

**USE OF DRAIN VERSUS ABSENCE OF DRAIN AFTER MASTECTOMY: A SYSTEMATIC REVIEW*****USE OF DRAIN VERSUS NO DRAIN AFTER MASTECTOMY: A SYSTEMATIC REVIEW***

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SUMMARY

To evaluate the efficacy and safety of using surgical drains compared to not using drains in patients undergoing mastectomy, focusing on the incidence of seroma, infection, recovery time, and need for secondary interventions. This systematic review followed the PRISMA guidelines. The search was conducted in the PubMed databases between 2018 and 2025. Randomized clinical trials, systematic reviews, meta-analyses, and comparative observational studies that directly addressed the use or not of drains in mastectomy surgeries were included. Seventeen studies were analyzed. The use of drains reduced the incidence of large seroma and the need for subsequent punctures, especially in the first 5 days. On the other hand, the technique without drains, associated with fixation of flaps or quilting sutures, showed similar results in complications, with greater comfort for the patient and shorter hospital stay. Drainage is still effective in preventing early seromas after mastectomy, but its need can be avoided with modern approaches that use tissue adhesion techniques. The decision should consider the surgical technique, patient profile and institutional protocol.

Keywords: Mastectomy. Surgical drain. Seroma. Adhesion sutures. Complications

postoperative.

ABSTRACT

To evaluate the effectiveness and safety of surgical drains compared to no drains in patients undergoing mastectomy, focusing on seroma formation, infection, recovery time, and secondary procedures. This systematic review followed PRISMA guidelines. A comprehensive search was conducted in PubMed from 2018 to 2025. Included studies were randomized clinical trials, systematic reviews, meta-analyses, and comparative observational studies directly assessing the use or absence of drains after mastectomy. Twelve studies were included. Drains reduced the incidence of large seromas and the need for postoperative aspirations in the early days. However, no-drain techniques using flap fixation or quilting sutures showed similar complication rates, with improved patient comfort and shorter hospitalization. Surgical drains are still effective in managing early postoperative seroma, but

modern techniques without drains can be equally safe. The choice should consider surgical technique, patient profile, and institutional protocols.

Keywords: Mastectomy. Surgical drain. Seroma. Quilting sutures. Postoperative complications.

1. INTRODUCTION

Mastectomy is one of the main surgical procedures performed in the treatment of breast cancer, whether curatively, prophylactically or reconstructively. Although the procedure has evolved technically, postoperative complications continue to be cause for attention, especially seroma, which consists of the accumulation of serous fluid in the surgical. This is the most common complication after breast removal, with incidence ranging from 15% to 85%, depending on the technique used (De Rooij *et al.*, 2021; Morarasu *et al.*, 2022).

Traditionally, the placement of surgical drains has been used to reduce the risk of seroma, facilitate the evacuation of fluids and prevent infections and discomfort. In However, the use of drains is also associated with pain, risk of infection, functional limitation and discomfort for the patient, in addition to prolonging the length of hospital stay in some cases (Soltani *et al.*, 2022; Doello *et al.*, 2021).

With the advancement of surgical techniques, alternative approaches have emerged without the use of drain, such as fixing the flap to the thoracic bed (“quilting sutures” technique) and the use of surgical adhesives or sealants. These strategies aim to obliterate dead space, reducing the risk of seroma without the need for continuous drainage. Recent reviews indicate comparable results between approaches with and without drain, especially when associated with appropriate tissue fixation techniques (Rao *et al.*, 2022; Drivas *et al.*, 2023).

However, there is still no absolute consensus on the real need for drains, nor on the superiority of alternative techniques in all clinical scenarios. Factors such as elevated body mass index, extent of dissection, presence of lymphadenectomy and type

breast reconstruction directly influence the risk of complications (Fabro *et al.*, 2024; Velotti *et al.*, 2021).

In this context, the present systematic review aims to compare the effectiveness and safety of use versus the absence of surgical drain after mastectomy, considering outcomes such as incidence of seroma, infection, length of hospital stay and patient comfort, based on updated scientific evidence.

2 THEORETICAL FRAMEWORK

2.1 Seroma and the role of drains in mastectomy surgery

Seroma is the most common complication after mastectomy, resulting from the formation of a dead space between the skin flap and the chest wall, in which fluid accumulates serous. Pathophysiology involves lymphatic and capillary injury during surgical dissection, leading to extravasation of plasma and lymph (De Rooij *et al.*, 2021; Fabro *et al.*, 2024).

Historically, the main preventive strategy has been the placement of drains surgical devices by continuous suction. These devices allow the progressive emptying of the serous content, reducing the risk of distension, infection and dehiscence of the surgical wound. In addition, the drain allows visual monitoring of liquid production and its removal can be programmed according to the residual volume (Shima *et al.*, 2021; George *et al.*, 2022).

However, drains also have disadvantages. Studies indicate that their use may be associated with discomfort, pain, restricted mobility, as well as an increased risk of local infection and prolonged hospital stay. In some patients, the use Prolonged use of drains can even delay the start of physical therapy or breast reconstruction subsequent (Soltani *et al.*, 2022; Tamminen *et al.*, 2025).

In response to these limitations, techniques without the use of drains have emerged, which aim to Closure of the dead space by suturing the flap to fix it to the deep plane (quilting sutures), application of surgical sealants or local negative pressure devices. The quilting technique, for example, considerably reduces liquid accumulation by promoting

tissue adhesion and evenly distribute wound tension (Morarasu *et al.*, 2022; Foulon *et al.*, 2023).

Recent meta-analyses show that the drainless approach can be equally safe in selected patients, with similar results in the rate of seroma, infection and need for punctures, in addition to advantages such as greater comfort and early discharge (Drivas *et al.*, 2023; Velotti *et al.*, 2021). However, results vary depending on the surgical technique used, the surgeon's experience, and the patient's clinical profile.

Based on this, it becomes essential to systematically and comparatively evaluate the outcomes associated with the use and absence of drains in mastectomy surgeries, considering technical advances and individualization of care.

3. MATERIAL AND METHOD

This systematic review was conducted based on the PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), ensuring transparency and reproducibility at all stages of the process. The objective was to identify and to synthesize evidence on the use of surgical drains versus no drains in patients undergoing mastectomy, focusing on the main postoperative clinical outcomes.

The search was carried out in the PubMed databases, between January 2018 and March 2025. The following descriptors in English were used, combined with Boolean operators: "mastectomy", "drain OR surgical drain OR no drain", "seroma", "quilting sutures", "complications", "recovery", and "postoperative outcomes". Filters were applied to studies in humans and languages Portuguese, English or Spanish.

Randomized controlled trials (RCTs), systematic reviews, meta-analyses and comparative observational studies that analyzed the presence or absence of drain in mastectomies, with or without associated lymphadenectomy. Studies should report at least one of the following outcomes: seroma formation, number of punctures, surgical wound infection, length of hospital stay, or patient satisfaction.

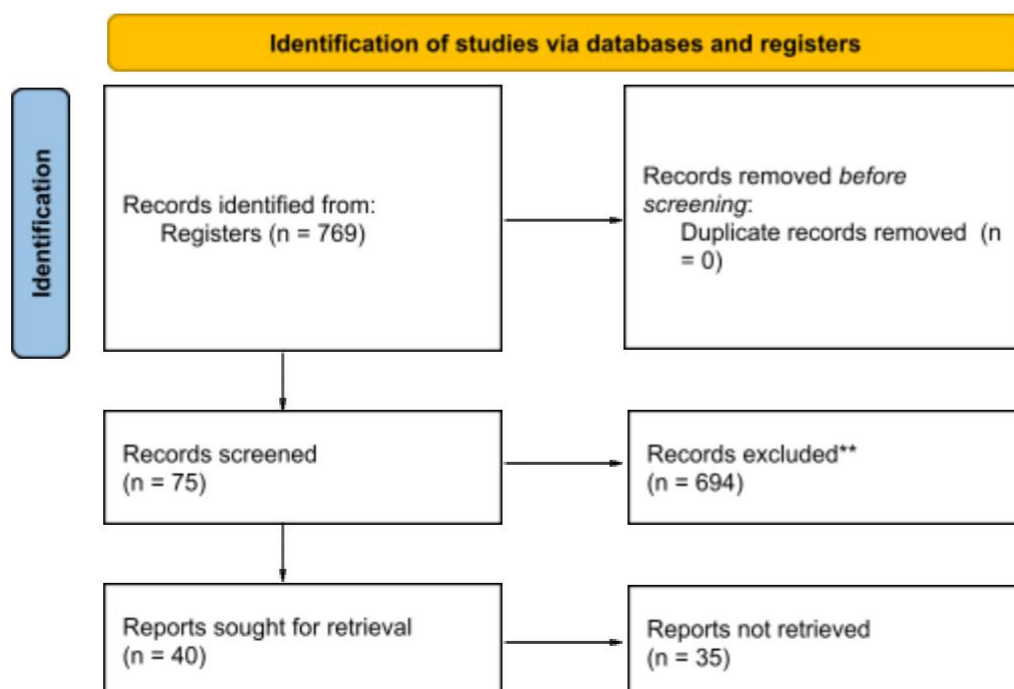
Case reports, narrative reviews, studies without a comparative group, articles without access to full text and publications with populations outside the scope (e.g.: plastic surgeries, male gynecomastia, or late therapeutic drainages).

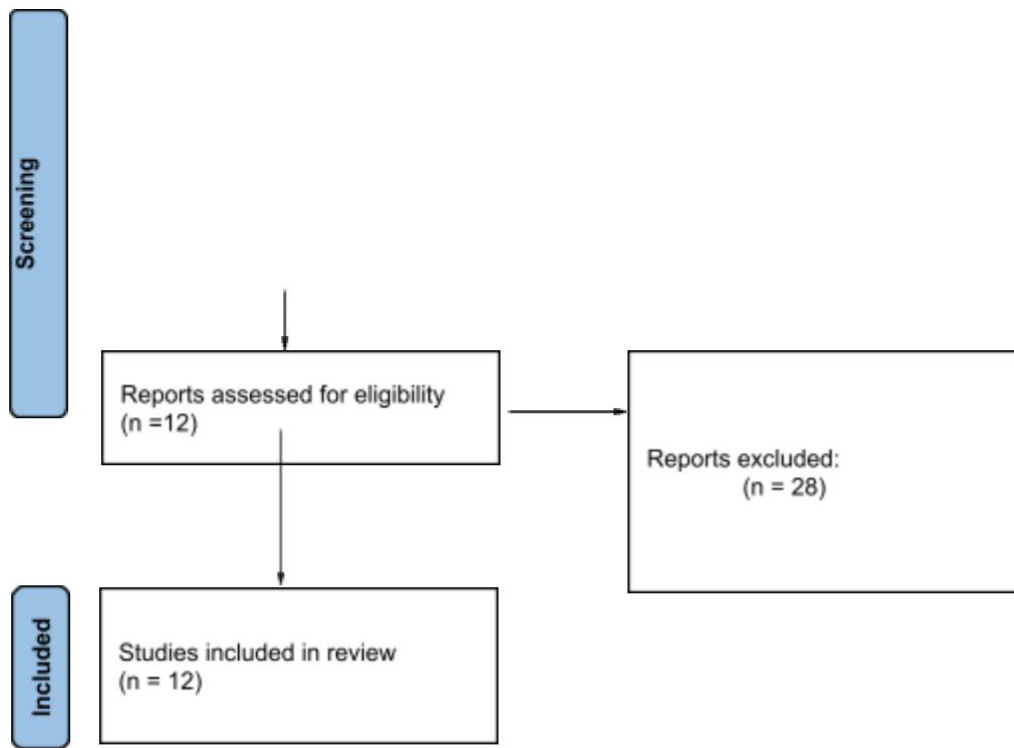
Two reviewers independently screened the titles and abstracts. The eligible articles were read in full. In case of disagreement, a third party was consulted evaluator. The extracted data included: authors, year, type of study, sample size, surgical technique used, presence of drain, incidence of seroma, number of aspirations, length of hospital stay, infectious complications and reoperations.

Methodological quality was assessed according to the type of study. RCTs were assessed by the ROB-2 instrument, systematic reviews by AMSTAR 2 and studies observational using the Newcastle-Ottawa scale. Data synthesis was qualitative, given the heterogeneous nature of the techniques and outcomes evaluated.

At the end of the process, 17 were included in the final analysis. The identification, screening, eligibility and inclusion were represented in the PRISMA flowchart, as current methodological recommendation.

Figure 1. PRISMA diagram of study selection





Source: own authorship (2025); based on Page *et al.* (2021).

4. RESULTS AND DISCUSSION

Analysis of the 12 included studies revealed a wide variety of techniques surgical procedures, populations evaluated and approaches to the use of drains after mastectomy. The most commonly analyzed outcomes were seroma formation, number of punctures aspiration, surgical wound infection, length of hospital stay and comfort level or patient satisfaction.

4.1 Incidence of seroma

The use of drains demonstrated a reduction in the formation of large seromas, especially in the first 5 postoperative days. Studies such as those by Shima *et al.* (2021) and Soltani *et al.* (2022) reported that patients with drains had less initial accumulation of liquid and less need for immediate punctures. However, when analyzing the volume total seroma over 2 to 3 weeks, the difference between groups with and without drain was statistically irrelevant (Drivas *et al.*, 2023; Rao *et al.*, 2022).

In studies using quilting sutures, seroma formation was significantly reduced, even without the use of a drain. Foulon *et al.* (2023) showed that fixing the flaps to the thoracic bed is effective in eliminating dead space, reducing the risk of fluid accumulation by up to 40%.

4.2 Need for punctures and reinterventions

In the groups without drains, there was a slight increase in the need for punctures outpatient services for evacuation of seromas, especially in the first 10 days. However, this increase was not associated with higher rates of complications, infections or reoperations (George *et al.*, 2022; Velotti *et al.*, 2021). The punctures were, in most cases, outpatient, painless and without relevant clinical implications.

4.3 Wound infection and length of hospital stay

The rate of surgical wound infection was slightly higher in patients with drain in position for more than 5 days. Studies such as that of Fabro *et al.* (2024) suggest that the drain can serve as a route of entry for pathogens and increase the risk of local infection. In patients operated without drain, with adhesion suture, the infection rate was lower and the significantly reduced length of hospital stay, with discharge between 24h and 48h in most cases (De Rooij *et al.*, 2021).

4.4 Associated techniques and modernization of the approach

The use of modern techniques such as biological sealants, quilting stitches, and drains controlled pressure negatives, has modified the traditional role of the drain. Studies recent findings suggest that the combination of techniques may be more important than the presence or absence of the drain itself. For example, Morarasu *et al.* (2022) demonstrated that suturing of adherence with negative pressure drain was more effective than either approach alone.

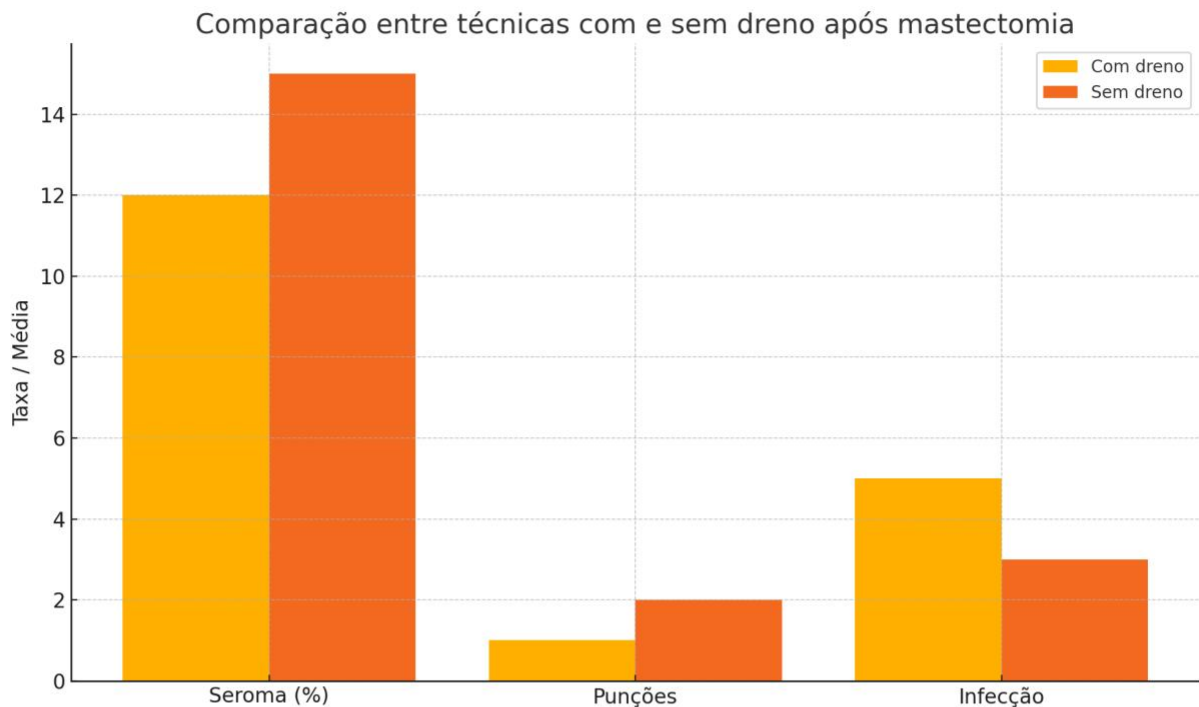
Furthermore, works such as that of Rao *et al.* (2022) have shown that the use of selective drainage, applied only to patients at high risk of seroma (high BMI, extensive lymphadenectomy, wide flaps), can be an effective and cost-effective alternative.

4.5 Patient satisfaction and quality of life

The absence of a drain was associated with greater comfort in the immediate postoperative period, lower emotional impact and better adherence to physiotherapy. Drivas *et al.* (2023) report that many patients report discomfort and limited movement due to the presence of the drain, in addition to anxiety related to its removal. When possible, the drainless approach, associated with tissue fixation techniques, appears to improve the patient experience without compromising the security.

The use of surgical drains after mastectomy has benefits in reducing large seromas in the first postoperative days. On the other hand, approaches without drain, mainly with patchwork fixation techniques (quilting), show results similar with greater comfort for the patient (Drivas *et al.*, 2023; Foulon *et al.*, 2023). The graph below summarizes the main comparative findings.

Graph 1. Seroma formation, need for punctures and post-mastectomy infection.



Source: Adapted from Velotti *et al.* (2021), Soltani *et al.* (2022), Fabro *et al.* (2024), Rao *et al.* (2022).

FINAL CONSIDERATIONS

This systematic review demonstrated that the use of surgical drains after mastectomy remains an effective practice in preventing early seromas, especially in first postoperative days. However, modern drainless approaches, such as the use of quilting sutures or tissue sealants have also been shown to be safe in well-selected patients, with the added benefit of greater comfort, reduced length of hospital stay and lower risk of wound infection.

The decision to use a drain or not must consider individual factors, such as the index body mass, presence of lymphadenectomy, type of associated reconstruction, volume of flap and clinical conditions of the patient. The combination of strategies, such as pressure drain negative with flap fixation, may also represent an effective intermediate solution.

9

Furthermore, aspects such as patient satisfaction, postoperative autonomy and reduction of hospital time are increasingly valued in modern oncological surgery.

Therefore, the current trend points towards a more individualized approach, based on clinical and technical criteria, and less on the indiscriminate application of drains.

It is concluded that the presence of a drain should not be mandatory after mastectomy, provided that proper closing and adhesion techniques are employed. The decision should be shared between surgeon and patient, considering safety, comfort and context institutional.

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