

THE MANAGEMENT OF THE SOLITARY THYROID NODULE

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The management of the solitary thyroid nodule is a relatively common problem. Many different types of pathology in the thyroid gland can present as a solitary lesion and the management covers a wide range of different conditions.

The solitary thyroid nodule presents in a variety of ways. One of the commonest is that the patient notices a swelling in his or her neck when looking in the mirror. There is often no discomfort or other symptom, but it is just noticed cosmetically. The swelling may even be noticed by a relative or friend who comments on the abnormality. Pain in the neck of fairly sudden onset sometimes draws attention to the swelling. In these circumstances it is likely that there has been a haemorrhage into an abnormality in the gland and the swelling appears or increases in size fairly suddenly. Another way of presentation is for the patient to complain of dysphagia and this often indicates a fairly large swelling in one or other thyroid lobe compressing the oesophagus. Hoarseness of the voice yet another presenting symptom and this is an ominous method of presentation as it indicates involvement of a recurrent laryngeal nerve. Severe dyspnoea may also be the first presenting symptom and this again is a sinister symptom.

Apart from all the types of presentation mentioned above, the patient may also come for advice because of the symptoms of either hyperthyroidism or hypothyroidism. Before examination of the patient, a full history is taken and important features are the length of the history which usually indicates a benign slowly growing process. A sudden onset of pain and swelling indicates haemorrhage into either a cyst or a nodule such as would be found in a multinodular goitre. The hoarse voice suggests infiltration of the recurrent laryngeal nerve by a malignant tumour. Very rarely, a benign lesion of the thyroid gland can cause recurrent laryngeal nerve palsy by compression of the nerve, but this is rare. Both dysphagia and dyspnoea suggest significant pressure on the trachea and oesophagus or malignant infiltration of either or both.

TABLE I PRESENTING SYMPTOMS OF A SOLITARY THYROID NODULE

NOTICED A LUMP IN NECK WHEN LOOKING IN THE MIRROR
SOMEONEELSE NOTICED THE LUMP
PAIN IN NECK
DYSPHAGIA
HOARSE VOICE OR CHANGE OF VOICE
QUALITY
OBSTRUCTED AIRWAY
SYMPTOMS OF THYROTOXICOSIS OR
HYPOTHYROIDISM

Hypothyroidism occurs in thyroiditis and Hashimoto's thyroiditis can present as a solitary nodule in one lobe of the thyroid gland, although much the most common method of presentation is with a diffuse bilateral firm goitre. A patient with a solitary "hot" nodule will present with the symptoms of hyperthyroidism.

Special Investigations

Thyroid function tests are a mandatory requirement in all patients presenting with any abnormality in the thyroid gland. The clinician can get a surprising result, especially in the elderly patient who shows none of the usual signs of hyperthyroidism. A solitary nodule assumed by the clinician to be a colloid nodule or a benign tumour can be a hot nodule, and when this is handled at surgery the patient can become severely toxic during the operation. This is another reason why thyroid function tests must be carried out in all patients. Estimation of thyroid antibodies is also necessary, as this will draw attention to thyroiditis as a diagnosis which had not been suspected. Thyroid antibodies are elevated in thyroiditis.

TABLE 2 INVESTIGATIONS OF THE SOLITARY THYROID NODULE

THYROID FUNCTION TESTS
THYROID ANTIBODIES
ULTRASOUND
FINE NEEDLE ASPIRATION CYTOLOGY (FNAC)
Tc SCAN
X-RAY THORACIC INLET
CT
MRI

A fine needle aspiration cytology (FNAC) of a nodule in the thyroid gland is an important and useful investigation. The procedure is carried out using a 20 millilitre syringe and a standard disposable needle as used when taking blood. Following the aspiration, firm pressure is required over the area punctured for three or four minutes. It is rare for any haemorrhage to occur following an aspiration biopsy if this precaution is followed.

A fine needle biopsy will yield important information if thyroiditis is the diagnosis. It is helpful if the patient has a papillary carcinoma of the thyroid. It is helpful in lymphoma of the thyroid, and it is of course very helpful if the diagnosis is a simple cyst. Important information can be obtained if the nodule is part of an anaplastic carcinoma, but fine needle aspiration cytology is not reliable in the diagnosis of follicular carcinoma. It cannot distinguish between follicular adenoma and carcinoma because it cannot assess the degree of capsular invasion. It is a vital investigation in differentiating between anaplastic cancer and lymphoma.

Ultrasound examination of the solitary nodule is useful as it gives information as to whether the nodule is solid or cystic. It gives no information about the function of the nodule.

A Tc scan is useful in assessing areas of hot and cold pathology. An x-ray of the thoracic inlet can be helpful to demonstrate tracheal deviation or compression.

Both CT scanning of the neck and MRI scan can give useful information in certain circumstances. It is particularly useful in investigating thyroid swellings in the elderly. Surgery to the thyroid gland should be avoided in the over eighties if possible, but it cannot be avoided if there is severe compression and narrowing of the trachea by a benign lesion. Both CT scan and the MRI scan give very accurate information of the degree of tracheal narrowing.

The Aetiology of the Solitary Thyroid Nodule

The commonest cause of a so-called "solitary" thyroid nodule is in fact a single palpable nodule in a multinodular goitre. Ultrasound examination may reveal other smaller nodules or cysts, giving a clue that the nodule is not solitary but part of a multinodular goitre. A solitary cyst in the thyroid gland is a common cause of the solitary nodule. Cysts, however, derive from degenerating thyroid cells with or without haemorrhage into an abnormal area. A cyst therefore indicates an abnormality in the thyroid gland. After aspiration of a thyroid cyst the cyst commonly refills. A benign lesion in the thyroid such as a "colloid nodule" or a "follicular adenoma" are also common causes of a solitary nodule. Aspiration cytology is particularly useful in these circumstances. Thyroiditis (Hashimoto's thyroiditis) can present as a solitary nodule and it is important to make this diagnosis without surgery as the treatment is non-surgical.

TABLE 3 SOLITARY THYROID NODULE

SOLITARY SINGLE PALPABLE NODULE IN A
MULTI NODULAR GOITRE CYST
BENIGN THYROID TUMOUR (FOLLICULAR ADENOMA)
COLLOID NODULE
THYROIDITIS
SOLITARY HOT NODULE
CANCER OF THE THYROID

Cancer of the thyroid often presents as a solitary thyroid nodule. Thyroid cancer accounts for about 1% of all malignancies. The malignancy arises either in the follicular or parafollicular cells. When it arises in the follicular cells, it either occurs as a differentiated or an undifferentiated tumour. When it is a differentiated tumour, it is either a papillary or a follicular carcinoma. The papillary carcinoma tends to occur in the younger patient, being not uncommon below the age of 20, whilst the follicular carcinoma occurs in a rather older age group, usually between 30 and 40. These two forms of differentiated thyroid cancer can co-exist however.

Both of these types of differentiated thyroid cancer carry a relatively good prognosis provided they are treated adequately.

Undifferentiated cancer arising from the follicular cells is a highly aggressive disease carrying a very high mortality within a relatively short time. It is vital to distinguish anaplastic follicular carcinoma from a lymphoma, as a lymphoma can be more readily treated and carries a relatively good prognosis.

Tumours also arise from the parafollicular cells in the form of medullary carcinoma of the thyroid or as a lymphoma. Medullary carcinoma of the thyroid is rare. It arises in the cells of the thyroid. These are the cells which produce calcitonin. It

occurs at all ages, but is more common in the younger patient between 20 and 40. It runs a fairly aggressive course, metastasising both to lymph glands and via the blood stream. It is part of the multiple endocrine adenomatosis syndromes (MEA 2a). It can be associated with a phaeochromocytoma, and any patient with medullary carcinoma of the thyroid must be thoroughly investigated to exclude a coincidental adrenal medullary tumour.

Lymphomas of the thyroid usually present as a diffuse swelling in both lobes of the thyroid, but they can present as a solitary nodule. Lymphoma of the thyroid can complicate long term thyroiditis particularly if the thyroiditis has not responded to TSH suppression with thyroxine.

Treatment of the Solitary Thyroid Nodule

Treatment of thyroiditis is non-surgical. Thyroid stimulating hormone (TSH) should be suppressed by giving the patient thyroxine orally. A dose of 0.1 mg of thyroxine daily is usual, but this can be increased provided the patient does not develop serious side effects. It is usual for a nodule of Hashimoto's thyroiditis to resolve on medical treatment. Only in very rare cases, when it does not respond to this medical treatment, is surgical intervention necessary. When such intervention is necessary, special care is required to avoid the recurrent laryngeal nerves as the incidence of damage is relatively high when operating on thyroiditis.

Initially, a cyst is aspirated but it usually recurs and, if it recurs after a second aspiration, surgical excision is often necessary this usually involves a hemithyroidectomy or a partial hemithyroidectomy.

A colloid nodule of modest proportions does not necessarily require surgical excision. In the past more thyroidectomies were carried out than are now considered necessary, contributing to unnecessary

morbidity. Regular monitoring of a colloid nodule is all that is required and, should it reach sizeable proportions, then surgical removal is indicated. With a benign tumour of the thyroid gland there is always doubt that fine needle aspiration biopsy has not yielded the important information of invasion of the capsule, so it is usual to excise a benign thyroid adenoma and this will involve a hemithyroidectomy.

The management of differentiated thyroid cancer involves a near total thyroidectomy. It is for this reason that a pre-operative diagnosis is valuable in order to avoid second surgical intervention to remove the contralateral lobe. A fine needle aspiration biopsy can give the essential information of a papillary carcinoma, and a one stage near total thyroidectomy can be performed. With a follicular carcinoma it is still sometimes necessary to re-operate on the patient to remove the contralateral lobe when the aspiration biopsy suggests a benign lesion that subsequently is shown on full histology to be an invasive tumour.

Once a near total thyroidectomy has been carried out the patient is referred for radioactive iodine scanning and, depending on whether there is or is not residual thyroid tissue, a therapeutic dose of radioactive iodine is given. Where there is evidence of involved lymph nodes at the time of surgery, these will have been removed during the operation. Residual disease is treated with radioactive iodine and six monthly scans are carried out followed by therapeutic doses of radioactive iodine until all signs of metastatic disease have been eliminated. All patients with differentiated thyroid cancer should receive thyroxine orally in order to suppress TSH in the long term.

TABLE 4 TREATMENT OF CANCER OF THE THYROID

DIFFERENTIATED CANCER

NEAR TOTAL THYROIDECTOMY

THERAPEUTIC I¹³¹

THYROID REPLACEMENT

UNDIFFERENTIATED CANCER

STEROIDS TO REDUCE OEDEMA (DEXAMETHASONE)

RADIOTHERAPY

THYROXINE

LYMPHOMA

RADIOTHERAPY

THYROXINE

Undifferentiated carcinoma of the thyroid usually presents as a respiratory emergency. The administration of steroids in the form of dexamethasone can be helpful to reduce oedema, and an oxygen helium mixture can assist breathing. Following an aspiration biopsy to confirm the diagnosis, radiotherapy is the only treatment available. There is no place for chemotherapy or surgery in this condition.

Medullary carcinoma of the thyroid is treated by radical surgery involving removal of all involved lymph nodes. A central core dissection may be necessary. Radioactive iodine plays no part in the treatment of medullary carcinoma of the thyroid, but radiotherapy can be used if radical surgery fails to eliminate the disease.

Lymphomas of the thyroid are diagnosed by fine needle aspiration cytology, and the treatment is radiotherapy. The prognosis in this condition is relatively good.

Before undertaking any surgical intervention on the thyroid gland, examination of the larynx is necessary to confirm that both vocal cords are functioning normally before intervention. If one or other cord is immobile, this must be recorded before any surgical intervention. The patient must be warned of the possible complications associated with thyroid surgery. These complications are haemorrhage (which is exceedingly rare with good technique), damage to the recurrent laryngeal nerves (which should be a rare complication in skilful hands), inadvertent removal of the parathyroid glands causing hypocalcaemia, and the possibility that the scar might become keloid in rare circumstances. Before embarking on a surgical procedure it would be wise to have an informed consent signed by both the patient and the operating surgeon.

INFORMED CONSENT

I am required to warn you of possible complication that can occur during thyroid surgery. You should be fully informed of possible risks when you sign this consent form to undergo surgery to the thyroid.

A temporary voice change following anaesthesia and intubation of the larynx is common and resolves within hours. A minor degree of sore throat for 24 hours after surgery is also common. A more permanent voice change due to damage to the recurrent laryngeal nerves (nerves to the voice box) can occur. This is rare but is slightly more common in operations for malignant conditions and thyroiditis. Should this complication occur the voice quality usually improves with time. When the paralysis occurs on both sides (extremely rare) it is more serious.

During the operation care is taken to minimize blood loss and in most cases the loss is negligible. Bleeding during and after surgery can

occur, and in very rare instances a further surgical procedure to remove a blood clot is necessary.

The parathyroid glands lie in close relationship to the thyroid gland and these control your calcium metabolism. You might require calcium supplement in the short term after thyroid surgery, and in rare case in the long term.

You may require to take thyroid replacement medication in the long term after surgery when both sides of the thyroid gland are removed. Every care will be taken to avoid all possible complications.

Signed:(Operating Surgeon)

I have read this explanation of possible complications and agree to proceed with surgery.

Signed:(Patient)

Further Reading :

Hay ID, Grant CS, Taylor WF, McConahey WM. Ipsilateral lobectomy versus bilateral lobar resection in papillary carcinoma. *Surgery* 1987; 102: 1088-95.

Johnson IDA, Thompson NW. Eds. *Endocrine Surgery* London : Butterworth 1983.

Kark AE. Voice changes after thyroidectomy. The role of the external laryngeal nerve. *Br Med J* 1984;289: 1412-5.

Lowhagen T, Granberg PO, Lundell G, Skinnari P, Sunblad R, Willeum JS. Aspiration biopsy cytology (ABC) in nodules of the thyroid gland suspected of being malignant. *Surg Clin N Am* 1979;59: 3-18.

Reeve TS. Thyroid cancers of follicular cell origin.

Prog Surg 1988;19: 78-88.

Russell CF et al. The surgical management of medullary thyroid carcinoma. Ann Surg 1983; 97: 42-8.

Wade JSH. The management of malignant thyroid tumours. Br J Surg 1983;70: 253-5.

Woolner LB, Beahrs OH, Black BM, McConahey WM, Keating FR. Classification and prognosis of thyroid carcinoma. Am J Surg 1961; 102: 354-87.