

Evaluation of 118 Thyroid Cancer Patients Who Underwent a Re-operation after Local Resection

Jianping Hang

Dong Meng

Liqi Li

Department of Thyroid and Breast Surgery, Wuxi No. 4 Hospital, Wuxi, Jiangsu 214062, China.

OBJECTIVE To evaluate the incidence of residual thyroid cancer and cervical lymph node metastasis following a previous local resection for thyroid cancer, and to discuss methods of a reoperation.

METHODS From 1994~2005, 118 patients with thyroid cancer who had previously been treated with a nodule-resection or subtotal lobectomy in other hospitals underwent a surgical re-operation.

RESULTS The incidence of residual cancer at the primary site was 38.1%. The lymph node metastasis rate at the central area was 39.8%. The rate of lymph node metastasis in patients with enlarged lymph nodes in the ipsilateral internal jugular chain was 37.5%. The rate of laryngeal recurrent nerve injury was 15.2% in other hospitals while that of the second operation in our hospital was 1.6%.

CONCLUSION Nodule-resection or subtotal lobectomy alone is not indicated for patients with thyroid cancer because of the high rate of local residual cancer. It is important to be familiar with the anatomy of the laryngeal recurrent nerve for thyroid surgery. Exploration to the central area is necessary for differentiated thyroid cancer.

KEYWORDS: thyroid neoplasm, re-operation.

Thyroid cancer is one of the most common malignant endocrine neoplasms for which surgery is the primary therapy. It is well known that a re-operation after a previous operation is extraordinarily difficult and complicated. The most important criterion for avoiding a re-operation is to be in strict conformity with a tumorless technique during the previous operation. We analyzed data from 118 patients who received a re-operation in our hospital because of a diagnosis of thyroid malignancy based on a pathological examination after the previous local resection. This study was conducted in order to emphasize the necessary range for a curative resection and to discuss the problems presented by a previous local resection.

MATERIALS AND METHODS

Materials

The 118 patients (15 male, 103 female) in this study, ranging in age from 17 to 73 (average 38.6), all had undergone a previous local-resection operation in other hospitals. Operational information received from other hospitals: 74 patients were treated with a simple tumor resection in a unilateral part or isthmus of the thyroid gland; 9 patients underwent a cancer resection in a bilateral part of the thyroid gland; 33 patients were treated with a partial or subtotal resection of a unilateral part of the thyroid gland; 5 patients underwent a partial resection of bilateral parts of the thyroid gland; 2 patients had undergone a total

removal of a unilateral portion of the thyroid gland. The diagnosis of papillary carcinoma was made in 102 patients, follicular carcinoma in 14 patients, and medullary carcinoma in 2 patients. Before the re-operation in our hospital, 92 patients had undergone only one previous operation, 14 patients had undergone 2 previous operations, and 2 patients had undergone 3 previous operations. Ninety-five patients were treated with the re-operation in our hospital from 10 days to 6 months after the last previous operation (68 patients within 2 months after the previous operation). Examination results upon admission: no obvious mass could be palpated in the thyroid gland, but residual cancer could be diagnosed by B type ultrasonography, CT or ECT. Nodules in the opposite lateral part of the thyroid gland were found in 38 patients and enlargement of lymph nodes in the ipsilateral internal jugular chain were found in 56 patients. Unilateral paralysis of the vocal cords was found in 18 patients (15.2%). Symptomatic hypocalcaemia was found in 2 patients.

Re-operation

All patients received general anesthesia during the operation. A foot-controlled sharp-tip electrotome was used. The skin was incised through the original incision of the previous operation. The incision should be performed carefully near the gland. The parathyroid glands on both sides and their blood supply must be identified and protected. An understanding of the anatomy of the laryngeal recurrent nerve is most important for lobectomy of the thyroid gland. An exploration of the lymph nodes in the ipsilateral central area routinely performed even though the pathological result of lymph nodes was negative for cancer. The residual lobe and the isthmus part should be removed in patients with an original single neoplasm. A frozen-specimen biopsy must be performed during operation if a nodule was found in the opposite lateral part of the gland. Total thyroidectomy is necessary when the biopsy result indicates a malignant neoplasm, and a partial resection should be performed if it is benign. Total thyroidectomy is also necessary for patients whose original neoplasm was in the isthmus and larger than 1.5 cm in diameter. A subtotal resection of the bilateral parts and the total isthmus of the thyroid gland should be performed if the diameter of the isthmus neoplasm is not larger than 1.5 cm. Total thyroidectomy for follicular carcinoma is beneficial to postoperative radioisotope treatment. A radical exploration of lymph nodes in the ipsilateral part of the thyroid gland in addition to a total thyroidectomy is necessary for

medullary carcinoma. A functional exploration of the jugular lymph nodes was routinely performed in cases in which the enlargement of the lymph nodes was found by palpation, B type ultrasonography or CT examination. The recurrent laryngeal nerve should be reconstructed during an operation within 2 months after the last operation in patients complicated with paralysis of the vocal cords. The nerve should be released if a mistake of nerve ligation was found. One should try to find the cut terminal of the nerve and reconstruct it if it had been severed.

RESULTS

Residual cancer

Residual cancer was found in 66 patients (55.9%). The residual cancer in the primary lateral part of thyroid gland occurred in 29 patients. Residual cancer with jugular lymph nodes metastasis was found in 16 patients. Lymph nodes metastases alone were found in 21 patients, and cancer was found in the opposite lateral part of the thyroid gland in 9 patients (7.6%).

Lymph nodes metastasis

In 56 patients who underwent functional exploration of the internal jugular lymph chain, lymph nodes metastases in the ipsilateral jugular internal chain were found in 21 patients (37.5%), while in another 19 cases additional cancer metastases were found in the central area. Twenty-eight cases of cancer metastasis were found by central area exploration of lymph nodes. Metastases of the general jugular lymph nodes were found in 49 patients (41.5%).

Complications

Unilateral paralysis of the vocal cords occurred in 18 patients (15.2%) due to the last previous operation. During the re-operation, the laryngeal recurrent nerve was found severed at the point of entering the throat in 6 patients. In 2 of these 6 patients, the proximal terminal of the nerve was found and then repaired with a vein-bridged operation, which resulted in the basic recovery of articulation in 1 patient but no improvement in the other. A nerve ligation mistake or adhesion was found in 7 patients, 5 of whom had undergone the last previous operation no more than 1 month ago. All recovered functionally by 2 to 6 months following the operation to release the nerve. The other 2 patients who had received the previous operation more than 2 months ago achieved no improvement at all. For another 5 patients with paralysis of their vocal cords no

apparent reason was found. An operational injury of the laryngeal recurrent nerve occurred in 2 patients (1.6%) during the re-operation. They recovered functionally in 3 and 6 months by a terminal-to-terminal reconstruction in the operation. Temporary hypocalcaemia occurred in 2 patients of the 50 who underwent a total thyroidectomy, which was relieved in 1 week by supplying calcium. A mistaken removal of 1 parathyroid gland was found by a histological examination in 2 patients, but without symptomatic hypocalcaemia. No permanent hypoparathyroidism was observed after the re-operation.

Follow-up

All the patients in this study were treated continuously with supplementary thyroxin resulting in suppression of thyroid gland function. During 1~6 months following the re-operation, 52 patients were treated with ¹³¹I. Full follow-up was achieved in 98 patients (83%). The follow-up showed that the tumorless survival rate was 95.9% (94/98), but 2 patients are surviving with a tumor-burden. Metastases of the lung and bone occurred in 1 patient with follicular carcinoma and bone metastases were found in 1 patient with papillary carcinoma, who is living but not well even after 2 treatments with ¹³¹I. The other 2 patients died of heart disease, one in 3 years and the other in 5 years after the re-operation.

DISCUSSION

The causes of re-operation

Surgeons have performed thyroid gland operations conservatively for many years because of fear of injuring the laryngeal recurrent nerve or parathyroid glands. Thus, only local resections or subtotal resections were commonly performed. Incomplete operations result in a high incidence of residual cancer and lymph node metastasis in the jugular internal chain. In this study, the incidence of total residual cancer and lymph node metastasis in the jugular internal chain was 55.9% and 41.5%, respectively. The most common reasons for a re-operation (75% approximately^[1]) were the high rate of misdiagnosis due to incomplete medical equipment and the lack of professional skills of surgeons and pathologists. This study showed that in 13.5% of all the cases the doctors mistakenly overlooked the important details of thyroid surgery as they were not familiar with the biological characteristics or the pathological types of thyroid cancers.

Selection of operation methods and resection range

Because of a lack of references from randomized prospective comparative studies, at the present time there is no consensus on the resection range for thyroid surgery.^[2] In a large survey of hundreds of thyroid carcinoma specialists, most recommended a total-removal operation for the treatment of differentiated thyroid carcinoma. For the following reasons, there is a low incidence of recurrence, a high rate of longtime survival, a low mortality of cancer-related causes, advantages for postoperative ¹³¹I therapy and follow-up, a low incidence of operative complications, and that it is usual to have multiple foci in bilateral parts of the thyroid gland. However because of a high incidence of operative complications when the total thyroid gland is removed by unskillful surgeons who lack sufficient surgical experience, many other specialists have stated the opposite opinion, i.e. that a limited operation could reduce the incidence of operative injury to the parathyroid glands or the laryngeal recurrent nerve.

The treatment criteria for treating thyroid carcinoma differs depending on its different pathological type, malignancy, pathway of metastasis, and its prognosis. We believe that the selection of operation methods should be individualized.

Papillary carcinoma

The operation method for papillary carcinoma should be selected in consideration of its tumor biological characteristics, of jugular lymph node metastasis and multiple carcinoma foci. The resection of the ipsilateral and isthmus portions of the thyroid gland should be performed on patients with a single neoplasm. Additional partial or total resection of the opposite lateral part of the gland also should be performed depending on the frozen-section biopsy during operation if the neoplasm exists in the opposite lateral part of thyroid gland. A carcinoma in the isthmus area needs resection of the isthmus and a subtotal resection of bilateral parts of the thyroid gland.

Follicular carcinoma

A follicular adenoma diagnosed by frozen-section biopsy during an operation needs at least a resection of the ipsilateral and isthmus portions of thyroid gland because an adenoma and adenocarcinoma are difficult to differentiate by frozen-section biopsy, and the most common metastatic pathway for a follicular carcinoma is via blood vessels. A total thyroidectomy and additional postoperative ¹³¹I treatment are necessary for

definitely-diagnosed follicular adenocarcinoma.

Medullary carcinoma

The primary treatment method for medullary carcinoma should be total thyroidectomy and exploration of the jugular lymph nodes if possible, because blood and lymph node metastases are common in patients with medullary thyroid carcinoma.

Undifferentiated carcinoma

An isthmus resection is usually selected for patients with undifferentiated carcinoma. This procedure is used only to release pressure on the trachea because a radical operation is usually impossible when the patients are admitted to the hospital in a high state of malignancy with a fast progressing course of undifferentiated carcinoma. The mortality rate is high with an average survival period of only 2 to 6 months.

Treatment of jugular lymph nodes metastasis

Most thyroid cancers are papillary carcinomas having the characteristic of frequent metastasis of the jugular lymph nodes, one of the most important factors that affect the prognosis. The incidence of jugular lymph node metastasis was reported to be 40~51% by Li,^[3] and in our study it was 41.5%. The first site of metastasis is usually in the Jugular Zone VI where the metastatic lymph nodes can easily invade the adjacent trachea, esophageal or laryngeal recurrent nerve. This is especially true for carcinomas which develop in the middle or inferior part of the thyroid gland. The primary aim of exploration of the central area is to clean down the lymph nodes in the Jugular Zone VI. Of the 49 patients with jugular lymph node metastasis in this study, 47 patients (95.9%) developed metastatic carcinoma in the Jugular Zone VI or simultaneous ipsilateral jugular metastasis, thereby strongly supporting the necessity for exploration in this zone. The exploration of lymph nodes in the central area should be performed when the diagnosis of papillary carcinoma is made by a frozen-section biopsy even though the lymph nodes in the ipsilateral jugular internal chain are negative. A functional jugular exploration should be performed on patients found with enlargement of lymph nodes in the ipsilateral jugular internal chain by palpation, B type ultrasonography or CT, and a lymph node biopsy also should be conducted if necessary, in order to define the pathology in a single operation.

Measures to reduce operative complications

The anatomical derangement resulting from the previ-

ous operation could lead to accidental injury for the parathyroid glands or laryngeal recurrent nerve. It has been reported that the incidence of nerve injury increased 7 times in the secondary operation.^[4] In our study unilateral paralysis of the vocal cords occurred in 18 patients (15.2%) due to the previous operation in other hospitals, suggesting that the surgeons have improved their techniques for thyroid surgery. We agree with the point of view of exposing the laryngeal recurrent nerve as much as possible^[5] and being familiar with the anatomical structure of the sites where the nerve is easily injured. By using the laryngeal recurrent nerve as an anatomical marker, one can thoroughly resect the lateral part of the neoplasm while avoiding operative injury. This technique is beneficial for lymph node exploration in the tracheoesophageal sulcus. Otherwise, the residual cancer may occur due to preservation of the posterior capsule of the thyroid gland to avoid injury. In this study, the incidence of nerve injury during the re-operations resulting from severe tissue adhesions caused by the previous operation was 1.6%, a value that is lower than the results in the literature. The incidence of hypocalcemia after total thyroidectomy increased from 1% after the first operation to 11% following the re-operation.^[4] No permanent hypoparathyroidism was observed in this study, because the anatomical disturbance usually due to bleeding in the field of operation was avoided via a refined operation technique.

Necessity for re-operation

Although a radical operation is the only effective treatment for thyroid cancer, improper operation methods can lead to a high incidence of residual cancer as reported by Li,^[3] which is similar to the result of this study. Re-operations are necessary. The characteristics of most thyroid cancers are that of well differentiated, low malignancy, slowly progressing, and with good prognosis, all of which make it possible for patients to undergo a re-operation. It is important to perform the first operation by the usual norms, though the prognosis of thyroid cancer is statistically better than many other cancers. One of the most important factors which worsen the prognosis is that of an incomplete operation used in the initial treatment without additional radical measures. The local resection and subtotal resection operations that do not produce a complete cure, should be abandoned. Re-operations should be performed as early as possible based on the pathological tumor type. Lymph node exploration is recommended for patients with a differentiated carcinoma

but without clinical findings of enlarged jugular lymph nodes. The goals are to achieve an effective complete cure while preserving normal jugular functions and appearance, and to avoid possible injury of the laryngeal recurrent nerve caused by tissue adhesions that may influence an exploration procedure in a future re-operation if lymph node metastases are found during follow-up.^[6]

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