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Assessment Outcomes of Common Complications and Side Effects of Thyroidectomy

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Annotation: Background: The treatment of patients with thyroid, endoscopic thyroidectomy is the most common method. **Objective:** This study was aimed to assess the clinical outcomes of patients who underwent thyroidectomy in terms of complications and side effects. **Patients and methods:** Two groups of patients who had undergone thyroid surgery were recruited for the study. The first group included 30 patients who had undergone endoscopic thyroid surgery. The second group included 30 patients who had undergone traditional surgery. Clinical and surgical patient data were collected from different hospitals in Iraq for the period extending from 8 April 2022 to 25 August 2023. **Results:** A comparison was made between the outcomes of endoscopic thyroidectomy and traditional surgery. We determined the operational duration in the endoscopic thyroidectomy category to be 106.63 ± 21.15 minutes and established that blood loss was 18.68 ± 8.76, and two cases demanded blood transfusion while the length of hospital stay was 1.52 ± 0.64 days. The intensive care unit had one admission case, and zero mortality cases were observed, while there were four complications cases in patients who underwent endoscopic thyroidectomy, and the traditional surgery group had an average operative time of 233.33 minutes, taking into account a 2.00 was the mean blood loss volume. Six cases of transfusion were reported during the study, and the mean blood transfusion volume was 1.45 ± 10.58 mL.

Furthermore, five cases of admission to the intensive care unit and three cases of mortality were recorded with a mean hospital stay of 5.30 ± 1.02 days. The prevalence of complications was 11 cases. Furthermore, the potential adverse effects of the procedure were identified, demonstrating that a number of patient-specific factors, including gender, hypertension, obesity, smoking, nodular goiter, thyroid cancer, tumour size, bleeding, wound infection, and hypocalcemia, can influence the outcome. Conclusion: Laparoscopic thyroidectomy is the optimal treatment for thyroid disease, offering a low complication rate, high quality of life, and low pain compared to traditional surgery.

Keywords: Endoscopic thyroidectomy; Postoperative complications; Side effects; and Length of stay in hospital.

Introduction

The primary function of the thyroid gland is to produce thyroid hormones that regulate metabolism in the human body [1]. In order for the diet to supply the papillary gland with the requisite amount of iodine, the foods consumed must contain iodine [2]. The laryngeal segment in the anterior neck consists of the thyroid gland in the front of the cervical trachea and immediately below the thyroid and

cricoid cartilages [3,4]. The thyroid gland is anatomically connected to the small oval glands on the back, which are associated with parathyroids. These glands are essential for regulating calcium and phosphorus metabolism through the hormone parathyroid hormone, or PTH hormone [5]. The thyroid gland has an isthmus of the right and left lobes that are not symmetrical. Its internal structure varies with activity. A follicle is a sphere of a structural unit that circles around a lone layer cubic cell made of epithelial tissue buried deep inside the thyroid glands [6]. These cells secrete thyroxine and triiodothyronine, which are thyroid hormones containing iodine [7].

These hormones are secreted by the epithelial cells for hormone production. The pace of cellular processes and tissue growth is controlled by these hormones, which are especially important for the development of the brain [8]. A protein substance, thyroglobulin, is found in thyroid colloid or thyroglobulin complex in the follicles and serves to store hormones prior to their availability for use by the body. Hypothyroidism is defined as a condition in which the thyroid gland fails to produce sufficient thyroid hormones [9]. Conversely, hyperthyroidism is characterised by an excess of this hormone in the bloodstream [10]. In addition to the follicular cells found within the basement membrane of follicles, the thyroid contains another type of secretory cell. These cells are single cells that are not randomly distributed among the follicular cells. They are known as parafollicular cells or C-cells, and they manufacture calcitonin, a hormone that regulates the concentrations of calcium in the blood. This process is carried out in conjunction with PTH [11,12].

Each type of cancer arises from a distinct type of cell, each cell exhibiting its own system of therapy and varying degrees of disease severity. The thyroid gland is situated in close proximity to the larynx and vocal cords, and there is a possibility that patients who have undergone thyroidectomy may experience speech therapy issues [13]. Therefore, it would be beneficial for this research to provide a concise description of the anatomy and functions of these parts. The larynx is composed of cartilaginous parts that are joined together. It contains four main cartilages, namely the thyroid, cricoids, arytenoids, and epiglottis [14]. The thyroid cartilage constitutes the majority of the front and side walls of the larynx, partially encasing other cartilages [15].

The larynx contains a sphincter that regulates airflow during respiration. Internally, there is a passage coated with mucosa that houses the laryngeal vocal cords. The larynx is lined with vocal cords, which are epithelial folds [16]. The vocal ligament and vocal muscle are two structures found in each vocal fold. Prior to phonation, the vocal folds should be in contact with each other while closing the glottal cleft to prevent interference from exhaled air [17]. Gradually, subglottic and infraglottic pressure increases as air is released [18]. The vocal folds must open when this pressure exceeds the tension required to keep them together, resulting in the sudden release of air and a sudden drop in pressure at the glottal cleft. The laryngeal innervation comprises a number of nerves, including the two laryngeal nerves derived from the vagus nerve [19]. The upper one of these nerves innervates the cricothyroid muscle, while the lower or recurrent nerve innervates all the other intrinsic laryngeal muscles. [20]

Patients and methods

A cross-sectional study of patients with thyroid diseases was conducted, including 60 patients aged between 20 and 50 years, comprising both males and females. Clinical and demographic data were collected from different hospitals in Iraq over a period extending from 8 April 2022 to 25 August 2023. The data set included information on age, gender, body mass index (BMI), which was categorised as underweight, normal weight, overweight, and obese, previous surgery, concomitant diseases, thyroid diseases, symptoms, and smoking status.

Patients over the age of 60 and under the age of 20, as well as children and adolescents, were excluded from the study. Conversely, patients who had undergone previous surgeries and those whose ages ranged between 20 and 50 years were included.

With regard to the data pertaining to the patients who were registered at the hospital, the data of the study patients was divided into two groups. The first group represents the patients who underwent

endoscopic thyroidectomy, which included 30 patients, while the second group includes the patients who underwent thyroidectomy using the traditional method, which included 30 patients.

This study also documented the diagnostic data for each patient, which involved ultrasound, CT scan, and MRI examinations. All patients underwent diagnoses using ultrasound, CT scan, and MRI techniques, with the tumour side (one or two), foci of the tumours (unifocal or multifocal), tumour size (greater than 1.5 cm or less than 1.5 cm), and the state of the thyroid glands being taken as the diagnostic parameters. The diagnostic parameters included the presence or absence of multifocality, the size of the tumour (greater than 1.5 cm or less than 1.5 cm), and the state of the thyroid glands. Four patients had no residual disease, two patients had no residual disease, and one patient had no residual disease. We recorded all the necessary elements regarding surgical data. Parameters include operation time, blood loss amount and transfusion, hospital stay duration, ICU admission, death rate, drainage volume measurements, and postoperative complication rates. Additionally, postoperative questionnaire outcomes were assessed through the questionnaire, which had a total of ten items.

The visual analogue scale (VAS) pain score at the surgical site ranged from 0 (no pain at all) to 10 (the worst pain ever experienced). Additionally, a questionnaire was administered to evaluate patients' quality of life, with a range of 0–100, where 0 represents poor quality of life and 100 represents optimal quality of life. The questionnaire scores were evaluated according to the following criteria: physical health, psychological aspect, energy/fatigue, emotional performance, social functioning, and general health.

Results

Table 1: *Identify baseline characteristics findings of patients who underwent to thyroidectomy.*

Characteristics	Number of patients [60]	Percentage [%]
Age		
20 – 29	15	25%
30 – 39	18	30%
40 – 50	27	45%
Sex		
Male	18	30%
Female	42	70%
BMI, Kg/m3		
Underweight	6	10%
Normal weight	12	20%
Overweight	15	25%
Obesity	27	45%
Past Medical history [%]		
Yes	24	40%
No	36	60%
Hypertension	16	26.67%
Diabetes	13	21.67%
Hyperlipidemia	8	13.33%
Ischemic heart disease	4	6.67%
Chronic obstructive pulmonary disease	9	15.0%
Cancer	0	0%
Kidney diseases	2	3.33%
Asthma	2	3.33%
Smoking status		
Yes	14	23.33%
No	46	76.67%

Prior surgeries		
Yes	13	21.67%
No	47	78.33%
Medications used		
Yes	38	63.33%
No	22	36.67%
Marital status		
Married	45	75.00%
Divorced	12	20.00%
Widow	3	5.00%
Educational status (%)		
Illiterate	12	20.00%
Elementary	15	25.00%
Diploma	9	15.00%
Bachelor	24	40.00%

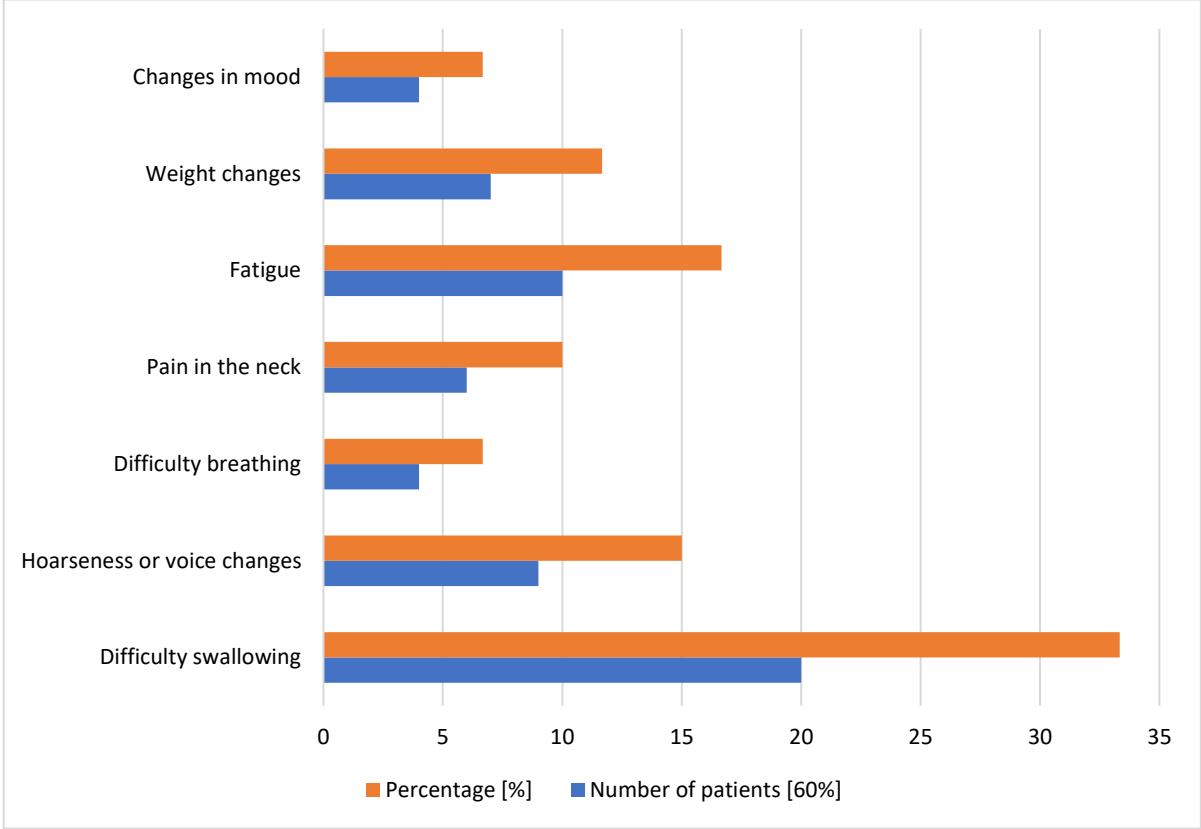

Figure 1: *Determining basic symptoms of patients who underwent to thyroidectomy.*

Table 2: *Enrolled diagnosis data of patients.*		
Variables	**Number of patients [60]**	**Percentage [%]**
Imaging		
Ultrasound	56	93.33%
CT scan	45	75.00%
MRI	21	35.00%
Illnesses		
Graves' disease	8	13.33%
Nodular goiter	25	41.67%
Follicular adenomas	8	13.33%
Thyroid cancer	19	31.67%

Tumor side		
Unilateral	54	90.00%
Bilateral	6	10.00%
Tumor focality		
Unifocal	45	75.00%
Multifocal	15	25.00%
Tumor size		
> 1.5 cm	42	70.00%
< 1.5 cm	18	30.00%
Parathyroid glands		
Four are left in place	38	63.33%
Two are left in place	15	25.00%
One left in place	7	11.67%
Vital signs		
SBP (mmHg)	118.24 ± 12.65	
DBP (mmHg)	75.35 ± 8.63	
PR (bpm)	74.40 ± 5.51	
Types of surgeries		
Endoscopic thyroid surgery	30	50%
Traditional surgery	30	50%

Table 3: *Surgical outcomes.*

Variables	Endoscopic thyroidectomy [30]	Traditional surgery [30]	P -value
Operative time (min), mean±SD	106.63 ± 21.15	223.52 ± 9.80	< 0.001
Blood loss (mL), mean±SD	18.68 ± 8.76	21.45 ± 10.58	0.886
Blood transfusion, n (%)			0.013
Yes	2 [6.67%]	5 [16.67%]	
No	28 [93.33%]	25 [83.33%]	
Clinical factors			
Albumin (g/dl)	3.84 ± 0.32	3.86 ± 0.33	
Phosphorus (mg/dl)	3.1 ± 0.7	3.35 ± 0.64	
Calcium (mg/dl)	8.55 ± 0.76	8.46 ± 0.8	
Hospital stays time (day), mean±SD	1.52 ± 0.64	5.30 ± 1.02	0.001
Admission to the intensive care unit, N (%)			
Yes	1 [3.33%]	5 [16.67%]	
No	29 [96.67%]	25 [83.33%]	
Mortality rate, N (%)			0.0382
Yes	0 (0%)	3 [10%]	
No	30 (100%)	27 [90%]	
Amount of postoperative drainage	90.24 ± 22.27	89.42 ± 20.84	< 0.001

Table 4: *Postoperative complications.*

Complications	*Endoscopic thyroidectomy [30]*	*Traditional surgery [30]*
Hypocalcemia	*1 [3.33%]*	*2 [6.67%]*
Scarring	*0 [0%]*	*1 [3.33%]*
Hoarseness	*0 [0%]*	*1 [3.33%]*
Dysphagia	*1 [3.33%]*	*2 [6.67%]*
Wound infection	*2 [6.67%]*	*3 [10%]*
Vocal cord paresis	*0 [0%]*	*2 [6.67%]*
Total	*4 [13.33%]*	*11 [36.67%]*

Table 5: *Evaluation of pain level at patients after surgery during follow–up time.*

Follow–up time	Endoscopic thyroidectomy [30]	Traditional surgery [30]	P -value
1st day	4.02 ± 0.02	8.56 ± 0.01	< 0.01
1st week	2.1 ± 0.003	5.673 ± 1.05	< 0.01
1st month	0.54 ± 0.0001	4.32 ± 0.55	< 0.01
4th month	0	2.10 ± 0.33	> 0.01

Table 6: *Evaluation of quality of life at patients after surgery during follow–up time.*

Follow–up time	Endoscopic thyroidectomy [30]	Traditional surgery [30]	P -value
Physical health	89.45 ± 8.33	72.19 ± 5.31	< 0.001
Psychological functioning	78.67 ± 5.85	65.43 ± 2.44	< 0.001
Energy/fatigue	82.10 ± 6.46	71.11 ± 3.78	< 0.001
Emotional functioning	84.44 ± 4.33	68.68 ± 4.65	< 0.001
Social functioning	87.77 ± 2.13	67.55 ± 4.82	< 0.001

Table 7: *Determine side effects associated on patients who underwent thyroidectomy.*

Side effects	OR	CI 95%
Female	3.4	0.22 – 5.78
Hypertension	4.5	1.23 – 6.77
Obesity	2.91	1.01 – 5.33
Smoking	1.86	0.22 – 3.88
Nodular goiter	2.10	0.90 – 4.66
Thyroid cancer	3.55	1.2 – 5.67
Tumor size	1.50	0.46 – 4.68
Bleeding	6.44	3.61 – 9.35
Wound infection	5.24	3.68 – 7.74
Hypocalcemia	4.33	2.92 – 6.83

Discussion

Our study was shown demographic characteristics, where we noticed that patients with ages (40 - 50) years was 45%, females were the highest which include 70% than, males with 30%, 45% of patients had obesity, rate of comorbidities were 40%, where include hypertension with 16 cases, diabetes with 13 cases, and chronic obstructive pulmonary disease with 9 cases, smokers got 13 cases, rate of patients had prior surgeries were 13 cases. Also, we enrolled the main symptoms prevalence on the patients where the most common factors were difficulty swallowing had 20 cases, fatigue had 10 cases, and hoarseness or voice changes had 9 cases.

In identification of diagnoses data, we enrolled diagnosis data which found rate of patients who undergone imaging test included ultrasound with 56 cases, CT scan with 45 cases, and MRI with 21 cases, the most common illnesses prevalent in the patients found nodular goiter got 25 cases, thyroid cancer with 19 cases, graves' disease with 8 cases, and follicular adenomas with 98 cases, tumor side

included unilateral had 54 cases and bilateral had 6 cases, tumor size got > 1.5 cm with 42 cases and < 1.5 cm with 18 cases, Vital signs contains SBP (mmHg) was 118.24 ± 12.65, DBP (mmHg) was 75.35 ± 8.63, and PR (bpm) was 74.40 ± 5.51.

For surgical data, our outcomes of patients divided patients into two groups where the first group included 30 patients who had undergone endoscopic thyroid surgery, while the second group included 30 patients who had undergone traditional surgery. According to endoscopic thyroid surgery findings included operative time was 106.63 ± 21.15 min, blood loss was 18.68 ± 8.76, blood transfusion got 2 cases, clinical factors included Albumin (g/dl) was 3.84 ± 0.32, Phosphorus (mg/dl) was 3.1 ± 0.7, and Calcium (mg/dl) was 8.55 ± 0.76, hospital stays time was (1.52 ± 0.64) days, admission to the intensive care unit included 1 cases, mortality rate included no cases, and amount of postoperative drainage was 90.24 ± 22.27. According to traditional surgery outcomes, our outcomes found operative time was 223.52 ± 9.80 min, blood loss was 21.45 ± 10.58 mL, blood transfusion got 6 cases, clinical factors included Albumin (g/dl) was 3.86 ± 0.33, Phosphorus (mg/dl) was 3.35 ± 0.64, and Calcium (mg/dl) was 8.46 ± 0.8, hospital stays time was (5.30 ± 1.02) days, admission to the intensive care unit included 5 cases, mortality rate included 3 cases, and amount of postoperative drainage was 89.42 ± 20.84.

In terms of postoperative findings, we enrolled complications which found in the patients, where the rate of complication prevalent on patients who underwent endoscopic thyroid surgery included 4 cases, while the rate of complication prevalence on patients who underwent traditional surgery included 11 cases. Also, we determined assessment results, which shown pain scores at patients who underwent endoscopic thyroid surgery were 4.02 ± 0.02 at the first day and 0 after the fourth month, while pain scores at patients who underwent traditional surgery were 8.56 ± 0.01 at the first day and 2.10 ± 0.33 after fourth months. In addition, the side effect was determined, which shown all these factors impact on patients, including of female, hypertension, obesity, smoking, nodular goiter, thyroid cancer, tumor size, bleeding, wound infection, and hypocalcemia. Furthermore, we identified quality of life assessment in which the most common items determined in our outcomes were physical health was 89.45 ± 8.33, and social functioning was 87.77 ± 2.13 in the endoscopic thyroidectomy group, while physical health was 72.19 ± 5.31 and energy/fatigue was 71.11 ± 3.78 in the traditional surgery.

Last study had found almost endoscopic thyroidectomy can be defined as a minimally invasive procedure with few benefits over the usual traditional surgery for thyroid removal which due to the fact that it ensures smaller incisions, less surgical discomfort, reduced hospital stay, shorter time of recovery and better cosmetic results due to less scarring. [21 - 23]

Some studies have indicated that the conventional thyroidectomy involved the removal of a portion or the entirety of the thyroid gland through an incision in the neck, can be as a safe and effective procedure, which surgical approach has been employed for a considerable period of time and has proven to be highly effective in isolating and removing affected thyroid tissue. [25 - 28]

In a French study, innovative methods of carrying out thyroidectomy with minimal injury had identified, where these methods incorporate endoscopic thyroidectomy, that shows improvement in clinical outcomes among patients. [29]

Another study published in Germany demonstrated that endocrine thyroidectomy is associated with reduced tissue stress compared to conventional surgery, a lower risk of complications such as hypothyroidism or injury to surrounding tissues, and higher patient satisfaction, but the choice between endocrine and traditional surgery options was influenced by various factors, including the size of the thyroid nodule, the surgeon’s experience in performing surgeries in this area of the body, and individual patient preferences. [30]

Conclusion

Our study was shown clinical outcomes of patients who underwent laparoscopic thyroidectomy indicated that clarify surgical procedure is the optimal treatment option for patients with thyroid disease, which indicates the effectiveness of surgical interventions in treating patients by achieving

clinical improvements which due to the advantages of a low complication rate, high quality of life, and low pain rate compared to traditional surgery.

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