Section: General Surgery

Original Research Article

# SINGLE LATERAL INCISION TOTAL THYROIDECTOMY (SLITT): A UNIQUE AESTHETIC PROCEDURE FOR TOTAL THYROIDECTOMY

***Sijin M G*[1]**

[1]*Consultant Surgeon, EMS Memorial Co-operative Hospital, Perinthalmanna, Kerala, India.*

***Received*** *: 15/01/2025*
***Received in revised form*** *: 14/03/2025*
***Accepted*** *: 01/04/2025*

**Corresponding Author:**
**Dr. Sijin M G,**
Consultant Surgeon, EMS Memorial Co-operative Hospital, Perinthalmanna, Kerala, India.
Email: drmgsijin@gmail.com

**DOI:** 10.70034/ijmedph.2025.2.12

**Source of Support:** Nil,
**Conflict of Interest:** None declared

**Int J Med Pub Health**
2025; 15 (2); 51-59

**ABSTRACT**

**Background:** Total thyroidectomy is the standard surgical approach for benign and malignant thyroid diseases, traditionally performed via a transverse cervical (Kocher's) incision. While effective, conventional methods often lead to increased scarring, postoperative pain, and longer recovery times. The Single Lateral Incision Total Thyroidectomy (SLITT) technique aims to minimize these drawbacks while maintaining surgical efficacy.

**Materials and Methods:** This prospective observational study, conducted from January 2021 to January 2025, evaluated the feasibility, safety, and outcomes of the Single Lateral Incision Total Thyroidectomy (SLITT) technique in 270 patients. The SLITT technique was introduced by a surgeon from North Kerala, India, at EMS Memorial Co-operative Hospital, Perinthalmanna, and aims to provide a less invasive, cosmetically favorable alternative to conventional thyroidectomy. Patients underwent comprehensive preoperative assessment, and the surgery was performed through a single lateral incision, ensuring preservation of vital structures. Postoperative monitoring focused on complications, recovery, and patient satisfaction. The study highlights SLITT as a promising technique with potential advantages in cosmesis, recovery time, and surgical safety.

**Results:** The retrospective analysis of 270 SLITT procedures demonstrated excellent surgical and postoperative outcomes. The majority of patients were female (86.3%) with a mean age of 44.6 years. Multinodular colloid goitre (76.3%) was the most common histopathological finding, and 95.6% underwent a right lateral incision with minimal blood loss (mean 13.9 mL) and a short operative time (mean 13.8 min). Postoperatively, complications were rare, with 87% experiencing no adverse events, and the mean hospital stay was just 2 days. Pain levels were minimal, with 100% pain-free status by 30 days. By 90 days, all scars were completely invisible, indicating excellent cosmetic and recovery outcomes.

**Conclusion:** The SLITT technique offers a safe, efficient, and minimally invasive alternative to conventional thyroidectomy. In 270 patients, it demonstrated minimal blood loss, a short operative time, low complication rates, excellent pain control, and complete scar resolution by 90 days. These findings highlight its superior recovery, aesthetic benefits, and high patient satisfaction.

**KeyWords:** Conventional Open Approach, Lateral Approach, National Comprehensive Cancer Network, Single Lateral Incision Total Thyroidectomy.

## INTRODUCTION

Thyroidectomy is a standard surgical procedure for thyroid diseases, including cancer, benign nodules, and refractory hyperthyroidism. The American Thyroid Association (ATA) and National Comprehensive Cancer Network (NCCN) recommend surgery for large benign nodules

causing compressive symptoms, substernal goiter, Graves' disease unresponsive to medical therapy, toxic nodular goiter with persistent hyperthyroidism, and thyroid cancer.[1]

Total thyroidectomy is advised for papillary and follicular thyroid carcinoma >1 cm with high-risk features, while lobectomy suffices for low-risk tumors up to 4 cm. Medullary thyroid cancer necessitates total thyroidectomy with central lymph node dissection due to its aggressive nature. The rising incidence of thyroid cancer, attributed to increased ultrasonography use, has led to earlier malignancy detection. Small, noninvasive tumors (T1, T2) without nodal involvement require only thyroidectomy, while advanced-stage tumors (T3, T4) or metastatic lymph nodes necessitate neck dissection. While reducing recurrence, neck dissection carries risks, such as recurrent laryngeal nerve injury and hypoparathyroidism, highlighting the need for precise surgical techniques and multidisciplinary decision-making.[1,2]

Total thyroidectomy remains the preferred option for many thyroid conditions, but it carries potential complications. The most concerning are recurrent laryngeal nerve (RLN) injury, leading to vocal cord paralysis or airway obstruction, and superior laryngeal nerve (SLN) injury, affecting high-pitched phonation. Hypoparathyroidism, due to inadvertent parathyroid gland damage, may cause permanent hypocalcemia requiring lifelong supplementation. Postoperative hemorrhage, seroma, and hematoma formation pose further risks. Despite advancements like nerve monitoring, preventing RLN and SLN injuries remains challenging. To mitigate these risks, subtotal or partial thyroidectomy is often preferred for benign conditions, and minimally invasive techniques are increasingly employed to enhance outcomes.[3]

**Surgical Anatomy and Considerations**

The thyroid gland, located anterior to the trachea (C5–T1), consists of right and left lobes connected by the isthmus, with a pyramidal lobe present in 44% of cases (Kim et al.).[4] It receives blood supply from the superior thyroid artery (external carotid) and inferior thyroid artery (thyrocervical trunk), with venous drainage via the superior and middle thyroid veins (internal jugular vein) and the inferior thyroid vein (brachiocephalic trunk).[4]

The RLN, a vagus branch, runs near the tracheoesophageal groove and is prone to injury, while the external branch of the superior laryngeal nerve, coursing with the superior thyroid artery, may be damaged during superior pole dissection, affecting voice quality.[5] Lymphatic drainage includes major (jugular, posterior triangle nodes) and minor (pretracheal, paratracheal, superior mediastinal nodes) pathways. Neck dissection, performed for metastatic lymph nodes, includes central (level VI) and lateral (levels I–V) compartments. Functional neck dissection, introduced by Suarez et al. (1962), preserves key structures and reduces complications compared to radical dissection.[5]

**Current Trends in Thyroidectomy**

With the increasing detection of early-stage thyroid carcinoma and patient concerns about visible scarring, alternative thyroidectomy techniques have gained popularity.[6]

**1. Cervical Approaches**

- **Conventional Open Approach (COA):** Standard method with excellent visibility, suitable for large or invasive tumors but causes visible scarring.
- **Lateral Approach (LA):** A modified COA with a smaller incision along the sternocleidomastoid, reducing scarring and discomfort.
- **Minimally Invasive Video-Assisted Thyroidectomy (MIVAT):** Uses a small incision with endoscopic assistance, offering better cosmesis and faster recovery but limited to smaller thyroid volumes.

**2. Recent Advancements**

- **Video-Assisted Lateral Neck Dissection (VALND):** A minimally invasive technique improving cosmetic outcomes while maintaining oncologic safety.

**3. Remote-Access Approaches**

- **Chest–Breast Approach (CBA):** Uses circumareolar incisions for better cosmesis but requires longer surgery time and advanced skills.
- **Bilateral Axillo-Breast Approach (BABA):** A robotic technique with symmetrical access, allowing better maneuverability but requiring extensive dissection and higher costs.
- **Transaxillary Approach (TA):** Uses a hidden axillary incision, offering excellent visualization, lower pain, and a shorter learning curve compared to other remote-access methods.

**Single Lateral Incision Total Thyroidectomy (SLITT) – A Novel Approach**

Given the increasing incidence of thyroid cancer in both India and high-income countries, largely attributed to widespread screening programs, there is a growing demand for thyroidectomy techniques that minimize complications and enhance cosmetic outcomes.[7] Kerala ranks second highest in India for thyroid cancer incidence.[7]

To address the need for a safe, effective, and aesthetically favorable alternative to conventional thyroidectomy, the Single Lateral Incision Total Thyroidectomy (SLITT) technique was developed. Introduced by a surgeon from North Kerala, India, at EMS Memorial Co-operative Hospital, Perinthalmanna, this technique aims to minimize visible anterior neck scarring and reduce perioperative complications while retaining the benefits of traditional thyroidectomy approaches. SLITT is especially relevant in resource-limited settings, such as developing countries like India,

where access to advanced robotic systems and high-cost surgical technologies is often restricted.

**Pilot Study on SLITT**

A pilot study on Single Lateral Incision Total Thyroidectomy (SLITT) was conducted and published by Sijin MG in *The Journal of Contemporary Clinical Practice.*[8] The study, titled *"The Single Lateral Incision Total Thyroidectomy (SLITT): Revolutionizing Thyroidectomy – A Pilot Study,"* examined the demographic, clinical, and intraoperative characteristics of 50 patients who underwent the SLITT procedure. It compared SLITT outcomes with traditional thyroidectomy methods reported in other studies, demonstrating its feasibility, safety, and potential advantages.[8]

Building upon this initial research, This prospective observational study 2021 to 2024, including all 270 patients who underwent SLITT during this period. The aim is to assess long-term outcomes and identify any additional complications that may have occurred, providing a more comprehensive evaluation of the procedure's safety and effectiveness.

**Objective:** The study's objective was to analyze the intra- and postoperative parameters of the patients who underwent the Single Lateral Incision Total Thyroidectomy (SLITT) procedure, a novel procedure for total thyroidectomy.

## MATERIALS AND METHODS

**Sample Study Design and Duration**

This study employed a prospective, observational design conducted over four years, from January 2021 to January 2025. The study aimed to assess the feasibility, safety, and preliminary outcomes of the Single Lateral Incision Total Thyroidectomy (SLITT) procedure in patients requiring total thyroidectomy. The SLITT technique was introduced by a surgeon from North Kerala, India, at EMS Memorial Co-operative Hospital, Perinthalmanna. A pilot study on SLITT was conducted and published by Sijin MG in *The Journal of Contemporary Clinical Practice*. The study, titled "The Single Lateral Incision Total Thyroidectomy (SLITT): Revolutionizing Thyroidectomy – A Pilot Study," examined the demographic, clinical, and intraoperative characteristics of 50 patients who underwent the SLITT procedure.

**Size and Selection**

The study included a total of 270 patients who underwent the SLITT procedure. A consecutive sampling method was employed to select eligible candidates meeting the defined inclusion and exclusion criteria. Consecutive sampling ensured that all qualifying patients within the study duration were included, minimizing selection bias and enhancing the generalizability of the findings.

**Eligibility Criteria**

Patients were recruited based on the following inclusion and exclusion criteria:

**Inclusion Criteria**

1. Adult patients (aged 18 years and above) requiring total thyroidectomy for benign or malignant thyroid conditions.
2. Patients who provided informed written consent to participate in the study.

**Exclusion Criteria**

1. Patients with a history of prior neck surgeries or radiation therapy, as previous interventions could alter surgical anatomy and outcomes.
2. Patients with significant medical instability or contraindications to surgery, including those with severe cardiovascular or respiratory conditions.

**Preoperative Assessment**

A thorough preoperative evaluation was conducted to optimize surgical outcomes and patient safety.

1. **Clinical Evaluation:** Each patient underwent a comprehensive medical history review and physical examination. Particular attention was given to neck assessment and thyroid function tests, including Thyroid-Stimulating Hormone (TSH) and Free T4 levels, to determine baseline thyroid function.
2. **Imaging and Diagnostics:** High-resolution ultrasonography was utilized to assess thyroid gland size, the presence of nodules, and any lymph node involvement. Fine-needle aspiration cytology (FNAC) was performed on suspicious nodules to confirm malignancy. Additional imaging modalities such as computed tomography (CT) or magnetic resonance imaging (MRI) were employed in cases where local invasion or significant anatomical variations were suspected.
3. **Laboratory Investigations:** Routine preoperative blood tests, including a complete blood count (CBC), coagulation profile, and serum calcium levels, were obtained to assess baseline health status and potential risk factors.
4. **Patient Counseling:** Patients were thoroughly counseled about the SLITT procedure, including the expected benefits, potential risks, and alternative treatment options. Informed consent was obtained after addressing any patient concerns or queries.

**Surgical Technique: Single Lateral Incision Total Thyroidectomy (SLITT)**

SLITT is a novel approach designed to perform thyroidectomy through a single, smaller, and more cosmetically favorable lateral incision on one side of the neck. The surgical technique follows a structured sequence to ensure optimal exposure, safety, and preservation of vital structures.

**Patient Positioning:** The patient was placed under general anesthesia in a supine position with the neck extended in the classical thyroidectomy position. The head was rotated to the opposite side of the

planned incision for optimal surgical access. [Figure 1]


**Figure 1**

**2. Incision and Initial Exposure:** A 3 cm transverse incision was made along the most cosmetically favorable crease over the sternocleidomastoid (SCM) muscle. The platysma muscle was incised, and a plane was developed between the SCM and the strap muscles. The strap muscles were retracted medially to provide exposure to the superior thyroid pedicle. (Fig 1 and 2)

**Figure 2**

**3. Superior Pedicle Dissection:** The superior thyroid pedicle was carefully identified and transected close to the gland using an energy device, with special attention given to preserving the external branch of the superior laryngeal nerve. The dissection progressed inferiorly while preserving the superior parathyroid gland, middle thyroid vein, and recurrent laryngeal nerve, which courses through Berry's ligament.

**4. Inferior Pedicle Dissection:** The dissection was extended caudally to preserve the inferior parathyroid gland and its venous drainage. The inferior thyroid pedicle was then transected, allowing both parathyroid glands to remain intact with their vascular attachments.

**5. Lobe Delivery:** The thyroid lobe was gently delivered into the incision after releasing the ligamentous attachments of the isthmus to the trachea. The isthmus was freed, and careful retraction using Langenbach retractors was employed to minimize tissue trauma.

**Figure 4**

**6. Contralateral Lobe Dissection:** Access to the contralateral lobe was achieved by first addressing the lower pole, followed by the middle thyroid vein and superior thyroid pedicle. The contralateral organ of Zuckerkandl was mobilized and removed, completing the excision. (Fig 3)

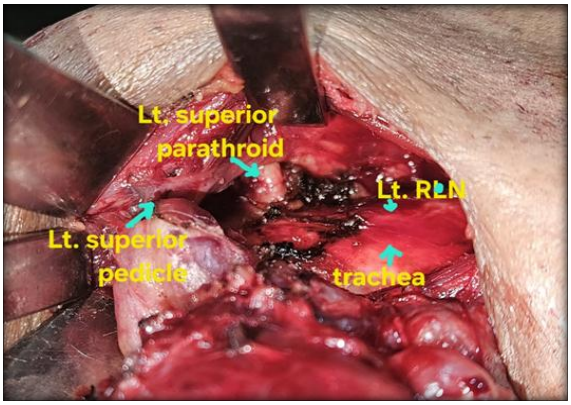


**Figure 5**

**7. Completion of Gland Removal:** The final step involved transecting the contralateral superior pedicle while preserving the external branch of the superior laryngeal nerve. Hemostasis was meticulously achieved before wound closure. (Fig 4)

**Figure 6: Specimens after bilateral MRND and central compartment dissection**

**Management of Lymph Nodes**

For patients with thyroid malignancies, lymph node dissection was performed as necessary through the same incision. This allowed for a modified radical neck dissection (MRND) or central compartment dissection when indicated. The ability to manage lymph nodes effectively through the lateral incision demonstrated the versatility of the SLITT technique in oncologic cases.

**Postoperative Care and Follow-Up**

Following surgery, all patients underwent close postoperative monitoring to identify and manage potential complications effectively. During follow up Cosmetic outcomes were assessed using standardized patient satisfaction surveys at discharge and follow-up visits. Scan assessment (Fig 7 and 8)


1. **Immediate Postoperative Monitoring:** Patients were observed for complications such as bleeding, hypocalcemia, and recurrent laryngeal nerve injury.
2. **Pain Management:** Postoperative analgesia was administered per protocol, and pain scores were recorded to evaluate patient comfort.
3. **Length of Hospital Stay:** The duration of hospitalization was documented for each patient, providing insight into recovery timelines associated with SLITT.
4. **Patient Satisfaction:** Cosmetic outcomes were assessed using standardized patient satisfaction surveys at discharge and follow-up visits.
5. **Adverse Event Reporting:** Any adverse events were reported to the Institutional Ethics Committee (IEC) for review and corrective action.

**Ethical Considerations**

The study adhered to strict ethical guidelines to ensure patient safety and research integrity.

- Ethical approval was obtained from the Institutional Ethics Committee (IEC) before study initiation.
- Informed consent was obtained from all participants, ensuring their voluntary participation.

Any adverse events, protocol deviations, or unexpected findings were promptly reported to the IEC for review and necessary interventions.

## RESULTS

A total of 270 study subjects' data were collected retrospectively from those who underwent the procedure of Single Lateral Incision Total Thyroidectomy (SLITT) since 2021.

**Table 1: Basic Demographic Characteristics of the Study Subjects**

| Variable | Characteristics | N (%) |
|---|---|---|
| **Age** | 44.6(12.86) Minimum 19 yrs and maximum age 96 yrs | |
| **Gender** | Female | 233(86.3) |
| | Male | 37 (13.7) |
| **Religion** | Muslim | 153(56.7) |
| | Hindu | 105(38.9) |
| | Christian | 12(4.4) |
| **Educational status** | Postgraduate | 32(11.9) |
| | Diploma | 84(31.1) |
| | High school | 61(22.6) |
| | Intermediate | 65(24.1) |
| | Professional Degree | 5(1.9) |
| | Middle school | 22(8.1) |
| | primary | 1(0.4) |
| **Occupational status** | Unemployed | 123(45.6) |
| | unskilled worker | 36(13.3) |
| | Professional | 52(19.3) |
| | Skilled worker | 53(19.6) |
| | Farmer | 4(1.5) |
| | business | 2(0.7) |
| **Marital status** | Married | 247(91.5) |
| | Unmarried | 23(8.5) |
| Total | | 270(100) |

A total of 270 study subjects were included in the study, with a mean age of 46 years (SD ±13), ranging from 19 to 96 years. The majority were females (233, 86.3%), and most belonged to the Muslim community (153, 56.7%), followed by Hindus (105, 38.9%) and Christians (12, 4.4%). Regarding educational status, a significant proportion had completed a Diploma course (84,

31.1%). In terms of occupation, a large majority were unemployed or homemakers (123, 45.6%). Marital status data revealed that 247 (91.5%) of the study subjects were married (Table 1)

**Table 2: BMI and Co-Morbidity pattern of the study subjects**

| Variable | Characteristics | N(%) |
|---|---|---|
| **BMI** | Normal weight | 143(53) |
| | Overweight | 58(21.5) |
| | Obesity | 62(17.9) |
| | Underweight | 7(2.6) |
| **Weight** | | |
| **Co-Morbidities** | yes | 122(45.2) |
| | No | 148(54.8) |

Out of a total of 270 study subjects a large majority of them were normal-weight people 143 (53), with an overweight study population of 58(21.5), followed by Obese 62(23) and Underweight 7(2.6) respectively. Nearly half of the study subjects presented with any comorbid conditions 122(45.2). (table 2)

**Table 3: Histopathological and clinical characteristics of the study subjects**

| Variable | Characteristics | N(%) |
|---|---|---|
| **Clinical Presentation** | Neck mass without pressure symptoms | 236(87.4) |
| | Neck mass with pressure symptoms | 34(12.6) |
| **Histo-pathology** | Multinodular colloid goitre (MNG) | 206(76.3) |
| | Papillary thyroid cancer | 27(10) |
| | Hashimoto's Thyroiditis. | 30(11.1) |
| **Indication of the surgery** | Goitre | 161(59.6) |
| | Malignant Thyroid Neoplasm. | 19(7) |
| | Non Toxic MNG | 40(14.8) |
| | Solitary nodule Thyroid | 15(5.6) |
| | Toxic MNG | 35(13) |
| **Mass L*W*T{Mean (SD)}** | 6.5(1.3) *3.9(1)*3.9(0.7) | |
| **Total** | | 270(100) |

Out of 270 study subjects, the majority presented with a neck mass without pressure symptoms (236, 87.4%), while 34 (12.6%) had pressure symptoms. Histopathological findings revealed that most cases were multinodular colloid goitre (MNG) (206, 76.3%), followed by Hashimoto's thyroiditis (30, 11.1%) and papillary thyroid cancer (27, 10%). Regarding the indication for surgery, goitre was the most common reason (161, 59.6%), followed by non-toxic MNG (40, 14.8%), toxic MNG (35, 13%), malignant thyroid neoplasm (19, 7%), and solitary thyroid nodule (15, 5.6%). The mean (SD) dimensions of the mass were 6.5 cm (1.3) in length, 3.9 cm (1) in width, and 3.9 cm (0.7) in thickness.

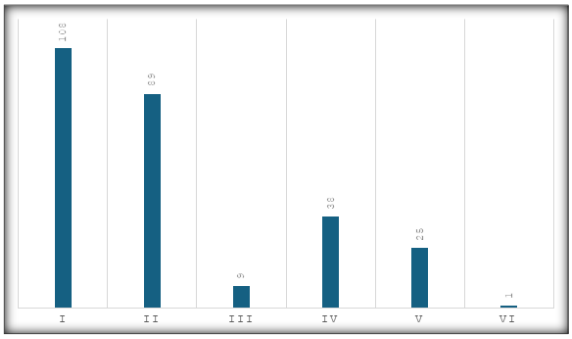


**Figure 1: Bethesda Classification**

The Bethesda classification of the study subjects showed that Category I was the most common, observed in 108 cases (40%), followed by Category II in 89 cases (33%). Categories IV and V were noted in 38 (14.1%) and 25 (9.3%) cases, respectively. Category III accounted for 9 cases (3.3%), while Category VI was the least frequent, with only 1 case (0.4%).

**Table 4: Intra-operative and post-operative characteristics of the study subjects**

| Variable | Characteristics | N(%) |
|---|---|---|
| **Incision** | Right lateral | 258(95.6) |
| | Left lateral | 12(4.4) |
| **Capsular invasion** | Seen | 29(10.7) |
| | Not seen | 241(89.3) |
| **`Post-operative drainage** | yes | 20(7.4) |
| | no | 250(92.6) |
| Operation time/min Mean (SD) | 13.8(4.3) | |
| Intraoperative bleeding volume/mL Mean (SD) | 13.9(3) | |
| **Post-operative hospital stays** Mean (SD) | **2(1)** | |

| | | |
|---|---|---|
| **Postoperative complications** | **Yes**<br>• Superior Laryngeal Nerve Palsy<br>• Hypocalcemia<br>• Haemostasis | **35(13%)**<br>30<br>4<br>1 |
| | **no** | **235(87%)** |

The majority of the study subjects underwent a right lateral incision (258, 95.6%), while a left lateral incision was performed in only 12 cases (4.4%). Capsular invasion was observed in 29 cases (10.7%), whereas it was not seen in the remaining 241 cases (89.3%), indicating that most cases did not exhibit invasive characteristics.

Post-operative drainage was very minimal in this SLITT procedure 20(7.4%). the majority of the study subjects did not require postoperative drainage 250(92.6%), showed minimal surgical trauma and successful intraoperative haemostasis

A large majority of the study subjects, 235 (87%), did not experience any postoperative complications. However, 35 (13%) developed complications, with 30 cases presenting superior laryngeal nerve palsy. Additionally, four cases exhibited minimal complications such as hypocalcemia, and one case developed a hematoma.

The mean operation time for the study subjects was 13.8 minutes (SD ±4.3). The average intraoperative bleeding volume was 13.9 mL (SD ±3), indicating minimal blood loss during surgery. Postoperatively, patients had a mean hospital stay of 2 days (SD ±1), suggesting a relatively short recovery period.

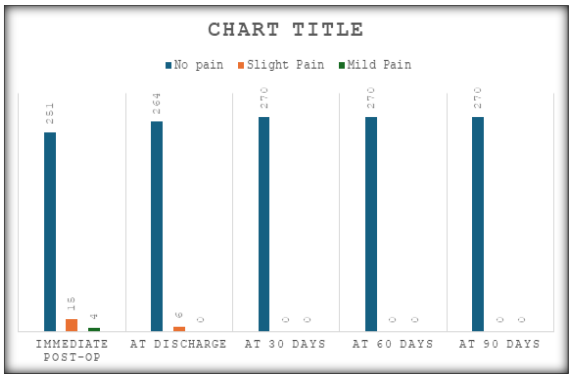


**Figure 2: Postoperative Pain Assessment (VAS Score) at Different Time Points**

Pain assessment using the Visual Analog Scale (VAS) showed that immediately after surgery, the majority of patients (93.0%) reported no pain, while a small proportion (6.7%) experienced slight or mild pain. At discharge, pain levels further decreased, with 97.8% of patients reporting no pain and only 2.2% experiencing slight pain. By 30 days postoperatively, all patients (100%) reported being completely pain-free, with no reported pain at subsequent follow-ups at 60 and 90 days. These findings indicate excellent postoperative pain control and recovery following the SLITT procedure.

Additionally, scar visibility was completely absent in all patients by 90 days, indicating optimal wound healing and aesthetic recovery.

## DISCUSSION

Single Lateral Incision Total Thyroidectomy (SLITT) is an innovative surgical approach introduced by a surgeon from North Kerala, India, at EMS Memorial Co-operative Hospital, Perinthalmanna. This technique, first studied and published by Sijin MG in The Journal of Contemporary Clinical Practice (2025),[8] aims to revolutionize conventional thyroidectomy by minimizing surgical trauma while ensuring optimal clinical outcomes. Given the increasing burden of thyroid disorders, evaluating the demographic, clinical, and intraoperative characteristics of patients undergoing SLITT is crucial for assessing its efficacy and safety.

This retrospective study analyzed data from 270 patients who underwent the SLITT procedure since 2021. The mean age of the study population was 44.6 years (SD ±12.86), with a predominant female representation (86.3%). The majority of the patients were from the Muslim community (56.7%) and had an educational background up to the diploma level (31.1%). Nearly half of the patients (45.6%) were unemployed or homemakers, and 91.5% were married. Regarding BMI, 53% had normal weight, while 21.5% were overweight, and 17.9% were obese. Comorbidities were present in 45.2% of cases. Clinically, most patients (87.4%) presented with a neck mass without pressure symptoms. Histopathological analysis revealed that multinodular colloid goitre (76.3%) was the most common finding, with goitre being the leading surgical indication (59.6%). The Bethesda classification showed Category I (40%) and Category II (33%) as the most prevalent.

Intraoperatively, 95.6% of patients underwent a right lateral incision, with minimal blood loss (mean 13.9 mL, SD ±3) and a short mean operative time of 13.8 minutes (SD ±4.3). Postoperatively, only 7.4% required drainage, and complications were minimal, with 87% of patients experiencing no adverse events. The mean hospital stay was 2 days (SD ±1), indicating a swift recovery with minimal surgical morbidity.

Pain assessment using the Visual Analog Scale (VAS) showed that immediately after surgery, the majority of patients (93.0%) reported no pain, while a small proportion (6.7%) experienced slight or mild pain. At discharge, pain levels further decreased, with 97.8% of patients reporting no pain and only 2.2% experiencing slight pain. By 30 days

postoperatively, all patients (100%) reported being completely pain-free, with no reported pain at subsequent follow-ups at 60 and 90 days. These findings indicate excellent postoperative pain control and recovery following the SLITT procedure. Additionally, scar visibility was completely absent in all patients by 90 days, indicating optimal wound healing and aesthetic recovery.

Several studies have explored modifications in thyroidectomy techniques to improve surgical outcomes, minimize complications, and enhance cosmetic results. The Single Lateral Incision Total Thyroidectomy (SLITT) technique offers a promising alternative by ensuring minimal tissue trauma, reduced operative time, and excellent postoperative recovery.

A study by Rafferty et al. (2006) investigated the optimal incision length for thyroid surgery and found that a 4 cm incision provided adequate access for most cases. However, the study primarily focused on incision size rather than a comprehensive evaluation of intraoperative and postoperative outcomes. In contrast, SLITT not only achieves an even smaller incision but also emphasizes minimal blood loss, shorter operative time, and superior aesthetic results with complete scar healing by 90 days.[9]

Similarly, Zhou et al. (2022) compared traditional thyroidectomy with modified small incision thyroidectomy, finding that the latter significantly reduced intraoperative bleeding and postoperative complications. However, their study was limited to thyroid cancer cases and did not focus on broader thyroid disorders such as multinodular goitre, which forms a substantial proportion of surgical indications. SLITT, on the other hand, demonstrated its effectiveness across a wider range of thyroid pathologies, making it a more versatile technique. Additionally, Zhou et al. reported a postoperative hypocalcemia incidence of 11.82% in their modified approach, whereas SLITT had no such complications, further emphasizing its safety profile.[10]

Consorti et al. (2012) evaluated incision length in relation to thyroid volume, gender, and body mass index (BMI), concluding that shorter incisions could be safely used in women without significantly impacting operative duration. However, the study acknowledged that thyroid volume remained a crucial determinant of incision length. In contrast, SLITT ensures a standardized lateral incision approach irrespective of gland size while maintaining a remarkably short operative duration of 13.8 minutes, thereby demonstrating a more efficient surgical technique.[11]

Park et al. (2001) introduced a minimally invasive open thyroidectomy (MIOT) that reduced incision length to 3.0–4.5 cm and limited tissue dissection. While their findings showed reduced blood loss, shorter hospital stays, and decreased postoperative analgesia use compared to conventional thyroidectomy, the mean operative time remained significantly higher at 57.6 minutes. In comparison, SLITT achieves similar advantages but within a much shorter surgical duration and with an even smaller lateral incision, ensuring superior cosmetic and functional outcomes.[12]

Terris et al. (2005) introduced the concept of Minimally Invasive Thyroidectomy (MITh) using a ≤6 cm incision with videoendoscopic assistance and transection of the strap muscles. Their study reported a mean surgical time of 115.7 minutes for hemithyroidectomy and 147.4 minutes for total thyroidectomy. Although the approach reduced incision length and yielded excellent cosmetic outcomes, the need for video-assisted technology and strap muscle transection added to the complexity of the procedure. In contrast, the SLITT technique achieves a far shorter operative duration of 13.8 minutes without the need for additional technological assistance or muscle transection, making it a more efficient and accessible approach. Additionally, MITh required a longer incision of approximately 4.9 cm, whereas SLITT is performed through a significantly smaller lateral incision, further improving cosmesis.[13]

Palazzo et al. (2006) explored an endoscopic lateral neck approach for thyroidectomy, demonstrating its feasibility in patients with solitary nodules smaller than 3 cm. The mean operating time was 99 minutes, with a nodule size range of 7–47 mm. While the study showed promising cosmetic and functional outcomes, only a small proportion (5.1%) of thyroidectomies performed in their center utilized this approach, highlighting the selectivity and limitations of the technique. Additionally, two patients required conversion to an open procedure, indicating that endoscopic techniques may not be universally applicable. In contrast, SLITT does not require patient selection based on nodule size or prior surgical history, making it a more versatile technique applicable to a broader range of thyroid pathologies. The significantly shorter operative time in SLITT also underscores its efficiency and practical advantages over endoscopic techniques.[14]

Inabnet et al. (2003) examined endoscopic thyroidectomy by a cervical approach, assessing its feasibility and safety. Their study involved 38 patients, with a mean operative time of 190 minutes. While the procedure was completed endoscopically in 35 cases, one patient experienced permanent recurrent laryngeal nerve palsy, emphasizing the inherent risks of endoscopic dissection. The requirement for prolonged operative time and specialized surgical expertise limits the widespread adoption of this technique. Comparatively, SLITT eliminates the need for endoscopic instruments and offers a straightforward approach with no reported complications, including recurrent laryngeal nerve palsy or postoperative hypocalcemia. The absence of such complications in SLITT highlights its superior safety profile and simplicity.[15]

Overall, the findings of the present study underscore the superiority of SLITT over these previously established techniques. The significantly reduced blood loss, shorter operative time, minimal complications, and rapid postoperative recovery highlight its effectiveness as a minimally invasive alternative to conventional thyroidectomy methods. Moreover, the absence of postoperative pain beyond 30 days and the complete resolution of scars by 90 days further establish SLITT as a technique that prioritizes both patient safety and satisfaction. These advantages position SLITT as a groundbreaking advancement in thyroid surgery, with the potential for widespread adoption in clinical practice.

## CONCLUSION

The Single Lateral Incision Total Thyroidectomy (SLITT) technique demonstrates significant advantages in terms of surgical efficiency, minimal invasiveness, and excellent postoperative outcomes. This retrospective analysis of 270 patients highlights the procedure's safety, with minimal blood loss, a short operative time, and low complication rates. Postoperative pain was well controlled, with the majority of patients reporting no pain by discharge and complete resolution by 30 days. Furthermore, scar visibility was entirely absent by 90 days, underscoring the aesthetic benefits of this approach. These findings suggest that SLITT is a viable and effective alternative to conventional thyroidectomy, offering superior patient satisfaction, faster recovery, and excellent cosmetic results.

**Conflict of interest:** Nil

## REFERENCES

1. Haugen B.R., Alexander E.K., Bible K.C., Doherty G.M., Mandel S.J., Nikiforov Y.E., Pacini F., Randolph G.W., Sawka A.M., Schlumberger M., et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016; 26:1–133. doi: 10.1089/thy.2015.0020.
2. Agcaoglu O, Sucu S, Toprak S, Tezelman S. Techniques for Thyroidectomy and Functional Neck Dissection. J Clin Med. 2024 Mar 26;13(7):1914. doi: 10.3390/jcm13071914. PMID: 38610679; PMCID: PMC11012902.
3. Padur AA, Kumar N, Guru A, Badagabettu SN, Shanthakumar SR, Virupakshamurthy MB, Patil J. Safety and effectiveness of total thyroidectomy and its comparison with subtotal thyroidectomy and other thyroid surgeries: a systematic review. Journal of thyroid research. 2016;2016(1):7594615.
4. Stewart W.B., Rizzolo L.J. Embryology and Surgical Anatomy of the Thyroid and Parathyroid Glands. In: Oertli D., Udelsman R., editors. Surgery of the Thyroid and Parathyroid Glands Berlin. 2nd ed. Springer; Berlin/Heidelberg, Germany: 2012. pp. 15–23. [Google Scholar]
5. Kim D.W., Jung S.L., Baek J.H., Kim J., Ryu J.H., Na D.G., Park S.W., Kim J.H., Sung J.Y., Lee Y., et al. The prevalence and features of thyroid pyramidal lobe, accessory thyroid, and ectopic thyroid as assessed by computed tomography: A multicenter study. Thyroid. 2013;23:84–91. doi: 10.1089/thy.2012.0253. [DOI] [PubMed] [Google Scholar]
6. Lu Q, Zhu X, Wang P, Xue S, Chen G. Comparisons of different approaches and incisions of thyroid surgery and selection strategy. Front Endocrinol (Lausanne). 2023 Jul 17; 14:1166820. doi: 10.3389/fendo.2023.1166820. PMID: 37529600; PMCID: PMC10390217.
7. Saadvik Raghuram et al., Rising thyroid cancer incidence in Kerala: Is it real or overdiagnosis? JCO 37, e17589-e17589(2019).
8. Sijin MG. The Single Lateral Incision Total Thyroidectomy (SLITT): Revolutionizing Thyroidectomy–A Pilot Study. Journal of Contemporary Clinical Practice. 2025 Jan 4; 11:1-0.
9. Rafferty M, Miller I, Timon C. Minimal incision for open thyroidectomy. Otolaryngology–Head and Neck Surgery. 2006;135(2):295-298. doi: 10.1016/j.otohns.2006.03.013
10. Zhou J, Ju H, Ma H, Diao Q. Clinical efficacy of modified small incision thyroidectomy and analysis of influencing factors of postoperative hypocalcemia. Frontiers in Surgery. 2022 May 27; 9:905920.
11. Consorti F, Milazzo F, Notarangelo M, Scardella L, Antonaci A. Factors influencing the length of the incision and the operating time for total thyroidectomy. BMC surgery. 2012 Dec; 12:1-4.
12. Park CS, Chung WY, Chang HS. Minimally invasive open thyroidectomy. Surgery Today. 2001 Aug; 31:665-9.
13. Terris DJ, Bonnett A, Gourin CG, Chin E. Minimally invasive thyroidectomy using the Sofferman technique. The Laryngoscope. 2005 Jun;115(6):1104-8.
14. Palazzo FF, Sebag F, Henry JF. Endocrine surgical technique: endoscopic thyroidectomy via the lateral approach. Surgical Endoscopy and Other Interventional Techniques. 2006 Feb; 20:339-42.
15. Inabnet Iii WB, Jacob BP, Gagner M. Minimally invasive endoscopic thyroidectomy by a cervical approach. Surgical Endoscopy and Other Interventional Techniques. 2003 Nov; 17:1808-11.