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ORIGINAL ARTICL

Surgical Loupe Assisted Total Thyroidectomy Vs Classic Total Thyroidectomy: A Comparative Study

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ABSTRACT

Keyword: Total thyroidectomy, surgical loupe-assisted total thyroidectomy, transient hypocalcemia

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Background: Total thyroidectomy (TT) is now largely recognized as the most reliable and preferred method for treating thyroid cancer**. Purpose:** To assess if using a loupe to enlarge the operating field might potentially improve the outcomes of a total thyroidectomy. compared to the traditional procedure in terms of identifying the glands responsible for parathyroid function and maintaining the recurrent laryngeal nerve. **Patients and methods:** Thirty people took part in this clinical investigation. Underwent thyroidectomy and were randomly divided into two distinct categories in this single-blinded, comparative experiment. Group A consisted of 15 patients who had a standard complete thyroidectomy and Group B: included 15 who underwent total thyroidectomy using surgical loupe in the general surgery department in Aswan University Hospital. **Results:** There was statistically insignificant disparity among the analyzed groups regarding pre-operation thyroid profile, PTH, and calcium levels. The tested groups differed significantly concerning the amount of time required to complete the procedure, intraoperative bleeding, and transient hypocalcemia as 6 cases in group A developed transient hypocalcemia while no cases in group B had transient hypocalcemia, there were insignificant differences between both groups regarding muscle cramps, circumorally numbness or nerve injury, only one case in group A had external laryngeal nerve injury. **Conclusion:** We found that Surgical Loupe-assisted total thyroidectomy had better results in decreasing intraoperative bleeding and minimizing postoperative transient hypocalcemia.

INTRODUCTION

Thyroid surgery is a very common surgical treatment that is done often on a global scale. Currently, total thyroidectomy (TT) is universally recognized as the most effective method for treating thyroid cancer and benign bi-lobular thyroid disorders when there is suspicion of malignancy, indications of local compression, or when a patient desires prompt and definite therapy (1,2).

The predominant postoperative problems often involve the laryngeal nerves, including the recurrent laryngeal nerve (RLN) and the external branch of the superior laryngeal nerve (EBSLN), as well as the glands that produce parathyroid hormone (3).

To keep the parathyroid gland(s) viable following thyroid surgery, it is essential to maintain the parathyroid arteries. The ultra-ligation technique, first proposed by Halsted and Evans in 1907, entails cutting off the lesser branches of the thyroid arteries above the point at which the parathyroid arteries arise (4). The meticulous surgical procedure described here is still

considered the most effective method for avoiding hypocalcemia after a complete thyroidectomy (5).

Before the use of the subcapsular method, the prevalence of transient hypoparathyroidism was 25.4 percent, whereas that of chronic hypoparathyroidism was 4.3 percent. The rate of transient hypoparathyroidism dropped to 4.8 percent once this strategy was put into place, and just 0.7 percent of patients required ongoing administration of calcium supplements (6).

Thus, it is believed that surgeons may achieve better results in thyroid surgeries when they use surgical microscopes or magnifying loupes via a microsurgical technique. Furthermore, it was said that the aforementioned anatomical features may be readily detected during the surgical procedure. The very first microsurgical thyroidectomy was documented in 1975 by Attie & Khafif (7).

This research aimed to assess whether the use of a loupe for magnifying the operating area may enhance the results of complete thyroidectomy compared to the usual procedure in terms of identifying the glands that produce parathyroid hormone and maintaining the recurrent laryngeal nerve.

PATIENTS AND METHODS

Thirty patients who underwent thyroidectomy were the subjects of this investigation, which was a randomized, controlled experiment with a single blind. Fifteen patients in Group A got a conventional full thyroidectomy, whereas fifteen in Group B underwent the same procedure but with the use of a surgical loupe at the Aswan University Hospital's general surgery department. Thirty patients, broken down into fifteen in each group, constituted our final sample size after excluding thirteen patients who did not fulfill our inclusion criteria and five patients who chose not to participate in the research.

Inclusion criteria: All patients diagnosed with thyroid illness who are eligible for total thyroidectomy (TT) are sent to the General Surgery Department at Aswan University Hospital.

Exclusion criteria: Patients who underwent irradiation to the upper chest or lower neck, patients who presented with malignant thyroid masses, patients who declined consent, or patients who were deemed unfit for surgery.

Methods:

Pre-operative investigations: Ultrasound, Vocal cord assessment by laryngoscope and Laboratory investigations (Parathormone and Ca ++)

Intraoperative investigations: Parathormone

Operative: An endotracheal tube was used to provide general anesthesia, resulting in effective muscular relaxation. The patient was placed in a posture where their neck was stretched out. Towels were positioned under the shoulders. A sponge doughnut was positioned under the occipital region. During surgery, the table was inclined at a 30° angle in a posture known as inverse Trendelenburg/Rose/Barking dog/Kocher's position. In group A, we used traditional complete thyroidectomy, but in group B, we utilized a surgical loupe. The length of the surgical procedure was calculated in minutes, starting from the moment the skin was incised to the moment it was closed. In order to keep the gland that produces parathyroid hormone supplied with blood, we performed ultra-ligation. At the spot where parathyroid arteries meet the thyroid tissue, which is outside their origin, the thyroid arteries are ligated. [(8)].

Postoperative care: The suction drainage should be used for the first 24 hours.

Points of evaluation

Intra-operative: Operative complications (bleeding)**,** operative time**, b**lood loss **and p**arathormone level.

Post-operative: Length of hospital stay, the incidence of hypocalcemia clinically and laboratory after 24 hours, and prevalence of recurrent laryngeal nerve damage.

Follow-up: The postoperative follow-up included clinical and laboratory follow-up immediately post-operatively, on the 1st, and 2nd day, and immediately before discharge.

Statistical analysis:

Each statistical computation was executed using appropriate statistical software. Age and weight, which are continuous variables, were presented as means with standard deviations and ranges. Gender and gender identity were examples of qualitative variables that were expressed as percentages. The student t-test was used for regularly distributed continuous data analysis, whereas the Mann-Whitney U test was employed for non-normally distributed data analysis. We evaluated the categorical data using the chi-square test and Fischer analysis where it was suitable. A P value below 0.05 was considered to be a statistically significant result.

Ethical consideration

Confidentiality:

Each and every person who agreed to take part in this research was given complete protection of their privacy. Any report or publication that was produced as a consequence of the data obtained in this research did not include any identifying information about the people who participated in the study.

Research statement:

The study included ethical issues, whether they were substantial or procedural. Before their inclusion in this study, patients were provided with a comprehensive description of the research project's aims, features, and possible hazards. Participants must acknowledge their understanding of the experimental nature of the study, the inherent advantages and disadvantages of the study, their entitlement to discontinue participation in the study without compromising their access to suitable medical treatment at the study location, the appropriate contact person for any study-related inquiries, and to take part in the research after giving their informed permission.

Informed consent:

After the person who participated signed the written consent form, it was securely filed away with the subject's additional information in the research.

RESULTS

According to Table 1, there was no statistically significant variation in the demographic information between the groups that were analyzed.

According to Table 2, there was no statistically significant difference in the pre-operative thyroid profiles of the groups being investigated.

When comparing the groups, we found that there was a statistically significant difference in the quantity of blood loss and the total time the procedure took. as seen in Table 3.

When comparing PTH levels across the groups, no statistically significant difference was seen. as may be seen in Table 4.

There was statistically insignificant disparity seen among the examined groups in terms of calcium levels. as shown in **Table 5**.

When comparing the groups that were evaluated, there was a noticeable difference in terms of transient hypocalcemia. according to what is stated in Table 6.

Table 1: Comparison between studied cases according to Demographic data

	Group A (n=15)		**Group B (n=15)**		**Test of Sig.**	**p**
Age						
Range.	24 – 65		21 – 63		t= 0.015	0.988
Mean ± SD.	40.33 ± 12.05		40.4 ± 13.03			
Sex	No.	%	No.	%		
Female	13	86.7	12	80.0	χ^2= 0.240	0.624
Male	2	13.3	3	20.0		

Table 2: Comparison between studied cases according to pre-operation thyroid profile

	Group A (n=15)	**Group B (n=15)**	**Test of Sig.**	**p**
TSH				
Median (IQR)	0.91 (0.42 – 2.1)	1.1 (0.32 – 1.45)	U= 97.0	0.539
T4				
Median (IQR)	2.4 (2.1 – 3)	3 (2.16 – 3.65)	U= 74.0	0.116
T3				
Median (IQR)	1.2 (0.86 – 1.7)	1.2 (0.67 – 1.9)	U= 112.50	1.0

Table 3: Comparison between studied cases according to operation data

	Group A (n=15)	**Group B (n=15)**	**Test of Sig.**	**p**
Operation time				
Range.	93 – 107	85 – 102	t= 3.083	0.005*
Mean ± SD.	98.53 ± 5.01	92.33 ± 5.96		
Intraoperative bleeding				
Range.	150 – 200	150 – 200	t= 3.434	0.002*
Mean ± SD.	183.33 ± 24.4	156.67 ± 17.59		
Postoperative bleeding				
Range.	50 – 100	50 – 100	t= 0.727	0.473
Mean ± SD.	83.33 ± 24.4	76.67 ± 25.82		

Table 4: Comparison between studied cases according to PTH

	Group A (n=15)	Group B (n=15)	Test of Sig.	p
PTH pre-operation				
Range.	40.5 – 73.5	15 – 125	U= 91.0	0.389
Median (IQR)	58 (51 – 70)	39.1 (30.6 – 73.5)		
PTH Interoperation				
Range.	10.6 – 68	5 – 68	U= 86.50	0.285
Median (IQR)	40 (30 – 48)	29.5 (16.2 – 51.5)		

Table 5: Comparison between studied cases according to calcium

	Group A (n=15)	Group B (n=15)	Test of Sig.	p
Pre-operation				
Range.	8.5 – 10.2	7.9 – 9.5	t= 1.262	0.217
Mean ± SD.	9.22 ± 0.55	8.99 ± 0.46		
Post-operation				
Range.	7.5 – 9.8	8 – 10.4	t= 1.458	0.156
Mean ± SD.	8.52 ± 0.68	8.86 ± 0.58		

Table 6: Comparison between studied cases according to post operation data

	Group A (n=15)		Group B (n=15)		χ^2	p
	No.	%	No.	%		
Transient hypocalcemia	6	40.0	0	0.0	7.500	0.006*
Complications						
Muscle spasms	1	6.7	0	0.0	1.034	0.309
Circumoral numbness	3	20.0	1	6.7	1.154	0.283
Nerve injury						
External	1	6.7	0	0.0	1.034	0.309
Internal	0	0.0	0	0.0		
recurrent	0	0.0	0	0.0		

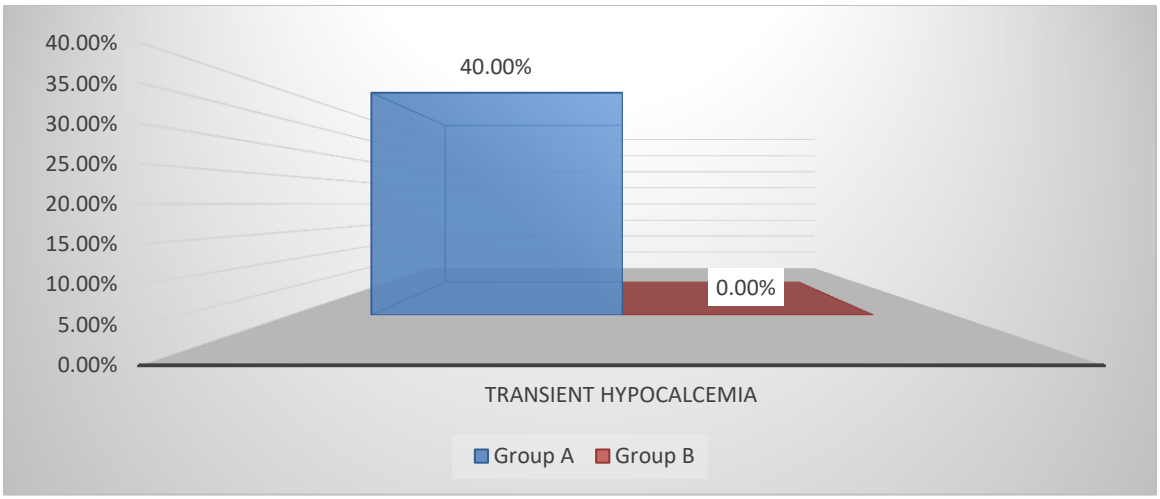

Figure 1: Comparison between studied Groups according to transient hypocalcemia

DISCUSSION

There was statistically insignificant disparity seen among the examined groups in terms of demographic statistics. Furthermore, there was statistically insignificant disparity seen among the groups under study in terms of their pre-operative thyroid profile. Furthermore, there was a statistically significant disparity seen between the groups under investigation in terms of the duration of the procedure and the amount of blood that occurred throughout the surgery, as the mean operation time was 98.53 ± 5.01 Vs 92.33 ± 5.96 minutes in group A and B respectively (P value 0.005), the mean intraoperative bleeding was 183.33 ± 24.4 vs 156.67 ± 17.59 ml, There was statistically insignificant difference in postoperative bleeding between groups A and B (P = 0.002).

Omran et al. (9) discovered that group B had an average operation time of 97.07 ± 5.39 minutes, whereas group A had an average surgery time of 93.67 ± 5.34 minutes. P = 0.017 indicates that this difference is extremely significant. The average amount of blood loss throughout the operation was 174.04 ± 22.32 milliliters in Group B and 164.76 ± 16.08 milliliters in Group A. (P = 0.03) This disparity was statistically significant. There was statistically insignificant difference between group A and group B in terms of average post-operative bleeding, which was 76.67 ± 24.51 ml and 83.00 ± 26.02 ml, respectively (P = 0.336).

According to Seven H et al. (10) there was insignificant difference in the average operating time between groups A and B, with group A using 98.6±24.7 min (range 38-130) and group B using 91.2±32.4 min (P>0.05). In addition, they noted that group A lost an average of 132±114 ml of blood during surgery, whereas group B lost an average of 95±103 ml. Although there was no statistically significant difference, group A had much less blood loss during surgery than group B. According to Ravi et al. (11) research, the average time for the surgery was 90 minutes, although it may take anywhere from 60 to 180 minutes.

When comparing pre- and post-operative PTH and serum calcium levels among the groups studied, no statistically significant differences were found. The results of Nagaty et al. (12) corroborate the discovery that the two groups did not differ significantly in terms of blood calcium and serum parathyroid hormone levels before and after the operation.

Our findings indicate a statistically significant disparity between the studied groups in terms of transient hypocalcemia. Specifically, 6 cases in group A experienced transient hypocalcemia, while no cases in group B exhibited this condition. However, there were no notable distinctions

between the two groups concerning muscle cramps, circumorally numbness, or nerve injury. Only one case in group A suffered from external laryngeal nerve injury.

The findings of Nagaty et al. (12) are in line with the results of this study, since they observed no significant variation in nerve damage. One patient in group A and three patients in group B had transient unilateral damage of the recurrent laryngeal nerve (RLN). None of the participants in Group A had a lasting nerve injury, while one in Group B was found to have irreversible unilateral RLN damage.

Furthermore, I concur with Omran et al., (9) who observed that no instances of persistent hypocalcemia were documented, while there were 8 cases (13.3 percent of temporary hypocalcemia.

In group A, there was only 1 instance (3.3 percent of transitory hypocalcemia, but in group B, there were 7 cases (35 percent This difference was found to be highly significant with a p-value of 0.005. Among the 8 patients who experienced low calcium levels after surgery, all of them reached the lowest point on the first day after the operation. Six patients (40 percent reached the lowest point on the third day, and by the seventh day, the calcium levels had returned to normal for all patients. In terms of symptoms related to low calcium levels, only one patient (3.3 percent in group B experienced muscle spasms, and one patient (3.3 percent in group A experienced numbness around the mouth, compared to four cases (13.3 percent) in group B. There were no more occurrences or instances of vocal cord paralysis in either group. However, each group had three cases (10 percent where there was a change in voice.

There was no statistically significant difference between group A and group B when it came to the eight instances (10%) of hypocalcemia reported by Nagaty et al. (12). Except one patient in group B who remained hypocalcemic six months after treatment ended, all patients' blood calcium levels recovered to normal within two weeks. As a result, group B had one incidence of persistent hypocalcemia. Aside from that, Testini et al. (13) found that group B had 7 cases of transient hypocalcemia, while group A had 2 cases (4.3%). Similarly, Seven et al. (10) found that out of two groups, one had transitory hypocalcemia (1.72%) and the other had two (5%). Lotfy Ali M et al. (14) discovered that there were only three instances of temporary hypocalcemia, which were successfully treated within three days by the use of oral calcium supplementation. Furthermore, none of the three patients had a recurrence of symptoms during the follow-up period.

Limitations: This study has several limitations as a small sample size affects the generalization of our results, also this was a single center study, further multicenter studies are recommended to confirm our results. Also, lack of long-term follows up to detect further long-term postoperative complications.

CONCLUSION

We found that Surgical Loupe-assisted total thyroidectomy had better results in decreasing intraoperative bleeding and minimizing postoperative transient hypocalcemia.

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