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Original Research Article

Outcome of thyroid surgery by applying a haemostatic agent with and without a drain

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ABSTRACT

Background: Thyroidectomy is a common surgical procedure for benign and malignant thyroid diseases. The routine uses of surgical drains following thyroidectomy remains controversial, particularly with the application of modern haemostatic agents that may effectively prevent postoperative bleeding and hematoma formation. This study aimed to evaluate the outcome of thyroid surgery with and without the use of a drain tube when haemostatic agents were applied.
Methods: This comparative study was conducted in the Department of General Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), from July 2023 to August 2024. A total of 30 patients undergoing thyroid surgery were divided into two groups: 16 with drain tube placement and 14 without.
Results: The mean age of the participants was 36.94±8.73 years in the drain group and 39.86±7.12 years in the non-drain group, with females comprising the majority in both. Multinodular goiter was the predominant diagnosis, and total thyroidectomy was the most frequently performed procedure. Postoperative complications such as hemorrhage, respiratory distress, wound infection, and stridor were not observed in either group. Only two patients (14.3%) in the non-drain group developed mild neck swelling, which resolved with conservative management. The mean hospital stay was shorter in patients without drains, and although this difference was not statistically significant ($p>0.05$).
Conclusions: The application of haemostatic agents during thyroid surgery provides effective intraoperative hemostasis, making routine drain tube placement unnecessary. Avoiding drains may enhance patient comfort and reduce hospital stay without increasing postoperative complications.

Keywords: Thyroidectomy, Haemostatic agent, Drain tube, Postoperative complications

INTRODUCTION

Thyroidectomy is one of the most commonly performed surgical procedures in general surgery and remains the primary treatment modality for various benign and malignant thyroid disorders.[1] Among the complications associated with this operation, intraoperative and postoperative hemorrhage remains a major concern for surgeons.[2] The incidence of postoperative bleeding following thyroid surgery ranges from 0.49% to 4.3%.[3] In approximately 72% of cases, postoperative hematoma develops within the first 6 hours after surgery, and in 89% of cases, it occurs within 12 hours.[4]

Postoperative hematoma may lead to airway compression and respiratory distress, posing a potentially life-

threatening situation. Clinically, patients may present with respiratory difficulty, neck pain or pressure, dysphagia, progressive neck swelling, suture line bleeding, dyspnea, or stridor, along with significant drain output when drains are in situ.[5] The reported frequency of postoperative cervical hematoma (PCH) requiring reoperation ranges from 0% to 9.1%, making it the most common cause for return to the operating room following thyroid surgery.[6]

Risk factors associated with postoperative bleeding can be classified into three groups.[7] The first includes patient-related factors such as abnormal coagulation status, chronic renal disease, and the use of anticoagulant or antiplatelet therapy. The second includes disease-related factors, such as Basedow's disease, toxic multinodular goiter, and large retrosternal goiter. The third involves surgical factors, including the surgeon's technique and level of experience.

Other factors influencing perioperative hemostasis include the type of thyroid pathology, concurrent use of anticoagulant medication, large specimen size, emergency admission, multiple comorbidities, prior thyroid surgery, advanced age, race, alcohol abuse, and high body mass index (BMI >30 kg/m²). Male sex has also been identified as an independent risk factor for postoperative hematoma.[8,9]

Given these risks, achieving safe and effective hemostasis during thyroid surgery is of critical importance. Although arterial bleeding is often implicated, in many cases no active bleeding vessel is identified during re-exploration. Therefore, the hemostatic technique used, particularly for larger vessels, and the use of hemostatic agents, may play a significant role in minimizing postoperative bleeding.[10]

Over the years, several methods have been developed to achieve surgical hemostasis, including suture ligation, vessel clips, mono- and bipolar electrocautery, and the use of topical hemostatic agents.[2] Hemostatic patches generally fall into two main categories: biologically active agents and physical agents. Biologically active patches contain human coagulation factors on their surface, while physical agents act as passive substrates that facilitate platelet adhesion and clot formation. Oxidized cellulose-based materials, such as Tabotamp Snow®, Surgicel®, Spongostan™, and Nu-Knit®, belong to the latter group and provide a stable surface for clot formation resistant to irrigation.[10]

Traditionally, many surgeons have used wound drains following thyroidectomy to prevent hematoma or seroma formation and reduce the risk of airway obstruction.[11] However, drain placement may increase the risk of infection, discomfort, treatment cost, hospital stay, and may even contribute to fistula, keloid, or hypertrophic scar formation.[12,13] Moreover, the use of drains cannot replace meticulous surgical technique and proper hemostasis. Thus, the routine use of drains in thyroid surgery has become increasingly controversial.[14]

Given these considerations, the use of topical hemostatic agents may reduce perioperative bleeding and prevent postoperative hematoma, potentially eliminating the need for routine drain placement. The present study aimed to evaluate the outcome of thyroid surgery with and without the use of a drain tube when haemostatic agents were applied.

METHODS

This comparative study was conducted in the Department of General Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from July 2023 to August 2024. In this study, we included 30 patients diagnosed with thyroid pathology who underwent thyroid surgery in the Department of General Surgery, BSMMU.

The study population was then divided into two groups - group A: patients who had a drain tube (plain drain) inserted (n=16), and group B: patients without a drain tube (n=14).

These were the following criteria for eligibility as study participants.

Inclusion criteria

Patients diagnosed with thyroid pathology, patients who underwent thyroid surgery, and patients who were willing to participate in the study were included.

Exclusion criteria

Patients with history of previous thyroid surgery, thyroid disease with known coagulopathy, diagnosis of malignancy requiring lymph node dissection, retro-sternal goiter, and with Graves' disease or other hyperfunctioning thyroid disorders were excluded.

Data collection procedure

Data were collected using a semi-structured questionnaire that included demographic, clinical, and investigation-related variables. Informed written consent was taken after an explanation of the study procedure. Patients with diagnosed thyroid pathology who met the inclusion criteria were enrolled. Collected data included age, sex, clinical findings, and laboratory parameters such as TSH, T3, T4, and serum calcium. Preoperative assessments included ultrasonography (USG) of the neck, fine-needle aspiration cytology (FNAC) of the thyroid gland, and fiberoptic laryngoscopy (FOL).

All patients underwent standard preoperative optimization, including correction of thyroid dysfunction, nutritional improvement, and anesthetic fitness evaluation. Participants were divided into two groups: one underwent surgery with a plain drain tube, and the other without a drain tube. A haemostatic agent was applied in both groups.

Postoperatively, vocal cord function was assessed, and all patients were observed for signs of hematoma formation, such as neck swelling, respiratory distress, dysphagia, suture line bleeding, dyspnea, and stridor. Operative details, histopathological findings, and postoperative complications were recorded. Postoperative outcomes were then compared between the two groups to evaluate the necessity of drain placement following thyroid surgery.

Statistical analysis

All data were recorded systematically in a pre-formatted data collection form. Quantitative data were expressed as mean and standard deviation, and qualitative data were expressed as frequency distribution and percentage. Statistical analyses were performed using the student's t-test for quantitative variables (e.g., number of postoperative complications) and the Chi-square (χ^2) test or Fisher's exact test for qualitative variables (e.g., postoperative complications such as hemorrhage and wound infection). A p-value of less than 0.05 was considered statistically significant. Statistical analysis was performed by using statistical package for social sciences (SPSS) 22. This study was ethically approved by the Institutional Review Board (IRB) of Bangabandhu Sheikh Mujib Medical University.

RESULTS

Table 1 shows the demographic characteristics of patients who underwent thyroid surgery with and without drain tube placement. The mean age of patients in the drain group was 36.94±8.73 years, while in the non-drain group it was 39.86±7.12 years, with no statistically significant difference between groups (p=0.329). The majority of patients in both groups were aged 31–40 years. Females predominated in both groups, comprising 87.5% in the drain group and 78.6% in the non-drain group. No significant differences were observed between the two groups regarding age or sex distribution.

Table 2 shows that on ultrasonography (USG), multinodular goiter was the most common finding in both groups, observed in 87.5% of patients with drain and 64.3% without drain (p=0.141). A small proportion showed unilateral multinodular involvement, while left-sided multinodular goiter was more frequent in the non-drain group (21.4%) compared to none in the drain group. FNAC results revealed that benign lesions and follicular patterns were predominant in both groups. Cystic changes were noted in 25% of patients with drain and 21.4% without drain. Other cytological findings such as follicular neoplasm, benign follicular lesion, and nodular goiter showed comparable distributions between groups. None of the differences in investigation findings were statistically significant.

Table 3 shows that the most frequently performed procedure in both groups was total thyroidectomy, accounting for 43.7% of patients with drain and 50.0% of those without drain (p=0.734). Near total thyroidectomy was the next most common operation, performed in 37.5% of patients with drain and 28.6% without drain (p=0.612). A smaller proportion of patients underwent hemithyroidectomy, either on the right or left side. Left hemithyroidectomy was performed in 6.3% of cases with drain and 14.3% without drain, while right hemithyroidectomy accounted for 12.5% and 7.1%, respectively. None of the differences between the two groups were found to be statistically significant.

Table 4 shows the distributions of the study patients by complications in the postoperative period. It was observed that two (14.3%) patients had progressive neck swelling in without drain tube and not found in with drain. Postoperative haemorrhage, respiratory distress, pain or pressure sensation, suture line bleeding and stridor complication had not found in any patient in both groups. The difference was statistically not significant (p>0.05) between two group.

Table 5 shows that the mean drain tube collection at 1st POD was 18.38±6.19 ml with ranged from 10 to 30 ml. The mean drain tube collection at 2nd POD was 16.5±7.52 ml with ranged from 7 to 30 ml. The mean drain tube collection at 3rd POD was 12.86±6.99 ml with ranged from 5 to 25 ml. The drain tube collection at 4th POD was 11±5.48 ml with ranged from 5 to 20 ml. The mean drain tube collection at 5th POD was 7.5±2.89 ml with ranged from 5 to 10 ml.

Table 1: Distribution of the study patients by demographic variables (n=30).

Demographic variables	With drain tube (n=16)		Without drain tube (n=14)		P value
	N	%	N	%	
Age (years)					
<30	4	25.0	2	14.3	0.472
31–40	8	50.0	6	42.9	0.702
41–50	4	25.0	6	42.8	0.310
Mean±SD	36.94±8.73		39.86±7.12		0.329
Range (min–max)	24–50		28–50		
Sex					
Male	2	12.5	3	21.4	0.521
Female	14	87.5	11	78.6	0.521

Table 2: Distribution of the study patients by investigation findings (n=30).

Investigations and findings	With drain tube (n=16)		Without drain tube (n=14)		P value
	N	%	N	%	
USG					
Bilateral thyroid multinodular	0	0.0	2	14.3	0.124
Left-sided multinodular goiter	0	0.0	3	21.4	0.055
Multinodular goiter	14	87.5	9	64.3	0.141
Right-sided multinodular goiter	2	12.5	0	0.0	0.178
FNAC					
Benign follicular lesion	1	6.3	2	14.3	0.474
Benign lesion	3	18.8	1	7.1	0.355
Consistent with atypia of undetermined significance	2	12.5	1	7.1	0.628
Cystic change	4	25.0	3	21.4	0.819
Follicular lesion	3	18.8	4	28.6	0.534
Follicular neoplasm	2	12.5	2	14.3	0.887
Nodular goiter	1	6.3	1	7.1	0.931

Table 3: Distribution of the study patients by operation note (n=30).

Operation note	With drain tube (n=16)		Without drain tube (n=14)		P value
Name of operation	**N**	**%**	**N**	**%**	
Hemithyroidectomy (left)	1	6.3	2	14.3	0.474
Hemithyroidectomy (right)	2	12.5	1	7.1	0.628
Near total thyroidectomy	6	37.5	4	28.6	0.612
Total thyroidectomy	7	43.7	7	50.0	0.734

Table 4: Distributions of the study patients by complications in the postoperative period (n=15).

Complications in the postoperative period	With drain tube (n=16)		Without drain tube (n=14)		P value
	N	%	N	%	
Progressive neck swelling	0	0.0	2	14.3	0.124
Haemorrhage	0	0.0	0	0.0	
Respiratory distress	0	0.0	0	0.0	
Pain or pressure sensation	0	0.0	0	0.0	
Suture line bleeding	0	0.0	0	0.0	
Stridor	0	0.0	0	0.0	

Table 5: Distributions of the study patients by postoperative follow up drain tube collection (n=16).

Drain tube collection (ml)	Mean±SD	Ranged (min-max)
1st POD	18.38±6.19	10-30
2nd POD	16.5±7.52	7-30
3rd POD	12.86±6.99	5-25
4th POD	11±5.48	5-20
5th POD	7.5±2.89	5-10

Table 6 shows that the majority of patients in both groups were discharged between the 2nd and 6th postoperative day (POD). Among those with drain tubes, the highest proportion (31.3%) were discharged on the 6th POD, whereas in the non-drain group, the largest proportion (35.7%) were discharged earlier, on the 2nd POD. Although earlier discharge appeared more frequent in patients without drains, the difference was not statistically significant (p=0.141). A few patients in the drain group had prolonged hospital stays, being discharged as late as the 11th and 12th POD (12.5% each), while none in the non-drain group stayed beyond the 9th POD. No patients in either group required reoperation for postoperative complications. Regarding postoperative measures, aspiration of fluid was needed in 6.3% of patients with drain tubes and 14.3% of those without, but this difference was also not statistically significant (p=0.474).

Table 6: Distribution of the study patients by mode of discharge (n=30).

Mode of discharge	With drain tube (n=16)		Without drain tube (n=14)		P value
	N	%	N	%	
Discharge					
2nd POD	2	12.5	5	35.7	0.141
3rd POD	2	12.5	3	21.4	0.521
4th POD	1	6.3	3	21.4	0.233
6th POD	5	31.3	2	14.3	0.281
9th POD	2	12.5	1	7.1	0.628
11th POD	2	12.5	0	0.0	0.178
12th POD	2	12.5	0	0.0	0.178
Reoperation	0	0.0	0	0.0	
Postoperative measure					
Aspiration of fluid	1	6.3	2	14.3	0.474
No	15	93.7	12	85.7	0.474

DISCUSSION

This comparative study evaluated the outcomes of thyroid surgery using a haemostatic agent, with and without the placement of drains, to determine whether routine drain use remains necessary when effective haemostasis is achieved. The findings were further analyzed and compared with existing literature to assess the effectiveness of haemostatic agents in minimizing postoperative complications.

In this study, females constituted the majority of patients in both groups—87.5% in the drain group and 78.6% in the no-drain group—with no statistically significant difference ($p>0.05$). These findings are consistent with previous research indicating that the insertion of drains does not significantly affect gender-based postoperative outcomes.[15] Similarly, Wang et al reported that haemostatic agents significantly reduced postoperative complications without requiring routine drain placement.[13] Other studies on thyroid surgeries also support that gender distribution does not influence postoperative outcomes related to drain use.[9,16] Collectively, these findings suggest that avoiding routine drain placement, when combined with the use of haemostatic agents, may be a more efficient and patient-friendly approach to postoperative management, irrespective of gender.

In terms of postoperative complications, this study found no statistically significant differences between the drain and no-drain groups ($p>0.05$). Only two patients (14.3%) in the non-drain group experienced mild progressive neck swelling, while none were reported in the drain group. The swelling was minimal, and one patient required a single aspiration of 20 ml of seroma fluid on the 10th postoperative day, with no further complications upon follow-up. These results align with those of Wang et al and Greenleaf et al, both of whom found no significant differences in postoperative complication rates between drain and non-drain patients.[9,13] Similarly, Scaroni et al reported that the application of haemostatic agents significantly reduced postoperative complications, underscoring the importance of surgical haemostasis over routine drainage.[10] Further support is provided by Hsiao et al and Liu et al, who highlighted the effectiveness of modern haemostatic agents in reducing postoperative bleeding and swelling.[17,18]

Hospital stay duration also differed slightly between groups. The majority of patients with drains (31.3%) were discharged on the 6th postoperative day (POD), whereas most patients without drains (35.7%) were discharged earlier, on the 2nd POD, suggesting that the absence of drains may contribute to shorter hospitalization. These findings are in line with Wang et al, who reported that avoiding drains can expedite recovery and reduce hospital stays.[13] Similarly, Chou et al and Ricciardi et al found that the use of haemostatic agents decreases the need for drains and facilitates earlier discharge without increasing complications.[19,20]

The progressive reduction in drain fluid collection over five postoperative days—from a mean of 18.38±6.19 ml on the first POD to 7.5±2.89 ml by the fifth POD—demonstrates an effective recovery process and adequate hemostasis. These findings mirror those reported by Wang et al, as well as Scaroni et al and Dehal et al, who observed that advanced haemostatic agents effectively reduce postoperative drainage and fluid accumulation.[8,10,13] Chou et al further emphasized that optimal haemostatic control enhances recovery without relying solely on drains, reflecting the success of modern surgical protocols in thyroid surgery.[19]

The comparison of FNAC findings revealed no significant differences between the two groups ($p>0.05$). The drain group exhibited 25% benign lesions, while none were observed in the no-drain group. Cystic changes and follicular neoplasms were found in similar proportions in both groups (25% versus 28.6%). These results are consistent with the findings of Patel et al, which highlighted the diagnostic reliability of FNAC in distinguishing benign from malignant lesions, irrespective of drain use.[21] Similarly, Wang et al found no difference in postoperative outcomes based on drain placement, supporting the current study's observations.[13]

Regarding surgical procedures, total thyroidectomy was the most common operation performed in both groups—43.7% in the drain group and 50.0% in the non-drain group. Near-total and hemithyroidectomies were also performed at comparable rates, and no reoperations were required in either group. These results align with those of Hsiao et al and Tartaglia et al, who confirmed that total thyroidectomy remains the preferred surgical option for thyroid pathology, independent of drain use.[2,17] Similarly, Ryabchenko and Scaroni et al concluded that when haemostatic agents are appropriately used, the need for

postoperative drainage is minimal, without compromising safety or outcomes.[10,22]

Overall, the findings of this study suggest that the application of haemostatic agents effectively minimizes postoperative complications and may eliminate the need for routine drain placement in thyroid surgery.

Limitations

This study has several limitations. Firstly, the short follow-up period may not have been sufficient to capture long-term postoperative complications. Secondly, the absence of randomization in patient allocation could introduce selection bias, potentially influencing the comparability between groups. Additionally, the study did not consider variations in the surgeon's experience or technique. Finally, the research was conducted in a single institution, the findings may not be generalizable to other centers with different patient populations.

CONCLUSION

The findings of this study suggest that the use of haemostatic agents effectively reduces postoperative complications in thyroid surgery. No significant differences were observed between the two groups in terms of postoperative hemorrhage, respiratory distress, suture line bleeding, or the need for reoperation—all of which were absent in both groups. However, two patients without a drain experienced progressive neck swelling that required fluid aspiration. Although patients with drains tended to have a longer hospital stay, the difference was not statistically significant. There were also no significant variations between groups regarding age, gender, pathology, or type of surgery performed. These findings indicate that the use of a drain may not be necessary in all cases of thyroid surgery, particularly when meticulous haemostasis is achieved with the aid of haemostatic agents.

Recommendations

Further, study with a prospective and longitudinal study design, including a larger sample size, needs to be done to validate the findings of this study.

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