

RISK FACTORS FOR POSTOPERATIVE COMPLICATIONS AFTER THYROIDECTOMY IN SIMPLE MULTINODULAR GOITER

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ABSTRACT

Background: Postoperative complications after thyroidectomy are problematic for patients and surgeons. The postoperative outcome of thyroidectomies is related to risk factors concerning the patient, the thyroid disease and the surgeon. **Objective:** To analyze the risk factors for postoperative complications after thyroidectomy in patients of simple multinodular goiter. **Methodology:** A prospective study was conducted in Surgical unit of Sheikh Zayed Medical College/Hospital, Rahim Yar Khan on 114 patients diagnosed and surgically treated for simple multi nodular goitre (MNG) between 1st July 2012 and 30th June 2014 meeting the following criteria: bilateral MNG; operation by surgeons with experience in endocrine surgery; no associated parathyroid pathology; no initial thoracic approach; and minimum follow-up of 6 months. Age, sex, time of evolution of symptoms, thyroid weight, recurrent goiter and type of surgery (total thyroidectomy or near total thyroidectomy) were analyzed as risk factors for complications. Data was analyzed using SPSS version 16.0. P values < 0.05 were considered statistically significant. **Results:** During the study period 114 thyroidectomies were performed. There were 20 (17.5%) males and 94 females (82.5%) with age of 48.5±13.6 years. Male to female ratio was 1:4.7. Total thyroidectomy performed in 57(50%) patients and near total thyroidectomy was also performed in 57(50%) patients. Total complications occurred was 29 (25.43%) in 114 patients. Transient hypoparathyroidism was the major complication seen in 17 (14.9%) patients and permanent hypoparathyroidism was seen in 3(2.6%) patients. 3(2.6%) patients suffered from transient recurrent laryngeal nerve palsy (RNLP) and 2 (1.8%) patients suffered from permanent RNLP. Hematoma formation was present in 3(2.6%) patients and wound infection was present in 1(0.9%). There was significant association of transient hypoparathyroidism with duration of goiter (p value=.016), presence of compressive symptoms (p value= 0.000) and type of surgery (p value=.017). Permanent hypoparathyroidism was significantly associated with recurrence of goiter (p value=.02). Permanent RNLP was significantly associated with compressive symptoms (p value=.007). There was no significant between hematoma formation and risk factors. So duration of goiter, presence of compressive symptoms, weight of thyroid gland, type of surgery and recurrence were the significant risk factors for complications in patients of simple MNG. **Conclusion:** In conclusion duration of goiter, presence of compressive symptoms, recurrence of goiter and surgical resection are significant factors for post thyroidectomy complications. By performing early surgery and total thyroidectomy complications rate can be reduced.

Key Words: MNG, Risk factors, Complications.

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INTRODUCTION

The term goiter is used to describe generalized enlargement of the thyroid gland.¹ Disorders of the thyroid gland constitute the second most common endocrine disease following diabetes mellitus.² The prevalence of nodular goiter and thyroid autonomy is increased in regions with chronic Iodine Deficiency (ID).³ It has been documented that the thyroid gland adjusts to ID in the early stages by diffuse hyperplasia, while chronic exposure to ID results in nodular hyperplasia, increased colloid content and increased height of the follicular cells.⁴ Thyroidectomy is one of the most frequent operations performed in iodine deficient regions.⁵⁻⁷

In the early 20th century, thyroidectomy was associated with increased morbidity and even mortality.⁷ Postoperative results from thyroid surgeries are usually related to patient condition, the thyroid disease, surgeon's experience and type of surgery.^{8,9} Thus, the percentages of undesirable

results in thyroidectomy surgeries may vary considerably, considering baseline disease persistence or recurrence and postoperative complications.¹⁰ However, today the improvements in anesthesia and antisepsis as well as better surgical instrumentation and improvement in the surgical technique have rendered thyroidectomy an efficacious and safe treatment modality with acceptable morbidity and even unrecorded mortality.¹¹⁻¹⁴ Currently, the main postoperative complications of thyroidectomy are Recurrent Laryngeal Nerve Palsy (RLNP) and hypoparathyroidism (hypocalcemia).¹⁵ The reported hypocalcemia incidence rates range widely; studies report that anywhere from 0.3%–66.2% of patients develop hypocalcemia after thyroid surgery.¹² The etiology of postoperative hypoparathyroidism has been proven to be multifactorial, with the surgical technique, the devascularization and accidental resection of the parathyroid glands being the most significant factors.¹⁵ Paralysis of the RLN

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could be transient or seldom permanent.^{14,15} It is the most common complication after thyroidectomy, especially for large goiters, for cancer, or in reoperations. Bilateral RLN injury occurs in 0.4% of total thyroidectomy.¹⁴ Postoperative hematoma remains a rare but potentially life threatening complication. Early recognition with immediate intervention is the key to the management of this complication.¹⁶ Certain factors such as extent of resection, additional neck dissection, indication for thyroidectomy, and patient volume per surgeon significantly affect the morbidity of thyroid surgery and the length of stay.¹⁷ Pneumothorax, pleural effusion, pneumonia, tracheomalacia, laryngeal edema, injury to the esophageal wall, the phrenic nerve paralysis and brachial plexus injuries have also been described.¹⁸ At the beginning of the 20th century postoperative infection was a major complication of thyroidectomy. Nowadays, with the benefit of antisepsis and the constant progress of surgical techniques, the overall risk of postoperative wound infection is substantially decreased.¹⁹ The objective of this study was to analyze the risk factors for postoperative complications after thyroidectomy in patients of simple multinodular goiter (MNG).

METHODOLOGY

A prospective study was conducted in Surgical unit of Sheikh Zayed Medical College/Hospital Rahim Yar Khan on 114 patients diagnosed and surgically treated for simple MNG between 1st July 2012 and 30th June 2014. The selection criteria were: (1) bilateral simple MNG (multinodular goiter); (2) operation by surgeons with experience in endocrine surgery; (3) no associated parathyroid pathology; (4) no initial thoracic approach; and (5) minimum follow-up of 6 months.

All the patients of simple MNG were admitted through surgical outdoor. The following parameters: sex, age (in years); clinical duration of goiter (in years); compressive complaints, baseline thyroid status and status upon surgery (hyper, hypo or normal thyroid function); tests proving compression or showing a diving goiter; type of surgery carried out (near total and total thyroidectomy); it being a second operation or not; post-operative final diagnosis on histopathology were recorded. Detail history was

taken and thorough physical examination was carried out. Final diagnosis of simple MNG was made on the basis of history, clinical examination, thyroid function tests, FNAC and histopathology after surgical excision. All the patients were divided in 2 groups. Group 1st underwent total thyroidectomy and group 2nd underwent near total thyroidectomy. All operations were performed by staff surgeons experienced in endocrine surgery. Total thyroidectomy was carried out by extracapsular dissection. Near-total thyroidectomy was performed by the capsular dissection method (total lobectomy on one side and sub total lobectomy on other side). Intraoperatively, efforts were made to identify and preserve the recurrent laryngeal nerves. Identification of at least two parathyroid glands was considered sufficient and meticulous dissection was adopted so as to preserve vascularization and the integrity of the gland. Following completion of thyroidectomy, a drain was placed according to the surgeon's judgment and not routinely.

Vocal cords were assessed by the anesthesiologist during extubation and by an Ear-Nose-Throat (ENT) specialist in case of symptoms development. Complications noted were transient hypoparathyroidism, permanent hypoparathyroidism, transient and permanent Recurrent Laryngeal Nerve Palsy (RLNP), Hematoma and wound infection. Permanent RLNP was defined as sustained immobility of the vocal cords six months after surgery. Routinely, serum calcium levels were assessed the day after the operation.

Hypocalcemia was defined as serum calcium levels, under 8.0 mg/dl and in all such cases oral calcium supplementation and 1(25OH) Vit D was administered. Intravenous administration of calcium gluconate was preserved for patients with clinical symptoms and signs of hypocalcemia. Permanent hypoparathyroidism was defined as the requirement of calcium supplementation and/or vitamin D to maintain eucalcemia six months postoperatively. All patients with postoperative complications were followed up to six months regularly. During follow-up visits complete patient evaluation was undertaken, including medications, physical examination and blood sampling for serum calcium levels. Patients who developed postoperative complication and could not attend the outpatient clinic were consulted by telephone. Development of RLNP and hypoparathyroidism were set as primary endpoints, Hemorrhage and

wound infection were the secondary endpoints. Patients' age and sex, duration of goiter, compressive symptoms (dyspnoea and dysphagia) preoperatively, extent of resection and specimen weight (extracted from the pathology files were also assessed as risk factors for the development of the above complications. Data was analyzed using SPSS version 16.0. *P* values < 0.05 were considered statistically significant.

RESULTS

During the study period 114 thyroidectomies were performed. There were 20 (17.5%) males and 94 females (82.5%) with a age of 48.5 ± 13.6 years. Male to female ratio was 1:4.7. 83 (72.8%) patients were less than 40 years and 31 (27.2%) patients were more than 40 years. In 50 (43.9%) patients, duration of goiter was less than 5 years and in 64 (56.1%) duration of goiter was more than 5 years.

Compressive symptoms (dyspnoea and or dysphagia) were present in 10 (8.8%) patients. In 40 (35.1%) patients thyroid weight was less than 100 grams postoperatively and in 74 (64.9%) patients thyroid gland weight was more than 100 grams post operatively. Total thyroidectomy was performed in 57(50%) patients and near total thyroidectomy was also performed in 57(50%) patients. (Table I)

Table I: Frequency of risk factors

Risk factors		No	Percentage
Age	<40 y	83	72.8%
	>40 y	31	27.2%
Sex	Male	20	17.5%
	Female	94	82.5%
Duration of goiter	<5 years	50	43.9
	>5 years	64	56.1%
Compressive symptoms	Yes	10	8.8%
	No	104	91.8%
Surgical procedure	Total thyroidect omy	57	50%
	Near total thyroidect omy	57	50%
Weight of thyroid gland	<100 gm	40	35.1%
	>100 gm	74	64.9%

Total complications occurred were 29 (25.43%) in 114 patients. Transient hypoparathyroidism

was the major complication seen in 17 (14.9%) patients and permanent hypoparathyroidism was seen in 3(2.6%) patients. 3(2.6%) patients suffered from transient recurrent laryngeal nerve pals (RNLP) and 2(1.8%) patients suffered from permanent RNLP. Hematoma formation was present in 3 (2.6%) patients and wound infection was present in 1(0.9%). (Table II).

Table II: Frequency of complications

Complications	No	Percentage
Transient hypoparathyroidism	17	14.9%
Permanent hypoparathyroidism	3	2.6%
Transient RLN Palsy	3	2.6%
Permanent RNL Palsy	2	1.8%
Hematoma formation	3	2.6%
Wound infection	1	0.9%
Transient complications	20	16.7%
Total complications	29	25.43%

There was significant association between transient hypoparathyroidism and duration of goiter, ($p=0.01$) presence of compressive symptoms ($p=0.000$) and type of surgery ($p=0.010$). Permanent hypoparathyroidism was significantly associated with recurrence of goiter ($p=0.02$). Permanent RNLP was significantly associated with compressive symptoms ($p=0.02$). There was no significant association between hematoma formation and wound infection with risk factors.

DISCUSSION

Thyroidectomy, one of the main forms of treatment for thyroid gland diseases, is performed worldwide by surgeons with varied background and expertise. The indications for surgery in these cases were suspicion of cancer, a massive goiter with symptoms of local compression, nodules with low radioiodine uptake (cold nodules) and patients' desire for rapid and definitive treatment.²⁰⁻²⁷ The extent of thyroidectomy in the management of thyroid diseases is a disputed issue among researches and there is still no consensus as to how much thyroid tissue should be left behind.²⁷ The role of total

thyroidectomy in benign thyroid disease still remains controversial in the literature, although minimizing the recurrence/reoperation rates,²⁵ because of higher complication rates associated to more radical surgeries.²⁶ The number of patients submitted to lumpectomy/lobectomy/lobectomy was higher in the group with recurrences (88.5%) when compared to the group which did not relapse (49.1%). The percentage of patients submitted to near-total/total thyroidectomy was higher in the group without recurrences (35.7%) when compared to the one with it (3.8%). Snook et al,²⁷ reported that total thyroidectomy is not the only safe procedure to treat benign thyroid goiter, but it is efficient and prevents relapses. According to Rosário et al,²⁸ the extension of surgery is associated with lower rates of recurrence, distant metastasis and mortality in patients with malignant thyroid neoplasia submitted to bilateral thyroidectomy.

Ramirez et al,²⁹ stated that complications associated with the thyroid surgery are directly proportional to the extension of the thyroidectomy and inversely proportional to the surgeon's experience. Patients submitted to thyroid surgery are exposed to a number of complications, both in the early and in the late postoperative times, and the latter are usually permanent. Among those in the first group we have hypocalcemia, vocal fold paralysis, surgical wound infection and hematoma.

Among those in the second group, the ones most frequently described are: hypoparathyroidism, permanent paralysis of the vocal folds and hypothyroidism. While hypocalcemia is considered the most important complication.³³ In the present study, there were transient complications in 17.7% of the cases. The literature reports a large variation in the rates of these complications, depending on type. In general, the prevalence varies between 5% and 27.5%.^{29,30,31,32}

Thus, the results shown here do not point to much difference when compared to the experience of other clinics, national or international. There were a few cases of hematomas and postoperative infection. Reeve & Thompson,⁹ reported that indeed, postoperative infections are the least common.¹⁵ Recurrent laryngeal nerve palsy is the most serious complication in thyroid surgery,³³ resulting in significant impairment of the quality of life³⁶ and having a negative impact on job performance.³⁷

The incidence of RLNP varies from 0% to 4% and has been related to the extent of thyroidectomy, the presence of Graves, disease, thyroid carcinoma and the need for reoperation.^{8,34} In the present study, transient RLNP occurred in 2.6% cases and permanent RLNP in 1.8%. In the literature, we find references to permanent lesions, with rates varying between 0.2% and 5.0%.^{34,35,36} In our institution, intra-operative nerve identification is the standard practice and thus it was not analyzed as an independent risk factor. Extensive resections, preoperative diagnosis of thyroid malignancy and recurrent goiter were identified as significant independent risk factors for RLNP in a recent study by Thomusch et al.³⁷ In our study presence of compressive symptoms was significant factor for RLNP. In several studies, the incidence of transient hypocalcemia (hypoparathyroidism) varied from 6.9% to 46%,^{37,38} while a rate of 0.4% to 33% has been reported for permanent hypoparathyroidism.³⁹ In the present study, transient hypoparathyroidism occurred in 17 patients (14.9%) and it was mostly manifested as transient hypocalcemia, which was easily managed with oral supplementation of vitamin D and Ca. Finally, the corresponding rate for permanent hypoparathyroidism was 2.6%. Recent studies have shown that the risk of postoperative hypoparathyroidism is related to the extent of thyroid resection.⁴⁰

In our study, hypoparathyroidism is related with age (18.65% in patients less than 40 years and 6.4% in more than 40 years) duration of goiter, surgical resection, compressive symptoms and recurrent goiter. The multivariate analysis revealed that duration of goiter, recurrent goiter and surgical resection are the potential risk factors for hypoparathyroidism. Consistent with the existing body of literature,^{41,42} hypocalcemia occurred significantly more often after total thyroidectomy than after unilateral thyroid lobectomy. Incidental parathyroidectomy is believed by many to explain the increased risk of hypocalcemia with more extensive and bilateral surgery.^{42,43} Hematoma following thyroid surgery is a rare event occurring in <1% to 2% of all thyroidectomies.⁴³ Nevertheless, it can be a significant burden leading to airway obstruction, which is a surgical emergency. In our study hematoma was a complication in 3 cases (2.6%) and reoperation was undertaken in one patient due to ongoing hemorrhage and airway obstruction. Univariate analysis revealed no association between hematoma and the extent of resection.

At the beginning of the 20th century postoperative infection was a major complication of thyroidectomy.¹⁹

Nowadays, with the benefit of antiseptics and the constant progress of surgical techniques, the overall risk of postoperative wound infection is substantially decreased. In our series it occurred in 1 case (0.9%). We did not find any association between wound infection and extent of thyroid resection.

CONCLUSION

In conclusion, duration of goiter, presence of compressive symptoms, recurrence of goiter and type of surgical resection are significant factors for post thyroidectomy complications. By performing early surgery and total thyroidectomy complications rate can be reduced.

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