# Clinical outcomes of chyle fistula management post-thyroidectomy with neck dissection: A prospective study

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**ABSTRACT**

***Background:*** Chyle fistula is a rare but potentially serious complication following neck dissection for thyroid cancer, associated with metabolic disturbances and delayed recovery. Optimizing its management remains a clinical challenge due to the lack of consensus on treatment strategies. The study aimed to evaluate the effectiveness of several improvements in the management of chyle fistula in patients undergoing neck dissection during thyroid cancer surgery. ***Methods:*** A prospective cross-sectional study was conducted on 32 patients who developed chyle fistula during or after thyroidectomy with neck dissection at Viet Tiep Friendship Hospital between March 2023 and March 2024. Intraoperative chyle leaks were managed by direct ligation with 5-0 Prolene sutures. Postoperative leaks were initially treated with conservative measures including total parenteral nutrition, targeted cervical compression, and low-pressure drainage. Surgical intervention was reserved for cases unresponsive to conservative therapy. Patients were followed clinically and sonographically for three months postoperatively. ***Results***: Chyle fistula was detected intraoperatively in 16 patients (50%) and postoperatively in 16 patients (50%). Successful intraoperative closure was achieved in 81.2% of cases. Conservative management was successful in 94.7% of patients, with only one patient (5.3%) requiring surgical repair. The mean duration of drainage was 7 ± 2.8 days. At three months, 96.9% of patients exhibited normal wound healing without residual fluid collections, and only one patient reported mild sensory disturbance. ***Conclusion:*** Chyle fistula following neck dissection for thyroid cancer can be effectively managed with early intraoperative ligation and structured conservative therapy. High success rates and favorable functional outcomes can be achieved with an individualized, stepwise approach.

***Keywords:*** *chyle fistula, conservative management, neck dissection, thyroid cancer, surgical repair*

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## INTRODUCTION

Thyroid cancer is one of the most rapidly increasing malignancies worldwide, ranking among the top ten most common cancers according to GLOBOCAN 2020, with approximately 600,000 new cases diagnosed annually. Although thyroid cancer generally has a favorable prognosis, especially for differentiated types such as papillary and follicular carcinoma, surgical intervention remains the cornerstone of curative treatment. Total thyroidectomy and selective or modified radical neck dissection are often required, particularly in cases with nodal metastases, to achieve optimal disease control and minimize recurrence rates [1].

Despite advances in surgical techniques and perioperative management, complications following neck dissection remain a significant concern. Among these, chyle fistula defined as the leakage of lymphatic fluid rich in chylomicrons, triglycerides, and lymphocytes is a rare but potentially serious complication. It occurs in approximately 2–8% of patients undergoing lateral neck dissection, especially in levels III and IV where the thoracic duct and its tributaries are vulnerable to injury. The development of a chyle fistula can lead to severe metabolic disturbances including dehydration, electrolyte imbalance, malnutrition, immunosuppression, delayed wound healing, and increased risk of infection, all of which can prolong hospitalization, escalate treatment costs, and impair overall patient recovery [2].

Timely recognition and appropriate management of chyle fistula are crucial to minimize morbidity. However, there remains a lack of consensus regarding the optimal management strategy, especially concerning the indications for conservative versus surgical intervention. Most existing studies emphasize conservative approaches - including dietary modifications (medium-chain triglyceride diet or total parenteral nutrition), targeted compression, and controlled drainage-while surgical re-intervention is reserved for refractory cases. Nonetheless, reported success rates and management protocols vary widely across studies, reflecting differences in clinical practice and patient characteristics [3].

This study aimed to evaluate the effectiveness of various management strategies for chyle fistula following thyroidectomy with neck dissection, with particular focus on intraoperative detection and closure, conservative postoperative management, and long-term surgical outcomes. The study can contribute practical insights into the optimal management of this challenging complication.

## MATERIALS AND METHOD

### Study design and subjects

This prospective cross-sectional interventional study was conducted at Viet Tiep Friendship Hospital, Hai Phong, Vietnam, between March 2023 and March 2024. The study protocol was approved by the Ethics Committee of Viet Tiep Friendship Hospital and adhered to the principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment. A total of 32 consecutive patients who met the inclusion criteria were recruited during the study period.

*Inclusion criteria*

- Patients diagnosed with thyroid cancer undergoing total thyroidectomy combined with lateral neck dissection (levels II–V).
- Development of chyle fistula either intraoperatively (detected during surgery) or postoperatively (diagnosed by drainage characteristics).
- Provision of informed consent to participate in the study and commitment to postoperative follow-up at three months.

*Exclusion criteria*

- Incomplete medical records.
- Patients lost to follow-up before three months post-surgery.
- Patients who declined participation or withdrew consent during the study period.

### Study procedures

Chyle fistula was diagnosed either intraoperatively by identifying milky-white, gelatinizing fluid during neck dissection or postoperatively through milky drainage confirmed by elevated triglyceride levels

(>110 mg/dL). Intraoperative leaks were managed with direct ligation using 5-0 Prolene sutures. Postoperative fistulas were initially treated conservatively with total parenteral nutrition, targeted cervical compression, and low-pressure drainage, with surgical intervention reserved for cases with persistent drainage exceeding 50 mL/day after seven days or signs of systemic complications. Reoperation involved precise localization and ligation of the leakage site. Primary outcomes included the success rates of intraoperative and conservative treatments; secondary outcomes assessed drainage duration, fistula resolution time, reoperation rates, and postoperative complications. All patients underwent clinical and ultrasound follow-up at three months to evaluate recovery and detect residual complications.

## RESULTS

### Patient characteristics

A total of 32 patients diagnosed with chyle fistula during or after thyroidectomy with neck dissection were included in the study. Among these patients, 5 were male (15.6%) and 27 were female (84.4%). The majority of chyle fistulas occurred on the left side (n = 28; 87.5%), while only 4 cases (12.5%) were detected on the right side. Chyle fistula was identified intraoperatively in 16 patients (50%) and postoperatively in 16 patients (50%).

### Success rates of treatment strategies

Among the 16 patients who had intraoperative identification of chyle fistula, successful closure with primary ligation was achieved in 13 patients (81.2%). Three patients (18.8%) experienced persistent postoperative leakage despite intraoperative management.
In patients managed postoperatively (n = 19, including the three cases from intraoperative failure), conservative treatment was successful in 18 patients (94.7%). Only one patient (5.3%) required surgical intervention due to failure of conservative management, and surgical repair was successful in this case (Table 1).

***Table 1.*** *Treatment success rates*

| Treatment strategy | Number of patients | Successful cases | Success rate (%) |
|---|---|---|---|
| Intraoperative closure | 16 | 13 | 81.2 |
| Conservative treatment | 19 | 18 | 94.7 |
| Surgical intervention | 1 | 1 | 100 |

### Drainage characteristics

Drainage output was closely monitored postoperatively. On the first postoperative day, 18 patients (94.7%) had drainage volumes of less than 100 mL, while 1 patient (5.3%) exhibited drainage greater than 100 mL.
On the second day after initiation of conservative treatment, 16 patients (89.4%) had drainage volumes of less than 50 mL/day, and 2 patients (10.6%) continued to drain more than 50 mL/day.
By the third day, 15 patients (79%) showed drainage volumes of less than 20 mL/day, with 4 patients (21%) exceeding this threshold (Table 2). The mean duration of drainage among patients treated conservatively was 7 ± 2.8 days, with a range from 4 to 11 days. The shortest drainage duration recorded was 4 days, while the longest was 11 days.

***Table 2.*** *Postoperative drainage volumes*

| Time point | Volume | Number of patients | Percentage (%) |
|---|---|---|---|
| First postoperative day | <100 mL | 18 | 94.7 |
| | >100 mL | 1 | 5.3 |
| Second postoperative day | <50 mL/day | 16 | 89.4 |
| | >50 mL/day | 2 | 10.6 |
| Third postoperative day | <20 mL/day | 15 | 79 |
| | >20 mL/day | 4 | 21 |

**Postoperative functional outcomes**

At the three-month postoperative follow-up, 31 patients (96.9%) reported normal wound sensation. Only one patient (3.1%) experienced residual numbness at the surgical site. No cases of persistent pain, tightness, or neck swelling were observed. Cervical ultrasound examinations revealed no residual fluid collections or abnormal masses in any patient, indicating complete resolution of the chyle fistula (Table 3).

***Table 3.*** *Sensory outcomes at three months postoperatively*

| Sensory status | Number of patients | Percentage (%) |
|---|---|---|
| Normal wound sensation | 31 | 96.9 |
| Residual numbness | 1 | 3.1 |
| Pain | 0 | 0 |
| Tightness or discomfort | 0 | 0 |

## DISCUSSION

This prospective study showed that early detection and a structured management protocol resulted in high treatment success rates and favorable functional outcomes.

The findings demonstrate that intraoperative detection and ligation of chyle fistula were successful in 81.2% of cases. This success rate was comparable to previously published data, such as that by Dhiwakar et al., who reported successful intraoperative closure in the majority of cases identified during surgery [3]. Prompt identification during neck dissection, particularly at levels III and IV, where the thoracic duct and its tributaries are most vulnerable, allows for immediate intervention and potentially prevents postoperative leakage. However, 18.8% of patients continued to experience postoperative leakage despite intraoperative repair, highlighting the technical challenges associated with complete identification and closure of all injured lymphatic channels during surgery [4].

Conservative management was highly effective in our cohort, achieving a 94.7% success rate among patients with postoperative chyle fistula. This rate exceeds those reported in some previous studies, such as Lorenz et al., who observed a conservative treatment success rate of approximately 66% [5]. The high success rate was attributed to the rigorous application of a comprehensive conservative protocol, including total parenteral nutrition to reduce lymphatic flow, targeted cervical compression, and controlled low-pressure drainage. Importantly, management strategies were stratified based on the site of leakage, with stricter fasting protocols applied to left-sided fistulas involving the thoracic duct, which may have contributed to improved outcomes [6].

Surgical reintervention was required in only one patient (5.3%), who exhibited persistent high-output drainage despite conservative measures. Surgical exploration revealed significant chyle accumulation, and direct placing the leakage site with 5-0 Prolene sutures led to successful fistula resolution. This outcome supports the notion that surgical intervention should be reserved for cases with prolonged high-volume output or failure of conservative treatment after 7–10 days, consistent with recommendations from previous studies.

Drainage volumes decreased rapidly over the course of treatment, with most patients demonstrating drainage <20 mL/day by the third postoperative day. The mean duration of drainage was 7 ± 2.8 days, which is shorter than durations reported in prior series (e.g., Roh et al.: 18 ± 18 days). Shorter drainage times in our study may reflect the efficacy of early aggressive conservative management.

At the three-month follow-up, nearly all patients exhibited normal wound healing without evidence of residual fluid collections or neurological complications. Only one patient reported mild residual numbness at the surgical site, suggesting that our management strategies not only resolved the fistula but also preserved neck function and quality of life.

However, this study has several limitations. First, the relatively small sample size may limit the generalizability of the findings. Second, this was a single-center study, and variations in surgical technique and postoperative care across institutions could influence outcomes. Further multicenter prospective studies with larger sample sizes are warranted to validate these findings and refine optimal management protocols for chyle fistula in thyroid cancer surgery.

## CONCLUSION

Chyle fistula is a challenging yet manageable complication after neck dissection for thyroid cancer. In this study, intraoperative identification and ligation achieved an 81.2% success rate, while conservative management was effective in 94.7% of postoperative cases. A structured protocol combining early diagnosis, targeted conservative therapy, and timely surgical intervention led to excellent outcomes with minimal morbidity. These results highlight the importance of meticulous surgical technique and proactive management, though larger multicenter studies are needed to validate and refine current treatment strategies.

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**Institutional Review Board Statement:** The study protocol was approved by the Ethics Committee of Viet Tiep Friendship Hospital

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in this study.

**Data Availability Statement:** The data presented in this study are available upon reasonable request, after the signature of a formal data-sharing agreement in an anonymous form, from the corresponding author because they are protected by privacy.

**Conflicts of Interest**: The authors declare no conflicts of interest.

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