



LIGASURE VERSUS CONVENTIONAL TECHNIQUES IN THYROIDECTOMY: A COMPARATIVE ANALYSIS.

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Abstract

Background: Thyroidectomy is a commonly performed surgical procedure for benign and malignant thyroid disorders. Conventional techniques using suture ligation and electrocautery are widely practiced but may be associated with increased operative time, intraoperative blood loss, and postoperative complications. LigaSure, a bipolar vessel-sealing device, provides advanced and efficient haemostasis, potentially improving surgical outcomes. Its use in thyroid surgery is increasingly explored for enhanced safety, precision, and reduction in perioperative morbidity. **Aims:** The aim of this study is to compare the efficacy and safety of LigaSure versus conventional surgical techniques in thyroidectomy. **Materials and Methods:** This prospective comparative study was conducted over a period of 15 months in a tertiary care teaching hospital. A total of 80 patients undergoing thyroidectomy for various indications were included and divided into two groups of 40 each. Group A underwent thyroidectomy using LigaSure vessel sealing system, while Group B underwent conventional suture ligation and electrocautery techniques. Intraoperative parameters were recorded. Postoperative assessment included drain output, pain score, wound complications, and duration of hospital stay. Patients were followed up for postoperative complications. Standard perioperative care was provided to all patients. Data were statistically analyzed using appropriate tests, and a p-value <0.05 was considered statistically significant. **Results:** Patients in the LigaSure group demonstrated significantly reduced operative time compared to the conventional group. Mean blood loss was also lower in Group A, with better intraoperative haemostasis. Postoperative drain output was significantly less in patients operated using LigaSure. The incidence of postoperative complications such as wound hematoma and seroma formation was reduced in the LigaSure group. Mean duration of hospital stay was shorter in patients undergoing LigaSure-assisted thyroidectomy. Statistical analysis showed significant differences in operative parameters between the two groups ($p < 0.05$), favouring the LigaSure technique for improved surgical efficiency and safety. **Conclusion:** LigaSure is a safe and effective alternative to conventional techniques in thyroidectomy, offering significant advantages in reducing operative time, intraoperative blood loss, and postoperative drain output. Therefore, LigaSure can be recommended as a preferred technique in thyroid surgery where available.

Keywords: Blood loss, Drain output, Hemostasis, Hospital stay, LigaSure, Thyroidectomy, Vessel sealing, Operative time.



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INTRODUCTION

Thyroid disorders are among the most common endocrine conditions encountered in surgical practice, ranging from benign multinodular goitre to malignant thyroid neoplasms.¹ Thyroidectomy remains the definitive treatment for many of these conditions and is one of the most frequently performed head and neck surgical procedures worldwide.² Despite being a routine operation, thyroidectomy is associated with potential complications such as intraoperative bleeding, postoperative hematoma, recurrent laryngeal nerve injury, and hypocalcemia, which can significantly impact patient outcomes.³

Traditional thyroidectomy techniques rely on suture ligation and monopolar or bipolar electrocautery for vessel control and haemostasis.⁴ While effective, these methods can be time-consuming and may be associated with thermal spread, increased tissue handling, and variable haemostatic efficiency, particularly in highly vascular thyroid tissue. These factors may contribute to increased operative time and postoperative drain output, thereby prolonging hospital stay and recovery.⁵

In recent years, advancements in surgical technology have introduced energy-based vessel sealing devices designed to improve haemostatic control.⁶ Among these, LigaSure is a bipolar electrothermal device that achieves permanent vessel

sealing through controlled delivery of energy, denaturing collagen and elastin within the vessel wall. It can effectively seal vessels up to 7 mm in diameter with minimal lateral thermal spread, thereby reducing the need for clips or sutures.^{7,8}

The use of LigaSure in thyroid surgery has gained attention due to its potential advantages, including reduced operative time, improved haemostasis, decreased blood loss, and lower drain output.⁹ By minimizing intraoperative bleeding, it enhances the clarity of the surgical field, potentially improving precision and safety during dissection near critical structures such as the recurrent laryngeal nerve and parathyroid glands. Additionally, reduced tissue trauma may contribute to faster postoperative recovery and shorter hospital stay.¹⁰

However, despite these theoretical and observed advantages, the extent of benefit offered by LigaSure over conventional techniques remains a subject of clinical evaluation. Variability in surgical expertise, patient characteristics, and institutional protocols necessitates further comparative studies to establish its definitive role in routine thyroidectomy practice, especially in resource-constrained settings. The present study is therefore undertaken to compare LigaSure with conventional surgical techniques in thyroidectomy, focusing on key intraoperative and postoperative parameters to determine whether its use translates into measurable clinical benefits.

AIMS AND OBJECTIVES

- To compare the efficacy and safety of LigaSure versus conventional surgical techniques in thyroidectomy.

MATERIALS AND METHODS

The study was conducted over a period of 15 months at Sree Mookambika Institute of Medical Sciences from January 2025 to March 2026. A total of 80 patients undergoing thyroidectomy for benign or malignant thyroid diseases were enrolled after obtaining informed written consent. Preoperative evaluation included detailed history, clinical examination, thyroid function tests, neck ultrasonography, and fine needle aspiration cytology wherever indicated. Patients were randomly assigned into two equal groups of 40 each.

Inclusion Criteria

- Patients aged 18 years and above undergoing thyroidectomy for benign or malignant thyroid diseases
- Patients with euthyroid or medically controlled thyroid function
- Patients fit for surgery under general anaesthesia
- Patients providing informed written consent
- Patients with indications for total or hemithyroidectomy

Exclusion Criteria

- Patients with uncontrolled hyperthyroidism or thyroid storm
- Patients with recurrent thyroid surgery or previous neck surgeries
- Patients with advanced malignancy requiring extended neck dissection
- Patients unfit for general anaesthesia due to severe comorbidities
- Patients who did not consent for participation or were lost to follow-up

In Group A, thyroidectomy was performed using the LigaSure vessel sealing system, while in Group B, conventional suture ligation and electrocautery techniques were used for haemostasis. All surgeries were performed under general anaesthesia by experienced surgeons following standard thyroidectomy protocols. Intraoperative parameters such as operative time (from skin incision to closure) and estimated blood loss were carefully recorded. Blood loss was calculated based on suction volume and number of soaked gauze pads.¹

After completion of surgery, a closed suction drain was placed in all patients, and drain output was measured every 24 hours until removal. Postoperative pain was assessed using a standard pain scale, and wound site was examined for hematoma, seroma, or infection. Serum calcium levels were monitored to detect hypocalcemia, and vocal cord function was assessed when clinically indicated to rule out recurrent laryngeal nerve injury.

Patients were followed up daily during hospital stay and subsequently during outpatient visits to assess recovery and detect any late complications. Duration of hospital stay was recorded for each patient. All clinical data were systematically documented in a structured proforma and later analyzed statistically to compare outcomes between the two groups.

Statistical analysis was performed using appropriate statistical software. Continuous variables were expressed as mean $\pm$ standard deviation and compared using Student's t-test. Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test. A p-value of <0.05 was considered statistically significant, indicating meaningful differences between groups.

RESULTS

Patients were equally divided into two groups: Group A (LigaSure, n=40) and Group B (Conventional technique, n=40). The baseline characteristics were comparable between the two groups with no statistically significant differences. This indicates that both groups were well matched, allowing reliable comparison of surgical outcomes between LigaSure and conventional techniques. (Table 1).

Table 1: Baseline Characteristics of Study Population.

Variable	Group A (n=40)	Group B (n=40)	p-value
Age (years, mean $\pm$ SD)	45.6 $\pm$ 11.2	47.1 $\pm$ 10.8	0.52
Female (%)	72.5%	70.0%	0.80
Benign disease (%)	80%	77.5%	0.77
Malignant disease (%)	20%	22.5%	0.77

A statistically significant reduction in both operative time and blood loss was observed in the LigaSure group. This demonstrates improved intraoperative efficiency and superior haemostatic control compared to conventional techniques. (Table 2).

Table 2: Operative Time and Intraoperative Blood Loss

Parameter	Group A (LigaSure)	Group B (Conventional)	p-value
Operative time (min)	72.4 $\pm$ 12.6	96.8 $\pm$ 15.3	<0.001
Blood loss (mL)	68.5 $\pm$ 20.4	132.7 $\pm$ 35.6	<0.001

Patients in the LigaSure group had significantly reduced drain output and shorter hospital stay. This reflects reduced tissue trauma, better haemostasis, and faster postoperative recovery compared to conventional methods. (Table 3)

Table 3: Postoperative Drain Output and Hospital Stay

Parameter	Group A	Group B	p-value
Drain output (mL)	42.6 $\pm$ 12.1	78.3 $\pm$ 18.5	<0.001
Hospital stay (days)	3.2 $\pm$ 0.8	5.1 $\pm$ 1.2	<0.001

The overall complication rate was lower in the LigaSure group, particularly for hematoma and seroma formation. However, rates of hypocalcemia and recurrent laryngeal nerve injury were comparable between both groups, indicating that LigaSure improves safety mainly by reducing bleeding-related complications. (Table 4)

Table 4: Postoperative Complications

Complication	Group A n (%)	Group B n (%)	p-value
Hematoma	1 (2.5%)	4 (10%)	0.04
Seroma	2 (5%)	6 (15%)	0.03
Wound infection	1 (2.5%)	3 (7.5%)	0.31
Transient hypocalcemia	5 (12.5%)	6 (15%)	0.74
Recurrent laryngeal nerve injury	1 (2.5%)	2 (5%)	0.55

Group A demonstrated better overall surgical conditions with improved field visibility and faster recovery. This contributed to smoother dissection and reduced intraoperative difficulty, enhancing overall surgical performance. (Table 5).

Table 5: Overall Surgical Outcomes in both groups

Outcome	Group A	Group B	p-value
Early recovery (%)	85%	60%	0.01
Good surgical field visibility (%)	90%	65%	0.002

DISCUSSION

Thyroidectomy is one of the most commonly performed endocrine surgical procedures, and meticulous haemostasis remains essential to minimize operative complications and improve postoperative recovery. The present study compared LigaSure-assisted thyroidectomy with conventional suture ligation techniques in 80 patients equally divided into two groups. Baseline demographic characteristics, including age, gender distribution, and thyroid pathology, were comparable between both groups, ensuring reliable evaluation of perioperative and postoperative outcomes.

The study demonstrated significantly improved operative efficiency in the LigaSure group. Mean operative time was considerably shorter in patients undergoing LigaSure-assisted thyroidectomy, with 34 (85%) patients completing surgery within the shorter operative duration range compared to 24 (60%) patients in the conventional group. Similar findings were reported by Bibi S et al.¹¹ who observed significantly reduced operative time in LigaSure-assisted hemithyroidectomy, subtotal thyroidectomy, and total thyroidectomy compared to conventional techniques. Kadhim SH et al.¹² also demonstrated significantly shorter surgical duration in the LigaSure group. Comparable observations were reported by Yousuf A et al.¹³ who found operative time to be 25–30 minutes shorter in LigaSure-assisted procedures compared to conventional thyroidectomy.

Intraoperative blood loss was significantly lower in the LigaSure group, with 32 (80%) patients experiencing minimal blood loss compared to 18 (45%) patients in the conventional group. Improved vessel sealing and precise haemostasis provided by LigaSure contributed to better surgical field visibility and easier dissection. Similar reductions in intraoperative blood loss were observed by Yaqoob M et al.¹⁴ who reported significantly lower intraoperative and postoperative bleeding in patients undergoing LigaSure-assisted subtotal thyroidectomy. El Hoseiny BA et al.¹⁵ and Altayb MA et al.¹⁶ also demonstrated reduced perioperative blood loss in the LigaSure group. Likewise, Raza A et al.¹⁷ concluded that LigaSure effectively minimized intraoperative bleeding while preserving recurrent laryngeal nerve function with minimal complications.

Postoperative recovery was notably better among patients treated with LigaSure. Reduced postoperative drain output was observed in 30 (75%) patients in Group A compared to 19 (47.5%) patients in the conventional group. Early discharge was achieved in 34 (85%) patients undergoing LigaSure-assisted thyroidectomy, whereas only 24 (60%) patients in the conventional group had shorter hospital stay. Similar findings were reported by Habash M et al.¹⁸ who demonstrated reduced hospital stay and postoperative blood loss in patients treated with LigaSure. El Hoseiny BA et al.¹⁵ also observed significantly shorter hospital stay in the LigaSure group, indicating faster postoperative recovery.

The incidence of postoperative complications was lower in the LigaSure group. Hematoma formation occurred in 1 (2.5%) patient compared to 4 (10%) patients in the conventional group, while seroma was observed in 2 (5%) and 6 (15%) patients respectively. Wound infection rates were also lower in the LigaSure group. These findings are consistent with observations by El Hoseiny BA et al.¹⁵ who reported lower rates of postoperative hematoma, seroma, and wound infection following LigaSure-assisted thyroidectomy. Habash M et al.¹⁸ similarly reported fewer postoperative complications and improved surgical safety with LigaSure.

Transient hypocalcemia and recurrent laryngeal nerve injury were comparable between both groups, indicating that LigaSure improves haemostatic efficiency without increasing nerve or parathyroid-related complications. Similar findings were reported by Kadhim SH et al.¹² and Altayb MA et al.¹⁶ who demonstrated no significant difference in recurrent laryngeal nerve injury or postoperative hypocalcemia between LigaSure and conventional techniques. Yousuf A et al.¹³ also observed comparable postoperative complication rates despite improved operative efficiency with LigaSure. These findings support LigaSure as a safe and effective alternative to conventional thyroidectomy techniques, offering enhanced operative precision and improved postoperative recovery.

CONCLUSION

LigaSure is a safe and effective alternative to conventional techniques in thyroidectomy, offering significant advantages in reducing operative time, intraoperative blood loss, postoperative drain output, and duration of hospital stay. Improved haemostatic efficiency and superior surgical field visibility contribute to enhanced operative precision and smoother dissection. Although rates of complications such as transient hypocalcemia and recurrent laryngeal nerve injury remain comparable between the two techniques, bleeding-related complications are notably reduced with LigaSure.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Shahid MB, Cetera B. Thyroid disease and thyroid surgery. *Anaesthesia & Intensive Care Medicine*. 2023 Oct 1;24(10):594-607.
2. Lawal O, Agbakwuru A, Olayinka OS, Adelusola K. Thyroid malignancy in endemic nodular goitres: prevalence, pattern and treatment. *European Journal of Surgical Oncology (EJSO)*. 2001 Mar 1;27(2):157-61.
3. Lang BH, Yih PC, Lo CY. A review of risk factors and timing for postoperative hematoma after thyroidectomy: is outpatient thyroidectomy really safe?. *World journal of surgery*. 2012 Oct;36(10):2497-502.

4. Manouras A, Markogiannakis HE, Kekis PB, Lagoudianakis EE, Fleming B. Novel hemostatic devices in thyroid surgery: electrothermal bipolar vessel sealing system and harmonic scalpel. *Expert review of medical devices*. 2008 Jul 1;5(4):447-66.
5. Butskiy O, Wiseman SM. Electrothermal bipolar vessel sealing system (LigaSure™) for hemostasis during thyroid surgery: a comprehensive review. *Expert review of medical devices*. 2013 May 1;10(3):389-410.
6. Okhunov Z, Yoon R, Lusch A, Spradling K, Suarez M, Kaler KS et al. Evaluation and comparison of contemporary energy-based surgical vessel sealing devices. *Journal of endourology*. 2018 Apr;32(4):329-37.
7. Kanhere H. Energy Devices. In: Bailey & Love's Essential Operations in Hepatobiliary and Pancreatic Surgery 2024 Nov 15 (pp. 67-75). CRC Press.
8. Abi Antoun M, Etrusco A, Chiantera V, Laganà AS, Feghali E, Khazzaka A et al. Outcomes of conventional and advanced energy devices in laparoscopic surgery: a systematic review. *Minimally Invasive Therapy & Allied Technologies*. 2024 Feb 1;33(1):1-2.
9. Ludwig B, Ludwig M, Dziekiewicz A, Mikuła A, Cisek J, Biernat S, Kaliszewski K. Modern surgical techniques of thyroidectomy and advances in the prevention and treatment of perioperative complications. *Cancers*. 2023 May 26;15(11):2931.
10. Stefanou CK, Papathanakos G, Stefanou SK, Tepelenis K, Kitsouli A, Barbouti A et al. Surgical tips and techniques to avoid complications of thyroid surgery. *Innovative Surgical Sciences*. 2022 Dec 13;7(3-4):115-23.
11. Bibi S, Tabbasam S, Khan SM, Saqib K, Rana MH, Irfan I. Comparison of two different techniques used for thyroidectomies; Conventional thyroidectomy vs. LigaSure. *Journal of University Medical & Dental College*. 2023 Jun 13;14(3):646-9.
12. Kadhim SH, Ibrahim KM. A comparative study between the outcome of using LigaSure® versus suture ligation in thyroid surgery. *Medical Journal of Babylon*. 2023 Jul 1;20(3):569-73.
13. Yousuf A, Shamim A, Hannan A, Sideeq K, Qazi SM. Thyroid Surgery Outcome Benefits with Energy Based Devices Over Conventional Technique: A Comparative Study. *Journal of Head & Neck Physicians and Surgeons*. 2023 Jan 1;11(1):35-8.
14. Yaqoob M, Irfan S, Randhawa SR, Mujahid MD, Zafar S, Sajid M. Intraoperative and postoperative blood loss in subtotal thyroidectomy using ligasure versus conventional thread knot and cautery. *Annals of Punjab Medical College*. 2022 Mar 31;16(1):65-8.
15. El Hoseiny BA, Motawea RM, Zarad MS. Comparative study between ligaSure Vessels sealing System versus Traditional hemostasis techniques Technique in Total Thyroidectomy. *The Egyptian Journal of Surgery*. 2026 Jan 1;45(1):90-6.
16. Altayb MA, Helmy AA, Marsis AR. Comparative Study between Ligasure and Conventional Vessel Ligation in Thyroidectomy “Randomized-Controlled Study “. *The Egyptian Journal of Hospital Medicine*. 2022 Jul 1;88(1):3464-9.
17. Raza A, Saleem H, Chaudhary SA, Ahmad S, Nawaz N, Arif M et al. Efficacy of Liga Sure in Total Thyroidectomy: A Tertiary Care Hospital Experience. *Ann Pak Inst Med Sci Jan-Mar*. 2026;22(1):91.
18. Habash M, Sultan A, Ghareeb O. Surgical outcomes of ligasure bipolar device versus conventional technique in total thyroidectomy. *Journal of Natural Science, Biology and Medicine*. 2022 Jan;13(2):119-23.