



## The Lateral “Backdoor” Approach to Open Thyroid Surgery: A Comparative Study

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### Abstract

**Introduction:** The traditionally taught technique for conventional open thyroidectomy is via a midline splitting of the strap muscles following a skin crease neck incision – midline approach (ma). The lateral “backdoor” approach (la) uses the same central neck incision but approaches the thyroid gland between the anterior border of sternocleidomastoid (scm) and strap muscles. This technique is usually reserved for re-do thyroid surgery. We compared the results of the two approaches in patients undergoing conventional thyroidectomy for the first time.

**Methods:** A case-control study was performed on 90 patients undergoing conventional open thyroidectomy from 2012 to 2014. The first 45 patients underwent ma and subsequent 45 patients underwent la. All patients were given 10 ml of 1% marcaine infiltration in to the neck incision before closure. Basic demographic data, operative time, incision length, weight of gland, need for transection of strap muscles and complications were recorded. Revision thyroid surgery and minimally invasive thyroid operations were excluded.

**Results:** The demographics, operative timing, gland weight and incisional length showed no significant difference. Post-Operative pain was significantly lower in the la group. Patients (5), (11%) in ma group needed horizontal transection of strap muscles to extract large goitres compared to 1 patient (2.2%) in the la group. no major complications occurred in either group.

**Conclusion:** The la method is as safe as the midline technique with comparable operative time and significantly lower pain scores. It avoids midline separation and suturing of strap muscles and reduces the need for strap muscle transection to removal large goitres.

**Keywords:** Lateral approach; Backdoor; Open thyroidectomy; Sternomastoid

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### Introduction

Thyroidectomy is the commonest endocrine surgical procedure. The traditionally taught technique for conventional thyroidectomy is via midline splitting of strap muscles (midline approach-ma) [1]. Lateral approach (la) uses the same central neck incision but approaches thyroid gland posterolaterally between the anterior border of sternocleidomastoid (scm) and strap muscles. It is also known as the sternomastoid or ‘backdoor’ or lateral approach (la) to the thyroid gland [2-4]. The critical structures that require identification and preservation in thyroid gland surgery such as parathyroid glands and recurrent laryngeal nerves are poster laterally located in relation to the thyroid lobe. La allows an easier access in delivering the thyroid gland into surgical field for easier identification of these critical structures with minimum retraction and pulling of strap muscles [2] this technique is usually reserved for re-do thyroid surgery performed previously using them due to extensive scarring and adhesions after midline division and suturing back of strap muscles [3]. The trans-axillary endoscopic and robotic thyroidectomy approaches also use the same lateral approach to reach and dissect the thyroid gland [5-9]. There have been a few publications studying the efficacy of the lateral approach and most authors conclude that a lateral approach offers excellent visualization of the vital structures [4].

### Methods

We conducted a case control study comparing 90 patients undergoing conventional open thyroidectomy from 1<sup>st</sup> January 2011 to 31<sup>st</sup> December 2012 after obtaining institutional review board approval. The first 45 patients underwent ma and next 45 underwent la. Re-operative thyroid surgery and minimally invasive endoscopic surgeries were excluded. basic demographic data, type of surgery done in the 2 groups, operative time, incision length, complications, thyroid gland weight,

**Table 1:** Comparison of basic demographic data and results between MA and LA group.

	MA group (N=45)	LA group (N=45)	P value
Age – year	47 ± 13	49 ± 12	0.207
Female: Male ratio	35:10	34:11	0.803
Types of Operation			0.837
- Hemithyroidectomy	18 (40%)	18 (40%)	
- Total Thyroidectomy	18 (40%)	20 (44.4%)	
- Total thyroidectomy and lymph node dissection	9 (20%)	7 (15.6%)	
Thyroid gland weight – gram	65.7 ± 28.6	64.8 ± 29.7	0.445
Operating time – minutes	137 ± 34.1	124 ± 20.2	0.984
Incision length - centimeters	4.9 ± 1.1	5.2 ± 0.8	0.071
Transaction of strap muscles –(No of patients)	5	1	0.09
Pain score post-operative day 1 (1-10)	1.86 ± 0.72	0.82 ± 0.72	0.02

the need to divide strap muscles and post-operative day 1 pain score were recorded and compared between these 2 groups. The pain score was measured using the visual analogue score (vas) on a scale of 0-10 by the ward nurses and recorded in the case sheets. Data was analyzed using t-test and chi-square test.

### Operative technique

In la technique, the same 4-6 cm skin crease neck incision was used but instead of midline separation and retraction of strap muscles. The anterior border of s cm was identified and mobilized laterally. The superior belly of omohyoid that crosses the field was retracted cranially. The lateral edge of strap muscles was identified and retracted medially to expose the underlying goitre. The ansa cervicalis is identified coursing downwards anterior to the sternohyoid muscle and retracted medially with the sterno hypoid and sterno thyroid muscles to expose the anterior surface of the thyroid lobe. The plane between anterior surface of goitre and overlying strap muscles was created as the strap muscles get pushed medially with retractors. Next the carotid artery was identified and the a vascular plane postero lateral to thyroid gland was opened to deliver the superior pole of thyroid and allow it to be retracted downwards and outwards to free it from larynx. The superior vascular pedicle could be easily identified in this technique allowing individual ligation of vessels and preservation of external laryngeal nerve. once the middle thyroid vein was identified (if present) and ligated, the rest of thyroid lobe can be easily dissected and retracted medially for easier identification of recurrent laryngeal nerve and parathyroid glands. The inferior thyroid veins were then ligated and divided and the thyroid lobe was freed from its attachment to the ligament of berry and underlying trachea rings. For hemi thyroidectomy, the isthmus was then transected to complete the operation. For patients undergoing total thyroidectomy, similar dissection of the opposite lobe was performed after identifying and retracting the opposite scm. Once both the thyroid lobes were fully dissected and freed from the overlying strap muscles, the smaller of the lobes could be easily pushed beneath strap muscles to the opposite site and the entire specimen was removed en-bloc for histology. At the end of operation, the midline strap muscles cover over the trachea remained intact preventing adherence of skin flap to the tracheal cartilage. There was no need for closure or suturing of strap muscles and the gap between lateral border of strap muscles and anterior border of scm was always left open to prevent any life-threatening hematoma from accumulating underneath the strap muscles. All total

thyroidectomy specimens were removed intact in the la group.

### Results

There was no significant difference in patient's demographics, type of thyroid surgery in each group and thyroid gland weight (Table 1). The mean operative time for ma group (137 +/- 34.1 minutes) was slightly longer than la group (124 +/- 20.2 minutes) but not statistically significant. The mean incision length for both groups (4.9 +/- 1.1 cm vs. 5.2 +/- 0.8 cm) showed no significant difference. 5 (11%) patients in ma group needed division of strap muscles to extract large goitres compared to only one patient (2.2%) in la group. post-operative day 1 pain scores were significantly lower in la group (0.82 +/- 0.72 vs 1.86 +/- 0.72; p = 0.02) compared to ma group (Table 1). no major complications occurred in either group such as significant post-operative haematoma or nerve injury causing voice change.

### Discussion

The la technique ('backdoor approach') to thyroid surgery is an established method for re-exploration of thyroid gland and exploration of parathyroid lesions [2-4]. We believe this approach allows easier access to the postero-lateral surface of the thyroid gland where the critical structures such as parathyroid glands and the nerves are located. It also allows easier delivery of large volume goitres without the need for transecting the strap muscles horizontally. This technique is routinely used in all transaxillary endoscopic and robotic thyroidectomy [5-8]. There is no significant difference in operative time or length of skin incision in this technique compare to the traditional technique (ma) where midline division of the straps muscles and resuturing after completion of surgery is employed. We therefore feel it could be routinely used for all patients undergoing conventional thyroid surgery for the first time.

A similar lateral, albeit endoscopic approach finds mention in the technique described by henry and sabag in 2006 [9]. The principles of approach to the thyroid lobe remains the same even when endoscopic techniques are applied. Extensive experience with this approach in endoscopic thyroidectomy has also been described by palazzo et al. [10]. The proponents of endoscopic approach generally agree that this approach is best suited for unilateral lesions and this "back door" approach gives good exposure of the poster lateral aspect of the thyroid gland without the need for dissecting and transecting the strap muscles horizontally. In general, all alternate incision site

thyroidectomy use this lateral approach purely or a combination of lateral and midline approach as in the bilateral axillo-breast approach (baba) technique except for the transoral endoscopic technique which use the midline approach in view of anatomical ease of performance [11]. A lateral approach of video assisted thyroidectomy has also been described by ishikawa et al. [12] which uses this backdoor technique compared to the traditional midline strap muscle separation described by micoli et al. [13] in minimally invasive video-assisted thyroidectomy (mivat).

In the past, due to the use of operations such as partial or subtotal thyroidectomy, patients often had recurrent goitre on the same side necessitating the use of la ('backdoor technique') to reach the previously operated site and avoid the dense midline adhesions. However, most established thyroid or head neck surgeons would now perform a lobectomy or hemithyroidectomy for any unilateral thyroid pathology that does not need a total thyroidectomy. Therefore, the need to perform a revision thyroid surgery on the same side is becoming less frequent as no remnant of the thyroid gland is usually left behind. Hence the la is an ideal technique even for patients who are undergoing unilateral or bilateral thyroid operation for the first time. It does not increase the complexity of the surgery and most surgeons performing thyroid operations are well versed with the anatomy of neck muscles. Moreover the critical structures are more easily identified. Even large bilateral goitres can be easily removed intact by separating the anterior surface of goiter from overlying strap muscles. This route of access to the lateral neck has also been described recently for lymph node clearance in thyroid cancer. Yan et al. [14] have described level ii, iii and IV clearance both during gasless and gas insufflation techniques of minimal access thyroidectomy for early cancers.

In our study, there is a lower incidence of strap muscles transection for la group but it does not reach statistical significance possibly due to a small number of patients. The strap muscles play an important role in voice pitch control and swallowing function and hence unnecessary midline division and suturing back of this muscle as done in traditional ma can be avoided using la [15]. Kim in his study mentioned that handling of strap muscles and reconstitution or even excessive retraction may affect voice quality and swallowing function post-thyroidectomy [16]. The excessive retraction of strap muscles laterally in main order to perform dissection postero-laterally along the thyroid lobe could also be the possible reason for increased pain score in these patients when delivering large glands. In our study, post-operative pain score was significantly lower in the la group. The transection of the strap muscles and their re-approximation is associated with the greater post-operative pain and contributed to the higher pain scores in the ma group. This is exactly the reason why we advocate the la approach especially for larger goitres due to the ease of approach to the superior pedicle and ability to retract and view the critical poster lateral structures during thyroidectomy. The la approach does reduce the incidence for transecting the strap muscles, hence may inherently have lower pain scores.

Another significant advantage of la approach is the gap left between anterior border of scm and lateral end of strap muscles after resection of thyroid gland. This gap is always left open (on both sides if a total thyroidectomy is performed) and acts as a safety valve in the event patient has a significant post-operative bleeding. The blood can easily flow through the gap superficially under the skin flap thereby preventing significant trachea compression, laryngeal edema and

stridor. In the ma approach, the midline re-approximation of the strap muscles and the lack of space between the sternomastoid and lateral edge of the strap muscles may allow a life-threatening hematoma beneath the strap muscles should there be a significant post-operative bleed. The authors acknowledge one of the limitations of this study is that it is a case control comparative study. A randomised control trial between the ma and la group would have provided stronger evidence. In conclusion, this study shows that the la ('backdoor') technique is as safe as conventional ma even for initial thyroid surgery. It reduces the need to transect the strap muscles horizontally for delivery of large goitres and has significantly lower pain scores compared to the traditional midline approach. It is now the authors' technique of choice for all conventional open thyroid surgery.

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