

Thyroid isthmusectomy: a critical appraisal

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Abstract

Thyroid lobectomy with isthmusectomy is the standard surgical technique for removal of unilateral thyroid nodules, and it involves the exposure of the tracheoesophageal grooves. Thyroid isthmusectomy is a surgical procedure that excises only the thyroid isthmus. It allows excision of a lesion without the exposure of the tracheoesophageal grooves.

We aimed to demonstrate that isthmusectomy could be a safe alternative to thyroid lobectomy with isthmusectomy in patients with nodules confined to the isthmus or the pyramidal lobe.

This was a prospective study performed over a five year period from 1999 to 2004. Inclusion criteria for thyroid isthmusectomy were: patients with a single lesion located in the region of the thyroid isthmus or the pyramidal lobe; maximum lesion diameter of 30 mm; and cytological reports of non-diagnostic appearance, follicular cells or suspicion of malignancy.

Nine patients were identified with these criteria. Histology included two colloid nodules, three benign follicular adenomas, two Hurthle cell adenomas and two papillary thyroid carcinomas. There were no recorded complications.

Thyroid isthmusectomy is a safe alternative to thyroid lobectomy with isthmusectomy in patients who have nodules confined to the isthmus and pyramidal lobe. Leaving a cuff of normal thyroid tissue has the advantage of not exposing the tracheoesophageal grooves, thus minimising potential damage to the recurrent laryngeal nerves and parathyroids. Surgeons performing isthmusectomies should be experienced in more complex thyroid surgical procedures.

Key words: Thyroid Nodule; Thyroid Neoplasms; Thyroidectomy

Introduction

Thyroid lobectomy with isthmusectomy is recognised as the standard surgical technique for removal of unilateral thyroid nodules, and it can be both diagnostic and therapeutic. In cases of proven malignancy, for which a completion thyroidectomy is required, re-exploration of the original site should not be necessary. However, the procedure involves exposure of the tracheoesophageal grooves and therefore increases the risk of injury to the recurrent laryngeal nerves and parathyroid glands. Compared with single stage total thyroidectomy, completion thyroidectomy is considered a much more difficult undertaking, associated with a higher rate of complications.¹ However, other authors feel that 'the procedure can be performed safely with low morbidity and is effective for diagnosing and removing occult disease in the remaining thyroid'.²

The thyroid isthmus is the central part of the thyroid gland that connects the lobes and lies directly anterior to the trachea. Where nodules arise from the

isthmus or the pyramidal lobe, it may be adequate to perform an isthmusectomy only. Thyroid isthmusectomy is a surgical procedure that excises the thyroid isthmus and the pyramidal lobe. It allows excision of a nodule with an adequate margin, without exposure of the tracheoesophageal grooves and the recurrent laryngeal nerves. Isthmusectomy can be an adequate diagnostic and therapeutic procedure, and it does not jeopardise the oncological outcome if completion thyroidectomy is required in cases of malignant disease.

'Sub-total thyroidectomy', which is performed for multinodular goitre and thyrotoxicosis, may represent a similar operation to thyroid isthmusectomy but is an imprecise term and is to be avoided, especially when dealing with thyroid cancer.³

Aims

The aim of this study was to demonstrate that isthmusectomy could be a safe alternative to thyroid

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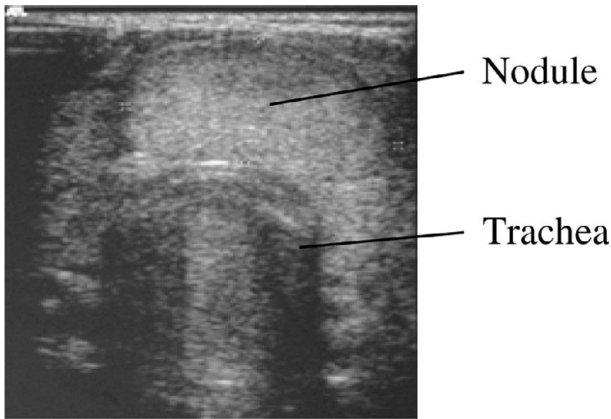


FIG. 1

Ultrasound scan of thyroid isthmus nodule; posteriorly, the trachea can be clearly seen.

lobectomy with isthmusectomy in patients with nodules confined to the isthmus or pyramidal lobe.

Subjects and methods

This was a prospective study performed over a five year period from 1999 to 2004.

During this period, all patients presenting with a solitary thyroid nodule were seen in the head and neck oncology clinic. A thorough history was taken and the patient was examined; fibre-optic laryngoscopy was included in the clinical examination. Patients were investigated with thyroid function tests, thyroid auto-antibodies and ultrasound (US) of the thyroid, with US-guided fine needle aspiration for cytology (FNAC) (Figure 1).

The inclusion criteria for thyroid isthmusectomy were: patients with a single lesion located in the thyroid isthmus or the pyramidal lobe; maximum lesion diameter of 30 mm; and cytological reports of non-diagnostic appearance, follicular cells or suspicion of malignancy.³



FIG. 2

Clear exposure of the nodule following dissection of the prethyroid strap muscles.

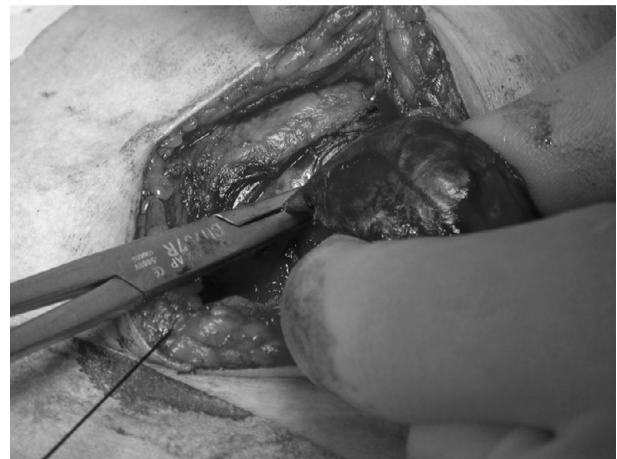


FIG. 3

The lateral aspects of the isthmus are clamped and the nodule is dissected free from the lobes.

We considered 30 mm to be the maximum size at which dissection over the anterior border of the trachea could be safely performed, while still leaving a reasonable cuff of normal thyroid tissue to protect the recurrent laryngeal nerves within the tracheoesophageal grooves and at their entry into the larynx. This was determined on the basis that the perimeter of the cartilaginous portion of the trachea in an average-sized adult is 50 mm. Lesions were assessed pre-operatively by US scanning to determine their exact size and location.

During the study period, nine patients were identified as meeting the inclusion criteria. Using the British Thyroid Association guidelines,³ all patients gave informed consent before undergoing the procedure. All patients were informed about the possibility of a completion thyroidectomy at a later stage if the final histological analysis showed carcinoma.

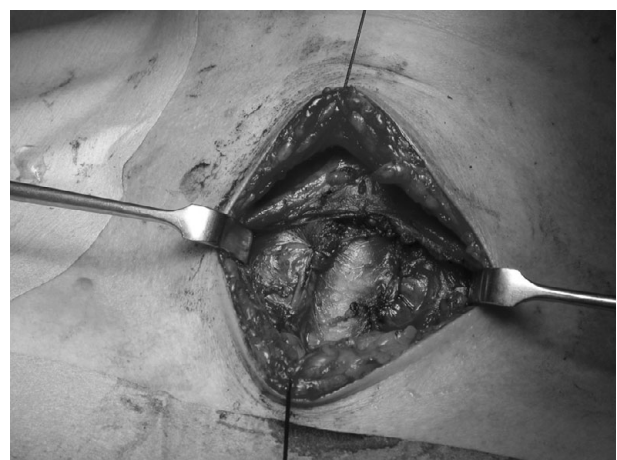


FIG. 4

Following removal of the nodule, the capsule is closed with transfixion sutures and the wound closed in layers. Note the normal cuff of thyroid tissue abutting the trachea and overlying the tracheoesophageal grooves.

TABLE I
PATIENT SUMMARY

Pt	Age (years)	Sex	Nodule site	Nodule size (mm)	FNAC result	Histology	Completion thyroidectomy?
1	71	F	Isthmus	7	Indeterminate THY3	Follicular adenoma	No
2	38	F	Right isthmus	24 × 12	Indeterminate THY1	Colloid nodule	No
3	35	F	Right isthmus	15	Follicular lesion THY3	Follicular adenoma	No
4	41	M	Right isthmus	14 × 7	Follicular lesion THY3	Follicular adenoma	No
5	41	F	Left isthmus	30	Follicular lesion THY3	Papillary carcinoma	Yes
6	50	F	Left isthmus	27 × 22 × 25	Follicular lesion with oncocytic features THY4	Papillary carcinoma	Yes
7	77	F	Isthmus	24 × 14	Indeterminate THY1	Colloid nodule	No
8	45	M	Isthmus	17 × 12	Follicular lesion THY3	Papillary carcinoma	Yes
9	31	F	Isthmus	25 × 14	THY4	Papillary carcinoma	Yes

Pt = patient; THY3 = follicular cells; THY1 = non-diagnostic; THY4 = suspicious of malignancy

Surgical technique

A standard Kocher incision of maximum length 5 cm was placed. Sub-platysmal flaps were elevated and the deep cervical investing fascia was incised in the midline from the suprasternal notch to the thyroid cartilage notch. The isthmus of the thyroid gland was exposed and the prethyroid strap muscles dissected from the thyroid capsule to expose the isthmus and the lesion (Figure 2).

At this stage, the superior and inferior aspects of the isthmus and adjacent lobes were dissected from the trachea, creating a tunnel, which allowed mobilisation of the central aspect of the thyroid gland. The fascial tissue was excised from the isthmus and the adjacent medial aspect of the lobes, maximising the skeletonisation of the isthmus. Two large clamps were placed with an adequate margin from the nodule; the nodule was then divided and excised from the gland (Figure 3). The capsule of the gland was closed with absorbable transfixion sutures and a cuff of normal thyroid tissue was left abutting the trachea, thus protecting the tracheoesophageal grooves (Figure 4).

The field was irrigated with saline solution, a suction drain placed and the wound closed in layers.

Results

Nine patients were included, seven women and two men. Patients' ages ranged between 37 and 76 years, with a median of 43 years. Fine needle aspiration cytology results included two non-diagnostic samples, five follicular lesions and two samples suspicious of malignancy. The size of the nodules ranged from 7 to 30 mm, with a median of 15 mm. All lesions were located in the thyroid isthmus, except one that was in the pyramidal lobe.

Histological results included two colloid nodules, three benign follicular adenomas, two Hurthle cell adenomas and two papillary thyroid carcinomas. These latter results corresponded to the patients whose cytology was suspicious of malignancy. Both these patients opted for isthmusectomy in the first instance. They both subsequently underwent a completion thyroidectomy. All patients had hospital stays of less than 24 hours, except for one patient who stayed 48 hours, and there were no recorded complications. The results are summarised in Table I.

Discussion

Thyroid isthmusectomy has been poorly defined as a type of thyroid surgical procedure and has not been recorded in the surgical literature.

Pre-operative evaluation of patients with solitary thyroid nodules should be with FNAC and may include US.⁴ Ultrasound allows the precise location and size of the nodule to be recorded, so that suitability for isthmusectomy can be assessed. We considered nodules located in the isthmus and with a maximum diameter of 30 mm or less to be suitable for isthmusectomy. This size was determined on the basis that the perimeter of the anterior cartilaginous portion of the trachea measures 50 mm in an average-sized adult. We felt that this size left a necessary cuff of 10 mm either side, thus avoiding exposure of the tracheoesophageal grooves. Therefore, pre-operative evaluation with clinical palpation and US scanning is essential to ensure appropriate patient selection.

- **Thyroid lobectomy and isthmusectomy is standard surgical management of solitary unilateral thyroid nodules**
- **Isthmusectomy excises only the isthmus and prevents exposure of the tracheoesophageal grooves**
- **Surgeons performing isthmusectomy should be experienced in performing more complex thyroid procedures**

Our study showed that thyroid isthmusectomy is a safe alternative to thyroid lobectomy with isthmusectomy in patients with nodules confined to the isthmus and pyramidal lobe. Leaving a cuff of normal thyroid tissue has the advantage of not exposing the tracheoesophageal grooves, thus minimising potential damage to the recurrent laryngeal nerves and parathyroids. Furthermore, as suggested in a previous study, it does not jeopardise completion thyroidectomy, as seen in our two patients with malignant nodules.²

Thyroid isthmusectomy is a simple and safe procedure with little morbidity, and it could potentially be performed as a day case. Surgeons performing isthmusectomies should be experienced in more complex thyroid surgical procedures so that, in the event of intra-operative complications, surgery can be completed without risking patient safety.

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