

## A TECHNIQUE OF LATERAL APPROACH THYROIDECTOMY IN THE MANAGEMENT OF THYROID SWELLING

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### Abstract

**Background:** In the past, thyroid surgery was often unsuccessful and injuries to the recurrent laryngeal nerve and tetany were also common after a thyroidectomy; however, innovative procedures are being developed to reduce the incision size and to decrease the post-operative complications. **Materials and Methods:** A prospective study was conducted at the Department of General Surgery, ESIC Medical College & PGIMS, KK Nagar, Chennai, for 18 months (September 2018 to March 2020) to study the outcome of Lateral approach thyroidectomy for managing thyroid swellings. The study will be done using a hospital based prospective descriptive design. After proper setting, informed consent patients were included in the study. Patients with thyroid swelling proposed for thyroidectomy will undergo a standard clinical examination, necessary investigations and fitness for anaesthesia. In addition, all the patients will be given standard post-operative care in the form of adequate intravenous fluids, antibiotics and analgesics. **Result:** Among 51 patients, only 2% were men, and 98% were women. Multi modular goitre was in 65% of patients, out of 51 people consented for surgery, 75% required total thyroidectomy as per standard protocol. Vital structures such as Thyroid pedicels and nerves are accessed easily, among those easily accessible structures, the Middle thyroid vessels and the Inferior thyroid pedicle were 100 % easier, the least being the Recurrent laryngeal nerve which was 94%. In post-operative complications, the hematoma and wound infection were 1 (14%) as there was better access and lesser injury. There is no significant difference between the surgical ease score and surgery complications, with a p-value of 0.863. **Conclusion:** We conclude the lateral backdoor approach thyroidectomy is as safe and easy as the conventional midline approach, even for large goitres.

## INTRODUCTION

In its converted form, triiodothyronine (T3), the thyroid hormone controls a plethora of genes from its pro hormone, thyroxine (T4). Different thyroid hormone transporters are expressed depending on the kind of cell or tissue being studied. Various iso forms of the thyroid hormone receptor (TR) interact with corepressors and coactivators, making for a highly regulated and intricate signalling cascade. As a bonus, the thyroid frequently signals cross-talk with several other signalling pathways.<sup>[1]</sup> The thyroid gland generates thyroid hormone, which comprises follicles synthesising thyroid hormone by iodinating binding to receptors in the glycoprotein thyroglobulin. The anterior pituitary secretes

stimulating thyroid hormone (TSH) in response to feedback from the body's circulating thyroid hormone. TSH exerts its effects by binding to and activating a receptor on the basolateral membrane of thyroid follicular cells.<sup>[2]</sup> To maintain adequate thyroid hormone production and secretion, TSH controls iodide absorption mediated by the sodium/iodide symporter. Mammalian metamorphosis necessitates the presence of thyroid hormone since it is important for appropriate growth, development, neuronal differentiation, and metabolic control. These effects are particularly pronounced in prenatal thyroid hormone shortage, as those caused by maternal iodine deficiency but rather untreated congenital hypothyroidism, and appear as severe cognitive impairments and

developmental delay. When ligand insufficiency occurs in adults, the resulting impairments are milder and more reversible.<sup>[3]</sup> The thyroid gland is removed in more cases than any other endocrine surgery. During a standard thyroidectomy, the surgeon makes an horizontal skin crease incision in the middle of the patient's neck and separates the strap muscles surrounding it (Midline Approach-MA). Then, the thyroid gland is approached posterolaterally by the same central neck incision in the lateral approach (LA), located between the anterior border of the sternocleidomastoid (SCM) and the strap muscles. A sternomastoid approach is a lateral approach (LA) that can be used to access the thyroid gland. The parathyroid glands and recurrent laryngeal nerves must be identified and preserved during thyroid lobe surgery as they are positioned posterolaterally to the thyroid lobe.<sup>[4]</sup> It is possible to transport the thyroid gland into the surgical area with little retraction and straining of the strap muscles due to LA, facilitating quicker identification of these vital structures. However, due to significant scarring and adhesions following midline division and suturing back of strap muscles, this method is often reserved for re-do thyroid surgery after an MA approach has already been taken. Both trans axillary endoscopic and robotic thyroidectomy employ a lateral technique to access and remove the thyroid gland. A lateral method has been the subject of a few scholarly articles, with most authors agreeing that it provides superior visualisation of the important structures.<sup>[5]</sup> One such revolutionary invention that has improved the safety of thyroid surgery is the lateral approach to the thyroid (LAT). The superior belly of the omohyoid on the side, the sternohyoid and sternothyroid (strap muscles) on the front, and the thyroid lobe at the base define the anatomical window targeted by this technique.<sup>[9]</sup> The deep cervical fascia investing layer needs to be opened to access this aperture. The superior thyroid arteries and middle thyroid veins are more easily managed, allowing for a smoother lateral component of the dissection, including mobilising and delivering the thyroid lobe from beneath the tense strap muscles to the midline incision.<sup>[11]</sup>

#### **Aim**

To study the outcomes of Lateral approach Thyroidectomy in managing thyroid swelling.

## **MATERIALS AND METHODS**

A prospective study was conducted at the Department of General Surgery, ESIC Medical College & PGIMS, KK Nagar, Chennai, for 18 months (September 2018 to March 2020) to study the outcome of Lateral approach thyroidectomy for managing thyroid swellings. The study will be done using a hospital based prospective descriptive design. To estimate the mean time taken for the

LAT approach of thyroidectomy with 95% confidence and relative precision of 20% the sample size was calculated using the formula  
$$N = 4 * SD^2 / d^2 = 4 * 34 * 34 / 10 * 10 = 46.24$$
rounded off to 50

#### **Inclusion Criteria**

Consenting of 51 patients with thyroid nodules proposed for thyroidectomy above the age of 18 years.

#### **Exclusion Criteria**

Patients with bleeding tendency, on anticoagulant medication or disorders affecting coagulation cascade, patients with toxic thyroid nodules, pregnancy with a thyroid nodule, and non-palpable thyroid nodules. Patients with thyroid swelling proposed for thyroidectomy will undergo a standard clinical examination, necessary investigations and fitness for anaesthesia. An experienced thyroid surgeon will operate on all the patients under general inhalational anaesthesia with endotracheal intubation. The patient's position will be rose position with an extension of the neck. Transverse skin crease incision will be given 2 cm above the supra-sternal notch extending laterally up to the posterior borders of both sternocleidomastoid muscles. Then, instead of incising the deep fascia in midline as in conventional midline approach, deep fascia is incised between strap and sternocleidomastoid muscle. All the patients will be given standard post-operative care in the form of adequate intravenous fluids, antibiotics and analgesics. In all the cases following parameters will be documented. Accessibility to various structures of the thyroid was assessed and given a score. When the access was easy, a Score of 2 was given, and when the access was difficult, a score of 1 was given. If any injury to vital structures were present, a score of 1 was given, and if there was no injury intra operatively, a score of 2 was given.

#### **Operative Time**

It is the time in minutes from skin incision to its closure. Post-operative pain: will be assessed by the Visual Analog Scale (VAS) on 1st and 2nd post-operative days. Post-operative complications like hematoma, hoarseness of voice, hypocalcemia, and wound infection will be documented. The duration in days of the removal of the post-operative drain will be recorded. Cosmesis: Accessibility to various parts of the gland: The ease or difficulty of accessing the middle thyroid vein, superior pole, inferior thyroid veins, Parathyroid glands, Recurrent Laryngeal Nerve and isthmus will be assessed intra-operatively by the Operating Surgeon. The operating surgeon will document ease in identification of the Parathyroid gland and Recurrent laryngeal nerve. Conversion to muscle cutting approach, if required, will be reported. Statistical analysis was done by using SPSS.

## RESULTS

**Table 1: Characteristics of the study sample**

Characteristic	Categories	No (%)
Sex	Male	1 (2%)
	Female	50 (98%)
Age	30 – 40 years	5 (10%)
	41-50 years	23 (45%)
	51-63 years	23 (45%)
Diagnosis	Solitary Nodular Goitre	18 (35.3%)
	Multi Nodular Goitre	33 (64.7%)
Surgical Procedure	Hemithyroidectomy	13 (25.5%)
	Total Thyroidectomy	38 (74.5%)

Of these 51 patients, 10% were younger, and 90% were above 41. It was also further seen that only 2% were men, and the remaining 98% were women. The surgery was done for multi-nodular goitre in about 65% of the patients. The most common procedure, about 75%, was total thyroidectomy [Table 1].

**Table 2: Access to key structures during surgery**

Structure	Easy	Difficult
Middle Thyroid Vessels	51 (100%)	-
Superior Thyroid Pedicle	50 (98%)	1 (2%)
Inferior Thyroid Pedicle	51 (100%)	-
Recurrent Laryngeal Nerve	48 (94.1%)	3 (5.9%)
Parathyroid Gland	50 (98%)	1 (2%)
Isthmus	50 (98%)	1 (2%)

The accessibility to key structures during surgery found that important structures like Middle thyroid vessels 51 (100%), Superior thyroid pedicle 50 (98%), Isthmus 50 (98%), Parathyroid gland 50 (98%) and Recurrent Laryngeal nerve 48 (94.1%) were easily accessible. Among those easily accessible structures, the Middle thyroid vessels and the Inferior thyroid pedicle were 100 % easier. Recurrent Laryngeal nerve was only 3 (5.9%) was difficult during surgery [Table 2].

**Table 3: Clinical outcomes of surgery by the lateral approach**

Characteristic	Mean (SD)
Pain by VAS on POD 1	4.92 ± 0.89
Pain by VAS on POD 2	3.43 ± 0.73
Post-operative day on which drain was removed	3.08 ± 0.78

The Visual Analog Scale assessed post-operative pain with a score ranging from 1 to 10, with 10 being the worst hitting pain. The average pain on a post-operative day 1 was 4.92 ± 0.89, the average pain on post-operative day 2 was 3.43 ± 0.73, and the Average post-operative day on which drain was removed on day 3 was 3.08 ± 0.78 [Table 3].

**Table 4: Association between surgical ease score and complications of surgery**

	Hematoma	Hypocalcaemia	Vocal cord palsy	Wound infection	P-value
Better access and lesser injury	1 (14%)	5 (72%)	0	1 (14%)	0.863
Lesser access and more injury	0	2 (100%)	0	0	

In post-operative complications, the hem atoms and wound infection were 1 (14%) better access and lesser injury. 5 (72%) had better access and lesser injury, and 2 (100%) had lesser access and more injury in hypocalcaemia. There is no significant difference between the surgical ease score and surgery complications, with a p-value of 0.863 [Table 4].

## DISCUSSION

Lateral approach thyroidectomy is also known as the Backdoor approach. In this study, we believe a Lateral approach is a convenient approach that allows more accessible access to the posterolateral surface of the thyroid gland, where vital structures such as the parathyroid gland and superior and recurrent laryngeal nerves were found. Also, we

found it allows easier delivery of large volume goitres without transecting the strap muscles transversely. Furthermore, since access was the easier time needed for surgery was lesser. Our study found better access to superior thyroid pedicle and other vital structures because intraoperative injury to vessels, nerves and the parathyroid gland was less. Hypocalcaemia following thyroidectomy is common and often transient, probably because of

unintentional iatrogenic damage to vessels supplying the parathyroid gland or accidental removal of glands. However, sometimes permanent hypoparathyroidism may result. Dissanayake et al. reported that hemithyroidectomies were conducted on 28 (87.5%) of the 36 individuals he evaluated who had undergone a Lateral approach to the thyroid LATT. Three (9.4%) patients required bilateral explorations, while four (12.5%) patients undergoing complete thyroidectomies for malignant follicular tumours required lateral approaches. There were no problems such as hematoma or post-operative stridor. However, four patients (12.5%) experienced transient clinical hypocalcemia, and one (3%) suffered transitory hoarseness of voice. The findings indicate that the lateral approach to the thyroid is a viable option for doing explorative thyroid surgery without compromising patient safety.<sup>[6]</sup> According to the study by Singaporewalla et al., there was no statistically significant variation in any of the demographics, surgical time, gland volume, or incision size variables. It was shown that patients in the LA group experienced much less pain after surgery. Five patients (11% of the total) in the MA group and one (2.2%) in the LA group required horizontal transection of strap muscles to remove significant goitres. In both groups, there were no serious adverse effects. The outcomes show that the LA approach is just as effective as the midline technique, with a shorter operation duration and similar or even lower pain levels.<sup>[7]</sup> El-Erian et al. found that recurrent laryngeal nerve (RLN) was detected in 93% of patients, whereas the external branch of the superior laryngeal nerve (EBSLN) was detected in 30%. Post-operative discomfort was well tolerated; the average quantity of drainage was 78 cc and lasted two days, and the average intraoperative bleeding was 70 cc. A 2% permanent rate of unilateral RLN damage, a 1% transient rate of EBSLN injury, and a 2% transient rate of hypoparathyroidism were observed. No one showed any symptoms of sympathetic nerve damage. Results show that a lateral (Carotid triangle) approach is superior for controlling the superior thyroid vascular pedicle, letting surgeons avoid turning strap muscles or performing unnecessary, taxing retraction, which can negatively affect post-thyroidectomy voice and swallowing function.<sup>[8]</sup> According to the study by Phookan et al., no intraoperative difficulties were found, and the superior belly of the omohyoid did not need to be sacrificed or the strap muscles severed. One patient had a change in voice that was helped by steroid treatment. After complete thyroidectomy, tetany occurred in one patient and was treated with calcium. The results show that the lateral approach to the thyroidectomy is a rapid and safe procedure that allows for the detection and preservation of essential structures and the simple discharge of the superior pole of the thyroid.<sup>[9]</sup> DeBiase et al. studied only 35 individuals out of 192 who were treated using a lateral approach. No major intraoperative

blood loss necessitated transfusion among any of the patients. One individual had a hematoma after surgery that needed to be surgically repaired. Vocal cord weakening affected 8.0% of individuals overall, with fewer than 1/3 experiencing noticeable symptoms. The number of weak vocal cords cases was low in both methods (3/23 in the lateral approach and 8/114 in the standard procedure), but this difference did not reach statistical significance. The results indicate that the lateral approach decreases the chances of blood loss and nerve injury by providing better access to the laryngeal nerves and the great vessels.<sup>[10]</sup> In a study by Phookan et al., 49 instances were classified as colloid goitres, 24 as multinodular goitres, nine as group 4 follicular neoplasms, four as papillary thyroid carcinomas, two as group 3 follicular neoplasms, and three as group 2 follicular neoplasms. According to the findings, there were fewer problems and better outcomes with the lateral approach thyroidectomy compared to the other method. All of the crucial structures around the thyroid may be preserved by following a single system's lead (the omohyoid's superior belly).<sup>[11]</sup> Rahman et al. reported the nodular goitres accounted for 91.30 % of the 138 benign thyroid lesions, followed by follicular adenomas (5.79%) and toxic MNG (2.89%). Papillary carcinoma comprised 93.75% of the 80 instances of thyroid cancer, follicular carcinoma for 2.57%, and medullary carcinoma for 3.75%. Metastasis to lymph nodes in the neck was detected in 28 people with thyroid cancer. The findings indicate that the lateral technique to the thyroid is a viable option for explorative thyroid surgery. Traditional thyroidectomy and parathyroid investigations have a choice in the lateral approach to the thyroid.<sup>[12]</sup> According to the study by Mohamed et al., fifty people were split into two groups based on whether they had undergone a second thyroidectomy for benign or malignant thyroid disease. Eighty percent of people (40 patients) had whole thyroidectomy surgery, 18% had hemithyroidectomy and just two near total thyroidectomy surgery. The results indicate that the lateral backdoor method is a safe, less traumatic technical method that can aid in controlling the superior thyroid vascular pedicle and preventing the aggressive rough treatment of strap muscles through either cutting or elevated retraction and robust gland manipulation.<sup>[13]</sup> Based on Kim's study, minimally invasive thyroidectomy (MIT) procedures take much less time on average than conventional open thyroidectomy (COT). In contrast, the COT group had a longer average hospital stay than the MIT group. Following surgery, patients in the MIT group required much fewer painkillers than those in the COT group. The findings indicate that MIT can be technically accomplished in DTC patients. Good clinical outcomes and excellent aesthetic results make MIT a desirable alternative operating approach to COT.<sup>[14]</sup> In our study, the need for the transaction of strap muscles was low due to poor

access to vital structures. However, the strap muscles are important in pitch control of voice and swallowing function. Hence the unwanted division of strap muscles as in the conventional midline approach can be avoided in the Lateral approach.

## CONCLUSION

This study shows that lateral backdoor approach thyroidectomy is as safe and easy as conventional midline approach even for large goitres. In addition, the lateral approach has better access to all the vital structures, and the need for division of strap muscles was low, hence less post-operative pain. Therefore, the lateral approach technique can be followed for all conventional open surgeries.

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