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The impact of completion thyroidectomy

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ABSTRACT

Introduction: The oncological benefit of completion thyroidectomy (CT) following thyroid lobectomy (TL) is presumed to be similar to that of upfront total thyroidectomy(TT), from a patient's perspective the risk and inconvenience of further surgery adds significantly to the impact of the overall treatment.
The aim of this study is to assess the impact of CT in terms of the duration of admission and associated complications.
Methods: A study of consecutive patients with DTC identified from prospective MDT records of South-East Scotland from 2009 to 2015. Surgical data was extracted from electronic medical record.
Results: Of 361 patients diagnosed with DTC, 161 (45%) had CT. The median postoperative stay was 1 day (range 1–5days). In total 22 patients (14%)suffered complications. Four patients (3%) developed post-operative haematoma. Two (1%) had an identified permanent nerve palsy on the completion side. 13 patients (8%) remained on calcium supplementation for more than 6 months postoperatively and three patients (2%) developed wound complications.
Conclusions: Our study confirms that CT is regularly performed (45%). Recent changes in international guidelines recognize increasing number of patients as eligible for a conservative approach but recommend CT based on whether upfront TT would have been recommended if the TL pathology were known from the outset. Such an approach fails to consider the additional risk and inconvenience of CT on the overall patient experience.
Due to a relatively high rate of complications, only those patients who are most likely to benefit from further surgery to facilitate adjuvant radioactive iodine should be offered additional surgery.

Introduction

When making treatment recommendations in any condition, the clinician and patient must consider the potential benefit of the proposed therapy and weigh this against the potential adverse impacts with which this therapy may be associated. In the setting of low-risk differentiated thyroid cancer (DTC), for many patients the potential benefit of total thyroidectomy in contrast to thyroid lobectomy is difficult to determine [1–8]. This is particularly true in patients with T1-2N0 DTC. Debate has raged for decades around this subject and there remains much uncertainty in international guidelines about how to select between these approaches [9,10].

The situation is made more complex when the definitive diagnosis is only reached after initial surgery. In this setting, most guidelines recommend that decision making is based upon risk prediction associated with classical oncological variables. Therefore, the decision on whether to complete a thyroidectomy after "diagnostic" lobectomy is made by considering whether total thyroidectomy would have been recommended initially had the definitive diagnosis been known prior to initial surgery [10].

However, while the overall oncological benefit of completing a

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thyroidectomy is presumed to be similar to that of upfront total thyroidectomy, from a patient's perspective the risk and inconvenience of a second surgery followed by adjuvant therapy adds significantly to the impact of the overall treatment plan.

The aim of this study was to assess the impact of further surgery in terms of duration of admission and associated complications for all patients who underwent CT and for (those with T1-2N0M0 disease) low risk disease.

Method

Consecutive patients with DTC were identified from our regionally collected prospective MDT records between 2009 and 2015. Although our region has a centralized MDT, surgical procedures are carried out over a wide geographic area. In total, 8 surgeons performed these procedures, all of who conform with national guidance that all thyroid surgeons should complete at least 20 surgeries per annum. Our network includes 1 tertiary referral centre and 3 district general hospitals. Although complex primary surgery and neck dissection is performed at the tertiary referral centre, uncomplicated thyroid surgery is performed across the network.

In total 361 patients with DTC had thyroid surgery, in accordance with the national guidelines at the time. Forty-four patients had thyroid lobectomy alone, 156 had initial total thyroidectomy, 161 patients (45%) had completion thyroidectomy (CT) following lobectomy and this formed the cohort for analysis. Patients with metastatic disease or who were not fit for surgery were excluded from the study. During the study our group adhered largely to the British Thyroid Association (BTA) guideline which recommended for total thyroidectomy and radioactive iodine for the majority of DTC cases at this time. Data was extracted from the electronic patient record, including demographics, extent of thyroid surgery, postoperative complications, hospital stay, histopathology diagnosis and pTNM staging. Early hypocalcaemia was defined as post-operative adjusted calcium level <2.1 mmol/l. Late hypocalcaemia was defined as patients treated with calcium or alfacalcidol at 6 months post surgery. Further details were extracted for these patients including PTH levels where available.

Table 1
Demographics, staging and histology of the whole cohort.

Age: 16–82 years, Median age 45 years		
Females: 130, Males: 31–4.2:1		
Disease	Number of cases	Percentage
pT Stage		
T1	44	27%
T2	73	45%
T3	40	25%
T4	4	3%
pN Stage		
N0/x	151	94%
N1a	6	4%
N1b	4	2%
Histology		
Follicular carcinoma (FTC)	73	45%
Papillary Microcarcinoma (PMC)	87	54%
FTC + PMC	1	0.6%

FTC: Follicular Thyroid Carcinoma.
PMC: Papillary Microcarcinoma.

Results

The median follow up for this cohort was 5 years (range 2–7years). The median age was 45 years (range 16–82years). Female:male ratio was 4.2:1. The median delay between initial lobectomy to CT was 82 days (interquartile range 55–128 days). The index pathology was papillary carcinoma in 87 patients (54%) and follicular carcinoma in 73 patients (45%). One patient (0.6%) had both follicular carcinoma and papillary microcarcinoma. Amongst the pathology of all contralateral lobes of completion thyroidectomies 22% contained papillary carcinoma. The total number of cases with confirmed nodal disease was 10 (6%) including 4% of N1a and 2% N1b. Two cases were subsequently diagnosed with metastatic disease (M1). 44 patients (27%)had T1 disease, 73 (45%) had T2 disease, 40 (25%) had T3 disease and four patients (3%)were diagnosed with T4 disease (Table 1). All patients who underwent CT went on to receive adjuvant RAI.

Regarding postoperative hospital stay, data was available for 141 patients (88%). Of those, 19 patients (14%) had post-operative stay more than 1 day. The median duration of stay was 1 day (range2-5days).

Twenty-two patients (14%) developed post-operative complications. Four patients (3%) developed a post-operative haematoma. All these patients were treated successfully by re-exploration of wound and evacuation of haematoma. One of these patients was later identified to have recurrent laryngeal nerve (RLN) palsy on CT side.

Data for early post-operative hypocalcaemia was available for 134 cases (83%). Amongst available data 22 patients (16%) developed early post-operative hypocalcaemia.

Two (1%) patients overall had an identified permanent RLN palsy on the completion side. Three patients (2%) developed wound complications. Two patients developed keloid and one patient developed a stitch abscess.

In total 13 patients (8%) were still being treated for hypocalcaemia at 6 months after CT. Of these, 10 were using both calcium and alfacalcidol, of who 4 also had a documented low PTH at 6 months. A further 3 were still using a single oral supplement daily. One of these had a history of Hodgkin's lymphoma treated with radiotherapy, and remained on regular oral calcium alone with a documented low PTH beyond 6 months following completion thyroidectomy. One had osteoarthritis and used vitamin D supplements following completion thyroidectomy. The third patient was managed on calcium supplements for over 6 months but has subsequently stopped treatment and is not hypocalcaemic. (Table 2).

Of the cohort with pT1-2N0M0 disease (n = 112 (70%)), 20 patients (18%) had complications. Two percent developed post-

Table 2
Rates of early and long term hypocalcaemia (>6 months) in the whole cohort (n = 161) and management of long term hypocalcaemia.

		Number of patients	Percentage
Early Hypocalcaemia		22	16%
Long term Hypocalcaemia		13	8%
Treatment for long term hypocalcaemia (n = 13)	Calcium supplements + Alfacalcidol±Low PTH at 6 months	10	77%
	Single oral supplement with documented low PTH at 6 months	1	8%
	Single oral supplement at 6 months without PTH recorded	2	15%

operative haematoma, 13% developed early hypocalcaemia, 5% were treated for long term hypocalcaemia, 2% developed hypocalcaemia later postoperatively requiring treatment for long term hypocalcaemia, and 1% each developed stitch abscess and keloid.

Discussion

In order to make effective treatment recommendations, clinicians and patients must appreciate the risk and benefit associated with their decisions. When considering the potential benefit of total thyroidectomy over thyroid lobectomy the contralateral lobe is removed, thereby eradicating any potential multifocal disease and facilitating adjuvant radioactive iodine.

Although it is now recognised that few patients have significant disease in the non-index thyroid lobe [11,12], RAI is generally considered indicated in patients at high risk of nodal recurrence or death [9,10,13].

However, for a significant number of patients, the role of RAI is now being questioned [13–15]. Increasing evidence suggests that RAI should be reserved for the highest risk cases and international guidelines are now moving away from the recommendation that adjuvant therapy should be considered in most cases. The result of this evolution is that a reduced number of patients now fall into a category where RAI is routinely indicated.

The associated impact on selection of primary thyroid surgery is therefore made more complex. Whereas previously, almost all patients were recommended to undergo total thyroidectomy to facilitate RAI [16,17], now lower risk patients are considered potential candidates for thyroid lobectomy as their primary treatment modality.

Many authors of the most influential international guidelines practice in academic centres of excellence where a pre-operative cytological diagnosis is confirmed prior to overall therapy decisions [18]. However, in a more general setting, many patients only achieve a diagnosis following thyroid lobectomy. Indeed in the 2017 report of the British Association of Endocrine and Thyroid Surgeons, only 38% of patients who had papillary thyroid carcinoma had a preoperative THY5 result (malignant FNA) [19]. When non diagnostic cytology is available prior to initial surgery which confirms malignancy, the decision is then whether or not to perform completion thyroidectomy.

Previous studies have cited that CT is safe with a complication rate comparable with total thyroidectomy [20,21]. Timing of CT within 10–90 days after initial surgery has been shown to have no effect on the rate of post-operative complications [20,22]. Incidental occult microcarcinomas are common findings although they have little impact on decision making in such cases [11,12]. Although many authors commend the safety of the procedure, additional surgery should not be recommended lightly. As highlighted by Shaha et al., the decision to recommend CT should be made cautiously as it is associated with more risk than observation [18].

Our study confirms that in a large UK centre, CT is regularly performed (45% DTC cases), which relates to high rate of non diagnostic cytology. A confirmed malignancy following diagnostic lobectomy thereforeled to CT as per BTA guidelines at the time. In total 8 surgeons performed these surgeries, each doing at least 20 thyroidectomies per year as per national recommendation. Although thyroidectomies were done across a network of 4 centres, which involved a tertiary centre and 3 general hospitals. Complex surgeries or those requiring neck dissection were performed in the tertiary referral centre, however standard thyroidectomy or diagnostic lobectomy was performed across the network. All patients were discussed at regional MDT (Multidisciplinary team meeting) with central pathology review.

A vast majority of patients are discharged following a one-night stay (87%) which is equal to or less than inconvenience than the adjuvant RAI for which it is being performed. However, a small minority (3%) suffered a potentially life threatening complication of wound haematoma.

A minimum of 1% patients suffered recurrent laryngeal nerve palsy secondary to CT, although routine post-operative laryngoscopy was not performed for majority of patients. In our cohort 16% patients developed immediate post-operative hypocalcaemia, treated with calcium supplementation. In total 8% of patients were treated for hypocalcaemia at 6 months. Of these the majority used calcium and alfacalcidol (77%) and 33% had a low PTH confirmed biochemically. Three patients however were treated with a single oral supplement alone. This may represent a failure to stop a prescription rather than a true disorder of calcium homeostasis but nonetheless, this remains inconvenient for the patient.

These results suggest that although the short term inconvenience of completion surgery is minimum, there is significant risk of life-long complications which will have a serious impact on quality of life for this patient group. Our findings were similar for those patients with least to gain (pT1-2N0M0).

It is unlikely that an adequately powered prospective study will ever be completed to settle the debate over the oncological impact of the extent of thyroid surgery [23]. However, this is because the impact is so small. With so few deaths and recurrences from differentiated thyroid cancer, although the precise clinical impact of total thyroidectomy versus thyroid lobectomy remains unclear, it seems reasonable to say that any impact is extremely limited at most.

On that backdrop, multidisciplinary teams should not only consider the potential (if any) oncological benefit from completion thyroidectomy but weigh that against the impact that further treatment has for the patient.

Despite this complexity, the British Thyroid Association Guidelines do not mention completion thyroidectomy in the clinician section on differentiated thyroid cancer at all [9]. The American Thyroid Association Guidelines recommend considering the increased impact of lobectomy and subsequent completion thyroidectomy in patients with indeterminate thyroid nodules when selecting lobectomy versus total thyroidectomy as primary treatment. This encourages clinicians to consider total thyroidectomy in this setting. However, they simply recommend completion thyroidectomy following lobectomy in the setting of differentiated thyroid cancer if total thyroidectomy would have been recommended had the diagnosis been made pre-operatively [10]. Therefore, international guidelines do not seem to address the fact that there is inevitable inconvenience and morbidity associated with additional treatment, choosing to focus on the potential oncological aspects alone.

This position is an over simplification. The decision at the point of reporting histological findings from the initial lobectomy is not whether the patient would have benefited from total thyroidectomy upfront, but whether the available information now known supports further therapy from this point onward. Factors which should be considered include basic risk stratification criteria (age, tumour size, presence of extra thyroidal extension etc) but also the function of ipsilateral nerve and fitness of the patient following recent general anaesthesia. In addition, features noted on the pathology and the ultrasound characteristics of the contralateral lobe should be reviewed.

For cases of papillary and follicular carcinoma which are 1–4 cm and in the absence of significant nodal or distant metastatic disease (cT1-2N0M0), patients should at the very least be informed that there is no definitive evidence that further therapy at this point will be oncologically beneficial.

Specifically, if the oncological aspects of the decision relate to the contralateral lobe, the treating team should consider whether a policy of observation and completion surgery only in the event of current occult disease manifestation is more or less favourable than an immediate procedure.

If the decision relates to the risk of subsequent regional failure which may be addressed using RAI at this stage, the team must weigh the combined risks and inconvenience of both further surgery and adjuvant therapy at this stage versus the potential benefit. Again, observation would be the alternative and will be required irrespective of the decision made at this point.

In contrast to observation, completion thyroidectomy is associated with significant impact on the patient and has the potential for significant morbidity. We studied a cohort of 112 low risk cases and 49 intermediate risk patients who had CT surgery. Twenty (18%) patients with low risk disease suffered post-operative complications, six (5%) of them developed long term hypocalcaemia.

Limitations of our study include, the retrospective nature of some data extraction and a lack of quality of life data. In particular, routine laryngoscopy was not common practice during this study and as such reported rates of RLN injury are likely to be underestimates. In addition, definitive biochemical data was unavailable for some patients who remained on calcium supplementation alone at 6 months.

Despite these limitations, our findings confirm that in our institution a significant number of patients undergo thyroid lobectomy as their initial procedure for DTC. Of these patients, 70% fall in to a category where evidence of benefit from further therapy is limited (pT1-2N0M0). Those patients are then considered for CT which is associated with postoperative complications. The potential benefit of CT must be weighed against the potential risks, as the postoperative complication rate in this cohort is 18%.

Conclusion

As our understanding of the biology of differentiated thyroid cancer evolves, the oncological benefit of more aggressive primary thyroid surgery and adjuvant radioactive iodine therapy is increasingly challenged. An improved appreciation of the risks and inconvenience of completion thyroidectomy following initial thyroid lobectomy allows clinicians to balance the potential oncological benefits of additional treatment against the real-life risks in order to provide patients with the most accurate information upon which to base treatment decisions.

Declarations of interest

None.

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