ORIGINAL ARTICLE

Comparative Study Between Backdoor and Conventional Thyroidectomy in Non-Recurrent Goiter

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Abstract

Background: ***The methodology of thyroidectomy has progressed during the past two hundred years. The preliminary contributions were made by Kocher. In the subsequent years, the technique has proven to be safe and associated with fewer complications.***

Aim: ***To compare conventional and backdoor thyroidectomy in non-recurrent goiter according to time of hospitalization and complications following surgery and early recovery.***

Patients and methods: ***This prospective randomized controlled research has been performed on forty cases with benign goiter who underwent thyroidectomy at the General Surgery Department, ALAZHER UNIVERSITY HOSPITALS between September 2023 and September 2024. The sample size was twenty cases in every group. Group A had a conventional thyroidectomy, and group B had a backdoor thyroidectomy.***

Results: ***The backdoor technique exhibited a significantly extended operation duration vs. the standard method (p-value below 0.001). A statistically insignificant distinction was seen among both groups concerning hospitalization, loss of blood, and monitoring duration (p-value above 0.05). Group A exhibited a statistically significant rise in pain score compared to group B (p-value below 0.001).***

Conclusion: ***The backdoor thyroidectomy approach, although requiring longer operative times, demonstrated several advantages over the conventional approach. It was associated with significantly lower postoperative pain scores, better visualization of the superior laryngeal nerve, and a reduced incidence of swallowing difficulties.***

Keywords: Backdoor Thyroidectomy; Conventional Thyroidectomy; Non-Recurrent Goiter

1. Introduction

The thyroidectomy method has progressed during the past two hundred years. The preliminary contributions were made by Kocher. In the subsequent years, the technique has proven to be safe and associated with fewer complications.[1]

Group B utilizes the same central neck incision but accesses the thyroid gland posterolaterally, situated among the anterior borders of the strap muscles and sternocleidomastoid (SCM). It is referred to as the lateral approach (LA) or sternomastoid to the thyroid.[2]

The essential structures requiring identification and conservation throughout thyroidectomy, such as the recurrent laryngeal nerves and parathyroid glands, are located posterolaterally to the thyroid lobe. The lateral approach facilitates improved access to the operating field for the identification of structures, minimizing pulling and retraction on the strap muscles.[3]

A few studies exist about the efficiency of the lateral approach, with most concluding that the lateral approach provides excellent visualization of these important structures.[4]

The cervical strap muscle division after thyroidectomy is a controversial problem. Certain physicians perform it routinely to achieve sufficient exposure to the surgical field. The cervical strap muscles assist with the regulation of voice pitch and the process of swallowing.[5,6]

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Some researchers advocate that the division of strap muscles results in no problems and recommend its liberal use during surgeries for big, poisonous, or malignant goiters. Strap muscle incision and reconstruction result in fibrosis and laryngotracheal fixation, which hinders vertical motion, with transient dysfunction of the strap muscles, affecting voice and swallowing capabilities.[7]

Respect for the motor function of cervical strap muscles is essential not only due to their role as accessory respiratory muscles but, more significantly, due to their involvement in voice pitch regulation and functions of swallowing.[8]

The aim of this work was to compare between conventional and backdoor thyroidectomy in non-recurrent goiter according to time of hospital stay, postoperative complication, and early recovery.

2. Patients and methods

This prospective randomized control research which has been performed on forty cases with benign goiter who has thyroidectomy at General Surgery Department ALAZHER UNIVERSITY HOSPITALS between September 2023 and September 2024. The sample size consisted of twenty cases per group. Group A received a Conventional Thyroidectomy, while Group B had a Backdoor Thyroidectomy. The research received agreement from the local Ethics Committee.

Inclusion criteria: Toxic multinodular goiter, Simple multinodular goiter , and Solitary thyroid nodule

Exclusion criteria: Recurrent goiters, huge goiters with retrosternal extensions, a History of prior cervical radiation, and restrictions on general anesthesia and operation.

Methods

All cases have been subjected to: History, Examination, and Investigations

Technique of the conventional procedure

The thyroid gland is accessed throughout the operation by hyperextending the neck, utilizing a folded sheet between the shoulder blades, and a foam rubber doughnut-shaped ring for support. The case is positioned in the semi-Fowler posture, and the incision line is crafted to be symmetrical and extend equidistantly from the midline. The subcutaneous tissue and platysma muscle are separated by diathermy, while flaps are elevated inferiorly and superiorly through cautery and blunt dissection. The superior flap is elevated to the thyroid cartilage level, and the dissection continues along the midline raphe. The thyroid lobe is further revealed by mobilizing the strap muscles with a mix of acute and blunt dissection. A Richardson retractor is positioned below the strap muscles, which are then divided to enhance visibility. The thyroid lobe is gently gripped and retracted toward the midline to reveal the middle thyroid vein, which is ligated with either 4-0 or 3-0 Vicryl suture and subsequently separated. This facilitates additional mobilization of lobes and recognition of the parathyroid glands and recurrent laryngeal nerves. The thyroid gland is repositioned and pulled downward, revealing the superior thyroid veins, involving the branches of the superior thyroid artery. The superior laryngeal nerve external branch runs alongside the cricothyroid, positioned medially to the superior thyroid veins. The inferior thyroid veins are identified and ligated upon their entry into the thyroid gland. A venous plexus can be seen at the midline position above the trachea and entering the isthmus. The veins are carefully ligated and severed to prevent damage to the trachea. During surgery, anatomical landmarks like the Tubercle of Zuckerkandl delineate the posterolateral side of the thyroid lobe and may directly lead to the RLN. The right and left recurrent laryngeal nerves closely accompany the inferior thyroid artery, serving as a landmark for their identification. The parathyroid glands located posterior to the thyroid are mobilized and preserved. If a total thyroidectomy is necessary, the procedure proceeds on the opposite side to completely excise the thyroid gland while preserving both the parathyroid glands and the RLN. Closure is executed by reapproximating the strap muscles at the midline, the platysma muscle, and the skin. Drainage is performed in every case.

Backdoor technique (lateral approach technique)

The procedure comprises incisions along skin creases, medial retraction of the strap muscles, and lateral exposure of the strap muscles, therefore revealing the goiter and the anterior surface of the lobe. The avascular plane posterior-lateral to the thyroid is exposed, permitting the superior pole to be separated from the larynx and revealing the avascular space between the lobes and the cricothyroid muscle. The superior laryngeal nerve, which arises from the vagus nerve, descends next to the pharynx and divides into a smaller external branch and a larger internal branch. The EBSLN traverses posterior to the sternothyroid muscle and the superior thyroid artery to innervate the inferior constrictor and cricothyroid muscles. The remaining thyroid lobe is dissected with medial retraction to visualize the RLN and parathyroid glands, while the inferior thyroid veins are ligated. If a hemithyroidectomy is necessary, the thyroid isthmus is severed. During a total thyroidectomy, the contralateral lobe is carefully dissected and liberated from the strap muscles. The smaller lobes are retracted beneath the strap muscles to the opposite side, and the

thyroid is excised en bloc for histopathological examination. Strap muscles may cover tracheal rings to avert skin flap adhesion, while the space between the lateral margin of the strap muscles and the anterior edge of the sternocleidomastoid is left free with a drain to prevent hematoma formation below.

3. Results

A statistically insignificant variance has been observed among both groups according to age and gender (p>0.05).

Table 1. Comparison among group A and B according to baseline

	GROUP A (NUMBER = TWENTY)		GROUP B (NUMBER = TWENTY)		TEST OF SIG.	P-VALUE
	No.	%	No.	%		
GENDER					x2 =	0.490
MALE	7	35.0%	5	25.0%	0.476	
FEMALE	13	65.0%	15	75.0%		
AGE (YEARS)					t =	0.220
(MIN. – MAX.)	32-65		33-66		1.248	
MEAN ± SD.	48.60±9.923		44.75±9.585			

(x2): Chi-square Test, t: Student T-Test, p: p value for comparing among the studied groups

The backdoor strategy exhibited a significantly extended operation duration compared to the standard method (p-value below 0.001). A statistically insignificant distinction has been seen among both groups concerning loss of blood, hospitalization, and monitoring length (p-value above 0.05).

Table 2. Comparative analysis among group A and B according to outcome.

	GROUP A (NUMBER = TWENTY)			GROUP B (NUMBER = TWENTY)			T	P-VALUE
OPERATIVE TIME (MIN)								
MIN – MAX	90	-	118	110	-	140	-6.336	<0.001**
MEAN ± SD	102.75	±	9.21	122.85	±	10.79		
BLOOD LOSS (ML)								
MIN – MAX	24	-	52	25	-	55	-0.347	0.731
MEAN ± SD	36.75	±	9.21	37.85	±	10.79		
HOSPITAL STAY (DAYS)								
MIN – MAX	1	-	3	1	-	3	0.565	0.575
MEAN ± SD	2.05	±	0.605	1.95	±	0.510		
FOLLOW UP PERIOD (MONTHS)								
MIN – MAX	1	-	3	1	-	3	-0.179	0.859
MEAN ± SD	1.80	±	0.834	1.85	±	0.933		

t: Student T-Test, **: p value <0.001 is highly significant

The table indicates that no intraoperative problems have been seen in our investigation. Despite the recurrent laryngeal nerve being detected throughout surgery in every case, it was easily seen and secured using the backdoor technique. Furthermore, the superior laryngeal nerve has been detected in thirteen cases (65%) inside the group B, while it has been detected in just eight cases (40%) in group A (p 0.113). Furthermore, parathyroid glands have been observed in all cases of study.

Table 3. Comparative analysis among group A and B according to operative data

OPERATIVE DATA	GROUPS				TOTAL		X^2	P-VALUE
	Group A (number = twenty)		Group B (number = twenty)					
	N	%	N	%	N	%		
INTRAOPERATIVE COMPLICATIONS	0	0.0%	0	0.0%	0	0.0%	0.00	1.00
RECURRENT LARYNGEAL NERVE IDENTIFICATION	20	100.0%	20	100.0%	40	100.0%	0.00	1.00
SUPERIOR LARYNGEAL NERVE IDENTIFICATION	8	40.0%	13	65.0%	21	52.5%	2.506	0.113
PARATHYROID IDENTIFICATION	20	100.0%	20	100.0%	40	100.0%	0.00	1.00

A statistically significant rise has been observed in pain score in group A than group B (p<0.001) (Table 4).

Table 4. Comparative analysis among group A and B according to Pain score post-operative (VAS)

	GROUP A (NUMBER = TWENTY)			GROUP B (NUMBER = TWENTY)			T	P-VALUE
PAIN SCORE 6H POST-OPERATIVE (VAS)								
MIN – MAX	2	-	5	1	-	3	4.817	<0.001**
MEAN ± SD	3.40	±	1.188	1.85	±	0.813		
PAIN SCORE 12H POST-OPERATIVE (VAS)								
MIN – MAX	2	-	4	1	-	3	6.058	<0.001**
MEAN ± SD	2.95	±	0.759	1.65	±	0.587		
PAIN SCORE 24H POST-OPERATIVE (VAS)								
MIN – MAX	2	-	3	1	-	2	6.462	<0.001**
MEAN ± SD	2.35	±	0.48	1.35	±	0.49		
PAIN SCORE 48H POST-OPERATIVE (VAS)								
MIN – MAX	1	-	3	1	-	2	5.804	
MEAN ± SD	2.05	±	0.510	1.20	±	0.410		

Transient following surgery hypocalcemia occurred in five cases (twenty five percent) in group A and two cases (ten percent) in group B (p-value equal 0.212). Eight cases (40%) in group A encountered swallowing difficulties, compared to two cases (10%) in the other group (p-value equal 0.028). This can be attributed to the being of adherent scar tissue, which has been observed more frequently in the conventional thyroidectomy group. Two cases (ten percent) in group A and one case (five percent) in group B have been complicated by hematoma and handled with surgical exploration. Seroma following surgery occurred in five cases (twenty-five percent) in

group A, but only two cases (ten percent) in the other group had the same complication (p-value equal 0.212). One incidence (five percent) of superficial site infection of surgery has been identified in group A. Furthermore, transient hoarseness of voice has been observed in two cases (10%) in group A, but it occurred in just one instance (5%) in group B (p = 0.548) (Table 5).

Table 5. Comparative analysis among group A and B according to following surgery and follow up data

	GROUPS				TOTAL		X^2	P-VALUE
	Group A (number = twenty)		Group B (number = twenty)					
	N	%	N	%	N	%		
TRANSIENT POST-OPERATIVE HYPOCALCEMIA	5	25.0%	2	10.0%	7	17.5%	1.558	0.212
SWALLOWING DIFFICULTY	8	40.0%	2	10.0%	10	25.0%	4.80	0.028*
HEMATOMA	2	10.0%	1	5.0%	3	7.5%	0.360	0.548
SEROMA	5	25.0%	2	10.0%	7	17.5%	1.558	0.212
WOUND INFECTION	1	5.0%	0	0.0%	1	2.5%	1.026	0.311
VOICE CHANGES DUE TO RLN AFFECTION	2	10.0%	1	5.0%	3	7.5%	0.360	0.548

4. Discussion

The study population exhibited insignificant variations in demographic parameters among both groups, both of which demonstrated a female predominance (sixty-five percent in Group A and seventy-five percent in Group B). The average age was similar among the groups (48.60±9.923 years in Group A compared to 44.75±9.585 years in Group B).

According to our research, El–Sayed YA et al.[9] indicated that the average age of the subjects was 48.34 years for the traditional group and 49.26 years for the backdoor group. No significant difference was seen across both groups concerning that parameter (p = 0.645). Females constituted seventy-five percent and eighty percent of cases in each group, respectively. The gender distribution among both groups wasn't statistically significant (p = 0.739).

Our investigation revealed a significant variation in operational duration, with the backdoor technique necessitating longer durations (122.85±10.79 minutes) than the conventional strategy (102.75±9.21 minutes, p<0.001).

This aligns with the findings of El–Sayed YA et al.[9] who indicated that the surgical duration was significantly extended in group B (124.72 versus 102.06 minutes – p < 0.001).

Significantly, blood loss was similar across the two groups (36.75±9.21 ml vs. 37.85±10.79 ml), indicating that the backdoor technique doesn't elevate the risk of surgical hemorrhage.

DeBiase et al.[10] examined only thirty-five cases from a group of 192 who underwent treatment via a lateral technique. No significant intraoperative hemorrhage required transfusion in any of the cases.

An et al.[11] indicated that there were insignificant variations in intraoperative blood loss among the three approach groups: thirty-one cases had thyroidectomy through the supraclavicular approach, thirteen cases had endoscopic thyroidectomy via the subclavicular approach, and eight cases had endoscopic thyroidectomy through the axillary approach.

One significant discovery was the enhanced visibility and detection of the superior laryngeal nerve with the backdoor technique (sixty-five percent compared to forty percent with the standard route). Although this variance did not attain statistical significance (p=0.113), it indicates a possible benefit of the backdoor strategy in nerve detection. The recurrent laryngeal nerve was correctly recognized in all instances in both groups; however, the backdoor technique provided superior visibility.

El–Sayed YA et al.[9] showed that, while the recognition of RLN and parathyroids didn't show statistical significance among both groups (p-value above 0.05), the superior laryngeal nerve has been discovered more frequently in group B (sixty-five percent versus. thirty-five percent of patients – p = 0.013).

Our investigation revealed significant variations in pain following surgery scores at all time intervals (6, 12, 24, and 48 hours), with the backdoor method consistently yielding lower pain scores (p-value below 0.001). The diminished pain scores in group B may be attributed to minimized muscle dissection and decreased tissue handling.

This aligns with the findings of El-Sayed YA et al.[9] who indicated that the analysis of pain following surgery, as measured by the Visual Analogue Scale score, demonstrated significantly lower values in group B than group A (1.67 versus 3.67 – p = 0.017).

In our research, although pain levels varied, the length of hospitalization was comparable between groups (2.05±0.605 days versus 1.95±0.51 days, p>0.05).

An additional Egyptian investigation carried out by El-Erian et al.[12] found that the average duration of hospitalization was three days for the backdoor technique, with a range of two to six days.

Our study revealed several important findings regarding postoperative complications:

Transient hypocalcemia was more frequent in the conventional group (25% vs. 10%), though not statistically significant.

Kumar et al.[13] investigated to evaluate the

effects of lateral approach thyroidectomy in the management of thyroid edema. Four cases (12.5%) were found to have developed temporary clinical hypocalcemia. The results demonstrate that the lateral approach to the thyroid is a feasible method for doing exploration thyroid operation without compromising the safety of cases .

Additional problems such as hematoma (10% versus 5%), seroma (25% versus 10%), wound infection (5% versus 0%), and temporary voice alterations (10% versus 5%) were often less prevalent in the backdoor group, although they didn't achieve statistical significance.

El–Sayed YA et al.[9] showed that the frequency of wound seroma or hematoma was comparable among both research groups (p = 0.847 and 0.179, correspondingly). Likewise, vocal alterations were significantly less prevalent in cases of group B (ten percent compared to thirty percent in the traditional group – p = 0.037). The frequency of site infections during the operation was identical in both groups, with five percent of cases occurring in each group (p = 1).

The study by Phookan et al.[14] reported no intraoperative complications, and the superior belly of the omohyoid was preserved without the necessity to cut the strap muscles. One case had a voice alteration that improved with steroid therapy.

Several limitations should be considered when interpreting these results. The relatively small sample size might have limited the statistical power to detect differences in some outcomes, and the short follow-up period (1.80±0.834 vs. 1.85±0.933 months) was insufficient for assessing long-term outcomes. Additionally, the learning curve effect associated with the backdoor approach could have influenced operative times and other outcomes, potentially affecting the generalizability of the findings.

4. Conclusion

The backdoor thyroidectomy approach, although requiring longer operative times, demonstrated several advantages over the conventional approach. It was associated with significantly lower postoperative pain scores, better visualization of the superior laryngeal nerve, and a reduced incidence of swallowing difficulties. Additionally, it showed generally lower rates of postoperative complications, though not all differences reached statistical significance. These findings suggest that the backdoor approach may be a valuable alternative to conventional thyroidectomy, particularly in cases where optimal nerve visualization is critical and minimizing postoperative pain and swallowing difficulties is a priority.

Disclosure

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Authorship

All authors have a substantial contribution to the article

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