

Thesis

**Evaluation of early postoperative discomforts and
perioperative satisfaction in urological patients of
the University Hospital LKH Graz**

submitted by
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Graz, 22.09.2023

Declaration of Academic Integrity

I hereby confirm that the present diploma thesis is the result of my own independent scholarly work.

I also confirm that in all cases, where material from the work of others (in books, articles, essays, dissertations, and on the internet) is acknowledged, quotations and paraphrases are clearly indicated. No material other than that cited in the reference list has been used.

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Sasa Pavić m. p.

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Zusammenfassung

Hintergrund

Die Zufriedenheit der Patientinnen und Patienten in Bezug auf die Anästhesie wird hauptsächlich durch postoperative Schmerzen sowie das Auftreten von Übelkeit und Erbrechen beeinträchtigt. Das Ziel dieser Arbeit ist es, die derzeitige Situation und frühe postoperative Beschwerden sowie die perioperative Zufriedenheit bei urologischen Patientinnen und Patienten im LKH-Univ. Klinikum Graz zu untersuchen, um mögliche Ansatzpunkte für Verbesserungen aufzuzeigen.

Methoden

Diese prospektive, monozentrische Querschnittsstudie wurde am Universitäts-Klinikum LKH Graz durchgeführt. Es wurden 395 Fragebögen (anästhesiologischer Nachbefragungsbogen nach Hüppe M et al.) an Klinik für Urologie des Universitäts-Klinikums LKH Graz nach elektiven Operationen ausgehändigt. Diese Fragebögen enthielten Fragen zum Ausmaß möglicher auftretender Beschwerden und zur aktuellen Zufriedenheit. Zusätzlich wurde der Einfluss von personalisierter Musik und nachfolgendem Eistee auf frühe postoperative Beschwerden und die perioperative Zufriedenheit untersucht.

Ergebnisse

Basierend auf den in unserer Studie erhobenen Daten stellten wir fest, dass 360 Patienten (ungefähr 93,51 %) keine physischen Beschwerden angaben, während nur 25 Patienten (ungefähr 6,49 %) während des Studienzeitraums physische Beschwerden hatten, wobei kein signifikanter Unterschied zwischen den Gruppen festgestellt wurde. Die Gesamtzufriedenheit unserer Patienten lag in allen drei Gruppen kontinuierlich über 90 % für Fragen zur Zufriedenheit mit bestimmten Parametern (Abb. 5-14). Dies deutet darauf hin, dass die Patientenzufriedenheit

nach urologischen Eingriffen auf einem sehr hohen Niveau liegt, während körperliche Beschwerden minimiert wurden.

Schlussfolgerung

Nach dem Vergleich aller im Rahmen dieser Studie gesammelten Daten konnten wir feststellen, dass keine signifikanten Unterschiede hinsichtlich des frühpostoperativen Unbehagens und der perioperativen Zufriedenheit bei urologischen Patienten bestehen. Das Angebot von Kopfhörern oder Eistee hat nicht den gewünschten, für uns signifikanten Effekt zur Verbesserung gebracht, hat jedoch die Türen für weitere Forschung und potenzielle Verbesserungen der Patientenzufriedenheit durch die Einführung kostengünstiger Methoden und Angebote unmittelbar nach der Operation geöffnet.

Abstract

Background

Patient satisfaction regarding anesthesia is primarily diminished by postoperative pain and the occurrence of nausea and vomiting. The aim of this study is to investigate the current situation, early postoperative discomforts, and perioperative satisfaction in urological patients at the University Hospital LKH Graz in order to identify potential areas for improvement.

Methods

This prospective, single-center cross-sectional study was conducted at the University Hospital LKH Graz. A total of 395 questionnaires (anesthesiology follow-up questionnaire according to Hüppe M et al.) were handed out to female patients in the Urology Department of the University Hospital LKH Graz following elective surgeries. These questionnaires included questions about the extent of potential discomforts experienced and current satisfaction. Additionally, the influence of personalized music and subsequent iced tea on early postoperative discomforts and perioperative satisfaction was investigated.

Results

Based on the data obtained in our study, we found that 360 patients (approximately 93.51%) reported no physical complaints, while only 25 patients (approximately 6.49%) experienced physical complaints during the study period, with no significant difference between the groups. The overall satisfaction of our patients was consistently above 90% in all three groups for questions regarding satisfaction with specific parameters (Fig. 5-14). This suggests that patient satisfaction after urological surgery is at a very high level, while physical discomfort has been minimized.

Conclusion

After comparing all the data obtained through the study, we found that there were no significant differences between patients in terms of early postoperative discomfort and perioperative satisfaction in urologic patients. For us, offering headphones or iced tea did not provide the statistically significant improvement we were looking for. However, it has opened the doors for further research and possible improvements in patient satisfaction through the introduction of low-budget methods and services immediately after surgery.

Table of Contents

Acknowledgement	3
Zusammenfassung	4
Hintergrund	4
Methoden	4
Ergebnisse	4
Schlussfolgerung.....	5
Abstract	6
Background.....	6
Methods	6
Results	6
Conclusion	7
List of Abbreviations	11
List of figures	12
List of tables	14
1 Introduction	15
1.1 Commencement of the Subject	15
1.2 Demonstration of Knowledge/Research Gap	16
1.3 Justification of the Research Inquiry.....	16
1.4 The objective of this study.....	16
1.5 Definition of Nausea and Vomiting	16
2 Postoperative nausea and vomiting (PONV)	17
2.1 Nausea	17
2.2 Vomiting	18
2.3 Retching	18
2.4 Involved receptors	18
2.5 The chemoreceptor trigger zone	19
2.6 Risk Factors for Postoperative Nausea and Vomiting	20
2.6.1 Individual risk factors:	21
2.6.2 Anesthetic risk factors:.....	21
2.6.3 Surgical risk factors:	22
2.7 Apfel Score for Postoperative Nausea and Vomiting.....	22
3 Reducing PONV risks in elective surgeries.....	25

3.1	Medical prophylaxis.....	25
3.1.1	Serotonin-5-HT3 Receptor Blockers	26
3.1.2	Dopamine receptor antagonist.....	27
3.1.3	Metoclopramide	27
3.1.4	Corticosteroids.....	28
3.1.5	Neurokinin-1 (NK1) receptor antagonists.....	28
3.1.6	Antihistamines	30
3.1.7	Benzodiazepines	30
3.1.8	Cannabinoids.....	31
3.1.9	Scopolamine	31
3.1.10	Combination therapy.....	32
4	Common urological procedures and the corresponding anesthesia techniques utilized	33
4.1.1	Nephrectomy	33
4.1.2	Cystectomy.....	34
4.1.3	Transurethral resection of bladder cancer (TURB)	34
4.1.4	Transurethral resection of the prostate (TURP).....	34
4.1.5	Prostatectomy.....	35
4.1.6	Radical prostatectomy (RPE).....	35
4.1.7	Laparoscopic (robot-assisted) radical prostatectomy.....	35
4.1.8	Percutaneous nephrolithotomy (PCNL)	35
5	Material and Methods	36
5.1	Patient recruitment	36
5.2	Questionnaire	37
5.3	Intervention	38
6	Results.....	40
6.1	Comparative demographics and medical history across three study periods	40
7	Discussion	57
7.1	Answers to the Research Questions	57
7.1.1	Pain	57
7.1.2	Physical discomfort.....	58
7.1.3	Satisfaction	58
7.1.4	Dry mouth	58
7.1.5	Headphones and Tea.....	59
7.2	Conclusion	59

7.3	Critical Reflection / Limitations on Content and Method	60
7.4	Implications for Theory and Practice	60
7.5	Outlook and Suggestions for Further Research	60
8	Bibliography	61
9	Attachment.....	68
9.1	Questionnaire.....	68

List of Abbreviations

ASA.....	American Society of Anesthesiologists
CRTZ	Chemoreceptor trigger zone
5-HT3.....	5-Hydroxytryptamin-3
CNS	central nervous system
H1	Histamine H1 receptor
M3/M5.....	muscarinic acetylcholine receptor
D2	dopamine receptor
NK1.....	Neurokinin-1 receptor
BMI	body mass index
ENT.....	ear, nose and throat
GI	gastrointestinal tract
CB1.....	cannabinoid receptor
DVC	dorsal-vagal complex
TDS.....	transdermal scopolamine
RCC	renal cell carcinoma
TURB	transurethral resection of the bladder
TURP	transurethral resection of the prostate
RALP.....	robotically assisted laparoscopic radical prostatectomy
RPE	radical prostatectomy
PCNL	percutaneous Nephrolithotomy

List of figures

Figure 1: Number of patients after a urological procedure with/without the onset of nausea for each group/period and in total.....	41
Figure 2: Number of patients after a urological procedure with/without occurrence of pain for each group/period and in total	42
Figure 3: Number of patients after a urological procedure with/without occurrence of physical discomfort for each group/period and in total	43
Figure 4: Number of patients after a urological procedure that are feeling and not feeling well for each group/period and in total	39
Figure 5: Number of patients after a urological procedure that are satisfied/unsatisfied after talking with the anesthesiologist before the surgery for each group/period and in total.....	45
Figure 6: Number of patients after a urological procedure that are satisfied/unsatisfied with the schedule of the operative day for each group/period and in total.....	46
Figure 7: Number of patients after a urological procedure that are satisfied/unsatisfied with preoperative care for each group/period and in total	47
Figure 8: Number of patients after a urological procedure that are satisfied/unsatisfied with anesthesia for each group/period and in total	48
Figure 9: Number of patients after a urological procedure that are satisfied/unsatisfied with post-anesthesia care for each group/period and in total	49
Figure 10: Number of patients after a urological procedure that are satisfied/unsatisfied with with the anesthesiologist's care for each group/period and in total.....	45
Figure 11: Number of patients after a urological procedure that are satisfied/unsatisfied with supervision by an anesthesiology nurse for each group/period and in total.....	46
Figure 12: Number of patients after a urological procedure that are satisfied/unsatisfied with measure against pain for each group/period and in total	47

Figure 13: Number of patients after a urological procedure that are satisfied/unsatisfied with recovery since surgery for each group/period and in total48

Figure 14: Number of patients after a urological procedure that are satisfied/unsatisfied with current status for each group/period and in total.....49

List of tables

Table 1: Analysis of different aspects of patients experience in the urology department	55
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1 Introduction

1.1 Commencement of the Subject

Postoperative nausea and vomiting, also known as PONV, have historically been among the most common complications of anesthesia. In the past, little attention was paid to this problem, but with advances in anesthesia and the achievement of high levels of patient safety (thanks to pharmacologic and technological developments), more attention has been paid to other aspects [1]. While safety remains a priority in anesthesia and the operating room, patient comfort and satisfaction have finally become more important. Preoperative survey of Macario, Alex MD, MBA, n=101, at Stanford University Medical Center (09/1999) has shown that many patients consider vomiting to be most undesirable outcome after surgery. In terms of a scale ranging from 1 to 10, where 1 represents the most tolerable adverse reaction and 10 represents the most severe, pain is rated as the third most significant, while nausea is ranked fourth, and vomiting is ranked tenth. [17,10]

Apart from patient dissatisfaction, PONV can be life-threatening. In addition to the potential for significant morbidity, it can lead to venous hypertension, bleeding, and esophageal rupture, which pose critical risks to the respiratory system. [10] Such events may require prolonged recovery and medical supervision, which are undesirable for both patients and the healthcare system. PONV not only presents problems for patients but also incurs financial costs and places a burden on the healthcare system. [10]

The actual risk of PONV for patients is still not fully understood. To clarify the risk factors, it is necessary to investigate the pathophysiology of PONV symptoms and their molecular biology. [10] Taking into account extensive years of research, a multitude of risk factors has already undergone comprehensive investigation, leading to the development of systems capable of predicting patient risk with a validity of up to 70%. [1].

1.2 Demonstration of Knowledge/Research Gap

The task of defining patient satisfaction proves to be notably challenging due to the highly abstract nature of this concept. [53] It is influenced by a myriad of factors, including but not limited to cultural, sociodemographic, cognitive, and emotional aspects. [51,52]

1.3 Justification of the Research Inquiry

Patient care has become increasingly important in the context of surgical procedures. Patient satisfaction is a key aspect of the effective functioning of health care systems, and the value of the patient is paramount in all decision-making processes [9,1].

1.4 The objective of this study

Aim of this study is to exploratory investigate early postoperative urological patients discomforts and satisfaction.

1.5 Definition of Nausea and Vomiting

Nausea

Nausea is defined as an unpleasant sensation referred to a desire to vomit not associated with expulsive muscular movement. [2]

Vomiting

It is the forceful expulsion of even a small amount of upper gastrointestinal contents through the mouth. [2]

2 Postoperative nausea and vomiting (PONV)

Postoperative nausea and vomiting (PONV) are one of the major problems after surgical procedures or anesthesia. [19] The duration of these symptoms can vary from a few minutes to several days. [10] PONV episodes typically occur within the first 24 to 48 hours after surgery, with patients experiencing severe nausea. [10] The incidence of postoperative nausea and vomiting is difficult to predict, making it a significant problem in postoperative patient care. More than a quarter of patients have had negative experiences with PONV. [10] The incidence of PONV is about 30% of all surgical patients and about 80% of high-risk patients (nonsmokers, women, history of vomiting after surgery, and planned postoperative opioid use for pain management). [14]

PONV consists of three main symptoms:

- Nausea,
- Vomiting and
- Retching without expulsion of gastric contents. [10]

These symptoms predominantly occur after surgical procedures, either individually or most commonly together. [10] Nausea and vomiting should be classified into separate groups as they are distinct entities that can occur not only after surgical procedures but at any time. [13]

2.1 Nausea

Nausea is a subjective sensation that precedes vomiting. Sweating, increased saliva production, and vasomotor disturbances may occur during nausea episodes. [10] Symptoms associated with nausea include epigastric burning, bloating, abdominal pain, and discomfort with ingestion of food or fluids. [13]

2.2 Vomiting

Vomiting involves activity of the abdominal intercostal and pharyngeal muscles, resulting in contraction of the bowel, elevation of the soft palate, relaxation of the gastric fundus, closure of the glottis, and oral expulsion of gastric contents. [10] Symptoms accompanying this reflexive act indicate increased autonomic nervous system involvement, such as rapid breathing, excessive salivation, dilated pupils, sweating, and increased heart rate. [10, 13] The process of vomiting begins with the activation of motor pathways in the medulla oblongata (particularly the lateral reticular formation), which is located near the nucleus tractus solitarius and the dorsal motor nucleus of the vagus nerve. The process continues via cranial nerves V, VII, IX, X, and XII, which innervate the upper gastrointestinal tract and are also connected to other autonomic centers in the reticular formation (respiratory, vasomotor, etc.) [14]

Activation of the vomiting center results in the initiation of the vomiting reflex, which can be stimulated by movement, gastrointestinal or oropharyngeal disturbances, hypotension, pain, and hypoxemia. [14]

2.3 Retching

Retching, which is repeated sequentially in intervals of up to five minutes without expulsion of contents, is defined as one emetic episode in this study. [10]

2.4 Involved receptors

The processes that lead to vomiting originate from the vomiting center. The vomiting center receives inputs from four important input systems. These input systems have specific receptors that serve as targets for various pharmacological antiemetic therapies. [18]

The four main systems that play a role in activating and stimulating the central vomiting center are:

- Gastrointestinal tract
- Vestibular region
- Cerebral cortex and thalamus
- Chemoreceptor trigger zone (CRTZ) [13,18]

Via vagal afferent neurons expressing 5-HT₃ receptors, the vomiting center receives inputs from the gastrointestinal tract. Serotonin stimulates these receptors, leading to the release of bacterial toxins, alkaloids, cytostatics, or radiation therapy from the enterochromaffin cells of the gastrointestinal mucosa. Activation of vagal afferents occurs through the nucleus tractus solitarius and the area postrema. [18]

The vestibular apparatus is activated in motion sickness and various motion-related disorders. This input system contains histamine H₁ and muscarinic receptors of the M₃/M₅ type. [18]

Inputs related to visual, olfactory, and gustatory sensations come from higher centers in the cortex and limbic system. [18]

2.5 The chemoreceptor trigger zone

CRTZ is located between the medulla and the floor of the fourth ventricle. Unlike other brain centers, it does not possess the blood-brain barrier, allowing toxins and chemicals that are normally excluded from the central nervous system by the blood-brain barrier to access this region. [13,2] This facilitates the penetration of various irritants into this area, regardless of their lipid solubility and molecular size. [13]

Circulating drugs in the blood can stimulate CRTZ-A, which, upon stimulation, can send emetogenic triggers to the vomiting center (in the brainstem) to activate the vomiting reflex. [14]

This chemoreceptor trigger zone possesses D2 receptors and opioid receptors, which send excitatory inputs to the vomiting center during stimulation. (18)

The blood-brain barrier plays a significant role in postoperative nausea and vomiting (PONV). It contains the neurotransmitter substance P, which is mediated by NK1 receptors. [18]

There is coordinated contraction of abdominal muscles against a closed glottis, leading to increased intraabdominal and intrathoracic pressure. During this process, the pyloric sphincter contracts while the esophageal sphincter relaxes. This results in active antiperistalsis within the esophagus, leading to forced expulsion of gastric contents. Symptoms such as sweating, pallor, and bradycardia occur during this process. [14]

2.6 Risk Factors for Postoperative Nausea and Vomiting

Risk factors for postoperative nausea and vomiting (PONV) can help an anesthesiologist differentiate and identify risks for PONV. [10] The occurrence of postoperative nausea and vomiting is influenced by numerous factors that depend on the patient or are associated with anesthesia and surgical procedures. Factors that most commonly affect the risk of PONV include age, female gender, body mass index (BMI), non-smoking status, history of migraine, type of anesthesia (general or regional), and the type and duration of the surgery. [16] The most common causes of PONV include the use of volatile anesthetics, nitrous oxide, and postoperative opioids. The effect of volatile anesthetics on PONV depends on the dose and is most pronounced in the first few hours after surgery. Additionally, postoperative opioids increase the risk of PONV, and this risk is dose dependent. There has been a noted reduction in the frequency of PONV in patients who received regional anesthesia without opioids and in those who used non-opioid analgesics, perioperative alpha-2 agonists, and beta-blockers for pain control after surgery. [32]

Risk factors are divided into three groups:

2.6.1 Individual risk factors:

there are four main individual risk factors for postoperative nausea and vomiting (PONV):

1. Female gender: women have a higher risk of suffering from PONV after surgery.
2. History of PONV or motion sickness: patients with a history of PONV or motion sickness are more likely to suffer from PONV after surgery.
3. Non-smokers: non-smokers are at higher risk for PONV compared to smokers.
4. Younger age: younger patients are more prone to PONV after surgical procedures. [50]

2.6.2 Anesthetic risk factors:

1. Increasing duration of anesthesia: The longer a patient is under anesthesia during a surgical procedure, the higher the risk of PONV. Prolonged exposure to anesthesia can disrupt the body's natural balance and contribute to postoperative nausea and vomiting. [10]

2. General anesthesia versus regional anesthesia or sedation: general anesthesia, in which unconsciousness is induced, is associated with a higher incidence of PONV than regional anesthesia or sedation, in which only certain areas of the body are anesthetized or the patient remains partially conscious. [10]

3. Balanced versus total IV anesthesia: Balanced anesthesia, in which multiple types of anesthetic are combined, may increase the likelihood of PONV compared with total intravenous anesthesia (IV), in which only IV-administered drugs are used for anesthesia. [10]

4. Use of longer-acting opioids compared with shorter-acting opioids: Opioids are commonly used to treat pain after surgery. Long-acting opioids are more likely than shorter-acting opioids to be associated with PONV due to their extended presence in the body. [10]

It is imperative that anesthesiologists consider these risk factors when planning and administering anesthesia to patients undergoing surgery. If it is possible to reduce exposure to these risk factors, it may help minimize the incidence of postoperative nausea and vomiting and improve the overall surgical experience for patients. [10]

2.6.3 Surgical risk factors:

fall into the third group of risk factors. The type of surgery is strongly considered a risk factor for PONV, but it is challenging to prove that it is an independent risk factor due to differences in identifying specific procedures. [10] Certain types of surgeries that are considered potential risk factors include intra-abdominal, laparoscopic, orthopedic, gynecological, ENT, thyroid, breast, plastic, and neurosurgical procedures. In children, risky procedures may include hernia repair, adenotonsillectomy, strabismus correction, penile surgery, and orthopedics. Other possible risk factors associated with surgery include reduced fluid intake before or during surgery and the use of colloid solutions instead of crystalloids, especially in prolonged operations. [10]

2.7 Apfel Score for Postoperative Nausea and Vomiting

Like all medications, antiemetics also have many side effects, ranging from mild headaches to potential prolongation of the QTc interval, which rarely can lead to cardiac arrest. [32] However, in addition to the various risk factors for postoperative nausea and vomiting (PONV) that have been mentioned, none of them is sufficient on its own to assess the risk or make clinical decisions regarding prophylactic antiemetic therapy. Therefore, there are two common risk assessments for patients,

namely the Koivuranta score and the Apfel score. [32] The Apfel score is mostly used for assessing PONV in patients. [32] This score consists of four items: female gender, history of PONV or motion sickness, non-smoking status, and postoperative opioid use. [4]

When using the Apfel score, points are assigned for each item mentioned. These points help identify the patient's risk. For example, with 0 points, the expected incidence of PONV is 10%, while with four points, it is 80%. Three points already indicate a high risk. [4]

Although the Koivuranta score and Apfel score are used to assess the risk of PONV, their predictive ability is not perfect. In other words, while these scoring systems can provide useful guidelines about an individual patient's risk of developing PONV, they cannot predict that risk with 100% certainty. [10] This limitation suggests that other factors should still be considered, and the clinical situation of each patient should be evaluated to make the best decisions regarding the administration of prophylactic antiemetics. [10]

When assessing and managing PONV, an approach known as "decision trees" is advocated. It uses risk factors to categorize patients into "low," "moderate," "high," or "extremely high" risk categories. [10] This approach takes into account different risk factors that the patient has, such as a history of previous nausea and vomiting, gender, smoking status, or the use of postoperative opioids. Based on these risk factors or their combination, patients are categorized into a specific risk level. [10]

This categorization helps in making decisions regarding the administration of prophylactic antiemetic therapy and provides guidelines on which patients are most likely to benefit from such therapy. [10] There is a consensus that prophylactic antiemetic therapy is not cost-effective for patients at low risk (below 10% or 20% expected risk), while it is recommended for other patients. The best possible prophylaxis for patients at moderate, high, or extremely high risk consists of a combination of therapies, using antiemetics from different classes or implementing pharmacological and non-pharmacological interventions (e.g., acupuncture) with a multimodal treatment approach or a combination of multiple approaches. [10]

This "decision tree" approach also allows an anesthesiologist to better identify patients at high risk of PONV and further reduce the incidence of PONV. Ultimately, this can increase the safety and cost-effectiveness of PONV prophylaxis. [10]

3 Reducing PONV risks in elective surgeries

Postoperative nausea and vomiting (PONV) are not only common but also one of the most disturbing side effects after surgery/anesthesia.

It is important to tailor pharmacologic treatment of PONV to the individual patient's risk by using validated risk assessment systems. This approach not only helps minimize potential side effects but also avoids unnecessary costs. [22]

Intra-abdominal surgeries, which include adult urologic procedures, are classified as having a very high incidence of postoperative nausea and vomiting (PONV) (70%). [21]

Given the high incidence of postoperative nausea and vomiting (PONV) in urologic patients, combining two antiemetics that act through different mechanisms or target different receptors may be a beneficial approach. [22] This combination can effectively prevent PONV and lead to positive outcomes. [30]

In addition to drug prevention, there are several nonpharmacologic measures to prevent postoperative nausea and vomiting. These include procedures such as acupuncture, aromatherapy, and fluid replacement. [31]

3.1 Medical prophylaxis

A number of medications are used to treat postoperative nausea and vomiting (PONV) and are categorized according to their effects on various receptors. The following section discusses medications that are effective in preventing and treating nausea and vomiting in patients after surgery.

3.1.1 Serotonin-5-HT3 Receptor Blockers

Selective serotonin receptor (5-HT₃) antagonists work by blocking serotonin in two key areas: at the stomach's nerve terminals and in a region of the brain called the chemoreceptor trigger zone. This blocking action helps prevent nausea and vomiting effectively. [3]

There are several 5-HT₃ receptor antagonists available on the market, such as ondansetron, granisetron, and palonosetron. They are approved for preventing nausea and vomiting in both kids and adults. [3]

These drugs can be taken by mouth or given as injections. The right dose should be determined based on individual factors to provide the best protection against nausea and vomiting. [18]

The most frequent side effects of 5-HT₃ receptor blockers are headaches, abdominal pain, and constipation. Although rare, one of the most serious side effects can be heart rhythm problems, specifically an abnormal prolongation of the QT interval in the heart. [18]

A systematic review found that serotonin antagonists (ondansetron, granisetron, and tropisetron), dexamethasone, droperidol, and cyclizine were more effective than placebo in treating postoperative nausea and vomiting. [18]

Ondansetron is widely used as a selective serotonin receptor (5-HT₃) antagonist in the field of antiemetics. It effectively antagonizes nausea and vomiting by acting on both central and peripheral mechanisms, primarily through antagonism of 5HT-3 serotonin receptors in the area postrema. [18] It does not act on dopamine receptors, and adverse central effects are rare. The dosage for PONV prophylaxis is 4 mg slow iv/im at induction or 16 mg 1 hour before surgery. Because of the association with prolonged Q-T syndrome, a single intravenous dose should not exceed 16 mg (8 mg at > 75 years) and should be infused over > 15 minutes. [5]

The antiemetic effect of ondasetron lasts for 12 hours. [6]

Palonosetron differs from other setrons in that it has approximately 100 times greater affinity for 5-HT₃ receptors. It also has a particularly long plasma half-life of about 40 hours, which is why it is administered only as a single injection. [18]

3.1.2 Dopamine receptor antagonist

The significance of this class of substances in antiemetic therapy has declined due to the development of more effective and safer antiemetics. [7]

The antiemetic effect of dopamine receptor antagonists is achieved through the inhibition of D₂ receptors in the chemoreceptor trigger zone and other brainstem nuclei. [7]

Dopamine receptor antagonists are indicated for the short-term treatment of postoperative nausea and vomiting (PONV) due to their safety concerns. [18]

There are three groups of medications that are effective in treating postoperative nausea and vomiting (PONV). These include:

-Butyrophenones: Haloperidol

-Benzimidazole derivatives: Droperidol, Domperidone

-Benzamides: Metoclopramide, Alizapride [18]

3.1.3 Metoclopramide

In addition to its central action as a dopamine D₂ antagonist, Metoclopramide also possesses peripheral cholinergic properties. This enables it to act as a prokinetic agent in the upper gastrointestinal tract, facilitating gastric emptying. The recommended dose for adults is typically 0.15-0.3 mg/kg body weight (10-20 mg). [8] Metoclopramide is a cost-effective and safe medication widely used worldwide

for the prevention of postoperative nausea and vomiting (PONV) [11]. It is often utilized when antiemetic prophylaxis with 5-HT₃ antagonists, dexamethasone, and/or Droperidol fails. [22] Within the context of general anesthesia, intravenous administration of Metoclopramide 10 mg effectively combats postoperative nausea and vomiting. At this dosage, no typical side effects such as headaches or sedation have been observed [11]. Metoclopramide serves as a viable alternative to more expensive preparations for PONV prevention [11]. The maximum daily dose of metoclopramide when taken orally should not exceed 30mg, and the maximum duration of use should not exceed 5 days. [18]

3.1.4 Corticosteroids

The recommendation for patients with a known increased risk of developing PONV is the prophylactic preoperative administration of a single dose of intravenous Dexamethasone. The mechanism by which glucocorticoids exert antiemetic effects is not fully understood. [12] At a dosage of 4mg intravenously, Dexamethasone demonstrates a comparable antiemetic effect to the use of 4mg Ondansetron and 1.25mg Droperidol. [23] Furthermore, it has been observed that the antiemetic efficacy of glucocorticoids is significantly enhanced when administered shortly before the induction of anesthesia. [13]

Although dexamethasone is the best known and most commonly used drug for the prevention of PONV from the class of corticosteroids, methylprednisolone and prednisone can also be used for this purpose. Dexamethasone has a half-life of 36 hours and no mineralocorticoid effects. [18]

3.1.5 Neurokinin-1 (NK1) receptor antagonists

NK-1 receptor antagonists antagonize nausea and vomiting by centrally blocking the area postrema, nucleus tractus solitarius, and visceral afferent nerves. Substance P, an excitatory neurotransmitter involved in pain perception, mediates most of the central and peripheral effects via NK-1 receptors. [15]

In combination with a setron (5-HT₃ receptor antagonist) and dexamethasone, these substances are able to prevent not only acute vomiting but also delayed vomiting. [18]

Aprepitant is taken orally in three doses (125mg, 80mg, 80mg) over three consecutive days. To prevent postoperative vomiting, Aprepitant is administered orally as monotherapy at a dose of 40 mg, 3 hours before induction of anesthesia. [18]

Fosaprepitant, a precursor to Aprepitant, is administered in a single intravenous dose of 150 mg. [14]

3.1.6 Antihistamines

It should be noted antihistamines such as diphenhydramine and dimenhydrinate carry a similar efficacy in reducing postoperative nausea and vomiting as dexamethasone and Droperidol. However, antihistamines are typically not a first-line treatment. [16]

H-1 receptors in central nervous system areas include the area postrema and vomiting center in the vestibular nucleus. Also, many of the antihistamines have anticholinergic properties that block muscarinic receptors at the same sites. Antihistamines must cross the blood-brain barrier to affect the central nervous system. [17, 20]

Dosing for PONV:

Diphenhydramine: 25 to 50 mg orally (PO) every 6 hours, as needed

Dimenhydrinate: 50 to 100 mg PO every 6 hours, as needed.

Adverse Effects:

These agents can exhibit many anticholinergic effects, including central nervous system (CNS) depression, fatigue, paradoxical vomiting, blurred vision, xerostomia, and worsening of narrow-angle glaucoma. [25]

3.1.7 Benzodiazepines

A recent study demonstrated that benzodiazepines such as lorazepam may be beneficial at reducing postoperative nausea and vomiting. Compared with placebo, 1 mg of orally administered lorazepam 60 minutes before general anesthesia significantly reduced both postoperative nausea and vomiting and the requirement for antiemetic treatment during the postoperative period. [24]

3.1.8 Cannabinoids

The antiemetic potential of cannabinoids is still being explored, and the exact mechanisms are still being researched, with no general consensus. [26] Cannabinoids exert their antiemetic effects through interaction with centrally located CB1 receptors and 5-HT3 receptors in the dorsal-vagal complex (DVC), which plays a role in emetic regulation. [26] Activation of 5-HT3 receptors in the DVC, particularly in the area postrema, appears to be a major factor in the occurrence of vomiting. Two cannabinoids, namely dronabinol and nabilone, have received pharmaceutical marketing approval for their use as antiemetics. [26]

The most common adverse drug effects of CB1 cannabinoid receptor agonists include mood swings, impaired concentration, visual disturbances, dizziness, and ataxia. [18]

3.1.9 Scopolamine

Scopolamine, particularly in the form of transdermal scopolamine (TDS), is a type of drug that acts as an antagonist for M1 muscarinic receptors. It is primarily used as a long-acting prophylactic antiemetic, originally developed to prevent motion sickness. [28] TDS acts by centrally inhibiting cholinergic activity and can be self-administered either by patients the night before surgery or by an anesthesiologist prior to surgery. [28]

Transdermal scopolamine (TDS) has been shown to be clinically effective in preventing postoperative nausea and vomiting (PONV), but it is important to be aware of the potential adverse effects of its use. [29] These adverse effects include sedation, dry mouth, blurred vision, central cholinergic syndrome, and confusion. Special caution should be exercised when administering TDS to elderly patients with mild cognitive impairment, as confusion may be more common as a side effect in them. [29]

3.1.10 Combination therapy

So far, there is no clear evidence that a specific antiemetic therapy is particularly effective for a certain profile of patients or a specific type of surgery. For this reason, combination therapy is recommended for patients at high risk of postoperative nausea and vomiting (PONV). This combination should consist of medications targeting different receptors. [22]

Most patients have one to two risk factors for PONV, with 20-40% of these patients developing it. Therefore, combination therapies are being increasingly used. Adults at moderate risk of PONV should receive combination therapy with medications from different drug classes. [22] The effect of antiemetics with different mechanisms of action is cumulative. [12]

The best-studied combinations include ondansetron with either Droperidol or dexamethasone. Overall, combination therapies are significantly superior to monotherapies in terms of PONV prophylaxis. [35] The multifactorial etiology of PONV is likely the reason why multiple drugs targeting different receptors have better efficacy. A balanced antiemetic approach could be the key to significant improvement in the prevention and treatment of PONV. [34]

If PONV occurs despite antiemetic prophylaxis within the first 6 hours after the procedure, a medication from a different drug class should be used. If this happens after the first 6 postoperative hours, a repeat dose of the primary antiemetic should be administered. If no prophylaxis was given, the recommended initial therapy consists of 5-HT₃ antagonists (e.g., ondansetron 1-2mg IV). [22]

4 Common urological procedures and the corresponding anesthesia techniques utilized

Urologic surgeries include various spectrums of disease and elderly patients. Therefore, overall collaboration between the urologist and the anesthesiologist is required in terms of preoperative evaluation, intraoperative management, and postoperative care. [36] An individualized, optimized approach leads to better outcomes, quality of recovery, and patient satisfaction. [36]

The choice of anesthesia for a surgical urological procedure can be either spinal anesthesia or general anesthesia. [48] Spinal anesthesia offers theoretical advantages for the initial postoperative period, such as immobilization of the patient, pain-free manipulation of the catheter, and reduced need for straining and coughing [49] The most performed urology operations and anesthesia options:

4.1.1 Nephrectomy

Nephrectomy, a surgical procedure for treating renal cell carcinoma (RCC), can involve either partial or radical removal of the kidney depending on tumor characteristics. [40] European Association of Urology guidelines suggest that patients with tumors smaller than 4 cm may be candidates for partial nephrectomy. [33] Given that RCC often occurs in individuals over 70 years of age, the majority of patients undergoing nephrectomy are elderly and have pre-existing medical conditions. [37] It is crucial to assess other health conditions, including cardiovascular, pulmonary, and cerebrovascular diseases, before the surgery. This evaluation is essential for estimating the remaining renal function since either the entire kidney or a portion of it will be removed. [40]

The introduction of robotic surgery has revolutionized the field, leading to the increased popularity and utilization of robot-assisted nephrectomy over the years [38].

Epidural anesthesia if possible and desired. General anesthesia. [40]

4.1.2 Cystectomy

For invasive bladder cancer, cystectomy is considered the preferred treatment option. Depending on the surgical approach, either the entire bladder or a portion of it may be removed. This procedure is lengthy and intricate, carrying a potential risk of bleeding. [40]

The combination of epidural anesthesia with general anesthesia reduces intraoperative and postoperative opioid requirements, decreases intraoperative bleeding, and accelerates postoperative gastrointestinal recovery following cystectomy. [39]

4.1.3 Transurethral resection of bladder cancer (TURB)

Transurethral resection of bladder cancer (TURB) is an essential endoscopic procedure used for both diagnosing and treating bladder cancer, serving as a cornerstone in its management [41]. TURB is conducted within the confined space of the bladder, enabling the identification of tumor characteristics such as shape, size, location, and quantity. This procedure can be performed with either general or regional anesthesia [42].

4.1.4 Transurethral resection of the prostate (TURP)

Transurethral resection of the prostate (TURP) is considered the primary treatment for benign prostatic hyperplasia, representing the gold standard approach. [40] Similar to TURB, TURP can be carried out with the use of either general anesthesia or spinal anesthesia. [40]

4.1.5 Prostatectomy

Since robotic surgery had been introduced to the surgical field in 1999, robot-assisted laparoscopic radical prostatectomy (RALP) has been widely performed to treat prostatic cancer. [47] Most prostatectomies are currently performed by robot-assisted surgery. [46]

4.1.6 Radical prostatectomy (RPE)

RPE is the gold standard curative therapy for patients with localized prostate cancer and a life expectancy of at least 10 years. [43]

Generally, general anesthesia is the usual approach. However, spinal anesthesia can be considered if a lymphadenectomy is not required. [40]

4.1.7 Laparoscopic (robot-assisted) radical prostatectomy

Laparoscopic (robot-assisted) radical prostatectomy is used for localized (non-metastatic) prostate cancer. [45] Life expectancy should be at least 10-15 years, depending on the differentiation.

General anesthesia is used by laparoscopic radical prostatectomy. [40]

4.1.8 Percutaneous nephrolithotomy (PCNL)

Percutaneous nephrolithotomy (PCNL) is commonly performed to treat renal stone. The indication of PCNL includes > 1.5–2 cm of renal calculi, staghorn calculi, lower pole stone, and refractory upper tract calculi. [44] Patients are placed in prone position under either general or spinal anesthesia. [40]

5 Material and Methods

5.1 Patient recruitment

This monocentric pre-post-interventional study is conducted at the Medical University of Graz. Our hospital has been consistently recognized for its high-quality pain management by the German Pain Association since 2009. Following approval from the ethics committee (Approval N° 31-255 ex 18/19, on March 14, 2019, chaired by Prof. Haas), we screened all adult inpatients who provided informed consent and were admitted to the post-anesthesia care units for elective orthopedic, neurosurgical, thoracic, general, gynecological, plastic, urological, oral, and maxillofacial surgeries. This screening took place in September 2019 and from December 2019 until March 15, 2020.

The inclusion criteria for participation in the study were age over 18, capacity to provide informed consent, admission to a specific ward, and postoperative care in the recovery rooms "A/C," "D, EG/TP," or "Gynäkologie/Gebär" at the University Hospital LKH Graz. This means that patients from general surgery, orthopedics, trauma surgery, urology, oral and maxillofacial surgery, cardiac surgery, plastic surgery, neurosurgery, and gynecology were surveyed. Prior to the study, all potential candidates were informed about the voluntary nature of participation and the anonymization of data. The questionnaires of the participants were anonymized, ensuring that data could not be traced back to specific individuals. In this study, data from both male and female participants were used.

The exclusion criteria were refusal to participate in the study, unplanned emergency surgeries, and simultaneous participation in the studies "Comparison of different Analgesia and Sedation Techniques for Regional Anesthesia" or "Fentanyl TTSAMG Phase III." Additionally, patients whose data were not meaningful due to impaired cognition were excluded. Participants had the right to decline participation in the survey at any time. During the anesthesia consent discussion, participants were informed about the study and provided their consent. The questionnaires were distributed in the recovery rooms postoperatively and collected by research interns the following day.

5.2 Questionnaire

The anesthesia follow-up questionnaire (ANP), which was developed by Hüppe M et al. in 2003, was used to evaluate patient satisfaction. This validated questionnaire has 30 questions, each allowing respondents to choose from a scale of 0 (not at all), 1 (a little), 2 (quite), and 3 (strongly) plus 2 additional questions at the end of the questionnaire where the patients were able to write about what impacted the well-being the most and also to write suggestion for the improvements. These questions covered both the period before and after surgery.

To streamline the analysis for this specific study, we had to create 2 categories: "Satisfactory" and "Not satisfactory." Ratings of "0" and "1" were grouped as "Not satisfactory," while ratings of "2" and "3" were considered as "Satisfactory." This categorization was introduced to provide a clearer presentation of the results.

The questionnaire was structured into two sections. The initial 19 questions tells us about the patients' overall well-being and physical discomfort. The second section is more focused in the participants' satisfaction levels regarding the care they received from the anesthesiologist and nursing staff.

The following questions were covered:

Part 1: How did you feel after the operation in the recovery room?

- 1) Feeling of coldness (sensation of shivering and chills)
- 2) Feeling of heat or sweating
- 3) Difficulty in waking up
- 4) Feeling of nausea/vomiting
- 5) Coughing sensation
- 6) Hoarseness
- 7) Dryness of mouth/feeling of thirst
- 8) Hunger
- 9) Feeling of difficulty in breathing
- 10) Sore throat

- 11) If applicable: Pain in the surgical area
- 12) Pain in the area of the infusion
- 13) Muscle pain
- 14) Back pain
- 15) Headaches
- 16) Problems with urination
- 17) Feeling of physical discomfort
- 18) Feeling of well-being
- 19) If applicable: How well can you remember the events

Part 2: How satisfied are you...

- 20) with the conversation with the anesthetist before the operation
- 21) with the course of the day of surgery
- 22) with the care before the operation
- 23) with the medications before the operation
- 24) with the anesthesia administered
- 25) with the care immediately after the anesthesia
- 26) with the care by the anesthetist
- 27) with the care by the anesthesia nurse
- 28) with the measures taken against pain after the operation
- 29) with the recovery since the operation
- 30) with your current condition

At the end of the questionnaire, these two open-ended questions followed:

Additional Question 1) What has most reduced your well-being? and Additional

Question 2) Do you have any suggestions/improvement requests?

The questionnaire used in the study can be found in the attachment.

5.3 Intervention

The data was collected over three periods, each lasting four weeks. During the first four weeks, the baseline assessment was conducted. Subsequently, the

implementation of interventions was evaluated in two four-week periods. In the control group, neither music nor iced tea was offered to the patients. The implementation of optional personalized music through headphones took place in October/November 2019, and the measurement of results was conducted in December 2019 and January 2020. In addition to personalized music, we introduced the option of refreshment drinks (iced tea at room temperature or 8°C, with flavors of peach or lime and with regular or sugar-free options) in February 2020. The corresponding measurement for this intervention took place from February until March 15, 2020. Data collection was halted on this date due to COVID-19-related circumstances.

6 Results

Since no significant differences were found between the groups, the results are presented purely descriptively. Detailed results are presented in Table 1, while Figures 1-14 provide further insight into the data and help illustrate the observations.

6.1 Comparative demographics and medical history across three study periods

Demographic differences among the three study periods were analyzed. These differences included age, gender, and medical history of the participants.

The results showed that the median age in the baseline group is 66 years, while for the headphone group it is 67 years and 71 years for the Tea group. There are no significant differences in age distribution among the three periods.

However, there was a no statistical significant differences in gender distribution, with a higher proportion of male participants in the second period compared to the first and third periods. In the baseline group, approximately 19.31% of the patients were females, while 80.69% were males. In the headphone group, approximately 23.24% were females, and 76.06% were males. In the Tea group, approximately 18.68% were females, and 81.32% were males. When considering all groups together, approximately 20.69% of the patients were females, and 79.31% were males, out of a total of 377 patients.

In terms of medical history, there were no significant differences observed among the three periods.

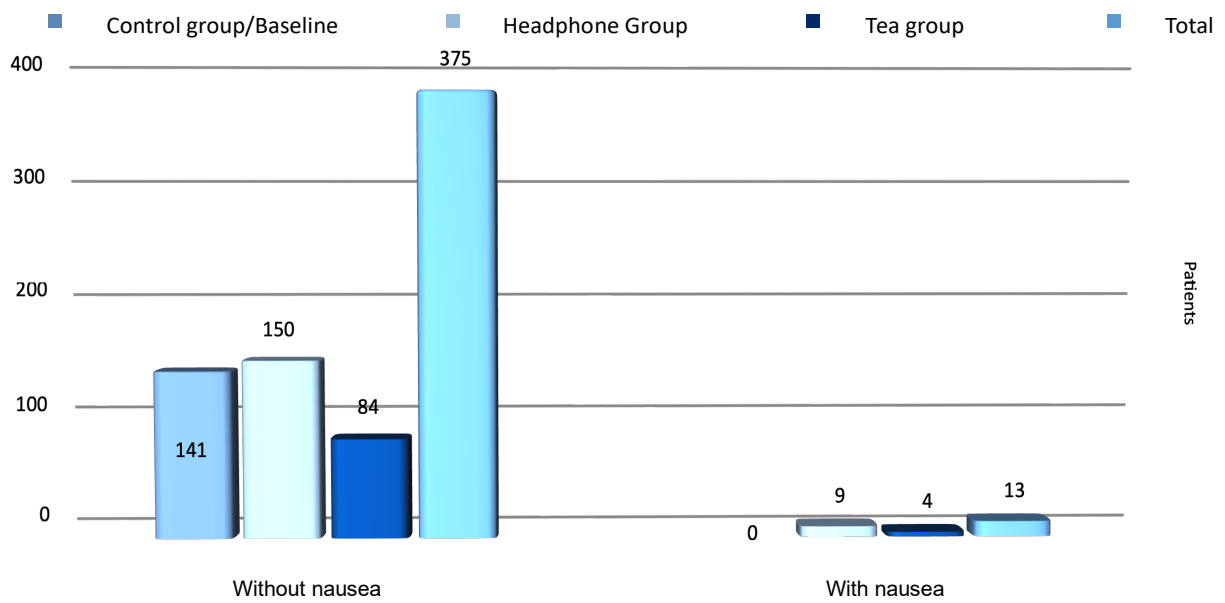


Figure 1: Number of patients after a urological procedure with/without the onset of nausea for each group/period and in total

Figure 1 presents data of the occurrence of postoperative nausea and vomiting following urological surgery. 141 patients from the “Baseline Group” reported no nausea at all, while no patients reported experiencing significant nausea. In the “Headphone Group” 150 patients reported no nausea, while only 9 reported experiencing significant nausea within this group. In the “Tea Group” 84 patients reported no nausea and 4 reported significant nausea.

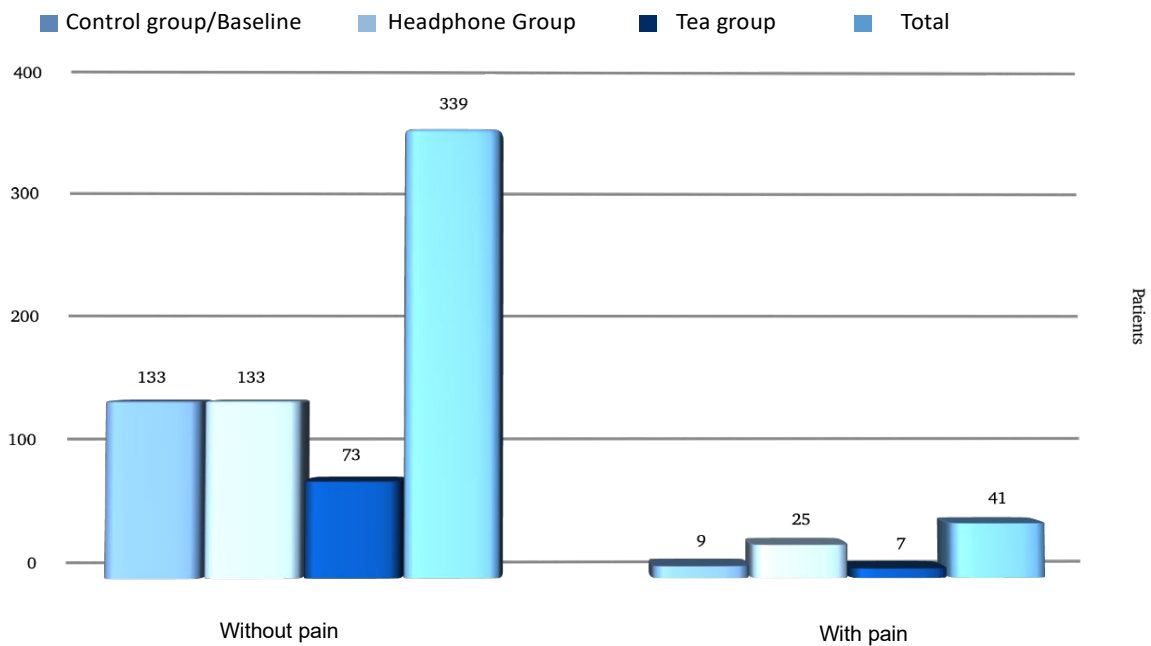


Figure 2: Number of patients after a urological procedure with/without occurrence of pain for each group/period and in total

In Figure 2, the control group/baseline had 133 patients with no operating room pain, similar to the headphone group. The tea group had 73 patients without pain. Overall, across all groups, 339 patients had no pain. Conversely, a total of 41 patients experienced pain during the procedure: 9 from the control group, 25 from the headphone group, and 7 from the tea group.

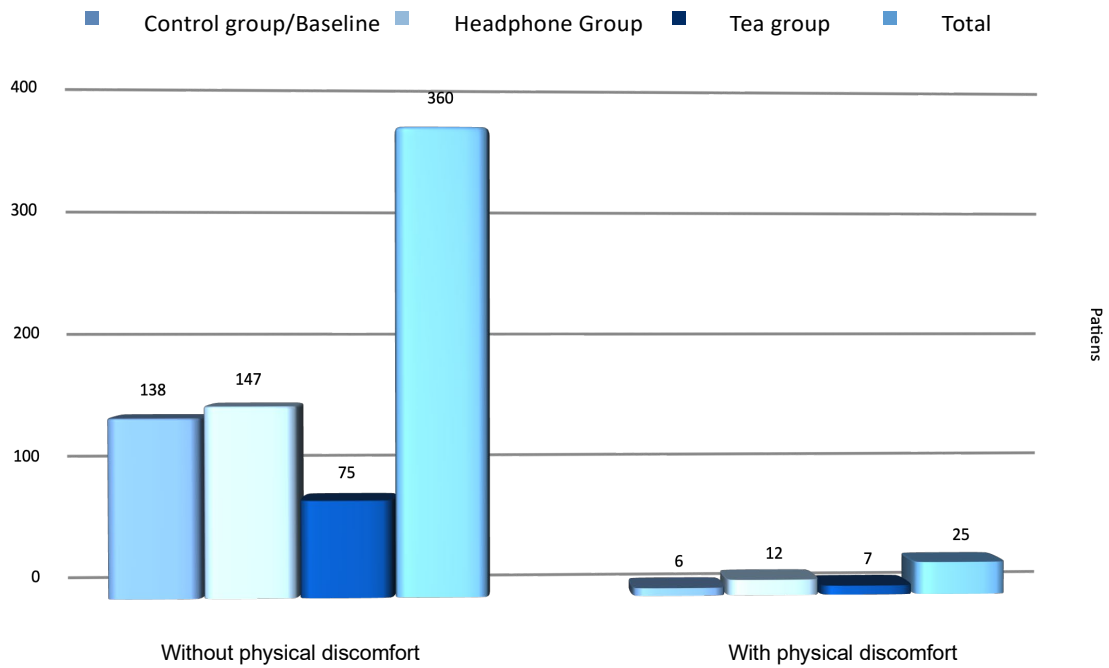


Figure 3: Number of patients after a urological procedure with/without occurrence of physical discomfort for each group/period and in total

Figure 3 present number of patients experiencing physical discomfort. The following results were discovered: 138 patients in the control group, as well 147 patients in the headphone group, and 75 patients in the tea group, resulting in a cumulative total of 360 cases without physical discomfort. Conversely, the presence of physical discomfort was observed in 6 patients from the control group, 12 from the headphone group, and 7 from the tea group, summing up to a total of 25 instances with physical discomfort.

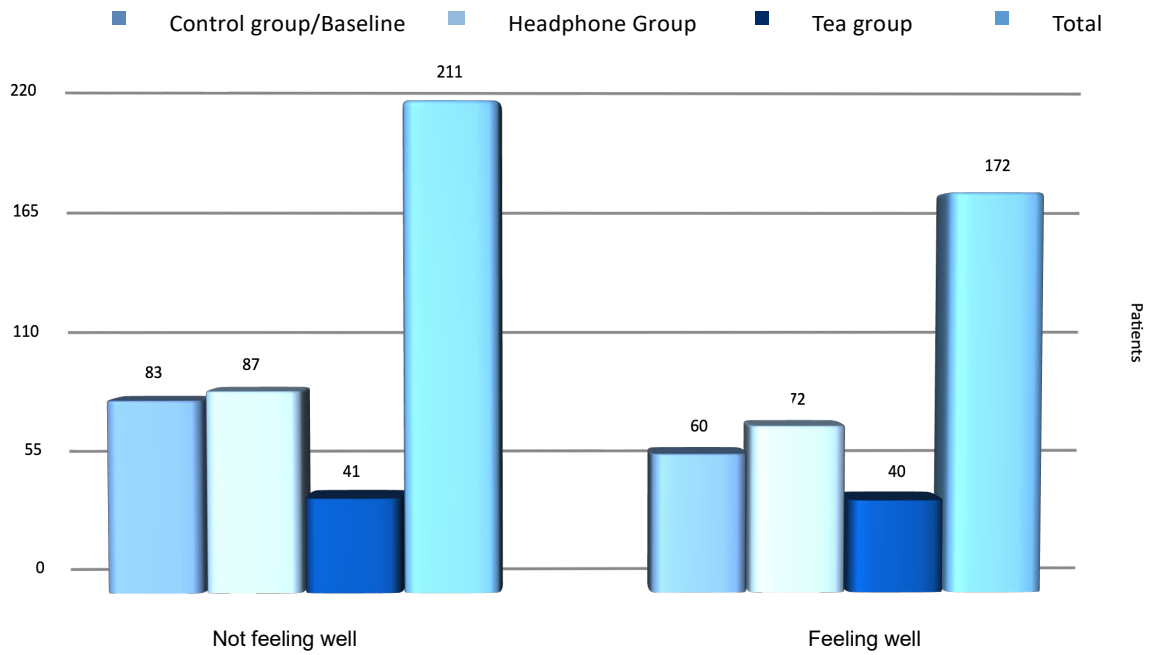


Figure 4: Number of patients after a urological procedure that are feeling and not feeling well for each group/period and in total

Figure 4 provides insights into post-surgery well-being across groups. In the control group, 83 patients reported discomfort, while the headphone group had 87 patients with similar experiences. The tea group noted 41 patients lacking well-being. Across all groups, 211 patients reported discomfort, while 172 patients felt well post-surgery.

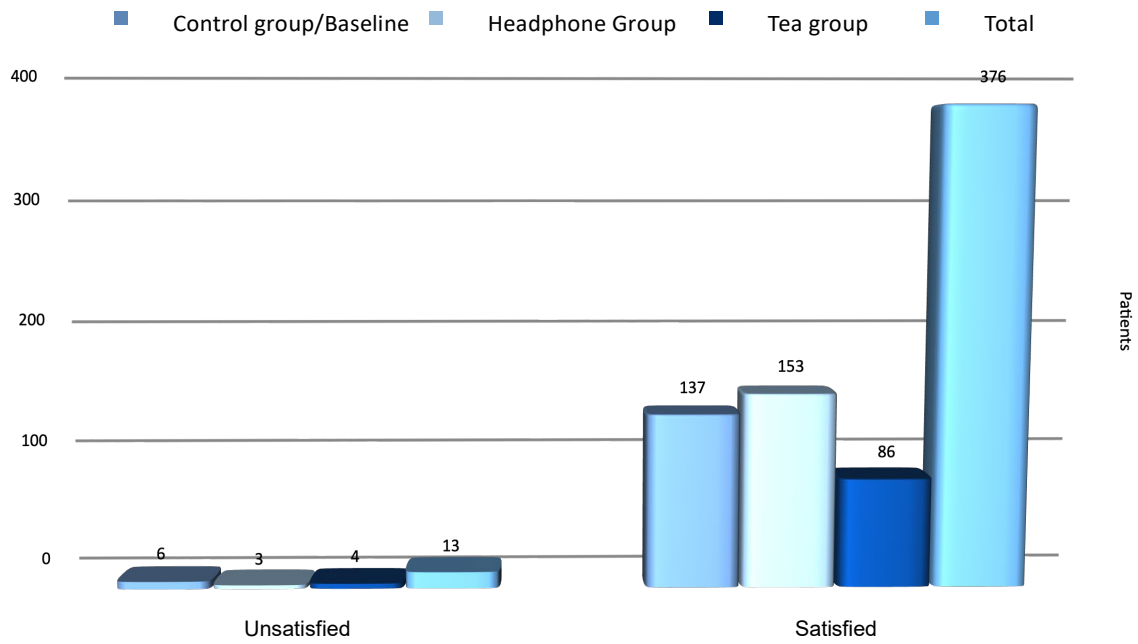


Figure 5: Number of patients after a urological procedure that are satisfied/unsatisfied after talking with the anesthesiologist before the surgery for each group/period and in total

Figure 5 presents data on patient satisfaction and dissatisfaction with the anesthesiologist after surgery in different groups. In the control group/base value, 6 patients expressed dissatisfaction, while 137 reported satisfaction. In the headphone group, 3 patients were dissatisfied, while 153 were satisfied. Within the tea group, 4 patients expressed dissatisfaction, while 86 reported satisfaction with the anesthesiologist's interaction.

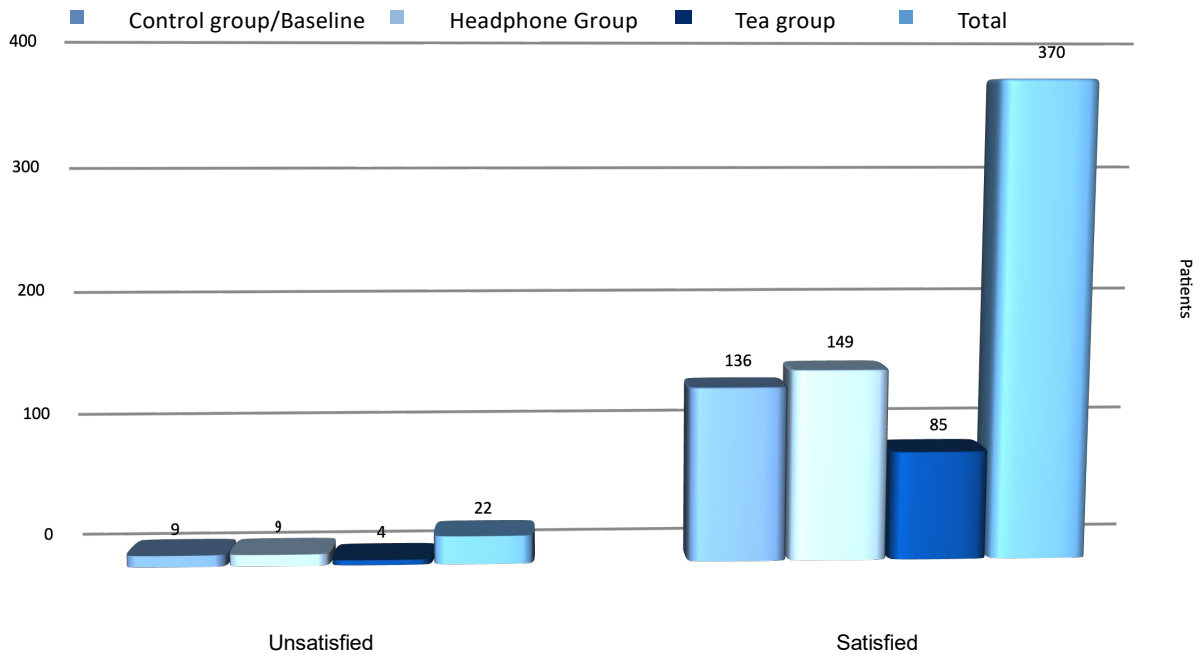


Figure 6: Number of patients after a urological procedure that are satisfied/unsatisfied with the schedule of the operative day for each group/period and in total

Figure 6 shows that Control Group (Baseline) had 9 out of 145 patients expressing dissatisfaction, with 136 reporting satisfaction. In the Headphone Group, 9 patients out of 158 were dissatisfied, while 149 were satisfied. Similarly, the Tea Group saw 4 out of 89 patients dissatisfied, and 85 satisfied.

Overall satisfaction rate with the schedule of the operative day was 94.39% (370 out of 392 patients).

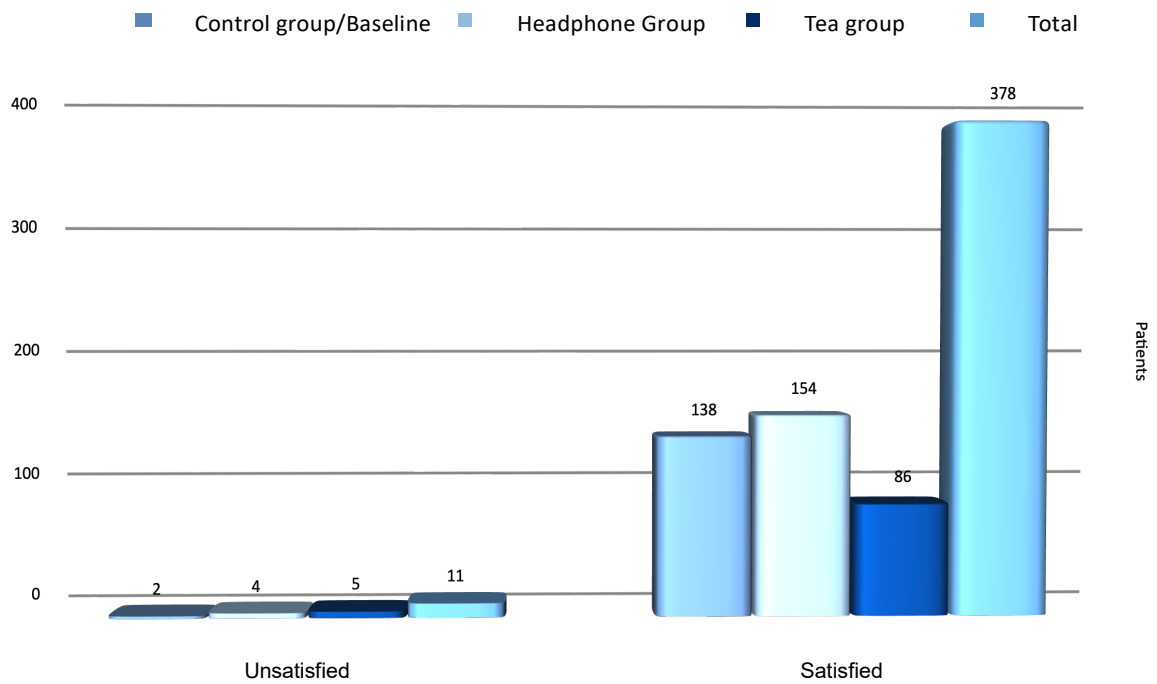


Figure 7: Number of patients after a urological procedure that are satisfied/unsatisfied with preoperative care for each group/period and in total

Figure 7 presents patient satisfaction with preoperative care in three groups: Control, Headphone, and Tea. Dissatisfaction: Control (2 out of 140), Headphone (4 out of 158), Tea (5 out of 91). Satisfaction: Control (138), Headphone (154), Tea (86). Across groups: Dissatisfaction (11 out of 389), Satisfaction (378 out of 389). The overall satisfaction rate is approximately 97.17%

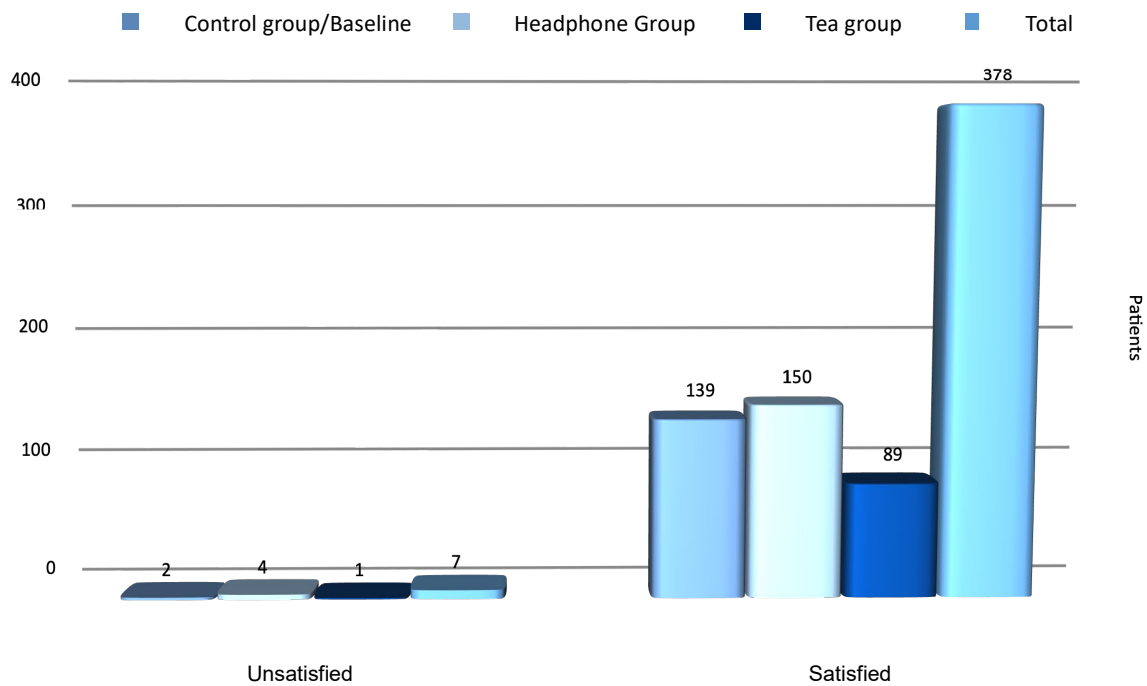


Figure 8: Number of patients after a urological procedure that are satisfied/unsatisfied with anesthesia for each group/period and in total

Figure 8 present patients satisfaction with given anesthesia during the operative procedure.

Overall satisfaction is approximately 98.18%.

In Control group were 2 out of 141 patients unsatisfied with the given anesthesia. The headphone group had 4 unsatisfied patients out of total 154 in that group. Tea group had only 1 patient out of 90 that was unsatisfied with given anesthesia.

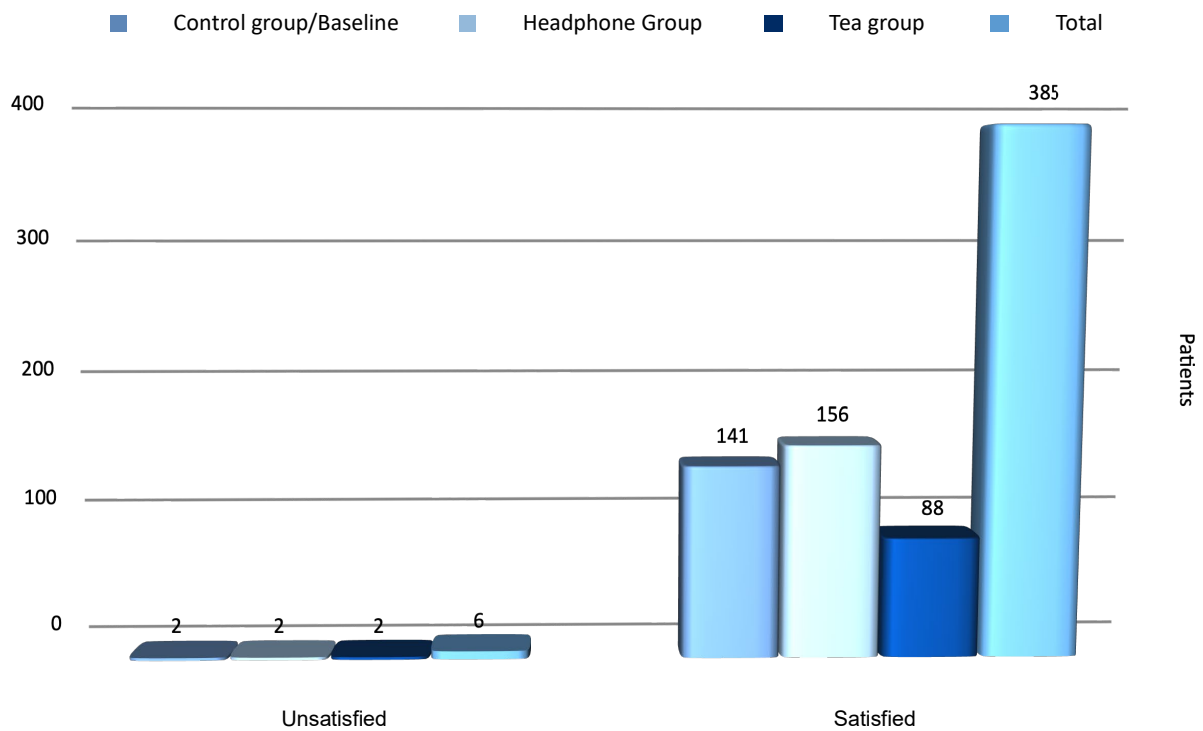


Figure 9: Number of patients after a urological procedure that are satisfied/unsatisfied with post-anesthesia care for each group/period and in total

Figure 9 illustrates patient satisfaction with post-anesthesia care after surgery across different groups. In the Control Group (143 patients), 141 patients reported satisfaction, and 2 patients expressed dissatisfaction. Similarly, in the Headphone Group (158 patients), 156 patients were satisfied, and 2 were dissatisfied. In the Tea Group (90 patients), 88 patients were satisfied, and 2 were dissatisfied. Overall, in the combined dataset of 391 patients, 385 patients reported satisfaction, while 6 patients were dissatisfied, resulting in an overall satisfaction rate of approximately 98.46%.

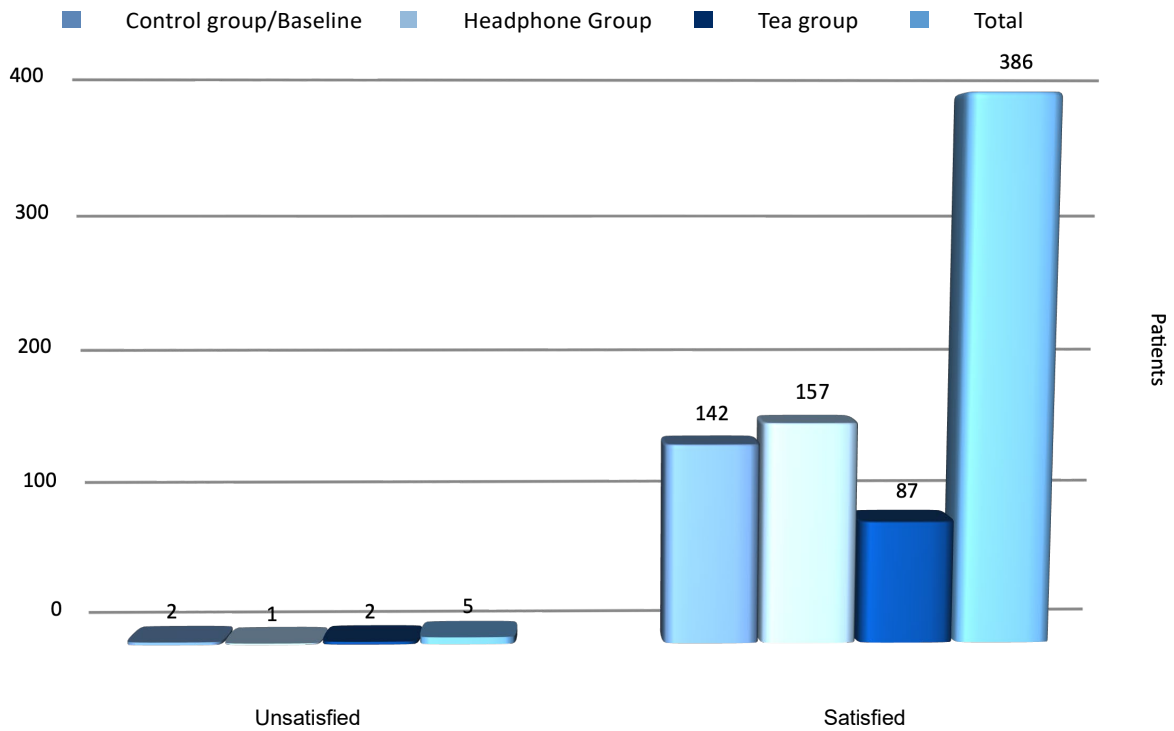


Figure 10: Number of patients after a urological procedure that are satisfied/unsatisfied with with the anesthesiologist's care for each group/period and in total

Figure 10 illustrates patient contentment with postoperative care provided by anesthetists and explores the effects of interventions such as headphone use and offering tea during the operative day.

Across all groups, the majority of patients reported being satisfied with the postoperative care provided by anesthetists. The overall satisfaction rate was approximately 98.44%.

The Control Group displayed a notably high satisfaction rate, with 142 out of 144 patients satisfied (98.61%). The Headphone Group followed closely with 157 out of 158 patients satisfied (99.37%), and the Tea Group reported 87 out of 89 patients satisfied (97.75%).

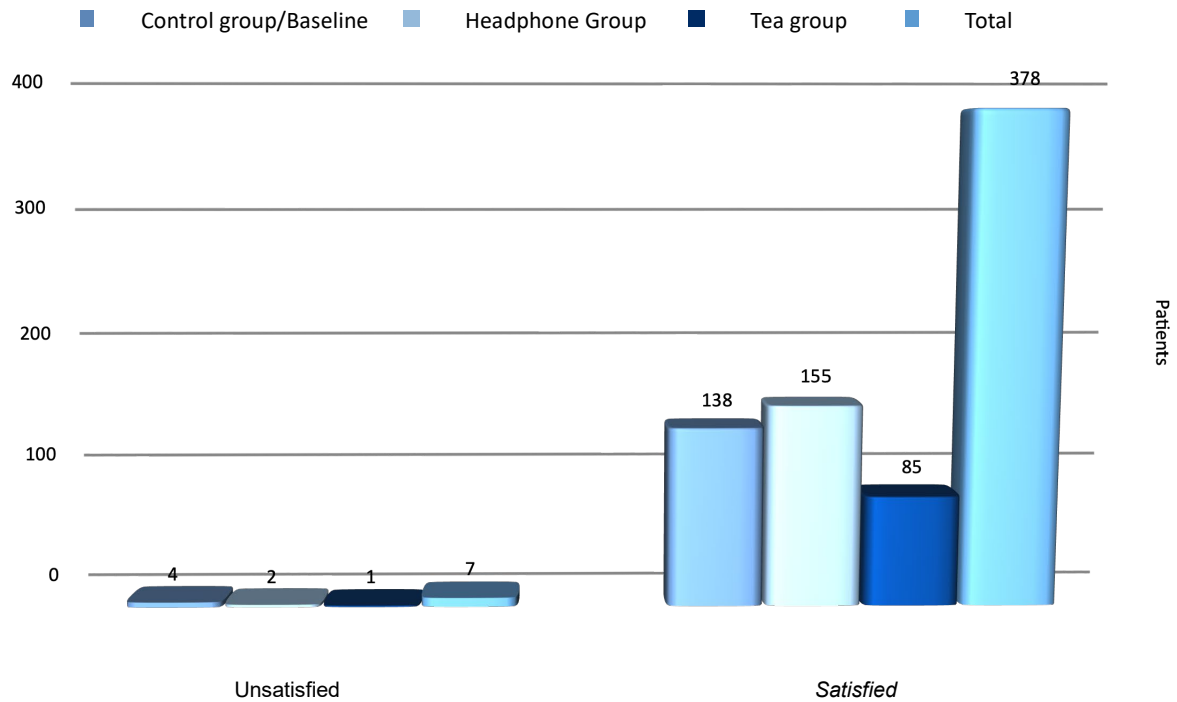


Figure 11: Number of patients after a urological procedure that are satisfied/unsatisfied with supervision by an anesthesiology nurse for each group/period and in total

Figure 11 depicts patient satisfaction with anesthesiology nurse supervision during the operative day across three groups: Control (142 patients), Headphone (157 patients), and Tea (86 patients). The Control Group exhibited a 97.18% satisfaction rate, the Headphone Group showed a 98.73% rate, and the Tea Group had a 98.84% satisfaction rate. In total, among 427 patients, 7 expressed dissatisfaction, while 378 reported satisfaction. Overall satisfaction stood at 98.52%, highlighting the positive perception of anesthesiology nurse supervision in all groups.

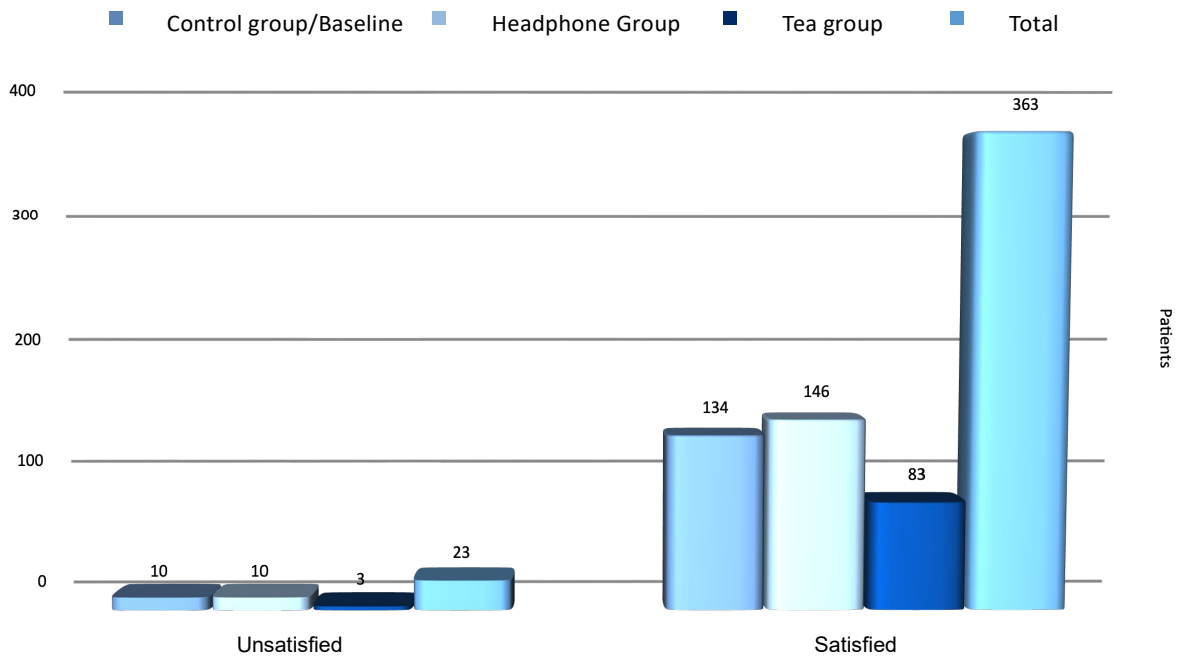


Figure 12: Number of patients after a urological procedure that are satisfied/unsatisfied with measure against pain for each group/period and in total

Figure 12 presents patient perspectives on surgical pain management, focusing on interventions like headphone use and offering tea .

Across all groups, most patients were content with pain management, resulting in an overall satisfaction rate of about 94.62%. In the Control Group, 134 out of 144 patients were satisfied (93.63%). The Headphone Group saw 146 out of 156 patients satisfied (93.80%), and the Tea Group recorded 83 out of 86 patients satisfied (96.88%).

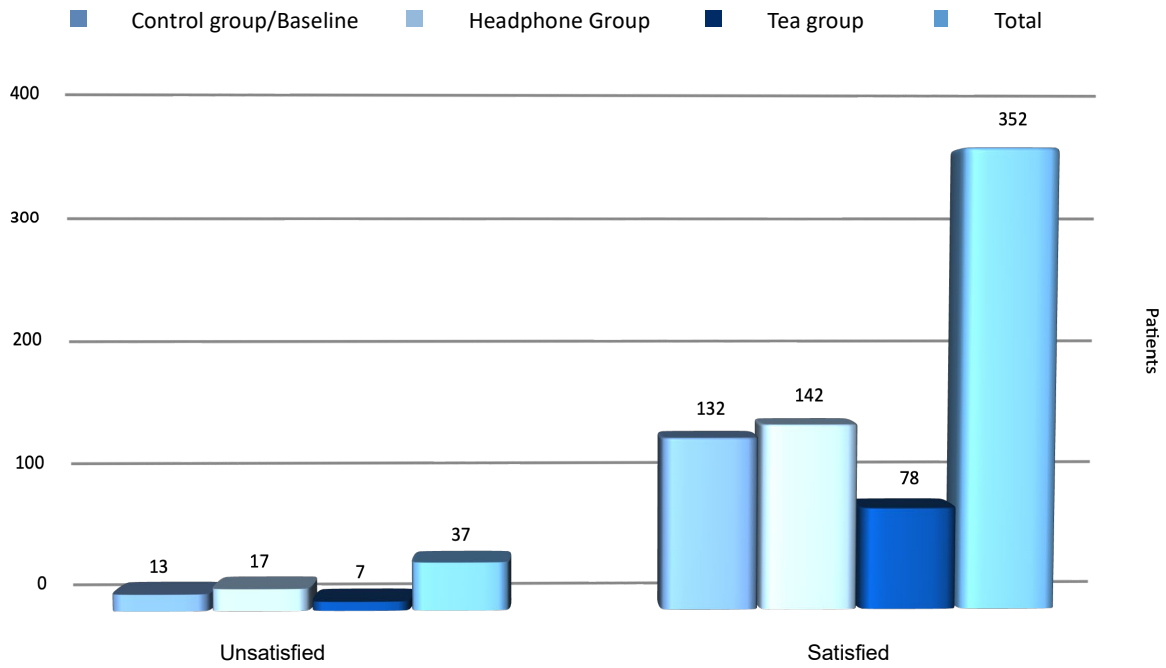


Figure 13: Number of patients after a urological procedure that are satisfied/unsatisfied with recovery since surgery for each group/period and in total

Figure 13 presents patient contentment regarding post-operative recovery in three segments: Control (145 patients), Headphone (159 patients), and Tea (85 patients) groups. Satisfaction rates were 91.03%, 89.31%, and 91.76% for the Control, Headphone, and Tea groups respectively. Among 389 patients, 37 expressed dissatisfaction, whereas 352 reported contentment. Overall satisfaction reached 90.46%, demonstrating positive recovery impressions across all groups.

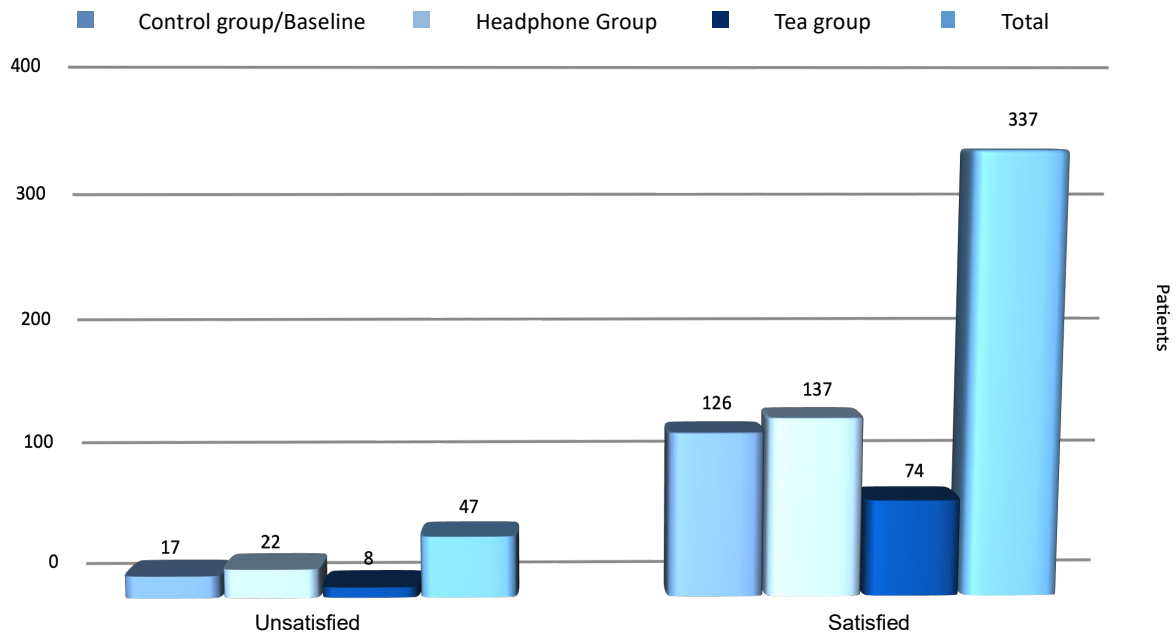


Figure 14: Number of patients after a urological procedure that are satisfied/unsatisfied with current status for each group/period and in total

Figure 14 depicts patient contentment with their post-surgery status across the Control (143 patients), Headphone (159 patients), and Tea (82 patients) groups. The Control Group had 17 unsatisfied patients, the Headphone Group had 22, and the Tea Group had 8. Overall, among 384 patients, 47 were unsatisfied, while 337 expressed satisfaction. The combined satisfaction rate reached 87.76%, highlighting the prevalent positive sentiment toward post-operative status across the groups.

Parameter	Median	q25	q75
Age	67	59	75
ASA	2	2	3
OP-Duration	44	20	88
RA	0	0	0
ITN	1	0	1
SPA	0	0	0
Premedication	0	0	0
Opioids	4.29	0	9.9
Piritramid	6.45	0	15
Nausea	0	0	0
Dry mouth	0	0	2
Pain in the surgical area	0	0	0
Physical discomfort	0	0	0
Wellbeing	0	0	2
Expiration of the operation day	2	2	2
Care before the operation	2	2	2
With the anesthesia performed	2	2	2
Measures against pain	2	2	2
Recovery since operation	2	2	2
Current state	2	2	2

Table 1: Analysis of different aspects of patients experience in the urology department

Table 1 shows an examination of patient experience in the urology department, using the median method (q25, q75) for analysis. The mean age of patients was 67 years (59.75), which is consistent with daily practice. The ASA classification before the procedure divided the patients into the risk groups ASA 2 and ASA 3. The median duration of the procedure was 44 minutes (range: 20 to 88). Most patients underwent general anesthesia, with a minority receiving regional or spinal anesthesia. Mean opioid consumption was 4.29 mg but varied in some patients, who required up to nearly 10 mg. Piritramide (Dipidolor) was the main opioid used, with an average dose of 6.5 mg, but some patients required higher doses of up to 15 mg.

Symptom assessment by questionnaire revealed minimal problems in categories such as sensation of cold, sensation of warmth, postoperative awakening, nausea, cough, and hoarseness, all uniformly rated 0. Dry mouth varied with a median score of 0 (range: 0 to 2). There were no significant differences in hunger, difficulty breathing, sore throat, and urination after surgery (all scores: 0). The assessment of pain, which included multiple domains, yielded scores of 0, indicating minimal impact on patient satisfaction. There were no significant differences between groups in the rating of physical discomfort (median: 0).

Patient satisfaction after surgery varied (median: 0, range: 0 to 2). The sections of the survey dealing with interaction with the anesthesiologist, competence, care by staff, preoperative care, and administration of analgesics all received high median scores of 2.

Overall recovery and current condition also received median scores of 2 (range: 2 to 2).

7 Discussion

7.1 Answers to the Research Questions

Based on the data and analysis presented in this study, we conclude that the majority of patients were satisfied and did not experience significant postoperative discomfort in any of the examined periods. The results consistently showed high levels of satisfaction across various aspects, such as absence of nausea, sufficient pain management, good physical discomfort as well as recovery and overall well-being after surgery.

Regarding Nausea, it has been shown in a meta-analysis study of 23 studies involving a total of 22,683 participants from 11 different countries that the prevalence rates of postoperative nausea and vomiting (PONV) were between 16.8% and 31.4%, respectively. [57] Also the current guideline for the management of postoperative nausea and vomiting (PONV) shows that the overall interdisciplinary incidence of PONV stands at 30%. [60]

A mere 3.35% of the patients in our study reported significant nausea experiences, placing this figure notably lower than the averages observed in comparable studies and established guidelines.

7.1.1 Pain

The high patient satisfaction indicates the successful implementation of pain control measures in this clinical setting.

In a study by Sierżantowicz et al., 82.87% of patients reported postoperative pain. [54] Emergency admissions experienced more pain than scheduled ones, suggesting a link between procedure urgency and pain severity. [54] Our study indicates relatively lower pain reports compared to this analysis. This is further attributed to the University Clinic in Graz holding certification as a pain management institution. Given this consideration, it is imperative to acknowledge that patients receive highly comprehensive care and exceptional professional assistance in matters pertaining to pain.

7.1.2 Physical discomfort

We also investigated the patients' physical complaints after surgery. Encouragingly, patients generally reported a low level of physical discomfort (approximately 3.12%). According to a study by Lang X. et.al conducted at Tongji Hospital in Wuhan, China, 152 out of a total of 428 patients reported discomfort, and the most common symptoms were back and chest pain (32.24%), followed by chest tightness (15.79%), dizziness (10.53%), and weakness (10.53%). [56] Some patients had multiple complaints, indicating a tendency to have different symptoms. The study also found that patients with a history of alcohol consumption were significantly more likely to have complaints. Overall, this study underscores that patients' postoperative complaints vary and may limit their daily activities, placing a psychological burden on their physical recovery. [56]

7.1.3 Satisfaction

In the study by Berning V. et al. the overall satisfaction was remarkably high with 94.6 points out of 100. [53] In contrast, our study showed a sustained and remarkably high level of patient satisfaction, with satisfaction rates ranging from 88% to 98.52% across all patient satisfaction questions in the study. On average across all questions, overall satisfaction exceeded 95%, a slight improvement over the results of the comparative study.

7.1.4 Dry mouth

In our study, we observed that approximately 33% of patients experienced dry mouth following urological surgeries. Comparatively, Hsiu-Ling Yang et al. reported a higher incidence of dry mouth at 88% in a study involving 105 participants after abdominal surgery, 6-8 hours post-operation. [55] One of the reasons for the reduced occurrence of dry mouth symptoms in our findings is associated with the prolonged withholding of food and fluids, during abdominal surgeries. Additionally,

specific procedures involve the utilization of agents such as Prepacol for gastrointestinal cleansing, which inherently contributes to fluid loss in patients.

These findings underscore the importance of addressing dry mouth as a postoperative concern and implementing measures to alleviate its impact on patients' well-being and overall surgical experience.

7.1.5 Headphones and Tea

By providing headphones and tea to the patients in our study, it was noted that patients reacted favorably to both choices. However, these straightforward interventions did not yield a significant difference compared to the control group, implying that offering headphones and tea did not result in a statistically meaningful distinction. Furthermore, a study conducted by Yilmaz N. et al. focused on preoperative interventions. Their research revealed that the occurrence of postoperative nausea and vomiting (PONV) was reduced among patients who consumed a carbohydrate drink compared to those who fasted, particularly during the 12 to 24 hours following surgery. [59] U. Nilsson et al. studied music's impact on post-hysterectomy recovery. Patients hearing therapeutic music needed fewer pain-relief analgesics than the non-music control.[58] Music group also had better first-day pain relief, suggesting faster recovery.[58] Music could reduce nausea, vomiting, fatigue, aiding analgesia, and hastening recuperation. [58]

7.2 Conclusion

The results of this study indicate a high level of postoperative satisfaction and low physical discomfort among patients after urological surgeries at the university hospital LKH Graz. Further research with long-term outcomes could further deepen the understanding of postoperative satisfaction and provide guidance for improving the quality of postoperative care.

7.3 Critical Reflection / Limitations on Content and Method

Sample size was relatively small due to termination of the study when the COVID - 19 pandemic began. Furthermore the study was conducted at a single institution, which may affect the generalizability of the results. In addition, the study was unable to assess long-term outcomes, and individual patient characteristics that might influence satisfaction were not fully accounted for.

In addition, the questionnaire used in the study did not capture important psychological factors such as anxiety, stress, or patient expectations.

It is important to acknowledge that patients who needed help completing the questionnaire may have skewed the results by giving more positive responses to accommodate the staff or students who may have helped them.

7.4 Implications for Theory and Practice

Our study revealed a high level of patient satisfaction and a relatively low percentage of postoperative nausea and vomiting (PONV) occurrences. Considering that our findings surpass those of comparative studies, we can infer that effective prevention of PONV, coupled with appropriate and sufficient pain management, is crucial for maintaining patient contentment and minimizing discomfort within this domain. The establishment of certified pain medicine institutions, even in smaller hospital centers or rural areas, would likely yield substantial benefits for patients. Moreover, adhering to guidelines for mitigating PONV is of paramount significance, as it can enhance patients' recovery experiences and potentially curtail hospital stays, thereby exerting a positive influence on healthcare system finances.

7.5 Outlook and Suggestions for Further Research

The results of this prospective, single-center cross-sectional study could serve as a basis for hypothesis generation for further multicentric studies.

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9 Attachment

9.1 Questionnaire

How did you feel after the operation in the recovery room?	not at all	a little	quite	strongly
1) Feeling of coldness (sensation of shivering and chills)	0	1	2	3
2) Feeling of heat or sweating	0	1	2	3
3) Difficulty in waking up	0	1	2	3
4) Feeling of nausea/vomiting	0	1	2	3
5) Coughing sensation	0	1	2	3
6) Hoarseness	0	1	2	3
7) Dryness of mouth/feeling of thirst	0	1	2	3
8) Hunger	0	1	2	3
9) Feeling of difficulty in breathing	0	1	2	3
10) Sore throat	0	1	2	3
11) If applicable: Pain in the surgical area	0	1	2	3
12) Pain in the area of the infusion	0	1	2	3
13) Muscle pain	0	1	2	3
14) Back pain	0	1	2	3
15) Headaches	0	1	2	3
16) Problems with urination	0	1	2	3
17) Feeling of physical discomfort	0	1	2	3
18) Feeling of well-being	0	1	2	3
19) If applicable: How well can you remember the events	0	1	2	3
How satisfied are you...	not at all	a little	quite	strongly
20) with the conversation with the anesthetist before the operation	0	1	2	3
21) with the course of the day of surgery	0	1	2	3
22) with the care before the operation	0	1	2	3
23) with the medications before the operation	0	1	2	3
24) with the anesthesia administered	0	1	2	3
25) with the care immediately after the anesthesia	0	1	2	3
26) with the care by the anesthetist	0	1	2	3
27) with the care by the anesthesia nurse	0	1	2	3
28) with the measures taken against pain after the operation	0	1	2	3
29) with the recovery since the operation	0	1	2	3
30) with your current condition	0	1	2	3
31) What has most reduced your well-being?				
32) Do you have any suggestions/improvement requests?				