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REVIEW ARTICLE **OPEN ACCESS**

Advances in Post Operative Nausea and Vomiting Management: Current Strategies, Emerging Therapies, and Patient-Centric Approaches

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ABSTRACT
Post – Operative Nausea and Vomiting is an unfavorable state that impacts numerous patients following surgical procedures. Vomiting after surgery is a considerable source of distress for patients and can sometimes outweigh postoperative pain in terms of concern. Following ear, nose, and throat surgery, postoperative nausea and vomiting (PONV) continue to be a frequent, uncomfortable, and profoundly distressing occurrence. Despite various investigations into the underlying causes of postoperative nausea and vomiting, there remains a limited understanding. This piece examines the factors contributing to its occurrence, the mechanisms involved, strategies for prevention, and approaches to its treatment.
Keywords: *Antiemetic, Neurokinin-1 antagonist, Post Operative Nausea and Vomiting, Multimodal prevention, Prophylaxis.*

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INTRODUCTION

Post Operative Nausea and Vomiting (PONV) refers to the occurrence of nausea and/or vomiting within 24 hours after surgery. This condition can affect around 70% to 80% of individuals at high risk. The underlying causes of PONV are complex and involve various factors such as individual characteristics, anesthesia methods, and surgical risks. PONV not only leads to increased discomfort and dissatisfaction among patients but also contributes to higher hospital costs due to prolonged stays. For instance, a study indicated that patients experiencing PONV had a 25% longer post-surgery recovery time.[1] In rare cases, severe complications like pulmonary aspiration can result in vomiting, further impacting patients and adding financial burdens to healthcare facilities. Beyond the patient's well-being, PONV raises concerns about potential negative outcomes like hospital readmissions, which incur additional costs. Effective management of PONV involves assessing risks, employing strategies to reduce risks through multiple approaches, implementing preventive measures, and ensuring prompt intervention when needed. The objective of this review is twofold: firstly, to provide an overview of the current recommendations for managing PONV, and secondly, to present recent research exploring alternative therapeutic options.[2] Historically, it was believed that PONV was more frequent and severe with general anesthesia compared to regional anesthesia methods. Recent controlled research has mostly supported, though not entirely confirmed, this conventional belief. As a result, significant efforts have been dedicated to investigating the causes of PONV, identifying individuals at higher risk, and devising preventive and treatment plans, particularly for those undergoing general anesthesia. Interestingly, while research on PONV has predominantly focused on general anesthesia, there is a growing interest in regional anesthesia techniques. This indicates a shifting trend within the field of regional anesthesia.[3]

ANATOMY:

The lateral reticular formation of the brainstem houses an area referred to as the "vomiting center," responsible for regulating the processes of nausea and vomiting. This center receives incoming signals from various sources, including higher cortical regions, the vagal and glossopharyngeal nerves, the vestibular

apparatus, and the cerebellum.[4] Interactions also take place between the nucleus tractussolitarius and the chemoreceptor trigger zone (CTZ), situated in the base of the fourth ventricle. Unlike other areas, the CTZ comes into direct contact with cerebrospinal fluid (CSF) and is not isolated by the blood-brain barrier. This proximity allows for interactions between blood components and CSF, facilitated by the CTZ. Interestingly, the CTZ itself does not elicit vomiting when directly stimulated. Immunohistochemical analyses of these anatomical regions have revealed the presence of specific receptor types, including D2 dopamine receptors, neurokinin-1 receptors, cholinergic receptors, histamine receptors, and serotonin receptors.[5]

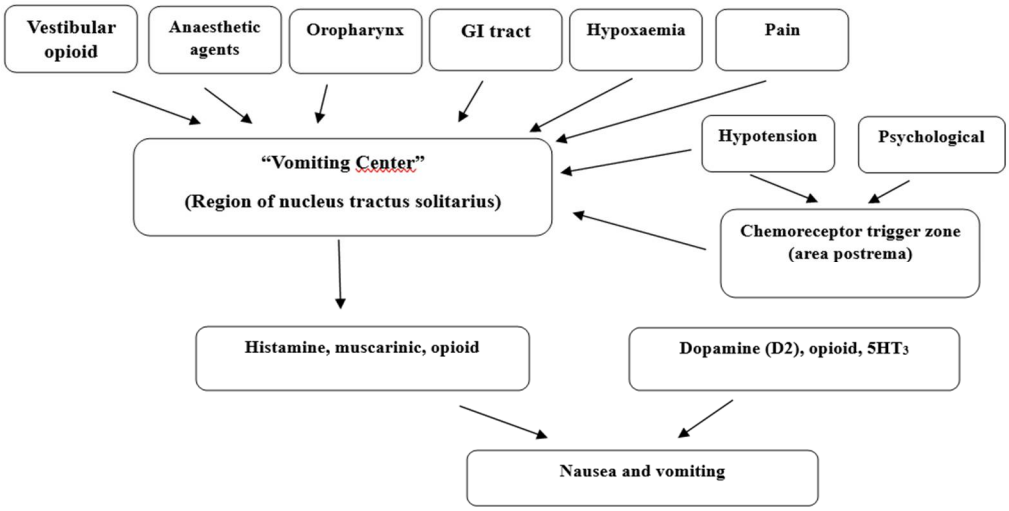

Figure :1 Vomiting Center and regulate Nausea and Vomiting

PHYSIOLOGY:

The "vomiting reflex" is triggered by various stimuli conveyed through the vagal, hypoglossal, and glossopharyngeal nerves, which transmit signals to the vomiting center [6]. Efferent signals from spinal segmental nerves are transmitted to the trigeminal, accessory, hypoglossal, and glossopharyngeal nerves. In response, the abdominal muscles contract in a coordinated manner while the glottis closes, leading to increased pressures within the thoracic and abdominal cavities. Simultaneously, the pyloric sphincter tightens, inducing vigorous antiperistalsis in the esophagus, opening of the esophageal sphincter, and the subsequent passage of stomach contents. This sequence is accompanied by symptoms like pallor, sweating, bradycardia, and is associated with robust vagal and sympathetic responses.[7] Notably, the chemoreceptor trigger zone (CTZ) is susceptible to the impact of opioids and volatile anesthetics. Additionally, neurotransmitters such as 5-hydroxytryptamine (5-HT), with the ability to cross the blood-brain barrier, may be released during surgical procedures, influencing these processes.[8]

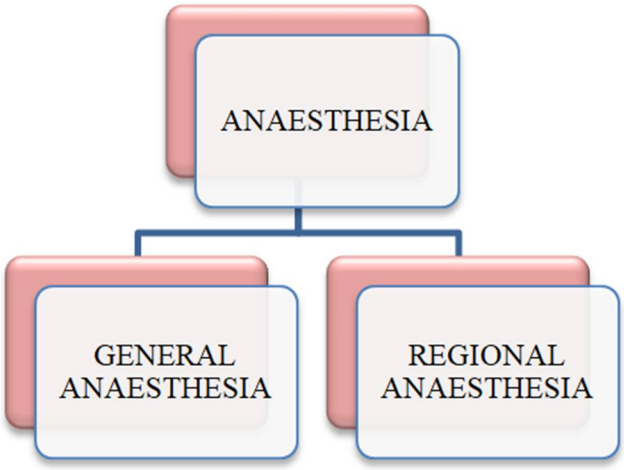

FIGURE: 2: Type of Anesthesia

ANAESTHESIA

Anesthesia, a fundamental medical process, serves as a protective shield against pain during surgical procedures, facilitating individuals in undergoing surgeries that contribute to their improved health and extended lifespan. This protective mechanism is achieved through the application of specialized medications known as anesthetics, which have been meticulously formulated by scientific researchers to cater to diverse purposes.[9] The spectrum of anesthetics comprises three primary categories: local, regional, and general anesthesia. Each variant exhibits distinct effects and finds its niche in various medical contexts.

GENERAL ANESTHESIA

The paradigm of general anesthesia entails inducing a state of absolute unconsciousness and muscle paralysis throughout the entirety of the patient's body.[10] It emerges as an indispensable component for surgeries that delve into internal organs and entail invasive procedures like spinal surgery. Critical medical undertakings such as organ transplants, intricate brain surgeries, and complex heart procedures hinge upon the successful application of general anesthesia. The orchestration of general anesthesia commences with a comprehensive preoperative consultation orchestrated by an anesthesiologist, a specialized medical practitioner.[11] This preliminary evaluation encompasses an in-depth scrutiny of the patient's medical history, allergies, lifestyle nuances, and other pertinent factors. During the surgical act, the anesthesiologist expertly administers the anesthetic agent either through intravenous infusion via a cannula or by introducing gas via a mask.[12] The vigilant of the anesthesiologist encompasses the continual assessment of the patient's unconscious status and the administration of pain alleviation interventions as necessitated by the circumstances.[13]

REGIONAL ANESTHESIA

The canvas of regional anesthesia delineates a more localized approach, numbing a specific area of the body, often encompassing the lower half, while ensuring that the patient remains conscious.[14] This modality gains traction when the surgical trajectory warrants targeted pain management. The delivery of regional anesthesia is facilitated through the conduit of injections or catheters, depending on the exigency.[15] Instances of regional anesthesia encompass spinal blocks and epidurals. The latter, frequently embraced as a panacea for pain mitigation during childbirth, not only empowers the expectant mother to retain consciousness but also facilitates the exertion of effort during the delivery process by mitigating discomfort.[16] Meanwhile, spinal blocks stand as a more potent iteration of regional anesthesia, commanding superior pain-relieving prowess for specific medical procedures.[17] The mantle of safety in the landscape of anesthesia leans favorably towards regional anesthesia, in contrast to the potential hazards and complications associated with sedation or general anesthesia.[18] This, however, does not obviate the presence of risks. Hence, it is imperative that the administration and oversight of regional anesthesia be entrusted exclusively to an anesthesiologist—a medical professional armed with expertise in the realm of anesthesia [19]. This meticulous supervision ensures the holistic well-being and unerring management of patients throughout the anesthetic journey.[20] To encapsulate, the phenomenon of anesthesia stands as a cornerstone in contemporary medical practice, endowing patients with the remarkable privilege of traversing surgical procedures bereft of pain.[21] The multifaceted array of anesthetic options caters to the diverse tapestry of medical exigencies, underpinned by the discerning guidance of skilled anesthesiologists who weave a tapestry of safety and comfort for patients.[22]

Table: 1: Types of Anesthesia

TYPES	EXPLANATION
SPINAL ANAESTHESIA	This form of regional anesthesia is widely utilized and involves the injection of anesthetic into the cerebrospinal fluid surrounding the nerves in the lower spinal region.
EPIDURAL ANAESTHESIA	During an epidural procedure, a small plastic catheter is carefully positioned in the epidural space near the nerves in your back, following a technique similar to spinal anesthesia. This method enables the anesthesiologist to administer multiple doses of local anesthetics and pain relievers without the need for additional injections. The advantage of this approach is that the catheter can remain in position for several days following the surgery, making epidural anesthesia beneficial for managing post-operative pain effectively.
REGIONAL NERVE BLOCK	Similar techniques can be employed to numb other parts of the body. For instance, an injection into the armpit or the side of the neck can effectively numb the arm, facilitating treatment for areas like the shoulder or wrist.

LOCAL ANAESTHESIA	Local anesthesia is employed to numb a specific and limited area of the body. Often, it is administered by a surgeon or a general practitioner in minor surgical settings. This type of anesthesia is primarily suitable for swift and uncomplicated procedures such as wound suturing or mole removal. In situations where anesthesia is unnecessary, sedation can serve as the sole method of pain relief; nonetheless, it might lead to discomfort or unfavorable sensations.

PATHOPHYSIOLOGY OF POST OPERATIVE NAUSEA AND VOMITING:

The brainstem's lateral reticular formation encompasses an unspecified area responsible for the coordination of nausea and vomiting responses.[23] Termed the "vomiting centre," it functions more akin to a **"central pattern generator"** (CPG), orchestrating a sequence of neural processes within the medulla that ultimately lead to vomiting.[24] The intricate muscular reactions involved in emesis are activated through inputs from various sources, including afferent signals from the vagal and glossopharyngeal nerves, the vestibular apparatus, visual centers, the cerebellum, and other regions of the brain.[25] Moreover, direct electrical stimulation of the CPG can also elicit emesis.

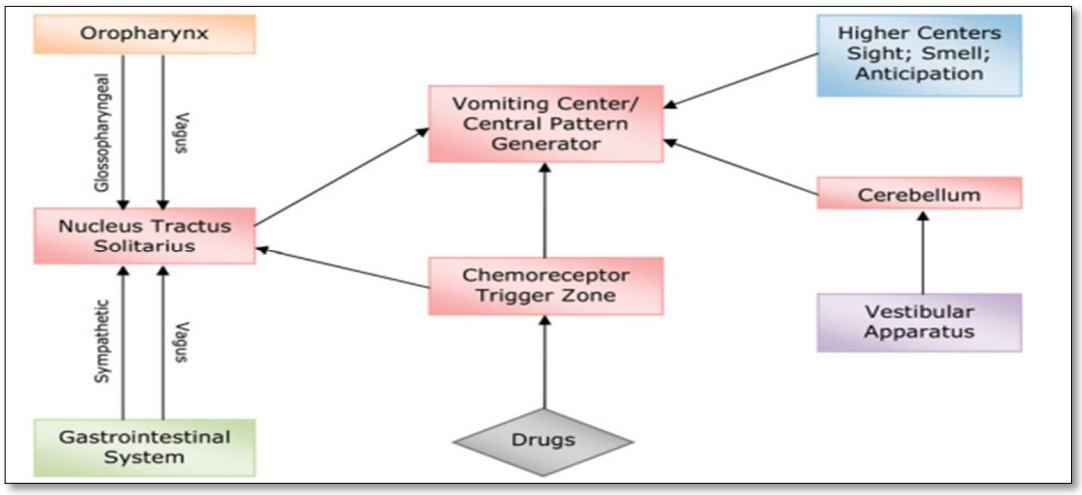

FIGURE: 3 Pathophysiology of PONV

A vital afferent input comes from the chemoreceptor trigger zone (CTZ), which is responsible for detecting emetic substances in both the bloodstream and cerebrospinal fluid (CSF).[26] Located in the postrema region beyond the blood-brain barrier, situated at the base of the fourth ventricle, the CTZ's direct electrical stimulation doesn't induce vomiting.[27] Nevertheless, the CTZ is interconnected with the neighboring nucleus tractussolitarius (NTS) and extends its influence into the CPG. Communication between these anatomical segments is facilitated by diverse neurotransmitter systems, including serotonin 5-HT3, dopamine D2, histamine H1, muscarinic cholinergic, and neurokinin NK1 receptors.[28] Strategies for preventing or treating nausea and vomiting involve the blockade of one or more of these receptor types.[29]

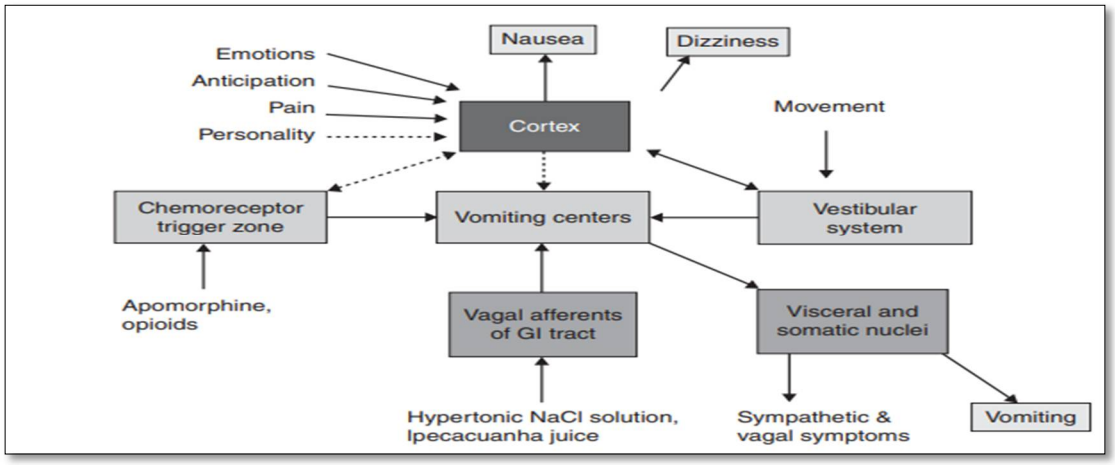

Figure: 4 Hypothetical Model of the Pathophysiology of Post Operative Nausea and Vomiting.[30].

HYPOTHETICAL MODEL:

COMPLICATIONS

Post-dural puncture headache (PDPH) stands as the most common adverse outcome resulting from neuraxial block, manifesting in up to 7% of cases involving dura mater tear. PDPH can arise due to various scenarios, including epidural catheter displacement, diagnostic lumbar puncture, "wet tap" during epidural insertion, or spinal anesthesia.[31] The underlying cause of PDPH is believed to be an ongoing cerebrospinal fluid (CSF) leakage through the dural defect, surpassing the rate of CSF production.[32] This transdural leakage leads to a decrease in CSF volume and pressure. In an upright position, gravity exerts pressure on the heavily innervated meninges and pain-sensitive intracranial vessels, inducing pain that radiates to the forehead, occipital region, neck, and shoulders.[33] This discomfort is conveyed through trigeminal, glossopharyngeal, and intracranial vessels, upper cranial nerves, and the vagus nerve. Backache is a commonly reported complaint following neuraxial anesthesia.[34] This issue occurs with nearly equal frequency after spinal or general anesthesia. Potential causes include a decrease in lumbar lordosis due to muscle relaxation, ligament stretching, or localized intervertebral disc damage.[35] The resulting discomfort is typically mild and self-resolving, although it can persist for a few weeks. Transient Neurological Symptoms (TNS) were initially identified by Schneider et al. in 1993, characterized by radicular back pain following uneventful spinal lidocaine anesthesia. TNS presents without bowel or bladder dysfunction, sensory or motor deficits, and typically resolves within a week.[36] Despite this, around 30% of TNS sufferers report severe pain. Lidocaine-based spinal anesthesia, particularly compared to bupivacaine, prilocaine, or procaine, has been associated with a higher risk of TNS.[37] Factors like obesity, outpatient status, and lithotomy posture were identified as increasing the likelihood of TNS.[38] Spinal or epidural hematoma, although rare, represents a serious complication of neuraxial blocks.[39] It can lead to irreversible neurologic damage if undetected. Symptoms include sudden back and leg pain, paralysis, numbness, and bowel/bladder dysfunction. Neurological consultation and neuroimaging are essential for diagnosis, and surgical decompression within hours can lead to acceptable neurological recovery.[40] Epidural abscess is a serious consequence of neuraxial blocks, although rare. Prompt identification and treatment are crucial, with symptoms including back pain, fever, sensory changes, flaccid followed by spastic paralysis, and elevated inflammatory markers.[41] Surgical drainage and antimicrobial therapy are cornerstones of treatment, with early intervention needed to prevent brain damage and manage sepsis.[42]

Meningitis poses a risk with dural puncture and subarachnoid space infection, potentially resulting from breaches in aseptic technique.[43] Symptoms like fever, headaches, lethargy, emesis, and altered CSF composition may manifest days to weeks after the procedure. Lumbar puncture aids in diagnosis, with timely administration of antibiotics essential.[44] Cardiac arrest is a rare but studied phenomenon in anesthesia. Neuraxial block causing circulatory dysfunction as the underlying mechanism is suggested.[45] Various strategies have been recommended to reduce its frequency and increase survival, including intravascular fluid administration, combined alpha- and beta-agonists, and vagolytic therapy.[46] Neuraxial anesthesia blocking S2-S4 nerve root fibers inhibits the voiding reflex and decreases urinary bladder tone. Postoperative urinary retention (POUR) is a frequent occurrence, influenced by factors like comorbidities, surgical type, and anesthesia approach. Reported prevalence ranges from 5% to 70%.[47]

RISK FACTORS FOR ADULT AND PAEDIATRICS POPULATION

ADULTS

PATIENT-RELATED FACTORS

Gender: The reason behind the increased susceptibility of women to nausea and vomiting compared to men is not well understood. It's suggested that the chemoreceptor trigger zone (CTZ) and vomiting center's heightened sensitivity to follicle-stimulating hormone (FSH) and estrogen could contribute to higher PONV rates during menstruation and the preovulatory phase of the menstrual cycle. Interestingly, this gender difference is absent in pediatric populations and individuals over 60 years of age.[48]

Non-Smoking: Research led by Cohen et al. highlighted that nonsmokers experience nearly double the incidence of PONV compared to smokers. This finding has been substantiated by subsequent studies. Chronic smoking exposure, especially to compounds like polycyclic aromatic hydrocarbons, might impact the liver's microsomal enzymes, affecting the metabolism of certain perioperative medications and their potential to induce PONV. It's less likely that the acute effects of smoking elements are responsible for the observed protective effect against post-surgery nausea and vomiting.[49]

History of PONV, Motion Sickness, or Migraine: Individuals with a personal history of PONV, motion sickness, or migraine are more predisposed to emetic stimuli, leading to an increased susceptibility to PONV.[50]

Age: PONV prevalence varies with age. Children aged 6–10 have exhibited a prevalence as high as 34%, which decreases with the onset of puberty. In adults, the incidence seems to decline with age.[51]
Obesity: Initially, a connection between PONV and a body mass index (BMI) over 30 was suggested due to increased intra-abdominal pressure and altered pharmacokinetics of lipophilic anesthetic drugs. However, recent evidence contradicts this, asserting that BMI might not be directly associated with an elevated risk of PONV. An increased BMI could potentially amplify the risk when combined with other independent risk factors for PONV.[52]

ANESTHESIA-RELATED FACTORS:

Postoperative Opioids: Various studies have indicated that the use of postoperative opioids roughly doubles the incidence of PONV. Notably, administering opioids to patients already experiencing pain doesn't significantly augment PONV occurrences. For instance, remifentanil, an ultra-short-acting opioid analog, demonstrates comparable PONV rates to fentanyl within the initial 24 hours post-surgery.[53]
Inhalational Anesthetics: Incidence of PONV remains largely consistent across various volatile anesthetics when administered at 1 MAC or lower (including halothane, isoflurane, sevoflurane, and desflurane). However, balanced anesthesia involving opioids appears to elevate PONV risk compared to volatile induction maintenance anesthesia (VIMA). Research has pinpointed volatile anesthetics as the primary instigator of PONV within the first two postoperative hours.[54]
Nitrous Oxide (N2O): Nitrous oxide and volatile anesthetics exert distinct emetic effects that are additive rather than synergistic. Replacing nitrous oxide with nitrogen can reduce the risk of postoperative nausea and vomiting by around 12%, compared to roughly 19% with volatile anesthesia.[55]
Duration of Anesthesia: Extended surgical procedures by an additional 30 minutes can elevate the risk of PONV by approximately 60%.[56]

SURGERY-RELATED INDEPENDENT FACTORS:

Certain procedures, such as intra abdominal, laparoscopic, orthopedic, major gynecological, ENT, thyroid, breast, plastic, and neurosurgery, are considered potential risk factors for PONV.[57] In laparoscopic surgery, the insufflation of gas to create workspace for instruments might strain the vagus nerve, connecting to the brain's emetic center, contributing to the higher PONV risk. For gynecological laparoscopy in day-case settings, female gender, use of perioperative painkillers, and modes of travel post-surgery that increase susceptibility to motion-induced emesis are additional risk factors.[58]

Table 2: different type of Risk factors

GENERAL RISK FACTORS	PATIENT RELATED FACTORS FOR PONV	SURGICAL RELATED FACTORS FOR PONV
Female gender Non-smoking status Use of post-operative opioids; 3/11 Previous history of either PONV or motion sickness. Surgical procedure, Use of volatile anaesthesia, and female sex Post-operative nausea and Vomiting history Motion sickness history Smoking-free status; The duration of the anaesthesia Youthful age Opioid usage following surgery	age body habitus gender delayed gastric emptying anaesthetic history motion sickness anxiety	site of surgery Adenotonsillectomy Ocular Strabismus Gastric suction Mask ventilation Gynaecological Duration of surgery Post operative fluids.[59]

PAEDIATRICS

Postoperative vomiting is a common occurrence in pediatric patients, reaching peak incidences of 34% to 50% among school-aged individuals.[60] Unlike inducing nausea, vomiting is more noticeable in this age group, and it stands as a significant concern for parents and a leading cause of readmission. Prior to puberty, gender differences in postoperative vomiting (POV) are not evident.[61] Certain procedures, including strabismus correction, adenotonsillectomy, hernia repair, orchidopexy, and penile surgery, increase the likelihood of postoperative vomiting in children. Generally, the risk of POV tends to rise as children grow older, except for those under the age of two.[62] While vomiting is infrequent in children

under two, it becomes more common as children reach the age of three, with a frequency of around 40%.[63] However, as children enter puberty, the frequency of vomiting tends to decrease. Adenotonsillectomy, strabismus correction, hernia repair, orchidopexy, and penile surgery exhibit varying degrees of increased vomiting risk in children, depending on their gender.[64] To mitigate postoperative discomfort, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) like Ketorolac and Paracetamol, which act centrally, can be used to reduce the need for opioids.[65] Employing a multimodal approach that combines lower doses of both opioids and NSAIDs can enhance analgesic effects while minimizing adverse effects from both drug classes. In the pediatric population, strategies such as the use of rectal acetaminophen and regional anesthetic methods (like caudal epidural) can reduce perioperative opioid usage and subsequently lower the incidence of PONV.[66]

MANAGEMENT

During intraoperative anesthesia management, it is recommended to prioritize the use of regional anesthesia whenever possible. This approach helps reduce opioid consumption, subsequently lowering the incidence of postoperative nausea and vomiting (PONV) while still providing effective pain relief.[67] In patients with a high risk of PONV, it's advisable to avoid the use of emetogenic induction medications such as nitrous oxide, inhalational agents, etomidate, and ketamine. Utilizing Regional anesthesia and Nonsteroidal Anti-Inflammatory drugs (NSAIDs) can be effective in complementing analgesia and reducing the need for perioperative opioids. Caution should be exercised when administering anticholinesterase medications like neostigmine, ensuring that their effects can be effectively reversed through neuromuscular monitoring.[68] For prophylaxis of PONV, a patient's individual risk should be assessed. Low-risk patients might not require prophylaxis, except when there are medical concerns related to vomiting consequences, such as patients with wired jaws, elevated intracranial pressure, or recent fundoplication surgery. Moderate to high-risk patients should consider regional anesthesia if feasible; if not, methods to reduce baseline PONV risk should be employed

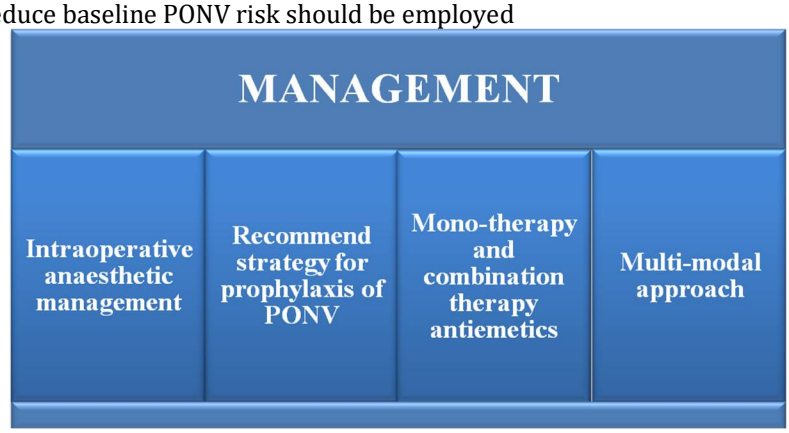

FIGURE: 5 Management of postoperative nausea and vomiting

A recommended strategy involves combination antiemetic therapy, also known as a multimodal approach, which combines two or more interventions.[69] This approach includes both pharmacologic and non-pharmacologic prophylaxis methods along with strategies to lower baseline PONV risk.[70] Ondansetron is effective in reducing the risk of PONV compared to other combinations, and both ondansetron with droperidol and ondansetron with dexamethasone combinations are shown to be effective in managing PONV. When it comes to antiemetic therapy, both monotherapy and combination therapy have limitations in preventing PONV, particularly in high-risk patients.[71] Since PONV involves multiple receptor systems, a more effective prophylaxis approach could involve combining medications that target different receptor sites. For instance, adding an anticholinergic, antidopaminergic, or antihistamine to serotonin receptor antagonists might be considered. Combining droperidol or dexamethasone with a 5-HT3 receptor antagonist has shown to be effective in studies. Combination therapy tends to be more beneficial for high-risk patients, while medium-risk patients can often benefit from single-agent therapy.[72]

Table 3: Class of drugs and Action

CLASS	DRUGS	SITE OF ACTION
Prokinetics	1. Metoclopramide 2. Domperidone 3. Prochlorperazine	D2receptor
Serotonin antagonist	1. Ondansetron 2. Granisetron 3. Ramosetron 4. Palanosetron	5HT-3 receptor
Antimuscarnics	1. Atropine 2. Hysocine	M1 receptor
Antihistaminics	1.Hydroxizine	H1 receptor
Neurokinin-I Antagonist	1. Aprepitant 2. Casopitant 3. Fosaptrepitant	NK -I receptor

A multimodal approach is considered more effective in addressing the complex underlying factors contributing to Post Operative Nausea and Vomiting (PONV) compared to relying solely on a combination of antiemetics that target different receptor sites.[73] This approach combines both pharmacological and non-pharmacological preventive measures along with interventions aimed at lowering the baseline risk of PONV. Scuderi et al. conducted a study to assess the efficacy of a multimodal strategy in reducing the occurrence of PONV. Their approach involved a comprehensive combination of interventions.[74]

TYPES OF THERAPY	DESCRIPTION
Preoperative Hypnotherapy	This technique aimed to reduce the psychological factors that could contribute to PONV.
Aggressive Hydration	Patients were administered a substantial volume of fluids (25 mL/Kg) to maintain optimal hydration levels.
Oxygen	Providing supplemental oxygen to patients helps maintain adequate oxygenation levels and can indirectly influence the occurrence of PONV.
Prophylactic Antiemetics	The study administered antiemetic medications prophylactically to prevent the onset of nausea and vomiting. This included droperidol (0.625 mg), dexamethasone (10 mg) at induction, and ondansetron (1 mg) at the end of surgery.
Total Intravenous Anesthesia (TIVA)	The study used propofol and remifentanil for anesthesia, avoiding the use of nitrous oxide and neuromuscular inhibition
Ketorolac	Ketorolac, a nonsteroidal anti-inflammatory drug (NSAID), was administered (30 mg) as part of the multimodal approach. NSAIDs can provide analgesia and contribute to reducing the need for opioids, which are associated with PONV.

Table 4: Types of therapy

This multimodal approach aimed to address various aspects of PONV causation, including psychological factors, fluid balance, oxygenation, pharmacological prevention, anesthesia technique, and pain management. By combining these different strategies, the goal was to provide comprehensive protection against PONV in a synergistic manner.[75]

NOVEL TREATMENTS FOR PONV:

Ondansetron is commonly employed as a treatment option for managing established instances of Post Operative Nausea and Vomiting (PONV). Acting as a 5-HT3 receptor antagonist, it effectively inhibits the activity of specific chemicals in the body responsible for triggering sensations of nausea and vomiting.[76] This medication can be administered through various methods, including oral solution, intravenous solution, injectable solution, oral tablet, dissolving strip, and disintegrating strip. Another choice for addressing established PONV is promethazine, which belongs to the phenothiazine antiemetic class. Its mechanism involves altering the actions of certain brain chemicals, providing relief from symptoms associated with nausea and vomiting.[77] Promethazine comes in several forms, including oral tablets, injectable syrup, and compounded powder. Droperidol, aside from its sedative and calming effects, is also employed as an antinausea treatment to manage the nausea and vomiting linked to surgical procedures. Administered through various means like injectable solution, compounded powder, and intravenous solution, it serves as a viable option for tackling PONV.[78] Palonosetron injection stands out as a potent

solution for preventing and managing PONV, particularly within a 24-hour period following cancer chemotherapy or surgery.[79] With dosages of 0.25 mg and 0.075 mg for preventing chemotherapy-induced and postoperative nausea and vomiting respectively, palonosetron offers a half-life of 40 hours and maintains therapeutic effects for up to 72 hours. Transdermal scopolamine, an anticholinergic medication, presents an alternate approach to reducing the frequency of PONV occurrences.[80] It acts on the muscarinic and histaminic receptors of the vestibular apparatus and the nucleus of the tractussolitarus. While notably effective in patients receiving opioids for postoperative pain control and those undergoing middle ear surgery, its utilization could be limited due to potential side effects like drowsiness and dry mouth. Transdermal scopolamine patches applied prior to surgery have shown to significantly decrease the incidence of PONV, demonstrating efficacy comparable to ondansetron. The timing of patch application, whether the evening before surgery or four hours before anesthesia conclusion, plays a pivotal role in achieving optimal results.[81]

SUGGESTED REGIMEN:

Once a patient's risk group for PONV has been determined, appropriate treatment strategies can be devised. Prophylactic measures are generally not recommended for individuals at low risk of experiencing PONV, unless they face potential medical complications from vomiting, such as those with wired jaws.[82] In cases where a preventive dose of dexamethasone proves ineffective for patients with moderate risk, prompt administration of a serotonin antagonist should be considered upon the onset of nausea or vomiting.[83] If singular medication treatment proves inadequate, a well-considered and robust combination therapy approach should be adopted, though the most optimal combination and dosages of antiemetic drugs within it remain to be definitively established. For individuals categorized as high-risk for PONV, prophylactic use of dexamethasone alongside a serotonin antagonist is recommended as part of the treatment regimen.[84]

CONCLUSION

The ramifications of PONV encompass a range of issues including prolonged recovery room stays, unexpected hospital admissions, heightened risks of pulmonary aspiration, and notable postoperative discomfort. Enhancing patient care and satisfaction within the post-anesthesia care unit (PACU) can be significantly improved by effectively identifying individuals at high risk for PONV and intervening proactively. For children categorized as having moderate or high PONV risk, comprehensive prophylactic measures should entail a combination therapy approach, involving both a 5-HT3 antagonist and a secondary medication from a different class. Combining interventions from distinct drug classes leads to an additive risk reduction effect due to their cumulative actions. In cases where rescue therapy becomes necessary, the chosen antiemetic should stem from a therapeutic class different from the drugs utilized for prophylaxis.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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