Re-operation for the Treatment of well Differentiated Thyroid Cancer: Necessity, Safety and Impaction on Further Management

MOHAMAD EL-ZOHAIRY, M.D. and AHMAD ZAHER, M.D.*
The Departments of Surgery and Nuclear Medicine*, National Cancer Institute, Cairo University.

ABSTRACT

**Background:** The diagnosis of thyroid carcinoma during the course of lobectomy for a dominant nodule occasionally cannot be rendered on the basis of frozen section. Once the diagnosis of carcinoma is made, the question of completion thyroidectomy arises.

**Patients and Methods:** During a period of 3 years, 28 patients diagnosed with well-differentiated thyroid cancer (WDTC), and operated upon with less than total thyroidectomy, were admitted to our department. Patients had no clinical or radiological evidence of any residual disease at the time of admission. All were submitted for total thyroidectomy.

**Results:** There were 7 men and 21 women (1:3), and the average age was 38.6 +/- 1.3 years (range, 20 to 62 years). The postoperative morbidity in completion thyroidectomy consisted of transient hypoparathyroidism in 2 patients (7.1%), permanent hypoparathyroidism in 1 patient (3.5%), there was no recurrent laryngeal nerve palsy, there were haematoma in 2 patients, and seroma in 1 patient. Completion thyroidectomy resulted in detecting 9 patients (32.1%) having residual disease that was not clinically manifest.

**Conclusion:** Although many surgeons advocate total or near-total thyroidectomy for differentiated thyroid carcinoma, some of these surgeons hesitate to complete thyroidectomy after lobectomy for thyroid nodule when there is no clinical evidence to suggest bilateral disease, for fear of added morbidity to the patients. However, as demonstrated in this study, completion thyroidectomy was shown to be a fairly safe procedure, which carries a low incidence of complications. It also facilitates further management and follow-up with radioactive iodine. The decision to perform completion thyroidectomy for WDTC should be based on the patient’s risk category, and not on a concern for risk of complications from the second procedure.

**Key Words:** Thyroid cancer - Completion thyroidectomy.

INTRODUCTION

The extent of surgery in WDTC has been a controversial issue. Patients with low risk WDTC have a relatively good prognosis with a mortality rate of about 2-5% and a recurrence rate of about 20% [1].

Some surgeons advocate unilateral lobectomy, claiming no difference in survival, while decreasing morbidity when compared to patients undergoing total or near-total thyroidectomy [2]. Several consensus guidelines state that total thyroidectomy is appropriate if the primary papillary type carcinoma is more than 1.5cm in diameter, and especially if the tumor extends beyond the thyroid, or there is metastasis. This operation should also be done in patients with history of exposure to ionizing radiation. For follicular thyroid carcinoma, the absence of multicentric disease is an argument against bilateral thyroidectomy for management of primary tumors, but most consensus guidelines recommend complete thyroid resection to allow subsequent radioiodine therapy [1]. The problem arises when one is confronted with a patient who has undergone lobectomy for a thyroid nodule and in whom the diagnosis of cancer was not made until after surgery. Under these circumstances, re-operation is required to remove all remaining thyroid tissue, including any undetected contralateral foci of cancer [3].

Patients with multifocal WDTC on primary surgery have a 17.4 times higher risk on re-operation to harbor extrathyroidal soft tissue infiltrates within the cervicocentral compartment.
At least in multifocal WDTC, a systematic en bloc resection of the thyroid remnant and cervicocentral lymph node compartment is warranted to ensure clearance of occult extrathyroidal soft tissue infiltrates [4].

Many surgeons have argued that the increased morbidity of re-operative thyroid surgery is too high to justify such a procedure. If completion thyroidectomy was done on a routine basis, a high incidence would surely be reported of recurrent laryngeal nerve injury and permanent hypoparathyroidism, problems that are more difficult to manage than the thyroid cancer itself. Before doing a completion thyroidectomy, the surgeon should think twice whether the operation is necessarily indicated and helpful to the patient. Just because completion thyroidectomy can be technically performed with minimal complications does not mean it is indicated in every patient with a solitary thyroid nodule [5].

The purpose of this study is to assess the validity of completion thyroidectomy in the management of WDTC and to elucidate its true indications.

PATIENTS AND METHODS

From January 2001 to December 2003, a total number of 28 patients presenting at NCI, Cairo University and El Mokatam Insurance hospital, with history of previous thyroid lobectomy for the treatment of a solitary thyroid nodule were studied. All patients had their post-lobectomy pathology revealing WDTC and had no clinical or radiological evidence of residual disease. We excluded low risk patients (females under the age of 45 with no history of irradiation whose primary tumors were less than 1cm).

All patients were studied and evaluated by history, physical examination and routine laboratory investigations including T3, T4 and TSH estimation, serum calcium levels, chest X-ray and neck ultrasound, I131 whole body scan, slide revision, and pre-operative vocal cord assessment by indirect laryngoscopy.

For completion thyroidectomy the residual thyroid tissue was approached through a lateral route (Fig. 1-A,B) by dissection of the sternocleidomastoid muscle from strap muscles and retracting both muscles away from each other. The omohyoid muscle was cut and the carotid sheath was defined. We retracted the thyroid tissue medially and the carotid sheath laterally (Fig 2). The recurrent laryngeal nerve (RLN) was found at the tracheo-oesophageal groove in front of, passing through, or behind the inferior thyroid artery. The superior parathyroid gland lied cephal to the inferior thyroid artery while the inferior parathyroid gland lied caudal to it. Branches of the inferior thyroid artery were ligated individually while keeping the RLN in view all the time. The nerve was then pushed posteriorly while the thyroid lobe was excised in a lateral to medial direction. In all cases the parathyroid glands were preserved with an intact vascular supply. Lymphadenectomy of the central (pretracheal and paratracheal nodes) compartment was routinely performed (Fig. 3) and the lower jugular lymph nodes were sampled. If these lymph nodes were found to be positive by frozen section (Fig. 4), a modified radical neck dissection of the involved side was added.

All patients were evaluated regarding operative technique, gross and histopathological examination of the specimen with special emphasis on multicentricity.

The patient’s serum calcium was monitored daily for the first 3 days and then again after one month. Recurrent laryngeal nerve function was assessed by indirect laryngoscopy.

Postoperative complications specific to thyroidectomy were recorded. These included permanent vocal cord palsy, permanent hypoparathyroidism. Postoperative vocal cord examination was performed only when hoarseness occurred. Permanent vocal cord palsy was defined as continued postoperative vocal cord paralysis 6 months after surgery. Similarly, patients requiring calcium or vitamin D supplementation for postoperative hypocalcaemia more than 6 months were defined as suffering from permanent hypoparathyroidism.

Postoperative I131 whole body scans were done to all patients after 4-6 weeks to detect residual thyroid tissue and to exclude functional metastases. Ablative doses (80-100 mCi) of I 131 were given, if the uptake in the thyroid bed was greater than 1.5%. Subsequently, all patients were given hormone suppressive therapy (Eltroxin 200-300 mcg per day) and were closely
monitored by FT3, FT4 and TSH aiming to keep TSH level below 0.1µIU/ml. Follow-up was done every 6 months by I131 whole body scan, neck ultrasound, non-contrast CT chest and serum thyroglobulin for 2 years and if free, follow-up was carried out annually using Tc-99 sestamibi instead of I131 to avoid stopping Eltroxin therapy.

RESULTS

Twenty eight patients who underwent an initial thyroid lobectomy for the treatment of a solitary thyroid nodule that prove to be WDTC were analyzed. Their average age was 38.6±1.3 years with an age range from 20 to 62 years. Females outnumbered males, with a ratio of 3:1, the number of male patients being 7 while that of females 21. Patients who had papillary carcinoma were 22 patients (78.5%), 5 patients had follicular carcinoma (17.8%), while 1 patient (3.5%) had mixed papillary and follicular tumor (Table 1).

Initial surgery was hemithyroidectomy in 23 patients, subtotal thyroidectomy in 2 patients and isthmectomy in 3 patients. Completion thyroidectomy resulted in detecting 9 patients having residual disease that was not clinically manifest (32.1%), either in the contralateral lobe (8 patients) or in the lymph nodes (2 patients), while one patient had residual disease in both, the contralateral lobe and in the lymph nodes (Table 2).
The postoperative morbidity in completion thyroidectomy consisted of transient hypoparathyroidism in 2 patients (7.1%) and permanent hypoparathyroidism in 1 (3.5%). There were two postoperative hematomas (only one requiring re-exploration) and one postoperative seroma. There was no incidence of RLN injury and no complications of radioactive iodine ablation (Table 3).

Ablation therapy was given to all patients as their percentage uptake at 24 hours was >2% (Fig. 5-A,B,C).

Follow-up of patients ranged from six months to three years. Three patients had recurrent disease (Table 4), two patients with papillary carcinoma had nodal recurrence at 7 and 10 months (Fig. 6) and were managed by selective block neck dissection, while one patient with follicular carcinoma had distant spread to lungs after 18 months (Fig. 7). This patient received 150 mCi of $^{131}$I three times with successful outcome.
DISCUSSION

The treatment of differentiated thyroid carcinoma remains controversial. Some surgeons and endocrinologists have advocated total thyroidectomy as the treatment of differentiated thyroid carcinoma [6, 7]. However, most surgeons and endocrinologists advocate total thyroidectomy as the treatment of choice for differentiated thyroid carcinoma [8,9]. Total thyroidectomy followed by radioactive iodine ablation results in a decreased rate of recurrence, distant metastasis and an improved survival rate compared with unilateral thyroid lobectomy [10]. Potential residual tumor is eliminated by total thyroidectomy because the incidence of bilateral differentiated thyroid carcinoma in the literature ranges from 30 to 88% [3,11]. Follow-up with the serum thyroglobulin level in patients undergoing total thyroidectomy is more useful and easier than unilateral lobectomy or subtotal thyroidectomy.

When all the thyroid tissue is removed, anaplastic transformation can also be eliminated in the remnant thyroid tissue [1]. Some surgeons and endocrinologists have advocated I\textsuperscript{131} ablation of the remaining thyroid remnant instead of doing completion thyroidectomy. However, this approach is associated with several disadvantages, including multiple doses of I\textsuperscript{131} for a successful ablation, difficulty in adequate ablation of large thyroid remnants. In addition, high doses of radioactive iodine can result in pulmonary fibrosis, temporary bone marrow suppression, and leukemia [12]. Therefore, surgical resection remains the best way to remove the remnant thyroid tissue.

One of the most feared complications of repeated thyroid surgery is RLN injury. Beahrs and Vandertoll [13] found a 17% incidence of vocal cord paralysis in 548 secondary thyroidectomies. As technique and experience have improved, this incidence of complications has gradually decreased. Chao et al. [14] reported a 2.6% incidence of transient RLN palsy in completion thyroidectomy. Mishra et al. [15] reported that the incidence of transient RLN palsy was 4% and there was no permanent RLN palsy. De Jong [16] reported 2% RLN palsy. Wax and Briant [17] and Eroglu et al. [18] reported 3% RLN palsy. Kupferman et al. [5] found 0% of RLN palsy.

In this study there was no transient or permanent RLN palsy. This is because it is our practice to routinely identify the RLN through the medial border of the sternocleidomastoid muscle (lateral approach) with ligation of the terminal branches of the inferior thyroid artery and avoiding using diathermy near the nerve.

Another feared complication of repeated thyroid surgery is permanent hypoparathyroidism. In this study, the incidence of transient hypoparathyroidism was 7.1%. This finding is similar to findings reported in the literature which was 3 - 15% in completion thyroidectomy [3,19-21]. The incidence of permanent hypoparathyroidism was 3.5% and was comparable to the results of Reeve et al. [22] who found 3.2% incidence of permanent hypoparathyroidism.

Kupferman et al. [5] reported their experience on 36 patients who had completion thyroidectomy where the tumor was found in 55.6% of re-operated specimens. Alzahrani et al. [23]
found residual cancer in the contralateral lobe in 38.8% of the patients. In this study, foci of cancer were detected in the contralateral lobe in 28.5% of cases and 7.1% in regional lymph nodes.

Follow-up of our cases showed that no local recurrence was found at the central compartment. This is because we routinely perform paratracheal lymph node dissection. Although it is not a routine practice in some centers, but is the main cause of local failure in multifocal papillary carcinoma.

It is part of our technique in performing initial lobectomy not to disturb the strap muscles overlying the uninvolved thyroid lobe. By not disturbing these strap muscles, a virgin plane is left intact. This decreases complications of re-operation.

I\textsuperscript{131} remains the cornerstone in the initial staging and follow-up of patients with differentiated thyroid cancer. It is done 4-6 weeks after surgery. This allows the patient to recover from surgery, for reestablishment of blood supply to the operative site, for circulating levels of T4 to fall, and for any stable iodine used in the setting of surgery to be excreted. The main aim for whole body scan is to exclude the presence of distant functioning metastases (especially lung metastases) that are not seen by other imaging modalities. Its sensitivity for detection of metastatic disease is 50-70% depending on the diagnostic dose given. This is why post therapy scan done 4-5 days later increases the detection of metastatic disease by 45% [24].

The combination of Iodine-131 whole body scan and serum thyroglobulin estimation in the detection of local recurrence or distant metastatic disease has a sensitivity that ranges from 85 to 100% especially when thyroglobulin is estimated 4-6 weeks after Eltroxin withdrawal, i.e. on high TSH levels more than 30\mu U/ml [25,26].

Thallium - 201 and Tc.99m sestamibi are nonspecific tumor imaging agents that are used in the follow-up of differentiated thyroid cancer. They have a sensitivity ranging from 60 to 90% and they do not require discontinuation of Eltroxin therapy. They are most sensitive for local tumor recurrence and lymph node metastases, but less sensitive for lung and bone metastases, [27].

Postoperative radioactive iodine ablation decreases the risk of recurrence by destruction of microscopic disease, which is known to be present in the thyroid remnant and ipsilateral lymph nodes in 90% of patients with papillary thyroid cancer. For many years, the ablative dose of radioactive iodine was between 30 and 150 mCi and most published data on the effectiveness of ablation in reducing the risk of recurrence was obtained from patients given 80-100 mCi [28]. The usual criteria for successful ablation are absence of any local uptake in the neck on follow-up Iodine whole body scans. In our study, all patients were successfully ablated as the amount of residual normal thyroid tissue was minimal after completion thyroidectomy.

The reported complications for radioactive iodine ablation are transient headache or nausea (radiation sickness), sialadenitis with temporary loss of taste, transient drop in sperm count and radiation thyroiditis. These are more common when more than 100mCi of I\textsuperscript{131} are given [29]. Fortunately, no significant complications were reported in our series as we did not exceed 100 mCi ablation and all patients had very small thyroid remnants after successful completion thyroidectomy.

In conclusion, although many surgeons advocate total or near-total thyroidectomy for differentiated thyroid carcinoma, some of these surgeons hesitate to do completion thyroidectomy when there is no clinical evidence to suggest bilateral disease, for fear of added morbidity to the patients. However, as demonstrated in this study, completion thyroidectomy can be performed safely with little morbidity to the patients also it facilitates further management and follow-up. The decision to perform completion thyroidectomy for WDTC should be based on the patient’s risk category, and not based on a concern for risk of complications from the second procedure.

REFERENCES


