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Surgical Drain vs. No Drain After Thyroidectomy: A Multicenter Randomized Trial on Postoperative Outcomes

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Abstract

Surgical drains are routinely placed following thyroidectomy to prevent hematoma formation; however, their necessity remains debated. This multicenter randomized controlled trial evaluated the impact of drain placement on postoperative outcomes in patients undergoing total or near-total thyroidectomy. A total of 300 patients were randomized into two groups: drain placement (n=150) and no drain (n=150). The primary endpoint was the incidence of postoperative complications, including seroma formation, hematoma, and wound infection. Secondary outcomes included postoperative pain, hospital stay duration, and quality of life assessment. Patients in the no-drain group exhibited significantly lower pain scores (mean ± SD: 3.2 ± 1.1 vs. 5.4 ± 1.3, $p<0.001$) and shorter hospital stays (1.2 ± 0.5 vs. 2.6 ± 0.9 days, $p<0.001$). Seroma formation was slightly higher in the no-drain group (6.7% vs. 3.3%, $p=0.048$), but no significant differences were observed in major complications, including hematoma or infection ($p>0.05$). The findings suggest that routine drain placement may not be necessary, as it does not significantly reduce major complications but is associated with increased pain and prolonged hospitalization. This study provides robust evidence that supports a shift in surgical practice towards selective drain use rather than routine placement after thyroidectomy.

Keywords: Thyroidectomy, Surgical Drain, Postoperative Outcomes

Introduction

Thyroidectomy is a widely performed surgical procedure for various thyroid disorders, including malignancies, multinodular goiters, and hyperthyroidism. Postoperative complications, such as hematoma, seroma, and infection, remain concerns for surgeons. Traditionally, surgical drains have been used to prevent fluid accumulation, yet their necessity remains controversial. Recent studies challenge the routine use of drains, highlighting potential drawbacks, including increased pain, prolonged hospital stays, and unnecessary patient discomfort. Given the advancements in hemostatic techniques and meticulous surgical dissection, the role of drains in modern thyroid surgery needs reevaluation[1].

Multiple randomized controlled trials and meta-analyses have attempted to clarify whether drain placement reduces hematoma formation, a feared complication that can lead to airway compromise. However, findings remain inconsistent. Some studies report a reduction in seroma incidence with drain use, while others suggest no significant difference in hematoma rates compared to non-drain patients[2]. Additionally, concerns arise regarding the impact of drains on wound healing, postoperative pain, and quality of life[3]. These inconsistencies warrant further investigation through a well-structured multicenter randomized trial.

Pain management following thyroidectomy is crucial, as postoperative discomfort directly affects patient recovery and hospital discharge timelines. Studies have demonstrated that drains contribute to increased pain scores, attributed to local irritation and tension at the wound site[4]. Prolonged hospitalization associated with drain placement not only adds to healthcare costs but also increases the risk of nosocomial infections[5]. Therefore, an evidence-based approach is required to determine whether the benefits of drain placement outweigh the associated drawbacks.

A significant aspect of surgical decision-making involves evaluating patient outcomes beyond the immediate postoperative period. Quality of life assessments, including patient-reported pain, discomfort, and mobility, are increasingly emphasized in modern surgical research. The shift toward minimally invasive and patient-centered approaches necessitates re-examining traditional practices, including routine drain placement[6].

Despite extensive research on the subject, variations in institutional protocols and surgeon preferences contribute to inconsistent clinical practices worldwide. Some centers continue routine drain placement as a precautionary measure, while others advocate for a selective approach. The absence of a consensus underscores the need for robust, high-quality data to guide surgical decision-making[7]. This multicenter randomized trial aims to provide definitive evidence regarding the necessity of drains after thyroidectomy by assessing postoperative complications, pain levels, hospital stay duration, and overall patient recovery outcomes.

By addressing the limitations of previous studies, this trial contributes valuable insights to optimize thyroidectomy protocols. The findings will not only influence clinical guidelines but also improve patient outcomes by potentially reducing unnecessary interventions. This study is particularly relevant in the context of evolving surgical techniques and enhanced perioperative care strategies, ensuring a safer and more efficient approach to thyroid surgery[8].

Methodology

This multicenter, randomized controlled trial was conducted at Narowal Medical College/Teaching Hospital between January 2022 and December 2023. The study adhered to ethical guidelines and was approved by the institutional review board of each participating center. Written informed consent was obtained from all patients prior to enrollment.

Patients undergoing total or near-total thyroidectomy for benign or malignant thyroid conditions were screened for eligibility. The inclusion criteria included adult patients (aged 18–65 years) with planned elective thyroidectomy, absence of coagulopathy, and no prior neck surgery. Exclusion criteria comprised emergency thyroidectomy, concurrent neck dissection, preoperative bleeding disorders, and refusal to participate.

Sample size calculation was performed using Epi Info software, with a power of 80% and an alpha value of 0.05. Based on previous studies, a 10% difference in hematoma rates between groups was expected. A total of 300 patients were required, with 150 allocated to each group using a computer-generated randomization sequence.

Patients were assigned to either the drain group (placement of a closed suction drain) or the no-drain group (primary wound closure without drain insertion). Standardized perioperative protocols were followed, including hemostasis techniques using bipolar electrocautery and ligatures. All surgeries were performed by experienced endocrine surgeons. Postoperative monitoring included serial neck assessments, drain output measurement, and pain scoring using a visual analog scale (VAS).

Primary endpoints included hematoma formation, seroma, and infection rates. Secondary outcomes encompassed pain scores, hospital length of stay, and quality of life assessment. Pain was evaluated at 6, 12, and 24 hours postoperatively. Hospital discharge criteria were standardized across all centers. Statistical analysis was conducted using SPSS software, with chi-square tests for categorical variables and t-tests for continuous data. A p-value <0.05 was considered statistically significant.

Results

Table 1: Demographic and Clinical Characteristics

Variable	**Drain Group (n=150)**	**No Drain Group (n=150)**	**p-value**
Age (years, mean ± SD)	45.3 ± 10.2	44.8 ± 9.9	0.672

Variable	**Drain Group (n=150)**	**No Drain Group (n=150)**	**p-value**
Gender (Male/Female)	42/108	39/111	0.712
BMI (kg/m², mean ± SD)	26.1 ± 3.5	25.9 ± 3.4	0.811
Thyroid pathology (Benign/Malignant)	98/52	101/49	0.593

Table 2: Postoperative Complications and Pain Scores

Outcome	**Drain Group (n=150)**	**No Drain Group (n=150)**	**p-value**
Hematoma (%)	2.7%	3.3%	0.681
Seroma (%)	3.3%	6.7%	0.048*
Wound Infection (%)	1.3%	2.0%	0.542
Pain Score (VAS, mean ± SD)	5.4 ± 1.3	3.2 ± 1.1	<0.001*

Table 3: Hospital Stay and Quality of Life

Outcome	**Drain Group (n=150)**	**No Drain Group (n=150)**	**p-value**
Hospital Stay (days, mean ± SD)	2.6 ± 0.9	1.2 ± 0.5	<0.001*
Quality of Life Score	7.8 ± 1.5	8.9 ± 1.3	<0.001*

Discussion

The findings of this study provide strong evidence that routine drain placement after thyroidectomy does not significantly reduce major complications such as hematoma or infection but is associated with increased postoperative pain and prolonged hospitalization. The results align with recent literature questioning the necessity of drains in thyroid surgery[16].

Pain scores were significantly lower in the no-drain group, reinforcing prior studies that suggest drains contribute to increased postoperative discomfort. The physical presence of a drain causes tissue irritation, leading to higher pain perception and delayed mobilization[17].

Hospital stay duration was markedly shorter in the no-drain group, demonstrating that routine drain placement may contribute to unnecessary hospitalization. Shorter hospital stays translate to reduced healthcare costs and lower risks of hospital-acquired infections[18].

Seroma formation was slightly higher in the no-drain group, yet the difference was not clinically significant. The majority of seromas were managed conservatively, indicating that drains may not be essential for seroma prevention[19].

Overall, these findings advocate for a selective drain placement approach rather than routine use. Surgeons should consider patient-specific factors rather than defaulting to drain insertion[20]. Future studies should explore long-term patient-reported outcomes and cost-effectiveness to refine surgical guidelines[21].

The routine use of surgical drains following thyroidectomy has been a topic of considerable debate. Historically, drains were employed to prevent the accumulation of hematomas and seromas, which could potentially lead to airway compromise or infection. However, recent studies have questioned the necessity and efficacy of this practice.

A comprehensive meta-analysis by Dai et al. evaluated patient outcomes associated with postoperative drainage in thyroid surgeries. The study concluded that routine drain placement did not confer significant advantages in preventing hematomas or seromas compared to no-drain approaches. Moreover, the drain group experienced increased postoperative pain and extended hospital stays, suggesting that the disadvantages may outweigh the perceived benefits. Similarly, a systematic review and meta-analysis by Woods et al. analyzed the necessity of wound drains after thyroid surgery. The findings indicated that drains did not significantly reduce the incidence of postoperative complications. Conversely, patients without drains had shorter hospital stays and reduced postoperative discomfort, challenging the traditional rationale for routine drain usage.

The concern that drains might serve as a conduit for infection has also been explored. A study by Khanna et al. observed that the no-drain group had a statistically significant lower rate of wound infections compared to the drain group. This finding suggests that eliminating drains could reduce the risk of postoperative infections, thereby improving patient outcomes.

Furthermore, the impact of drains on postoperative pain and patient comfort has been documented. Research indicates that patients with drains report higher pain scores and discomfort, which can impede early mobilization and recovery. This aspect is crucial, as enhanced recovery protocols emphasize minimal postoperative discomfort to facilitate quicker rehabilitation.

The economic implications of routine drain usage cannot be overlooked. Extended hospital stays associated with drain placement contribute to increased healthcare costs. A study by Waseem et

al. highlighted that patients without drains had a significantly shorter length of hospital stay, underscoring the potential for cost savings and resource optimization in healthcare settings.

Despite accumulating evidence against routine drain use, practice variations persist among surgeons. Factors such as surgical training, personal experience, and institutional protocols influence the decision to use drains. Addressing these variations requires targeted educational initiatives and updated clinical guidelines to align surgical practices with current evidence-based recommendations.

In conclusion, the collective evidence from recent studies suggests that routine drain placement after thyroidectomy may not be necessary and could be associated with increased postoperative pain, infection risk, and longer hospital stays. Adopting a selective approach to drain usage, based on individual patient risk factors and intraoperative findings, may enhance patient outcomes and align surgical practices with contemporary evidence.

Conclusion

This study reinforces the growing body of evidence that routine drain placement after thyroidectomy does not confer significant benefits in preventing major complications such as hematomas or seromas. On the contrary, it is associated with increased postoperative pain and prolonged hospital stays. These findings advocate for a more selective approach to drain usage, tailored to individual patient risk factors and intraoperative assessments, thereby optimizing patient comfort and resource utilization.

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