduce the need for narcotic use. It was associated with low pain perception scores, favorable OBAS, and overall satisfaction scores. The role of multimodal analgesia needs additional evaluation through comparative effectiveness assessment vs conventional pain management strategies.

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Outpatient head and neck surgical procedures present a unique opportunity for early return of patients to their home environment and reduced resource burden for the health care system.¹ However, same-day dismissal poses challenges for quick transition of patient care from the intensity of intraoperative management to postanesthesia care unit, and subsequently brief observation and discharge. Among other components of care pathways, this necessitates postoperative pain management strategies that avoid continued dependence on parenteral analgesia, as well as a reliable perioperative and postdischarge analgesia plan.

Perioperative analgesia strategies following outpatient head and neck surgical procedures (including thyroid, parathyroid, and parotid surgery) are variable and often depend on narcotic use. However, opioid use contributes to treatment-related adverse events in a substantial number of patients. In addition, substantial concerns persist relating to the abuse of and dependence on prescription narcotics.² A marked increase in deaths related to opioid use over the past 2 decades has resulted in several warnings on the prescription and use of opioids from the Centers for Disease Control and Prevention. Most of these deaths are the result of legally prescribed opioid medication use, as opioid sales have quadrupled over the same period.³ Concerns related to this epidemic of opioid use, as well as negative short-term effects, have spiked interest among the surgical community in enhanced recovery after anesthesia and multimodal analgesia (MMA) protocols.⁴

Multimodal analgesia techniques use varying combinations of local anesthesia and preoperative, perioperative, and postoperative administration of acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and gabapentin. These multimodal approaches have been shown to reduce or eliminate opioid use during in-hospital stay in a variety of surgical settings.⁵⁻⁷ Whereas MMA strategies may be uniquely useful and applicable in outpatient head and neck surgery, their feasibility and safety have not been studied in a same-day discharge patient population. Particular skepticism persists about the safety of perioperative administration of NSAIDs when operating in the richly vascular head and neck anatomical sites, as well as in surgical procedures in close proximity to the airway.

This study describes our experience with use of an MMA strategy in patients undergoing outpatient thyroid, parathyroid, and parotid surgery with same-day discharge. It reports information on its feasibility, safety, ability to avoid outpatient narcotic prescription, and patient perception of pain and satisfaction with an alternative analgesia strategy.

Methods

This is a retrospective evaluation of prospectively collected data for patients who underwent outpatient head and neck surgery at a tertiary care hospital between July 2016 and February 2017 with planned same-day discharge. The study was approved by the Nebraska Methodist Hospital institutional review board. Due to the retrospective nature of the study, and the minimal risks related to medical record review, additional con-

Key Points

Question Can multimodal analgesia techniques be safely applied in patients undergoing outpatient head and neck surgery?

Findings This study found that in patients undergoing outpatient thyroid, parathyroid, and parotid surgery, multimodal analgesia techniques reliant on a preoperative acetaminophen and postdischarge nonnarcotic anti-inflammatory agent strategy allowed the majority of patients to avoid postdischarge narcotic use; patients were satisfied and had low pain scores, and there were no adverse events related to the altered analgesia strategy.

Meaning A multimodal analgesia strategy is feasible, safe, and well tolerated by patients undergoing outpatient head and neck surgery, and may reduce the need for narcotic use.

sents were not required. Adult patients who underwent elective outpatient thyroid lobectomy (with or without isthmus-ectomy), total thyroidectomy, parathyroid exploration, and parotidectomy were included for assessment of outcomes related to use of MMA. Patients with concurrent neck dissection, additional surgical sites, or substantial deviation from surgical plan, and those with contraindications, drug interactions, or allergies related to acetaminophen, NSAIDs, and gabapentin were excluded.

As part of established institutional enhanced recovery after anesthesia pathways, patients planning to undergo elective outpatient head and neck surgery were counseled by the surgery and anesthesia teams about anticipated perioperative and postoperative pain management strategy. Patients were introduced to and offered the possibility of using an MMA plan using acetaminophen, NSAIDs, and gabapentin as analgesia adjuncts. Counseling in the clinic, at the time of case booking, was provided about pain management using acetaminophen and NSAIDs on same-day discharge, but patients were advised about opportunities for escalation of analgesic choices to narcotic agents if needed for rescue. Patients who expressed discomfort with the strategy were allowed treatment with a standard analgesia strategy, including narcotic use as clinically indicated.

On arrival to the preoperative area, patients underwent routine presurgical assessment by the surgical and anesthesia teams and were given a single dose of orally administered acetaminophen (1000 mg), gabapentin (100 to 300 mg, depending on age and weight), and meloxicam (7.5 mg) or celecoxib (200 mg), with a sip of water, approximately 1 hour before procedure initiation. Patients received standard-of-care intraoperative anesthesia care using intravenous propofol, midazolam, and fentanyl, and inhalational anesthetic agents. Additionally, patients received standard-of-care intravenous dexamethasone and ondansetron for antiemetic effect. Planned incisions were subcutaneously infiltrated with 1% lidocaine with 1:100 000 epinephrine solution, or 0.25% bupivacaine with 1:200 000 epinephrine solution, according to surgeon's choice, prior to making the incision.

The procedures were performed by 6 surgeons as per their usual technique. No specific changes in technique, postoperative care, or discharge patterns were requested for

Table 1. Overall Benefit of Analgesia Score (OBAS)^a and Components⁷

| Item No. | Description (Scale) |
|----------|---|
| 1 | Current pain (0 = minimal to 4 = maximum imaginable pain) |
| 2 | Distress and bother from vomiting in preceding 24 h (0 = not at all to 4 = very much) |
| 3 | Distress and bother from itching in preceding 24 h (0 = not at all to 4 = very much) |
| 4 | Distress and bother from sweating in preceding 24 h (0 = not at all to 4 = very much) |
| 5 | Distress and bother from freezing in preceding 24 h (0 = not at all to 4 = very much) |
| 6 | Distress and bother from dizziness in preceding 24 h (0 = not at all to 4 = very much) |
| 7 | Patient satisfaction related to pain management during the preceding 24 h (0 = not at all to 4 = very much) |

^a Calculated OBAS = (sum total of scores from items 1 through 6) + (4 - score from item 7); low OBAS indicates high benefit of analgesia.

patients receiving MMA. Routine postanesthesia care was provided with intravenous fentanyl titrated for pain until the patient could be moved to a short-observation unit where oral intake of fluids and nutrition was resumed.

Following resumption of oral intake, patients were administered oral ibuprofen, 600 mg, and acetaminophen, 500 mg, every 6 hours on an alternate staggered schedule such that one agent or the other was available to the patient every 3 hours. Patients were discharged home with this analgesia regimen when they met discharge criteria, 2 to 4 hours after procedure completion. Patients and clinicians were permitted to seek and prescribe narcotics (typically either a combination of hydrocodone with acetaminophen, or oxycodone), if indicated, either before or after discharge. However, the intention to treat with MMA strategy was considered to have failed in cases when oral narcotics were prescribed, irrespective of the cause of such prescription (poor pain control or lack of patient or clinician confidence in an untraditional analgesia strategy). Patients who were discharged with narcotics vs those discharged with non-narcotic regimens were recorded.

Patients received a follow-up telephone call from a dedicated health coach (independent of the surgical and study team), usually within 24 to 48 hours of same-day discharge, to check on patient well-being, reinforce after care instructions, answer patient queries, and offer support during convalescence at home. Patients had the opportunity to provide responses to a structured questionnaire enquiring about peak pain perception on a 10-point ordinal scale (0 = no pain to 10 = worst pain ever experienced).

Other questions related to current resting pain perception scores, and information relating to perceived adverse effects of analgesic use including nausea and/or vomiting, pruritus, diaphoresis, freezing, and dizziness, and overall satisfaction with analgesia strategy were recorded.

These variables contributed to the Overall Benefit of Analgesia Score (OBAS) calculated for each patient, and the median values and range for the entire cohort were reported. The OBAS has previously been validated and assesses the composite effectiveness of analgesia strategies, where low OBAS corresponds to high benefit of pain management strategy (Table 1).⁸

Table 2. Patient-Reported Outcomes Related to Use of Multimodal Analgesia Strategy, With or Without Narcotic Prescription at Discharge

| Variable | Median (Range) | | |
|---|-----------------------|-----------------------------------|-------------|
| | All Patients (N = 64) | Narcotics Prescribed on Discharge | |
| | | Yes (n = 25) | No (n = 39) |
| Resting pain ^a | 2 (0-8) | 2 (0-8) | 2 (0-6) |
| Peak pain ^a | 4 (0-9) | 4 (1-8) | 4 (1-9) |
| Overall Benefit of Analgesia Score ^b | 1 (0-10) | 2 (0-10) | 1 (0-6) |

^a On a scale of 0 to 10 (0 = no pain, 10 = worst pain ever experienced).

^b Low score indicates improved benefit of analgesia (Table 1 presents components and score calculation). Permissible range was 0 to 28.

In addition, review of clinical records was performed to identify analgesia-related adverse events including incidence of readmission, unplanned contact with clinical team for adjustment or change in analgesia strategy, bleeding complications, aspiration, and others. Data related to patients treated with the MMA strategy who completed the follow-up questionnaire are reported.

Results

During the study period, a total of 222 patients underwent outpatient thyroid, parathyroid, and parotid surgery. Sixty-four (29%) patients underwent outpatient head and neck surgical procedures with use of the MMA technique. This included 18 patients undergoing hemithyroidectomies, 30 patients undergoing total thyroidectomies, 9 patients with minimally invasive directed parathyroid explorations, and 7 patients undergoing superficial parotidectomy. A majority of patients were women (n = 48 [75%]), and the mean (SD) age for the cohort was 54.6 (14.3) years.

On a 10-point rating scale, patients reported a low median resting pain perception score (2 [range, 0-8]). Similarly, the median of the “peak” postoperative pain score remained low (4 [range, 0-9]).

The OBAS assessment measures the composite effectiveness of analgesia in optimizing pain control; minimizing nausea, itching, freezing, diaphoresis, and dizziness; and overall patient satisfaction with pain management. The median OBAS was 1 (range, 0-10), which fell within the permissible range of 0 to 28 (with low OBAS scores considered to be favorable), indicating effectiveness of the MMA strategy (Table 2).

Fifty-six patients (88%) reported “high” or “very high” satisfaction with the MMA strategy. No complications related to aspiration, bleeding, hematoma, significant adverse events, extension of hospital stay, or readmissions were observed.

Twenty-five patients (39%) required outpatient use of oral narcotics with or without anti-inflammatory agents. These patients experienced a median OBAS of 2 (range, 0-10). By corollary, narcotic prescriptions could be avoided in the remaining 39 (61%) of the patients, with a median OBAS of 1 (range, 0-6). A low OBAS indicated a favorable assessment of the

analgesic strategy by the patients and affirmed noninferiority of the MMA technique in patients who went home without narcotics (Table 2).

Four of the patients who were discharged with narcotic prescriptions required unplanned contact with a clinician in relation to pain management. In the group that was successfully managed with acetaminophen and ibuprofen, only 1 patient required such unplanned postdischarge contact with the surgical team.

Discussion

This study found that MMA strategies can be safely used in adult patients undergoing outpatient same-day thyroid, parathyroid, and parotid surgery. Patients receiving MMA did not experience any adverse events related to the alternative analgesia strategy, and they reported low peak and resting pain perception scores. Multimodal analgesia permitted same-day discharge and allowed 61% of patients to avoid the need for prescription of outpatient narcotics.

Postoperative pain management strategy has traditionally been steeped in use of narcotic agents.⁹ This practice has been reinforced by a variety of factors including tradition, patient expectations, and physician perception of what constitutes optimal analgesia. However, narcotic-based analgesia strategies contribute to perioperative adverse effects such as nausea, pruritus, constipation, and others. Additionally, there are substantial concerns about opioid prescriptions and their contribution to an emerging epidemic of opioid dependence and abuse. In 2012 alone, 259 million opioid analgesic prescriptions were filled in the United States. On average, 91 people die every day due to opioid overdoses. The Centers for Disease Control and Prevention cites physician disagreement on narcotic prescription as a key factor causing this epidemic, affirming the need for a reevaluation of prescription patterns and standardization of pain management protocols.³

Moreover, opioid-related adverse events may significantly prolong hospitalization and increase the costs related to health care delivery.^{10,11} Given the safeguards associated with the process of prescription of opioids for postdischarge pain, such as 2-factor authentication and prescription drug monitoring programs, additional demands on time and resources can be expected.

This has highlighted the need for alternative MMA protocols that could provide safe and effective analgesia while reducing the need for postoperative and postdischarge use of opioids. Multimodal analgesia protocols incorporate nonnarcotic agents including NSAIDs, acetaminophen, local anesthetics, and gabapentin in a variety of combinations, as adjuncts to standard analgesia strategies. These have been shown to reduce the need for opioid agents and adverse outcomes.¹² Preemptive administration of analgesia and combination of agents acting on a variety of receptors has been a central piece of these protocols.¹²

The role for such protocols has been investigated in a variety of surgical specialties such as orthopedic, gastrointestinal, and head and neck surgery.^{4,5,13,14} In addition to preinci-

sion infiltration of local anesthetic agents, studies indicate that preemptive analgesia with anti-inflammatory agents such as parecoxib may reduce plasma levels of stress hormones and produce better analgesia for patients undergoing thyroid surgery.¹⁵⁻¹⁷ There may be a role for ketorolac in reduction in nausea, vomiting, and dizziness episodes, without statistically significant contribution to the risk of postoperative hematoma formation, when used as an adjunct to narcotics.^{18,19} Combination regimens with use of NSAIDs and acetaminophen or its analogs have similarly demonstrated decreased narcotic use in thyroid and parathyroid surgery.^{20,21} Similarly, use of intravenous acetaminophen and lornoxicam may reduce postoperative pain scores, nausea, and opioid requirements.²²

Understandably, incorporation of NSAIDs in perioperative pain management may meet skepticism due to perceived risk of bleeding. In this study, we did not find any adverse events related to bleeding or hematoma. This is in congruence with emerging studies that suggest that, combined with meticulous intraoperative hemostasis, perioperative NSAID use may not be detrimental to surgical hemostasis. Chin and colleagues¹⁹ investigated ketorolac use in thyroid surgery and did not observe any statistically significant differences in the rate of bleeding complications. Other investigators have reported a comparable frequency of bleeding events for patients undergoing tonsillectomy with or without use of ibuprofen. In a large study of more than 6000 patients, Pfaff et al²³ found no significant increase in bleeding events or return to the operating room with use of an ibuprofen-based post-tonsillectomy analgesia strategy. Mudd and colleagues²⁴ corroborate that ibuprofen use did not contribute to overall risk for posttonsillectomy hemorrhage. In their study, bleeding events that necessitated transfusion were rare; however, when bleeding did occur, transfusion requirements were higher in patients who had received ibuprofen. Similarly, the safety of continued use of perioperative NSAIDs has been demonstrated in head and neck cutaneous surgery and carotid endarterectomy.^{25,26} Moreover, alternative agents such as cyclo-oxygenase 2 inhibitors (including celecoxib) avoid interference with the normal mechanisms of platelet aggregation and hemostasis.²⁷ These data may allay anxiety about risk for bleeding and encourage surgeons and patients to consider incorporation of anti-inflammatory medications in perioperative analgesia protocols. Future large-scale randomized clinical trials may further clarify the interaction of perioperative NSAIDs with surgical hemostasis.

Investigations on the use of gabapentin suggest potential benefit in postoperative pain, time to demand for first rescue analgesic, reduced analgesic consumption, and role in prevention of delayed neuropathic pain in a study using a superficial cervical plexus block.²⁸⁻³² However, these investigations relied on in-hospital observation and management of patients and variable reliance on rescue analgesics including narcotics administered through enteral and parenteral routes. Whereas these reports provide important information, they do not describe the experience of patients who undergo outpatient head and neck surgery with no expectation of overnight hospital stay and no avenue for rescue with breakthrough medications.

The feasibility, safety, and experiences with MMA and outpatient pain management centered on the use of acetaminophen and NSAIDs, and its role in curtailing the need for opioid prescriptions at discharge, have largely not been reported. In this study, we found that the patient-reported pain scores were relatively modest, matching the findings by Kalmovich et al.³³ As a result, most patients undergoing outpatient thyroid, parathyroid, and parotid surgery may have an opportunity to deescalate traditional opioid-dependent analgesia protocols, by incorporating preemptive and multimodal agents.

Our findings of low pain perception scores and favorable OBAS measurements, as a metric of adverse effects such as freezing, nausea and/or vomiting, pruritus, diaphoresis, dizziness, and overall satisfaction with analgesic plan, set the stage for additional comparative assessment through a randomized clinical trial of multimodal and nonnarcotic postdischarge analgesia against narcotic-based care pathways. Our results show no detriment toward the ability to achieve same-day discharges and no increase in the burden of readmissions or unplanned interactions with the health care team necessitated by a failed analgesia strategy during convalescence at home. These findings can easily be adopted by physicians and clinical pathways that use a 23-hour stay for patients undergoing thyroid, parathyroid, or parotid surgery.

Limitations

Some of the limitations of this study include a small sample size and the retrospective nature of the study. The ability to pursue the MMA strategy may have been affected by the patients' baseline health, anxiety, and previous experiences with health care. Additionally, some patients may experience greater distress than others when confronted with surgery and may find discussion about the proposed alternate analgesia strategy burdensome. Other factors that may influence participation may relate to the clinician, such as the way the opportunity for using the altered analgesia strategy is presented. Whereas it is possible that patients may experience selection bias based on their perceived pain threshold, the prac-

tice of counseling patients in the clinic and deciding to proceed with the MMA strategy only when the patient and the clinician were comfortable with the plan reflects the challenges of real-world medicine. Furthermore, this approach respected the equipoise and/or uncertainty related to the feasibility or benefits of the strategy in this patient population.

Additionally, our present findings may not be generalizable to patients who require adjunctive procedures such as regional lymphadenectomy and reoperative procedures. However, the observations in this study demonstrate the feasibility and applicability of an MMA strategy and successful aversion of prescription of narcotics at discharge following outpatient head and neck surgery by a diverse group of surgeons using standard care pathways. It reports outcomes that are recorded by health coaches independent of the surgical and study teams, and reflects current patterns of health care in which patients undergoing these surgical procedures anticipate and expect quick postsurgical discharge and return home. In this setting, it is important that analgesia strategies balance the goals of safety, reliability, and effectiveness while promoting optimal use of resources during and after a short hospital stay.

Our findings provide reassurance to clinicians considering use of adjunctive agents for preemptive MMA protocols and encourage reevaluation of the necessity and frequency of narcotic prescriptions for patients being discharged after outpatient head and neck surgery.

Conclusions

A multimodal analgesia strategy was feasible and safe in patients undergoing outpatient same-day head and neck surgery and may reduce the need for postdischarge narcotic use. It was associated with low pain perception scores, favorable Overall Benefit of Analgesia Score, and overall satisfaction. The role of multimodal analgesia needs additional evaluation through comparative effectiveness assessment vs conventional pain management strategies.

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