

Original Article

# A Comparative Study Between Total Thyroidectomy with Ligasure and Total Conventional Thyroidectomy

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Received: 13 March 2024

Revised: 18 April 2024

Accepted: 02 May 2024

Published: 15 May 2024

**Abstract - Background:** Total thyroidectomy is a common surgical procedure. Some reports demonstrate the efficacy of the Ligasure system in terms of reduction of thyroidectomy operation time. **Objective:** This study aims to evaluate the results of total thyroidectomy by using Ligasure compared with conventional technique. **Patients and Methods:** An analytic study compares two surgical techniques for one year (2021- 2022) at Tishreen University Hospital in Lattakia-Syria. Patients are randomly allocated into two groups according to the surgical technique: conventional group (CG) (35 cases) and Ligasure group (LG) (15 cases). **Results:** The population of 50 patients is predominantly female (60%). There are no significant differences between the two groups regarding demographic variables: Age and gender ( $p > 0.05$ ). The duration of surgery is significantly shorter in (LG) ( $90.1 \pm 6.4$  versus  $110.8 \pm 5.3$ ,  $p: 0.0001$ ). There are significant differences between the two groups regarding duration of drain placement <48 hours (80% in (LG) versus 51.4% in (CG),  $p: 0.0001$ ). The rate of paracetamol consumption is significantly less in (LG) ( $4.22 \pm 1.2$  g versus  $6.02 \pm 1.1$  g,  $p: 0.01$ ). In a 48-hour postoperative period, the rate of bleeding is significantly shorter in (LG) ( $51.23 \pm 7.2$  versus  $67.21 \pm 9.3$  ml,  $p: 0.0001$ ). There are no significant differences between the two groups regarding of mean length of hospitalization and occurrence of complications in (LG) versus (CG). **Conclusion:** The current study demonstrates favorable results in the efficiency of the Ligasure technique for thyroidectomy, with a significantly shorter duration of operation, rate of bleeding and removal of the drain in a 48-hour postoperative period and pain relief.

**Keywords -** Thyroidectomy, Ligasure, Conventional, Techniques, Complications.

## 1. Introduction

The thyroid gland is defined as a highly vascular organ located anteriorly in the lower neck, which extends from the level of the fifth cervical vertebra to the first thoracic [1]. Normal gland weight ranges from 10 to 20 grams, and thyroid hormones are considered critical determinants of brain development and metabolic activity [2, 3]. Total thyroidectomy is defined as surgical removal of the entire thyroid gland (right and left lobes, isthmus, and pyramidal lobe if it has existed). It is indicated in malignant diseases as well as in certain benign lesions [4, 5]. Thyroidectomy is associated with intraoperative and postoperative complications depending on the surgical technique by which a thyroidectomy is performed [6,7]. Hemostasis is considered of paramount importance when dividing various vessels before excising the gland [8, 9, 10]. Use of suture ligation and electrocoagulation for hemostasis and management of bleeding in thyroid surgery was associated with prolonged operation time, so a number of methods have been developed in vessel sealing systems such as hemostatic clipping, laser, ultrasonic instrumentation, and Ligasure with promising results [11,12,13,14,15,16]. Ligasure is defined as a bipolar diathermy system that seals vessels with reduced thermal spread, which was used successfully in abdominal surgery and has been introduced as a recent method for hemostasis during thyroidectomy

[17,18, 19]. The absence of local studies prompted to conduct this study; therefore, the aims of our study were: 1- to elucidate differences between Ligasure and conventional method for thyroidectomy regarding of duration of surgery and bleeding after surgery significant at 5% types I error rate ( $p < 0.05$ ),  $\beta$ : 20% and power of the study: 80%. 2- to compare complications between two groups.

## 2. Patients and Methods

This is a comparative analytic study of a group of patients with various indications for total thyroidectomy attending the Department of General Surgery at Tishreen University Hospital in Lattakia-Syria during the one-year period (November 2021 – November 2022). The exclusion criteria were the presence of one of the following: patients who underwent any surgery on the thyroid before, partial thyroidectomy, subtotal thyroidectomy hemithyroidectomy, and patients with thyroid cancer. The following workup included a history and physical examination. Patients were assigned to Group 1, who had undergone the conventional technique, and Group 2, who had undergone to Ligasure method. All patients received antibiotics (ceftriaxone: 1 g) before and after surgery, analgesics (venous acetaminophen) using Redon drainage tube size 14 and Covidien Ligasure LF212A (length: 18.8 cm, jaw design: curved). Patients were followed up at regular intervals in the



postoperative period regarding post-surgery bleeding, need for analgesics, duration of hospitalization, and the occurrence of complications, and results were compared between the two groups.

### 3. Ethical Consideration

All patients were provided a complete and clear informed consent after discussion about the study. This study was performed following the Declaration of Helsinki.

### 4. Statistical Analysis

Statistical analysis was performed by using IBM SPSS version 20. Basic Descriptive statistics included means Standard Deviations (SD), median, Frequency and percentages. To examine the relationships and comparisons between the two groups, the chi-square test was used. Independent t-student tests were used to compare 2 independent groups.

### 5. Results

The baseline characteristics of the participants are shown in Table 1. Ages range from 18 to 70 years (mean 46.41±4.8 years), and females represented 64% of the patients. Patients were divided according to surgical techniques of thyroidectomy as follows: conventional method in 35 cases (70%) and using Ligasure in 15 cases (30%).

**Table 1. Demographic characteristics of the study population**

Variable	Result
Age (years)	46.41±4.8 (18-70)
Sex, (n, %)	
Male	18 (36%)
Female	32 (64%)
Methods of total thyroidectomy	
Conventional	35 (70%)
Ligasure	15 (30%)

The demographic characteristics were compared between patients according to the techniques of thyroidectomy, as shown in Table 2. In conventional group, males represented 37.1% of the patients and females 62.9%, whereas males represented 33.3% and females 66.7 % in Ligasure group without significant differences (p: 0.1). There was no significant difference between two groups regarding age (46.79±3.9 in group I versus 45.11±5.6 in Group II p: 0.8). In conventional group, mean duration of surgery was 110.8±5.3 minutes versus 90.1±6.4 minutes in another group p: 0.0001. Patients were classified according to the median wound drainage (Group I versus Group II): 48 hours (51.4% versus 80%, p:0.0001), 72 hours (34.3% versus 13.3%, p:0.06) and 96 hours (14.3% versus 6.7%, p:0.2). Bleeding post-surgery was significantly lower in Ligasure group (51.23±7.2 versus 67.21±9.3, p: 0.0001).

**Table 2. Demographic and surgical characteristics of the study population by comparison of the two group**

Variable	Group 1 Conventional	Group 2 Ligasure	P value
Age (years)	46.79±3.9	45.11±5.6	0.8
Sex (n, %)			
Male	13 (37.1%)	5 (33.3%)	0.1
Female	22 (62.9%)	10 (66.7%)	
Duration of surgery (minutes)	110.8±5.3	90.1±6.4	0.0001
Duration of drainage (hours)			
48	18 (51.4%)	12 (80%)	0.0001
72	12 (34.3%)	2 (13.3%)	0.06
96	5 (14.3%)	1 (6.7%)	0.2
Postoperative bleeding during 48 hours (ml)	67.21±9.3	51.23±7.2	0.0001

**Table 3. The final outcome of the study population was by comparison of the two groups**

Variable	Group 1 Conventional	Group 2 Ligasure	P value
Dosage of analgesic medication (g)	6.02± 1.1	4.22±1.2	0.01
Duration for analgesics (days)	4.1±1.9	3.4±1.1	0.09
Duration of hospitalization (days)	1.95±0.6	1.47±0.1	0.09
Complications			
• Hypocalcemia			
Temporary	4 (11.4%)	1 (6.7%)	0.5
Persistent	0 (0%)	0 (0%)	
• Recurrent laryngeal nerve paralysis			
Temporary	3 (8.6%)	1 (6.7%)	0.2
Persistent	0 (0%)	0 (0%)	

The requirement for supplemental analgesics was significantly higher in Group I ( $6.02 \pm 1.1$  g in the conventional group versus  $4.22 \pm 1.2$  g in the Ligasure group,  $p:0.01$ ) without the presence of any significant difference between the two groups regarding duration of consumption ( $4.1 \pm 1.9$  days in Group I versus  $3.4 \pm 1.1$  days in Group II  $p:0.09$ ). The mean total hospital stay was without the presence of any a significant difference between the two groups ( $1.95 \pm 0.6$  days in Group I versus  $1.47 \pm 0.1$  days in Group II,  $p: 0.09$ ). Complications that occurred in the conventional group versus the Ligasure group were as follows without the presence of any significant differences: temporary hypocalcemia (11.4% versus 6.7%,  $p:0.5$ ) and temporary recurrent laryngeal nerve paralysis (8.6% versus 6.7%,  $p:0.2$ ) without any cases of persistent complications.

## 6. Discussion

This is a comparative analytic study in patients who underwent thyroid surgery assessed for efficiency of Ligasure in the management of bleeding compared to the conventional method, as well as the final outcome of the patients in two techniques. This study showed the main findings: First, patients were of a wide range of ages and there were no significant differences between the two groups regarding age. Approximately two-thirds of the patients were females which might be explained by the high frequency of thyroid diseases in females, and this finding is in agreement with Kirdak et al. [20], Cakabay et al. [21], Ahmed et al. [22], and Ammar et al. [23]. On the other hand, Molnar et al. [24] and Pons et al. [25] demonstrated that the majority of patients were males. Second, the duration of surgery was significantly shorter in the Ligasure group ( $p:0.0001$ ) and this finding is in agreement with Kirdak et al. [20], Cakabay et al. [21], Ahmed et al. [22], Ammar et al. [23] Molnar et. [24] and Pons et al. [25].

Third, the duration of drainage placement was less than 48 hours in the majority of patients in the Ligasure group ( $p:0.0001$ ). This decrease in duration might reflect changes in surgical technique, in which this change leads to better hemostasis and less trauma during thyroid surgery. This finding is in agreement with Ahmed et al. [22]. Fourth, consumption of analgesics after surgery for 48 hours, the

dosage of analgesia was significantly lower in the Ligasure group ( $p:0.01$ ) with shorter duration in those patients ( $p:0.09$ ), which might be related to the shorter duration of surgery and decreased hyperextension of the neck that led to pain. This finding is in agreement with Pons et al. [25], which demonstrated that the dosage of analgesics was significantly lower in the Ligasure group, and Molnar et study [24], which showed that duration of analgesics was lower in this group but without significant difference. Fifth, postoperative bleeding during 48 hours was significantly lower in the Ligasure group ( $p:0.0001$ ), and this finding is in agreement with Ammar et al. [23] and Pons et al. [25]. In addition, the duration of hospitalization was shorter in the Ligasure group compared to the conventional technique but without significant difference ( $p: 0.09$ ), which might be related to the reduction in postoperative pain and the laryngeal nerve paralysis represented complications observed in two groups with low frequency in the Ligasure group ( $p>0.05$ ). Hypocalcemia after thyroidectomy is associated with direct injury to the parathyroid gland tissue due to inappropriate manipulation, especially in the conventional method. These findings are in agreement with the results of previous studies regarding hypocalcemia, except for the Kirdak et al. [20] study, which demonstrated that temporary hypocalcemia was more frequent in the Ligasure group but without significant differences. There was one case of permanent paralysis in the conventional method by Cakabay et al. [21].

In addition, Ahmed et al. [22], Cakabay et al. [21], and Kirdak et al. [20] found similar results to our study regarding temporary recurrent laryngeal nerve paralysis. In contrast, Molnar et al. [24] and Ammar et al. [23] demonstrated similar prevalence in two methods.

## 7. Conclusion

There appears to be good evidence in favor of the Ligasure technique due to clinical benefits regarding the quality of life, improving final outcome, decreasing the duration of operation, the rate of bleeding and removing the drain in a 48-hour postoperative period, dosage, and duration of analgesics, hospital stays, and the associated costs.

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