

Managing The Solitary Thyroid Nodule

FA Meah, FRACS, MA Qureshi, FRCS (Gen), Department of Surgery, Hospital University Kebangsaan Malaysia, Bandar Tun Razak, Cheras, 56000 Kuala Lumpur

Summary

Solitary thyroid nodules are commonly seen in surgical outpatient clinics. A detailed history and a careful physical examination are essential. In the management of the solitary thyroid nodule, fine needle aspiration cytology has become the cornerstone investigation. Ultrasound cannot differentiate between benign and malignant nodules, however is useful in the follow-up period to identify any further nodular growth. As thyroid malignancy occurs in both hot and cold nodules, radionuclide scans are not useful in the management of solitary thyroid nodules. We have attempted to outline the process of managing the solitary thyroid nodule and discuss the options available.

Key Words: Solitary Thyroid Nodule

Introduction

A solitary thyroid nodule (STN) is a discrete palpable nodule within an otherwise normal thyroid gland. The incidence of thyroid nodules increases with age and is more common in females compared to males^{1,2}. A clinically solitary nodule when visualized by ultrasound, in as many as 40-67% prove to be multinodular^{3,4}. The causes of solitary thyroid nodules include colloid nodules (42-77%), adenomas (15-25%), cysts (15-25%), and carcinoma (8-17%)². Other rare causes include inflammatory diseases and developmental anomalies. The concern regarding these solitary nodules is the possibility of cancer within these nodules. Fortunately the incidence of carcinoma in these STN is only 8-17%². Nevertheless, this is a significant figure and is a cause of real morbidity and mortality.

The only large Malaysian study on thyroid carcinoma is in keeping with established international findings⁵. This Malaysian study was a retrospective analysis of 152 cases of thyroid malignancy, with a female to male ratio of 4:1. Of these 152 cases, papillary carcinoma was seen in 63%, follicular carcinoma in 28%, anaplastic carcinoma in 5% and medullary carcinoma in 4%. Due to the high default rates an assessment of survival was

not possible. In an attempt to reduce morbidity and mortality in Malaysia the management of STN needs to be unified. A consensus has to be realised. Therefore in the management of STN, we suggest the following:

1. Detailed history

A history of ionizing radiation particularly in infancy/childhood increases the risk of malignancy⁶. Other factors increasing the risk of malignancy include an age below 20 years and greater than 60 years at presentation, male sex, a family history of medullary carcinoma, familial adenosis polyposis and hoarseness^{7,8}. Enquire regarding symptoms of hypo/hyperthyroidism.

2. Physical examination

Cancer of the thyroid gland tends to be found more commonly in patients with a solitary palpable nodule although up to 50% of these patients actually have multiple nodules^{2,7}. Features increasing the risk of malignancy include firm to hard nodule, regional lymphadenopathy, fixation to adjacent tissue and vocal cord paralysis⁸. In addition the presence hypo/hyperthyroidism as well as features of thoracic inlet compromise need to be ascertained.

3. Investigations

Mandatory investigations include Thyroid Function Tests (TSH and T4) and Fine Needle Aspiration Cytology (FNAC). FNAC has become the cornerstone in the investigation of the STN. In a recent review of over 18,000 FNAC results indicated a sensitivity rate of 83% and a specificity rate of 92% for the diagnosis of cancer⁹. Serum calcitonin should be measured when medullary thyroid carcinoma is suspected².

Ultrasound is sometimes used to differentiate between STN and a multinodular goitre, however it is important to note that cancer occurs more frequently in patients who have a single palpable nodule on physical examination, even though as many as two thirds of these may have multiple nodules on ultrasound². Ultrasound at present is unable to distinguish between benign and malignant nodules^{1,8,10}. The previously described halo sign, a sonoluscent rim around a solid lesion with dense internal echoes, of benign nodules is now known to occur in both papillary and follicular carcinoma^{11,12}. Ultrasound is useful in the follow-up period to detect any further nodular growth. Radionuclide scans can mislead as thyroid carcinoma can occur in cold, warm or hot nodules. In a review of more than 5,000 cases, the incidence of carcinoma in a cold nodule was 16%, 5% in a warm nodule and 4% in a hot nodule, hence although the incidence of carcinoma is less likely in a hot nodule, it is still significant¹³⁻¹⁵. Hence, radionuclide scans are not useful in the management of solitary thyroid nodules.

4. Management of STN

The management of the STN will depend largely on the FNAC findings. However on occasions that the FNAC is inconclusive/bloody after two attempts, surgery is probably indicated in the form of a hemithyroidectomy. When the results of the FNAC suggest a diagnosis of either a cyst, colloid adenoma, follicular adenoma, papillary carcinoma or medullary thyroid carcinoma, the management is as follows:

Cyst

Aspirate until the cyst is completely collapsed. Once collapsed, the patient will need to be followed up and if the cyst recurs, will need re-aspiration. All aspiration contents should be sent for cytological assessment.

Surgery is indicated in the form of a hemithyroidectomy in cases of residual mass following FNAC and recurrent cysts¹⁰. Where the FNAC confirms the presence of cancer proceed to the appropriate management below.

Colloid Adenoma

In cases of small lesions (<2cm), patients can be followed up at intervals of 3 months for up to 12 months. If the lesion continues to increase in size surgery is indicated. For lesions that later prove to be malignant there is no increase in morbidity or mortality as a result of the waiting period⁸. For larger STN (>2cm), surgery is indicated in the form of a hemithyroidectomy^{8,16}.

Toxic Adenoma

As malignancy occurs in both cold and hot nodules, in the presence of a hot nodule surgery is indicated in the form of a hemithyroidectomy¹⁵.

Follicular Adenoma

Due to the difficulty in differentiating between benign and malignant follicular adenomas, a hemithyroidectomy is indicated in all cases. If the histopathological assessment of the resected specimen is that of a benign nature, no further treatment is indicated. Total thyroidectomy is indicated in cases of malignant follicular adenoma. Radioactive iodine can be used for scanning of the body and if metastases are found adjuvant therapy such as radioactive iodine ablation must be considered postoperatively. These patients with a follicular carcinoma require careful long-term follow-up¹⁷.

Papillary Carcinoma

When there is no evidence of lymph node spread at surgery, a total thyroidectomy is advocated together with a prophylactic central node dissection, which includes the pretracheal, paraoesophageal and paratracheal group of lymph nodes¹⁸. However, if there is evidence of lymph node spread at surgery, a total thyroidectomy together with a functional neck dissection on the affected side is required¹⁹. In addition adjuvant therapy with 0.2mg L-thyroxine to suppress TSH is required. The optimal degree of suppression is unknown². DeGroot and associates believe that it is appropriate to perform a total body scan with radioactive iodine in patients with differentiated thyroid carcinoma to ablate any uptake in the neck after total

thyroidectomy and to treat any local or distant metastases that are present with I131 therapy⁶.

Medullary Thyroid Carcinoma (MTC)

In these cases the Multiple Endocrine Neoplasia (MEN) syndromes (Type IIa, IIb) have to be excluded. Investigations such as serum calcium, serum parathyroid hormone levels and urinary VMA levels have to be checked. For cases of sporadic MTC, the best course of treatment is a total thyroidectomy as MTC does not respond to radioactive iodine, nor does it respond to L-thyroxine and there is a tendency for this tumour to be multicentric. There is minimal response to external beam irradiation²⁰. In the management of familial MTC associated with the MEN syndromes, the

phaeochromocytoma should be treated first. Parathyroidectomy is performed if hypercalcaemia is present and as there is usually hyperplasia of the parathyroid glands, all four should be removed with autotransplantation to the brachioradialis.

Thyroid Nodules in Children

These pose a special problem as although infections and developmental anomalies are common, the incidence of cancer in a STN in a child may be as high as 14-61%^{19,21}. Due to its difficulty in children FNAC has not been extensively studied in this group. Hence following radionuclide scan to exclude a hyperfunctioning nodule, if FNAC cannot be performed, surgery is indicated to identify the cause of the nodule²².

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MCQ's on the Article Managing the Solitary Thyroid Nodule

1. Solitary thyroid nodules
 - a) are more common in females.
 - b) commonest cause is carcinoma.
 - c) ultrasound will correspond to clinical diagnosis in nearly all cases.
 - d) may result from developmental anomalies.
 - e) incidence increases with age.

2. Clinical features that may suggest malignancy in solitary thyroid nodules include
 - a) soft nodules.
 - b) regional lymphadenopathy.
 - c) fixation to adjacent tissue.
 - d) vocal cord paralysis.
 - e) features of hyperthyroidism.

3. Medullary thyroid carcinoma
 - a) may be part of MEN type I syndrome.
 - b) tumour may be multicentric.
 - c) responds to radioactive iodine.
 - d) does not respond to L-thyroxine.
 - e) may be associated with hypercalcaemia.

4. The following statements are true
 - a) solitary thyroid nodules in children are almost never malignant.
 - b) radionuclide scans are useful in the management of solitary thyroid nodules.
 - c) ultrasound can distinguish between benign and malignant nodules.
 - d) surgery is not considered without FNAC.
 - e) small colloid adenomas can be followed up without surgery.

CONTINUING MEDICAL EDUCATION

5. In relation to papillary thyroid carcinoma
- a) hemithyroidectomy is the recommended option.
 - b) when there is nodal spread, a total thyroidectomy with a functional neck dissection is warranted.
 - c) L-thyroxine suppression is useful postoperatively.
 - d) radioactive iodine can be used to ablate metastases.
 - e) may be associated with raised serum calcitonin.