Original Article

Lateral backdoor approach versus conventional anterior approach in recurrent Thyroid surgery

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ABSTRACT

Background: Recurrent thyroid surgery has a greater risk of complications due to excessive fibroses and increased tissue fragility from the preceding operation. Numerous surgical practices and approaches have been endorsed to reduce the complications accompanied with recurrent thyroid surgery. Objective: A combined prospective and retrospective study to assess the complication rate of individuals undergoing a thyroid surgery for the second time by applying a lateral backdoor methodology in comparison with a primary intervention. Patients and Methods: The results of 50 subjects underwent recurrent thyroid operation for benign or malignant thyroid disease (Groups I and Group II) were compared. The operations were done by means of a classical midline and lateral method. Admission was attained amongst the anterior border of the strap muscles and the sternocleidomastoid muscle. In 1ry operation, the thyroid was entered. Results: The average age of group I was 49.9±14.1 years, while in group II, it was 45±12.6 years, and ranged from 22-65 years; p=0.69. In the present study 90.9% (n=43) of the population in group I were females, while in group II it reached 75% (n=33), p=0.87. 25% of patients in group I and 7 (15.9%) of patients in group II were subjected to surgical interference owing to the occurrence of a malignancy (p=0.29). Bilateral interference was performed in 26 (59.1%) individuals in Group I, whereas, in Group II it reached 28 (63.6%) subjects. Conclusion: The lateral backdoor approach is a safe less traumatizing technical approach help to control the superior thyroid vascular pedicle and avoid aggressive rough handling of strap muscles by both cutting or excessive retraction and vigorous gland manipulation.

Keywords: Recurrent thyroidectomy, lateral backdoor approach, anterior approach

Introduction

Recurrent or secondary thyroid operation is generally infrequent, in contrast to primary thyroid operation. On the other hand, operation for the second time has a high risk of impediments owing to the development of scar tissue in addition to augmented breakability of the tissues after the 1st surgical interference. Many sectional methods and schemes have been endorsed to diminish the rate of difficulty accompanied with operation for the 2nd time.

Many surgical techniques and strategies have been suggested to lower the rate of complications after 2nd operation [1].

One of these methods for thyroidectomy is the lateral approach, which permits entrance to the postero-lateral area with a low rate of adhesion in comparison with incisions through a midline approach, which has been concomitant with formation of higher incidences of adhesions and scar tissues post-operation [2].

Lateral (backdoor) approach to the thyroid bed has been previously described for para-thyroidectomy, recurrent thyroidectomy, and hemi-thyroidectomy for solitary thyroid nodule [3, 4].

On revising the anatomy of the front and lateral parts of the neck, we see that the superior pole of the thyroid is medially applied to the inferior pharyngeal constrictor on which the

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superior thyroid vessels are running antero-medially parallel the EBSLN in their way to the superior thyroid pole and crico-thyroid muscle respectively, and such landmark muscle (inferior pharyngeal constrictor) constitute a part of the floor of the carotid triangle [5].

So, we assumed that by the lateral approach through the anatomical window between the upper part of sternocleidomastoid and superior belly of omohyoid that requires only opening of a fascia (investing layer of deep cervical fascia) we can manage the superior thyroid vessels, the middle thyroid vein, and easily start the lateral part of dissection of the thyroid lobe, therefore facilitating its mobilization and easy delivery from underneath the taut strap muscles to the midline wound without their division or even excessive retraction.

The risk of problems is normally higher in secondary surgical interference in contrast to primary surgical operations [6]. In secondary surgery, searching for the nerve within this area may have risks, due to the formation of dense scar tissue. Also, in the presence of non-RLN, the lateral approach may be risky because the nerve courses perpendicularly to its normal course in secondary cases [7].

Patients and Methods

From August 2016 to August 2018, a prospective and retrospective study of 50 consecutive patients who had previously undergone thyroid surgery for benign or malignant thyroid disease and then underwent a secondary surgical intervention at General Surgery Department, Al-Azhar university Hospitals was performed by a single team of surgery. There were 40 women and 10 men (4:1). In this study, the mean age of the patients was 40 years (range of 25-60 years), 32 patients (72%) were euthyroid, and 8 (26%) had controlled toxic goiter.

The pathology was multi-nodular in 42 patients (82%) and confined to one lobe in 28 (8 adenomas and 20 huge solitary thyroid nodule) and the final histo-pathology was colloid nodular goiter in 40 patients (80%), follicular adenoma in 8 (18%), and Graves 'disease (diffuse toxic goiter) in 2 (6%).

Most of our patients (40 patients; 80%) were operated upon by total thyroidectomy, 8 (18%) were operated by hemi-thyroidectomy, and only 2 were operated by near total thyroidectomy.

Parathyroid glands were identified and preserved in all patients.

Pre-operative Evaluation:

1. **Ultrasonography (US):** is the imaging technique of choice for a thyroid mass and allows precise distinction between the common thyroid pathologies.
2. **Fine needle aspiration cytology:** for Focal thyroid masses or suspicious lymph-adenopathy.
3. **Thyroid function tests:** For all patients with thyroid complaints should be done.
4. **CT scans:** are helpful in selected cases, especially with a MNG with a suspected retrosternal component.
5. **Thyroid uptake scans:** not routinely done, but may be requested in cases of thyroid enlargement with thyrotoxicosis.
6. **Laryngoscopy:** It is medico-legally prudent to document vocal cord function prior to thyroid surgery.

Pre-operative consent.

Surgical Technique:

Anesthesia and positioning:

Under general endo-tracheal anesthesia the patient is supine position with gentle neck extension and arms stuck to patient`s both sides with perfect alignment of the head and body for suitable placement of the incision and adequate anatomical exposure.

Incision:

A low collar incision along the langer's lines, its length is adequate for anatomical exposure to facilitate surgical approach. The incision then is cut through subcutaneous fat and platysma muscle, and after developing the sub-platysmal plane we raise the upper sub-platysmal flap till the thyroid notch and the lower flap till the suprasternal notch with exposure of the two anterior jugular veins which symmetrically flank the linea alba. Then we dissect laterally in the sub-platysmal plane till exposing the anterior border of sternocleidomastoid muscle along the whole of its length on both sides.

Approach:

A. Midline Approach:

The investing cervical fascia is cut at the linea alba from the thyroid notch to the sternal notch to separate the strap muscles apart, then we start at the side of the larger lobe by opening the delicate pre-tracheal fascia and dissecting the strap muscles, and free off the thyroid capsule.

B. Lateral Backdoor (Carotid Triangle) Approach:

In the carotid triangle (anatomical window between the upper third of sternocleidomastoid laterally, the superior belly of omohyoid medially and posterior belly of digastric muscle superiorly) we approach the superior thyroid vascular pedicle and the middle thyroid vein where the investing layer of the deep cervical fascia is incised along the anterior border of sterno-mastoid muscle, and by gentle lateral retraction of sterno-mastoid and the superior belly of omohyoid muscle together with the paired sterno-hyoid and sterno-thyroid muscles medially the superior pole of the thyroid which is medially applied to the inferior pharyngeal constrictor and the thyroid cartilage became exposed [8].

The superior thyroid vessels became clearly exposed and separated from EBSLN that may or may not be visualized at this step.

Lateral backdoor for recurrent thyroid single lobe and to lobes

The superior thyroid vessels are now to be individually ligated and divided along the anterior aspect of the superior pole. With the superior pole now free of fascial attachment it is grasped by an artery forceps and retracted medially, turning the larynx and exposing the tracheo-oesophageal groove. Middle thyroid veins are ligated and divided, and the inferior thyroid veins are approached by the midline where they are ligated and divided [9], as Photo 1.

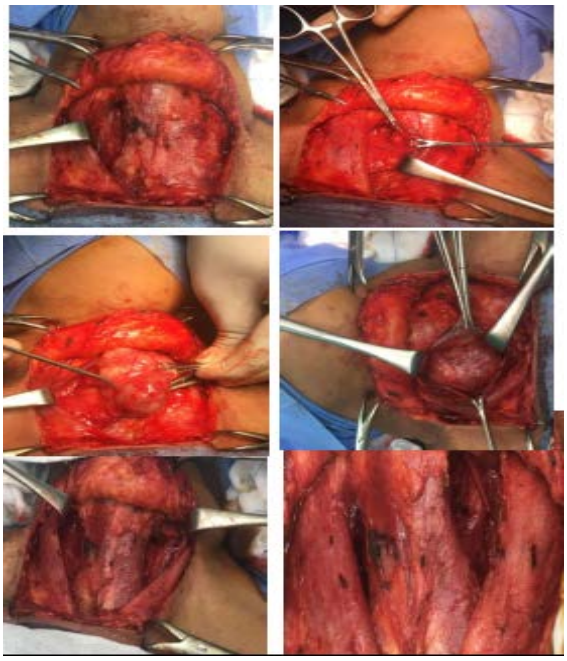

Photo 1

Post-operative Complications

1. RLN injury: the nerve is anatomically intact in approximately 90% of RLN injuries and a visible injury is detected in 7% to 15% of cases [10].

RLN injuries were shown to be caused by traction injury in 71%, thermal injury in 17%, compression injury in 4.2%, clamping injury in 4.2%, ligation injury in 1.6%, and nerve section in 1.4% of the cases [11].

Common causes of RLN injuries	Ratio
Traction injury	71%
Thermal injury	17%
Compression injury	4.8%
Clamping injury	4.2%
Ligation injury	1.6%
Nerve section	1.4%

2. Superior Laryngeal nerve injury.
3. Hypoparathyroidism.
4. Neck parasthesia.

Results

The ages of patients were averaged 45 years, ranged from 25-60 years), they included 43 females and 6 males (4.3:1). 45 patients (90%) were euthyroid, 5 (10%) were controlled toxic goiter.

The pathology was multi-nodular in 42 patients (82%) and confined to one lobe in 28 (8 adenomas and 20 huge solitary thyroid nodule) and the final histo-pathology was colloid nodular goiter in 40 patients (80%), follicular adenoma in 8 (18%), Graves 'disease (Diffuse toxic goiter) in 2 (6%).

Parathyroid glands were identified and preserved in all patients (Table 2).

The mean amount of intra-operative blood loss was 70ml (range; 45-140ml). The mean operative time was 90 minutes (range; 60-140 minutes).

The mean amount of post-operative drainage was 78ml (range; 40-160ml) with a mean duration of 2 days, ranged from 1to 4 days. The average hospital was reached 3 days, ranged from 2 to 6 days).

The intra-operative and post-operative data evaluating this surgical approach are presented in (Table 3). There was no technique related intra-operative morbidity and our evolving approach has succeeded in all study cases with no conversion to strap muscle cutting or sacrificing of superior belly of omohyoid to improve exposure has occurred.

Table 1: Common causes of RLN injuries

Table 2: Demographic data and complications

Demographic data			Group A n=25	Group B n=25	p
Age (mean+SD, years)			49.9+14.1	44.9+12.6	0.069
Gender, female/male ratio			20/4	23/2	0.087
Complications	operative	Intra-operative blood loss	70 ml (45-140 ml)	120 ml (70-140 ml)	0.009
		Parathyroid glands injury	None		
		External laryngeal nerve injury	None		
	Post-operative	Vocal cord paralysis – Transient	3 (4.2)	5 (6.9)	0.719
		Vocal cord paralysis – Permanent	2 (2.8)	0	0.245
		Hypocalcemia	15 (34.1)	10 (22.7)	0.345
		Hypoparathyroidism	4.5%	2.4%	0.016
		Hematoma & seroma formation	0	0	0
		Post-operative pain	Well tolerated	Well tolerated	

Mean operative time	90 minutes(range; 60-140 minutes)	40 minutes (range; 30-60 minutes)	0.009
Mean amount of post-operative drainage	50 ml (range; 40-60 ml)	50 ml (range; 40-60 ml)	0.009
Mean hospital stay	3 days (range; 2-6 days)	2 days (range; 24 h-4 days).	0.016
Final Histopathology	▪ (Follicular Adenoma) 8 (8%). ▪ Grave's 7 (7%). ▪ Colloid nodular goiter 85 (85%).		

Table 3: Assessment of Procedure in study group A

Intra-operative Data		Post-operative data		
Conversion to strap muscle cutting	None	Hematoma & seroma formation		None
Recurrent Laryngeal nerve identification	93 (93%)	Post-operative drainage.	amount (ml)	50ml (40-60ml)
			duration (days)	2 days (1-4 days)
Superior Laryngeal nerve identification	30 (30%)	Recurrent Laryngeal nerve injuries		2 (2%) (unilateral)
Parathyroid identification and preservation	100 (100%)	Superior Laryngeal nerve		1 (1%) (Transient)
Bilaterality of the procedure	18 (70%)	Hypoparathyroidism		None
		Swallowing difficulty		18 (18%)

Discussion

Lateral backdoor approach will facilitate the identification of the inferior pharyngeal constrictor muscle and crico-thyroid space.

Strap muscles cutting and reconstitution lead to fibrosis with laryngo-tracheal fixation that impairs vertical mobility together with strap muscles temporary mal-function with the resulting deleterious effect on voice and swallowing functions [12].

Strap muscle cutting is now considered as one of the causes of post-thyroidectomy voice changes other than laryngeal nerve injury [13].

Some authors advocate that the most important aim of strap muscles cutting is to facilitate exposure of the crico-thyroid space, which is important in identifying and safe-guarding of the EBSLN, because the latero-caudal traction of the superior pole is limited by proximity of the insertion of sterno-thyroid muscle [14].

Cernea and associates have put a widely accepted classification system for the relationship of Superior Laryngeal Nerve (EBSLN) external branch to the superior thyroid vessels; this classification greatly helps to avoid injury of EBSLN during ligation of the superior thyroid vessels [15].

Strap muscles cutting and reconstitution lead to fibrosis with laryngo-tracheal fixation that impairs vertical mobility together with strap muscles temporary mal-function with the resulting deleterious effect on voice and swallowing functions [15].

Some surgeons declare that they rarely resort to strap muscles cutting during thyroidectomy, but this is most likely on the expense of excessive strap muscles retraction besides having the same deleterious effects of muscle cutting based on some authors in terms of denervation and fibrosis [16].

Developing our procedural technique depends on a through working knowledge of the anatomy of the lateral and anterior neck regions and the pathological anatomy of the enlarged thyroid gland [17].

The only potential risk of this approach is the risk of injury of the sympathetic chain which was safeguarded by careful handling of the carotid sheath with the avoidance of its excessive retraction or dissection behind it.

In this study, intra-operative data confirm that lateral backdoor approach was successful in 100% of our study cases with no conversion to strap muscles cutting or scarification of the superior belly of omohyoid as in classical midline approach it gives adequate exposure of the field in terms of clear identification of vital anatomical landmarks laryngeal nerves, superior thyroid vessels and parathyroid glands with minimal blood loss and consuming a reasonable operative time.

Conclusion

Based on the results we suggest that the use of lateral approach to control the superior thyroid vascular pedicle enables us to avoid aggressive surgical handling of strap muscles by either cutting or excessive exhausting retraction or vigorous gland manipulation with the possible morbid sequelae in terms of voice and swallowing functions. It is a quick technical approach that facilitates surgery without compromising safety. It is bloodless and less traumatizing as it uses fibrous sheathes (cervical fasciae) with respect of their contents.

References

1. Freeman JL. Kim DS, Alzahran MA, Randolph GW. Reoperative thyroid surgery. In: Randolph GW, editor. Surgery of the Thyroid and Parathyroid Glands. 2ed. Philadelphia: Elsevier Saunders; 2013. p. 499–510.
2. Uludag M, Yetkin G, Citgez B, Isgor A, Atay M, Kebudi A, et al. Con-tribution of gamma probe-guided surgery to

lateral approach completion thyroidectomy. EndocrPract 2009; 15:213–9.

3. Pinchot s., Chen H. and Sipple R.: Incisions and Operative Exposure of the Neck for Thyroidectomy and Parathyriodectomy in Operative Techniques in General Surgery (3rd ed.), New York, ELSVEIR INC., Vol. 10, No. 2, pp. 73-6.
4. Bonjer H.J. and Bruining H.A.: Technique of parathyroidectomy. Text Book of Endocrine Surgery (2 nd ed.), Philadilphea, Elsevier Inc., Chapter 47: pp. 439-47, 2005.
5. Godballe C, Madsen AR, Sorensen CH, Schytte S, Trolle W, Hel-weg-Larsen J, et al. Risk factors for recurrent nerve palsy after thyroid surgery: a national study of patients treated at Danish departments of ENT Head and Neck Surgery. Eur Arch Otorhino-laryngol 2014; 271: 2267–76.
6. Hardman JC, Smith JA, Nankivell P, Sharma N, Watkinson JC. Re-operative thyroid surgery: a 20-year prospective cohort study at a tertiary referral centre. Eur Arch Otorhinolaryngol 2015; 272: 1503–8.
7. Kandil E, Singer M, Deniwar A, Randolph GW. Surgical Approaches to the Recurrent Laryngeal Nerve. In: Randolph GW, editors. The Recurrent and Superior Laryngeal Nerve. Switzerland: Springer; 2016. p. 139–44.
8. Uludag M, Yetkin G, Citgez B, Isgor A, Atay M, Kebudi A, et al. Contribution of gamma probe-guided surgery to lateral approach completion thyroidectomy. EndocrPract 2009; 15: 213–9.
9. Attie JN, KRA. Preservation of parathyroid glands during to tal thyroidectomy. Improved technic utilizing microsurgery. Am J Surg 1975; 130: 399–404.
10. Dionigi G, Wu CW, Kim HY, Rausei S, Boni L, Chiang FY. Severity of recurrent laryngeal nerve injuries in thyroid surgery. World J Surg 2016; 40: 1373–81.
11. Henry A., Leonard M., Solomon N.P., Howard R., Gurevich-Uvena J., et al.: The functional impact on voice of sternothyroid muscle division during thy-roidectomy. Ann. Surg. Oncol., 15: 2027-33, 2008.
12. Kim Y.M.,Cho J.I., Kim C.H., Park J. S., Chio H.S. and HA H.R.: Voice comparison between strap muscle retraction and cutting technique in thyroidectomy. Korean J. Otolaryngol-Head Neck Surg., 43: 985-91, 2000.
13. Bliss R.D., Gauger P.G. And Delbridge L.W.: Surgeon`s approach to the thyroid gland: Surgical anatomy and the importance of technique, 24: 891-7, 2000.
14. Cernea C.R., Ferraz A.R., Nishio S., Dutra A. Jr., Hojaij F.C., Dos Santos L.R., et al.: Surgical anatomy of the external branch of the superior laryngeal nerve. Head Neck, 14: 380-3, 1992.
15. C.P. Lombardi, M. Raffaelli, L. D'alatri, et al.: "Voice and swallowing changes after thyroidectomy in patients without inferior laryngeal nerve injuries," Surgery, Vol. 140, No. 6, pp. 1026-34, 2006.
16. Pereira J.A., Girvent M., Sanccho J.J., Prada C. And Sitges-Serra A.: Prevelance of long-term upper aero-digestive symptoms after uncomplicated bi-lateral thyroidectomy. Surgery, 133: 318-22, 2003.
17. Lennquist S., Cahlin C., Smeds S.: The superior laryngeal nerve in thyroid surgery. Surgery, 102: 999, 1987.