

Exploring the Belly of the Beast: A Systematic Review of Gastrointestinal Symptoms Following Mammoplasty Procedures

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ABSTRACT

Background & Aims: Mammoplasty, a common cosmetic procedure involving breast augmentation and reduction surgeries, has gained global popularity. Recently, attention has shifted towards understanding the prevalence and significance of gastrointestinal (GI) symptoms following mammoplasty. This systematic review aims to consolidate existing literature to provide a comprehensive overview of the type and frequency of GI problems associated with various mammoplasty procedures.

Methods: A systematic search of PubMed and Scopus databases was conducted until January 22, 2024, identifying observational and interventional studies examining GI symptoms post-mammoplasty. Inclusion criteria covered human studies, while exclusion criteria ensured specificity. Two independent investigators performed screening, and data extraction included study characteristics, surgical procedures, anesthesia methods, and interventions.

Results: Nineteen studies, involving 2,487 subjects, were included in the review. Breast reconstruction emerged as the most studied procedure, followed by breast reduction, augmentation, mastectomy, and breast cancer surgery. Predominant GI symptoms included nausea and vomiting, with varying rates across mammoplasty types. Anesthesia modality influenced symptomatology, with general, local, and combined anesthesia associated with GI disturbances. Antiemetics, notably ondansetron and droperidol, showed variable efficacy. Non-pharmacological approaches, such as preoperative hypnosis, were explored for symptom management.

Conclusions: Our systematic review reveals insights into GI symptoms post-mammoplasty, emphasizing the common occurrence of symptoms such as nausea and vomiting, alongside less frequent manifestations such as constipation, dry mouth, retching, abdominal pain, and tightness. Variations in symptom prevalence were noted across diverse mammoplasty surgeries, anesthesia methods, and the use of antiemetics, underscoring the complex nature of post-mammoplasty GI disturbances.

Key words: mammoplasty – nausea – abdominal pain – constipation – anesthesia techniques – antiemetic efficacy.

Abbreviations: DIEP: deep inferior epigastric perforator; GI: gastrointestinal; TRAM: transverse rectus abdominis myocutaneous.

INTRODUCTION

Mammoplasty, a procedure that involves breast augmentation and reduction surgery, is one of the most common cosmetic procedures performed globally. It is motivated by a number of considerations, such as functional enhancements, post-mastectomy reconstruction, and aesthetic purposes. In the range of postoperative complications,

consideration has progressively shifted to assessing the prevalence and significance of gastrointestinal (GI) symptoms after mammoplasty. This growing focus emphasizes how crucial it is from a medical standpoint to fully comprehend the type and frequency of GI problems in relation to mammoplasty operations [1, 2].

Patients may experience a wide range of symptoms and complications post mammoplasty surgeries, from minor pain to more serious symptoms. Although the most common immediate concerns are pain at the surgery site, problems with wound healing, and changes in breast sensation, research lately has revealed that GI issues can also arise. They can include, but are not limited to stomach pain, vomiting, nausea, and

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changes in bowel patterns. It is critical to comprehend and treat these symptoms in order to maximize postoperative care and patient satisfaction [3, 4].

The GI symptoms and complications that occur as a result of mammoplasty surgeries are particularly interesting. These symptoms, which are sometimes neglected in the middle of the more prominent issues surrounding breast surgery, can have a substantial impact on postoperative healing and patient well-being. Studies have found varying rates of GI disturbances following mammoplasty, but a thorough synthesis of present research is required to determine precisely the severity and characteristics associated with these symptoms [5].

Numerous variables may contribute to the development of GI problems during mammoplasty. Surgical trauma, perioperative drugs, changes in body positioning and mechanics, and psychological stressors can all impair GI function. Furthermore, the interaction of these factors and specific patient characteristics emphasizes the multidimensional nature of postoperative symptomatology [6, 7].

This systematic review aims to consolidate existing literature pertaining to GI symptoms and complications following mammoplasty procedures. By synthesizing data from diverse sources, our objective was to provide a comprehensive overview of the frequency and nature of GI disturbances post mammoplasty. Through this review, we elucidate gaps in current understanding and identify avenues for further research aimed at optimizing postoperative care and patient outcomes.

METHODS

Data Sources and Search Strategy

To identify potentially eligible observational and interventional studies evaluating GI symptoms in post mammoplasty patients, we conducted a systematic search on PubMed and Scopus from inception till the 22nd of January 2024 without restrictions. The search strategy applied in these two databases included the following search string for PubMed: ((„Mammaplasty”[Mesh]) OR („Mammaplasty”[All Fields])) AND ((„Signs and Symptoms, Digestive”[Mesh]) OR („Signs and Symptoms, Digestive”[All Fields])) and the following search string for Scopus: (Mammaplasty AND Digestive symptoms). Furthermore, we also manually searched the references lists of relevant articles to minimize the bias of all results and find any additional related missed publications.

Study Selection and Eligibility Criteria

All observational and interventional studies that examined the complexity and the correlations of GI symptoms in post-mammaplasty patients were eligible for inclusion. Our qualitative assessment included original publications that met the following inclusion criteria: (1) interventional or observational cohort population-based/hospital-based/primary care-based, case-control, descriptive studies of prospective or retrospective design; (2) patients who recently underwent breast surgery, or with a previous history of breast surgery, regardless of the type of procedure, with post-op GI symptoms; (3) no restrictions in terms of gender, race, or ethnicity; and (4) studies conducted on humans only.

Exclusion criteria included the following: (1) patients undergoing additional operative procedures less than 24 hours after breast surgery; (2) studies that do not evaluate GI symptoms post mammoplasty; (3) studies that include patients that underwent other surgical procedures along with mammoplasty; (4) studies published in languages other than English; and (5) Case reports, reviews, practice guidelines, commentaries, opinions, letters, editorials, short surveys, articles in press, conference abstracts, conference papers, and abstracts published without a full article.

According to the abovementioned eligibility criteria, two investigators (A.A and M.A.H.) carried out an impartial screening evaluation, with titles and abstracts scrutinized to omit research that appeared to be irrelevant. Subsequently, we evaluated the full-text of selected publications that met the inclusion and exclusion criteria. Any divergences concerning study eligibility were settled through mutual consensus and discussion.

Data Extraction

We extracted the following information from eligible studies: author's name, publication year, study type, sample size, procedure of surgery, associated GI symptoms, number of patients with symptoms, sedative and anesthetic agents used, pharmacological drugs, non-pharmacological therapies, statistical significance in relation to symptoms. One investigator (A.A.) extracted the data using an electronic spreadsheet, whereas another investigator (M.A.H.) verified the extracted data for authenticity. Any discrepancies in the outcomes of the extracted data were resolved through discussion. The extracted data were then entered into tables, and the final data was compiled and provided in the manuscript's text.

Quality Assessment of Included Studies

The Cochrane collaboration's tool was used to assess the risk of bias for randomized controlled trials [8]. The formulation of random sequences, concealing treatment allocation, blinding, and accuracy of outcome data, together with selective outcome reporting and additional sources of bias, were used to evaluate the quality of the study. The cross-sectional study quality was assessed using the Newcastle-Ottawa Scale (NOS). If the sample was accurately or partially representative of the target population's average, we gave it one star in the representation of the sample section. If the sample size was appropriate and sufficient, we awarded one star in the sample size evaluation. If the characteristics of respondents and non-respondents could be compared and the response rate was adequate, we gave the non-respondents section one star. In the section that focused on determining exposure (risk factor), we gave two stars if the study utilized a validated measurement technique, and one star if the study used a non-validated measuring method but it was available or discussed. In the comparability section, we gave one star if the study controlled for the most important factor and another star if the study adjusted for any other factor. In the assessment of the outcome section, we assigned two stars if the outcome was evaluated by independent blind assessment, two stars if the outcome was evaluated by record linkage, and one star if the outcome was assessed by self-report. In the statistical test section, we gave one star if the statistical test used to evaluate the data was clearly defined and appropriate, and the measurement

of the relationship was reported, including confidence intervals and the probability level (p-value). We left a blank instance in any of these sections where the study did not complete one of the requirements. We used these evaluation techniques to assess bias risk and internal validity in individual research in a similar way. The risk of bias in individual research was assessed independently by two investigators (A.A. and M.A.H.).

RESULTS

Literature Search

The literature search identified 56 and 53 records from PubMed and Scopus, respectively. No duplicates were found, we obtained a total of 109 records that were carefully reviewed through the assessment of the titles and abstracts, of which a total of 79 records were excluded due to the following reasons: (1) thirty-five irrelevant articles; (2) twenty-two review articles; (3) eighteen editorials, letters, notes, and short surveys; (4) four articles with foreign languages. The total records that were sought for retrieval through contacting the authors included 2 articles, of which none were retrieved. The eligibility of the remaining 28 articles according to the inclusion and exclusion criteria was evaluated through assessing the full text, of which 9 records were excluded due to the following: (1) not evaluating GI symptoms post mammoplasty; (2) studies that contain surgical procedures and GI symptoms but not exclusive to post mammoplasty; (3) case reports. Therefore, a total of 19 records fulfilled our inclusion and exclusion criteria and were included in our qualitative assessment as described in Fig. 1 [9-27].

Study Characteristics

The main characteristics of included studies are summarized in Supplementary Table I. A total of 2,487 subjects were included in this review. Study population included adult females, aged 16 and above.

Seven studies had a retrospective study design [11-14, 21, 23, 26]. Six studies had randomized controlled design (prospective randomized blinded controlled study [9, 18], randomized controlled trial [16, 17, 20], parallel group study [24], prospective trial study [19]). While five studies had a cohort study design (retrospective cohort study [15, 25], prospective cohort study [10, 27], and historical cohort study [22]).

Six studies were conducted in Europe (Sweden $n=1$, Finland $n=1$, Norway $n=1$, UK $n=2$, Belgium $n=1$), seven studies in North America (USA $n=6$, Canada $n=1$), two studies in Asia (Republic of Korea $n=1$, China $n=1$), and three studies were conducted by countries in different continents that were either between Europe/Asia or Asia/North America.

Gastrointestinal Symptoms According to Surgical Procedure

The mammoplasty surgeries enumerated in the final studies included for assessment, involved up to five different surgeries as follows: (1) breast reconstruction ($n=9$); (2) breast reduction ($n=5$); (3) breast augmentation ($n=2$); (4) mastectomy ($n=2$); (5) breast cancer surgery ($n=1$). Each of them had mentioned their own GI symptoms, respectively, which are mentioned further below, as they are also represented in Table I.

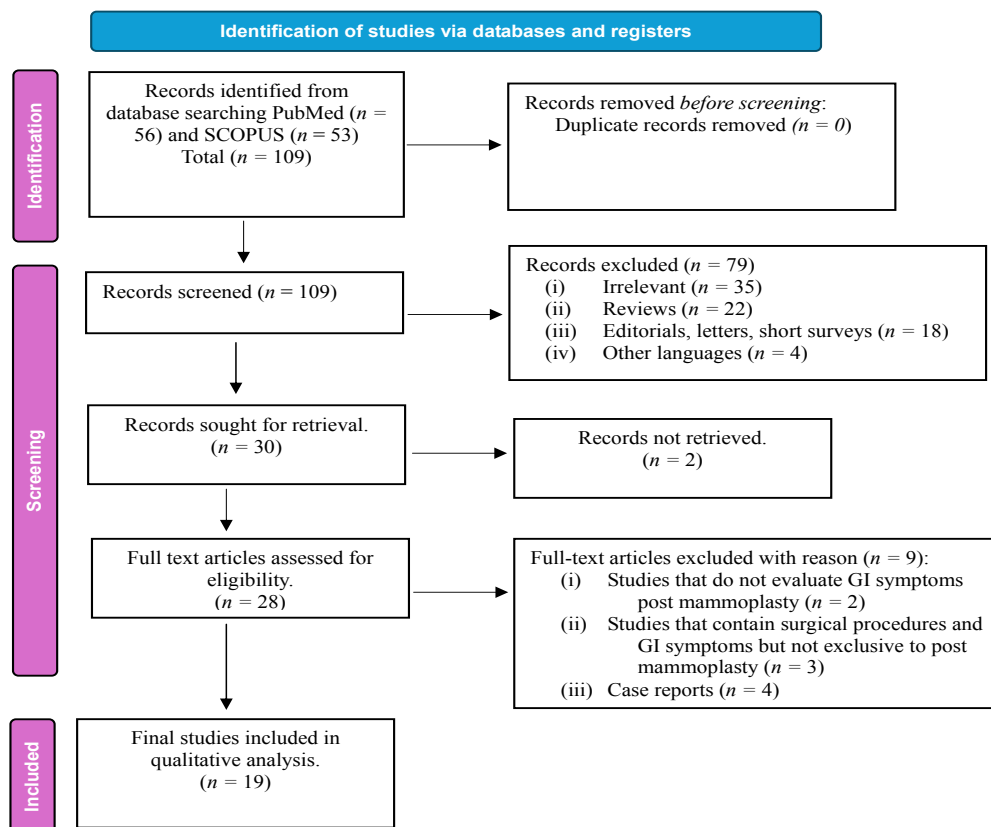


Fig. 1. PRISMA flow diagram for search and selection processes of this systematic review.

Table I. Gastrointestinal symptoms according to post mammoplasty procedures

Surgery procedure	Number of Studies	Total Number of Patients	GI Symptoms	Additional Information
Breast reconstruction	9	938	Nausea, vomiting/emesis, abdominal pain, abdominal tightness, constipation	3 TRAM flap surgical procedures, 4 DIEP flap breast reconstruction procedures, 2 unspecified procedures
Breast reduction	5	520	Nausea, vomiting	3 bilateral breast reduction surgeries, 1 elective breast reduction, 1 unspecified
Breast augmentation	2	334	Nausea, vomiting	–
Mastectomy	2	607	Nausea, vomiting	Mastectomy procedure with & without PVB & nipple sparing mastectomy (RNSM and CNSM)
Breast cancer surgery	1	115	Nausea, vomiting	Breast cancer surgery without reconstruction

GI: gastrointestinal; TRAM: transverse rectus abdominus myocutaneous; DIEP: deep inferior epigastric perforator; PVB: paravertebral block; RNSM: robotic nipple sparing mastectomy; CNSM: conventional nipple-sparing mastectomy.

Breast Reconstruction

There were 9 studies in total where patients underwent breast reconstruction. The studies' population were all female adults (>18 years old), while the sum of patients, in all the nine studies, was 938 patients. As for the surgical procedures chosen for the breast reconstruction surgeries, 3 out of the 9 studies undertook transverse rectus abdominis myocutaneous (TRAM) breast flap surgical procedure [9-11], 4 studies undertook deep inferior epigastric perforator (DIEP) flap breast reconstruction procedure [12-15] meanwhile, 2 studies had not specified the exact procedure of breast reconstruction [16, 17]. Surgical anesthesia used was either general, local, spinal or a combination between them. Pharmacological drugs, mainly antiemetics, were administered in majority of studies when needed. Only 2 studies had nonpharmacological strategies used, saline solution [16] and supplemental 80% or 30% oxygen [17]. It is observed that the most frequent GI symptoms seen among almost all patients who underwent breast reconstruction in the studies were nausea and vomiting as 8 out of 9 studies reported.

TRAM Procedures

In some studies, with patients that underwent TRAM procedures, less common GI symptoms post mammoplasty were reported; one study reported nausea and vomiting was accompanied with retching [9], while another study reported abdominal pain and tightness [10], and lastly, one study that reported nausea and vomiting with abdominal pain [11].

DIEP Procedures

Findings of less common GI symptoms were reported in one study where patients underwent DIEP procedures including constipation along with the known nausea and vomiting [12].

Breast Reduction

There was a total of 5 studies where patients underwent breast reduction, where the total sum of patients was 520, of which at least 200 reported GI symptoms. Among the 5

studies, three of them were bilateral breast reduction surgery [19, 20, 22], one was an elective breast reduction surgery [18] and one was an unspecified breast reduction surgery [21]. General anesthetics, local anesthetics, spinal anesthetics, or a combination of these anesthetics were used for the operations. In most studies, pharmacological medications, particularly antiemetics, were administered as needed. Nonpharmacological agents or methods used in some studies include preoperative hypnosis [18] and saline [21]. All the studies mentioned have reported nausea and vomiting as GI symptoms post-surgery, with one study reporting fewer common symptoms accompanying them such as retching [18].

Breast Augmentation

The analysis comprised two studies involving a total of 334 patients who underwent breast augmentation procedures [23, 24]. Anesthesia administration varied among the studies, with a combination of general anesthesia, local anesthesia, or monitored anesthesia care (MAC) utilized across procedures. Pharmacological interventions, including NSAIDs, opioids, steroids, and other medications, were utilized to address postoperative symptoms and manage pain. Within this context, GI symptoms, notably nausea and vomiting, were prevalent among the patients.

Mastectomy

The findings from two studies include a total of 607 patients undergoing mastectomy [25, 26]. GI symptoms reported were notable nausea and vomiting. Anesthesia techniques varied between general anesthesia, spinal anesthesia, or a combination of both. Pharmacological interventions included opioids, antiemetics, and NSAIDs, with one study engaging in a non-pharmacological approach: mechanical ventilation [26].

One of the studies was a retrospective cohort study, where two hundred and three mastectomy patients underwent immediate breast reconstruction [25]. The other study was a robotic vs non robotic nipple sparing mastectomy [26], which was done with patients who had breast cancer; however, the

surgery procedure was specified (mastectomy), thus including it in the “mastectomy” category and not “breast cancer surgery” category.

Breast Cancer Surgery

This category contained 1 study, where a total of 115 patients underwent breast cancer surgery without reconstruction [27]. However, the specific procedure of breast cancer surgery was not mentioned (i.e. mastectomy or lumpectomy etc.) and patients in this study were reported to have nausea and vomiting post-operatively.

Gastrointestinal Symptoms Associated with Different Types of Anesthesia in Post Mammoplasty

The mammoplasty surgeries studied included in the final studies comprised three different anesthesia groups analyzed as such: (1) general anesthesia only ($n = 7$); (2) local anesthesia only ($n = 5$); (3) other anesthesia ($n = 6$). The other category refers to a combination method of general, local, or spinal. Results showed that GI symptoms, mainly vomiting, and nausea, were noted among all the three types of anesthetic categories.

General Anesthesia

There are a total of 7 studies where general anesthesia alone was used [9, 14-17, 21, 26]. The most common GI symptoms reported among many studies were nausea and vomiting. Additionally, in some patients, emesis was reported to accompany dry mouth as well [9].

Local Anesthesia

There are a total of 5 studies where local anesthesia alone was used [11, 12, 18-20]. Among all studies, the most common symptoms were nausea and vomiting/emesis; however, some studies reported other symptoms as well such as constipation [12], retching [18], and abdominal pain [11].

Other/Combined Anesthesia

There are a total of 6 studies where combined anesthesia methods were used [13, 21-25]. In this category, 4 studies used general and local anesthesia combined [21-24]. Two studies used general and epidural/spinal anesthesia combined [13, 25]. All the studies only reported nausea and vomiting.

Gastrointestinal Symptoms in Antiemetics Post Mammoplasty

Certain studies had assessed antiemetic drug effects on GI symptoms post mammoplasty. The conduction of this review identified 14 studies that administered different types of antiemetic drugs [9, 11, 13-20, 23, 25-27]. Gastrointestinal symptoms reported were mainly nausea and vomiting, nonetheless some studies had reported cases of retching [9, 18], dry mouth [9] and abdominal pain [11]. In most cases, antiemetics were given post operatively or when the patient experienced symptoms such as nausea or vomiting but administering antiemetics as a prophylactic procedure immediately pre-operatively was an option as well. Most studies have shown effective improvement in GI symptoms, i.e. nausea or vomiting, after the use of antiemetics post mammoplasty.

Specific Comparisons and Procedures

It's notable to mention that two of these studies carried out a comparison including either one antiemetic agent with a placebo group [16], or, between two different antiemetics [9]. Moreover, two other studies reported significant reduction of symptoms following the use of a local “Marcaine” pain pump [19, 20].

Quality Assessment of Included Studies

Several issues were reported regarding bias in the assessed articles. Throughout the quality assessment, there was a total of seven randomized clinical trial studies which were assessed using the Cochrane collaboration's tool [9, 16-20, 24]. Meanwhile, twelve observational and cross-sectional studies were evaluated using the NOS Quality Assessment Tool [10-15, 21-23, 25-27]. Supplementary file summarize the obtained quality assessment of the included studies.

Using the NOS quality assessment tool, two studies had an overall rating of 9 stars [10, 25], while 10 studies had an overall rating of 10 stars. [11-15, 21-23, 26, 27], Overall, all studies that received 9 or more stars on evaluation showed a significant representation of GI symptoms in post mammoplasty.

Regarding RCTs evaluated in our review, six out of the seven included RCTs had a low risk for selection bias related to random sequence generation [9, 16-18, 20, 24]. Two studies presented an unclear risk of allocation concealment bias [17, 19]. One study reported unclear performance bias [19]. Furthermore, two studies reported unclear detection bias [18, 19], while unclear attrition bias was reported in one study [16]. Four studies reported other sources of bias [16, 17, 20, 24]. The reasons included one scenario of randomization broken [16], enrollment of extra patients mid-study, presence of small discrepancies due to small trials and study was underpowered [17], troubles interpreting pain intensity data [24], and small sample size [20]. Lastly, three studies in the assessment reported an unclear risk of other sources of bias [9, 18, 19].

DISCUSSION

This systematic review offers a comprehensive examination of GI symptoms in patients undergoing various mammoplasty procedures, providing nuanced insights into the prevalence, characteristics, and management strategies associated with post-mammoplasty GI symptoms. The meticulous review process involved exhaustive screening of literature from multiple databases, resulting in the inclusion of 19 studies encompassing a total of approximately 2,487 subjects. Across the spectrum of mammoplasty surgeries investigated in the included studies, breast reconstruction emerged as the most commonly studied procedure, followed by breast reduction, breast augmentation, mastectomy, and breast cancer surgery. Notably, GI symptoms, prominently nausea and vomiting, were prevalent across all types of mammoplasty surgeries, underscoring the significant impact of surgical interventions on GI function. The predominance of nausea and vomiting as common post-mammoplasty GI symptoms underscores the importance of proactive management strategies to alleviate patient discomfort and optimize postoperative recovery.

Both TRAM and DIEP flap operations were linked to GI symptoms in breast reconstruction patients, with nausea and vomiting being the most commonly reported [9-15]. Some studies also reported less typical GI symptoms such as constipation, stomach pain, and tightness, emphasizing the varied nature of post-mammoplasty GI problems. Similarly, patients undergoing breast reduction, breast augmentation, mastectomy, and breast cancer surgery reported gastrointestinal symptoms, with nausea and vomiting being the most frequent. This is consistent with results from other surgical techniques, where postoperative GI problems are frequently observed. These data imply that the physiological stress of surgery and anesthesia may lead to GI issues, independent of the type of mammoplasty treatment used [28].

Anesthesia modality appeared to influence the incidence and severity of post-mammoplasty GI symptoms, with general anesthesia, local anesthesia, and combined anesthesia methods all associated with GI disturbances. The mechanisms influencing anesthesia-induced GI symptoms in the post-mammoplasty circumstances are complex and may include changes in GI motility, gastric emptying, and bowel function. General anesthesia's systemic effects on the central and autonomic nervous systems can disturb normal GI physiology and cause symptoms such as nausea, vomiting, constipation, and abdominal discomfort. Similarly, local anesthesia, though targeted to specific anatomical regions, can still exert systemic effects, and contribute to GI disturbances [29]. Combined anesthesia methods, which involve a combination of general, local, or regional anesthesia techniques, may further exacerbate GI symptoms through cumulative physiological effects. More precisely, combination of different anesthesia techniques may have additive or synergistic effects on various physiological processes within the body, including those related to GI function [30]. Overall, our findings underscore the importance of considering anesthesia modality in perioperative management strategies to minimize post-mammoplasty GI symptoms. Tailored approaches to anesthesia selection and administration, along with vigilant monitoring and proactive management of GI symptoms, are essential to optimize patient comfort and outcomes in this population. Further research is warranted to elucidate the underlying mechanisms of anesthesia-induced GI disturbances and develop targeted interventions to mitigate their impact on post-mammoplasty recovery.

Notably, pharmaceutical therapies such as antiemetics were frequently used to treat postoperative nausea and vomiting, with some studies showing a beneficial reduction in GI symptoms after antiemetic administration. However, the efficacy of antiemetic drugs varied across studies, with certain medications demonstrating superior symptom relief compared to others. The variability in the efficacy of antiemetic drugs across studies can be linked to multiple variables, such as variations in drug pharmacology, dosage regimens, and demographics of patients, or psychosocial factors, including anxiety, stress, and previous experiences with anesthesia and surgery, which may influence the efficacy of antiemetic therapy. Patients with high levels of anxiety or fear related to surgery may be more prone to experiencing postoperative nausea and vomiting. Additionally, individual preferences and expectations regarding treatment options may influence

treatment adherence and overall satisfaction with antiemetic therapy. Tailoring antiemetic regimens to each patient's unique requirements and characteristics may be critical for maximizing alleviation of symptoms and enhancing overall postoperative results. Notably, other drugs may have distinct mechanisms of action or be less effective in relieving post-mammoplasty GI problems [31, 32].

Furthermore, the review identified studies investigating the efficacy of specific antiemetic agents, including ondansetron and droperidol, in reducing post-mammoplasty GI symptoms [9, 16]. Results from these studies revealed significant reductions in nausea and vomiting following antiemetic administration, highlighting the potential utility of pharmacological interventions in managing postoperative GI disturbances. However, further research is warranted to elucidate the optimal timing and dosing of antiemetic drugs in the context of mammoplasty surgeries, as well as their potential interactions with other perioperative factors influencing GI function.

In addition to pharmacological interventions, certain non-pharmacological approaches were also explored in managing post-mammoplasty GI symptoms. For instance, preoperative hypnosis was reported in one study as an adjunctive measure to mitigate GI disturbances [18]. By inducing relaxation and reducing stress responses, hypnosis may mitigate the physiological stress associated with surgery, potentially decreasing the occurrence of postoperative GI symptoms such as nausea and vomiting [33]. Furthermore, hypnosis presents a potential avenue for mitigating psychological influences such as anxiety and fear, known contributors to gastrointestinal (GI) disturbances. Through the provision of coping mechanisms and fostering positive anticipations, hypnosis has the potential to furnish patients with a holistic framework for managing symptoms, thereby complementing conventional pharmacological interventions and augmenting the overall efficacy of surgical procedures [34]. These findings underscore the importance of a multimodal approach to perioperative care, incorporating both pharmacological and non-pharmacological interventions to optimize patient outcomes and enhance postoperative recovery.

Several limitations should be considered in interpreting the findings of this systematic review. Firstly, the review was confined to studies published in English, potentially overlooking relevant data from non-English literature. Additionally, while the included studies offer insights into immediate postoperative GI symptoms, not all studies establish a clear causal correlation between GI symptoms and long-standing mammoplasty patients, limiting understanding of the long-term implications of post-mammoplasty GI disturbances. Furthermore, reliance on published literature may lead to publication bias, potentially overestimating treatment effects, and heterogeneity among included studies in design, patient population, and outcome measures may limit generalizability. Finally, the lack of standardized definitions and assessment methods for GI symptoms across studies contributes to variability in reported symptom prevalence and severity. Nonetheless, this review offers valuable insights into post-mammoplasty GI symptoms, emphasizing the importance of further research to address knowledge gaps and inform evidence-based clinical practice.

This systematic review demonstrates notable strengths, primarily in its pioneering investigation into the emerging domain of research concerning the correlation between GI symptoms and mastoplasty procedures, thereby enriching the existing literature in this realm. Through a meticulous analysis encompassing a heterogeneous array of studies sourced from diverse geographic locales and employing various study designs, this review provides a comprehensive overview of the prevalence, attributes, and mitigation strategies pertaining to post-mastoplasty GI symptoms. Notably, the rigorous screening and data extraction procedures, carried out independently by two researchers, augment the reliability and validity of the results, ensuring robust and exhaustive scrutiny of the available data. Furthermore, the review delves into a thorough examination of both pharmacological and non-pharmacological approaches to managing GI symptoms, offering valuable insights into the multifaceted nature of symptom alleviation in this patient cohort. Additionally, the detailed exposition of study characteristics, encompassing anesthesia modalities, pharmacological interventions, and non-pharmacological therapies, facilitates a comprehensive comprehension of the factors influencing post-mastoplasty GI symptoms.

CONCLUSIONS

Our systematic review sheds light on GI symptoms following mastoplasty procedures, highlighting the prevalence of common symptoms such as nausea and vomiting, as well as less common manifestations including constipation, dry mouth, retching, abdominal pain, and tightness. We observed variations in symptom prevalence across different types of mastoplasty surgeries, anesthesia techniques, and antiemetic usage, emphasizing the multifactorial nature of post-mastoplasty GI disturbances. Our findings underscore the importance of tailored perioperative management strategies, encompassing pharmacological and non-pharmacological interventions to enhance postoperative recovery and optimize patient outcomes.

Looking ahead, further research is warranted to explore the long-term implications of post-mastoplasty GI symptoms and identify potential risk factors for chronic GI disturbances. Longitudinal studies with extended follow-up periods are required to assess symptom persistence beyond the immediate postoperative period and evaluate the impact of surgical interventions on GI physiology in the long term. By elucidating the complex interplay between surgical interventions and GI function, our study provides valuable insights for clinicians and researchers alike in addressing the multifaceted nature of post-mastoplasty GI symptoms and improving patient care in this population.

Conflicts of interest: None to declare.

Authors' contribution: D.I.D. and A.I. had the idea of the manuscript. A.A., M.A.H., and A.I. independently applied the search strategy and performed the study selection. A.A. and M.A.H. performed risk of bias assessment. A.A., M.A.H. and S.L.P. performed the data extraction. D.I.D. A.A., N.A.S., and M.T. drafted the manuscript. A.I., S.L.P. and M.I. contributed to the writing of the manuscript. A.I. and D.I.D. made

substantial contributions to the conception and critically revised the manuscript for important intellectual content. All authors revised the final manuscript and approved the final version.

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