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Lobectomy versus total thyroidectomy in differentiated thyroid carcinoma: A review

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REVIEW

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ABSTRACT

Background
Thyroid cancer is on the rise globally, there is increasing adoption of lobectomy for low-risk differentiated thyroid cancer.

Aims
The current review aimed to assess lobectomy versus total thyroidectomy in low-risk differentiated thyroid carcinoma.

Methods
A systematic electronic search was conducted in the Pub Med and Google Scholar with no limitation of the period, 85 articles published in English were retrieved, two researchers screened the abstract for removal of duplications. Twenty-one articles fulfilled the inclusion and exclusion criteria.

Results
Among the twenty-one articles included (more than two-thirds were retrospective), eleven were from the USA, two from Europe, six from Asia, one from Canada and one from Australia. The results were mixed, some preferred lobectomy, others were on the side of total thyroidectomy, while some advised to weigh the risks and benefits.

Conclusion
The results were mixed regarding the mode of surgery in low-risk differentiated thyroid cancer. Further, well-designed studies are needed to solve the current controversy.

Key Words
Lobectomy, total thyroidectomy, low risk, differentiated thyroid carcinoma

What this review adds:

1. What is known about this subject?
There is an increasing use of lobectomy for low-risk differentiated thyroid carcinoma.

2. What new information is offered in this review?
The increasing rate of lobectomy in differentiated thyroid carcinoma may be not justified in all patients, both the patient's risks and the aggressiveness of the tumour need to be considered.

3. What are the implications for research, policy, or practice?
An improvement of thyroid surgery for low-intermediate risk differentiated thyroid cancer by proper patients stratification before thyroid surgery.

Introduction

The incidence of thyroid carcinoma is on the rise with a great contribution from microcarcinoma (<1cm). The tumour size criteria for lobectomy have been widened to 1–4cm. Thus, there is increasing use of lobectomy versus total thyroidectomy, the American Thyroid Association recommend lobectomy for low-risk differentiated thyroid cancer, however thyroxine replacement is needed in the majority of patients to suppress thyroid-stimulating hormone (TSH) <2mIU/ml to suppress the proliferation of thyroid cancer cell. A recent study including 1521 patients with low risk differentiated thyroid cancer and followed for

more than five years showed that the level of TSH did not affect tumour recurrence in the short-term following lobectomy.[1,2] Total thyroidectomy in differentiated thyroid carcinoma is recommended only for aggressive tumours, those with local invasion or distant metastasis. However, the extent of thyroid surgery in tumours measuring 1cm remains controversial. The current review aimed to assess lobectomy versus total thyroidectomy among low-risk differentiated thyroid cancer measuring <4cm.

Methodology

The search strategy and article selection:

A systematic search was conducted in Pub Med and Google Scholar databases for relevant articles. All article published in the English language during the period from the first published article to August 2019 were eligible.

Inclusion and exclusion criteria:

All articles comparing lobectomy and total thyroidectomy during the stated period in English were included; articles in languages other than the English language were not included. A total of 85 studies were identified through the database search, 60 full-text articles were assessed for eligibility: only 21 studies fulfilled the inclusion and exclusion criteria, the name of the author, year of publication, type of study, the number of patients included, and the results were reported. The excel was used for data analysis. The different phases of the systematic review were reported (Figure 1).

Results

A total of 21 studied were included (eleven were from the USA, two from Europe, six from Asia, one from Canada and one from Australia). There were 15 retrospective studies, two prospective, three reviews, and one comparative survey. The studies included 280871 patients. The results were inconclusive, some studies preferred lobectomy, others were on the side of total thyroidectomy, while some advised to weigh the risks and benefits (Table 1).[3]

Discussion

In the current review, Shah et al.[4] showed that lobectomy (Lb) and total thyroidectomy (TT) are similar for low-risk patients, Santini and colleagues[5] in their review stated that the risks and hazards should be weighed when considering lobectomy and total thyroidectomy, Zerey et al.[6] included 13,854 patients with well-differentiated thyroid carcinoma and showed that Complete thyroidectomy is associated with increased morbidity, total charges, and length of hospital stay, similarly Kuo et al.[7] showed no survival benefits of TT versus lobectomy in follicular thyroid microcarcinoma and Hurthle cell microcarcinoma (<1cm), Lee et al.[8] assessed papillary microcarcinoma and concluded similar observations. In the current review, Adams et al.[9] studied papillary thyroid carcinoma (PTC) measuring 1–4cm and showed no survival benefit of TT versus lobectomy, Megwalu et al.[10] from the USA studied 203 patients with microfollicular carcinoma and showed no survival benefits, Kluijfhout et al.[11] studied1000 low-risk well-differentiated thyroid cancer 1–4cm in Canada and recommended to weigh the risks and benefits of surgery, Aburjania et al.[12] assessed 68 encapsulated form of follicular variant of papillary thyroid cancer *vs.* the nonencapsulated variant and stated that the encapsulated variant may be managed more conservatively, Kuba et al.[13] studied 173 patients with 1 to 5cm stage cN0 and cM0 PTC in Japan and concluded equivalent prognosis of TT *vs.* lobectomy, Kim et al.[14] studied thyroid microcarcinoma and showed similar observations. Mainthia et al.[15] investigated 1335 noninvasive encapsulated follicular variant of papillary thyroid carcinoma and showed that the impact on the extent of surgery is limited, Gartland et al.[16] studied of PTC measuring 1–4cm and showed similar results. Liu et al. and de Rienzo-Madero et al.[17,18] showed the advantage of lobectomy versus TT. On the other hands Doi et al.[19] from Australia showed Improved outcomes in TT and post-surgical ablation, while Leiker et al.[20] concluded the cost effectiveness of TT, Ebina et al.[21] assessed 1187 patients with PTC >1cm and concluded that Low-risk patients possessing risk factors for distant recurrence would be likely to benefit from total thyroidectomy followed by radioactive iodine, Macedo et al.[22] in their meta-analysis concluded lower mortality in TT for unilateral (≤1cm) PTC in Rajjoub et al.[23] assessed 33,816 of conventional papillary thyroid cancer *vs.* follicular-variant papillary thyroid cancer and showed total thyroidectomy improved survival for conventional PTC (2.3.9cm) but not 1–1.9cm. Equivalent outcomes for follicular variant PTC, Benjamin and colleagues[24] investigated 114/562 low-risk thyroid carcinoma patients and concluded that TT recommended due to high contralateral lobe involvement.

Conclusion

The current review showed mixed results with some preferred lobectomy, others were on the side of total thyroidectomy, while some advised to weigh the risks and benefits, randomized controlled trials are needed to solve the issue.

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PEER REVIEW

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CONFLICTS OF INTEREST

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ETHICS COMMITTEE APPROVAL

The ethical committee of the Medical College, University of Tabuk approved the research (Ref. Number, READ, 0049)

Figure 1: Flow diagram through the different phases of the systematic review(PRISMA flowchart)

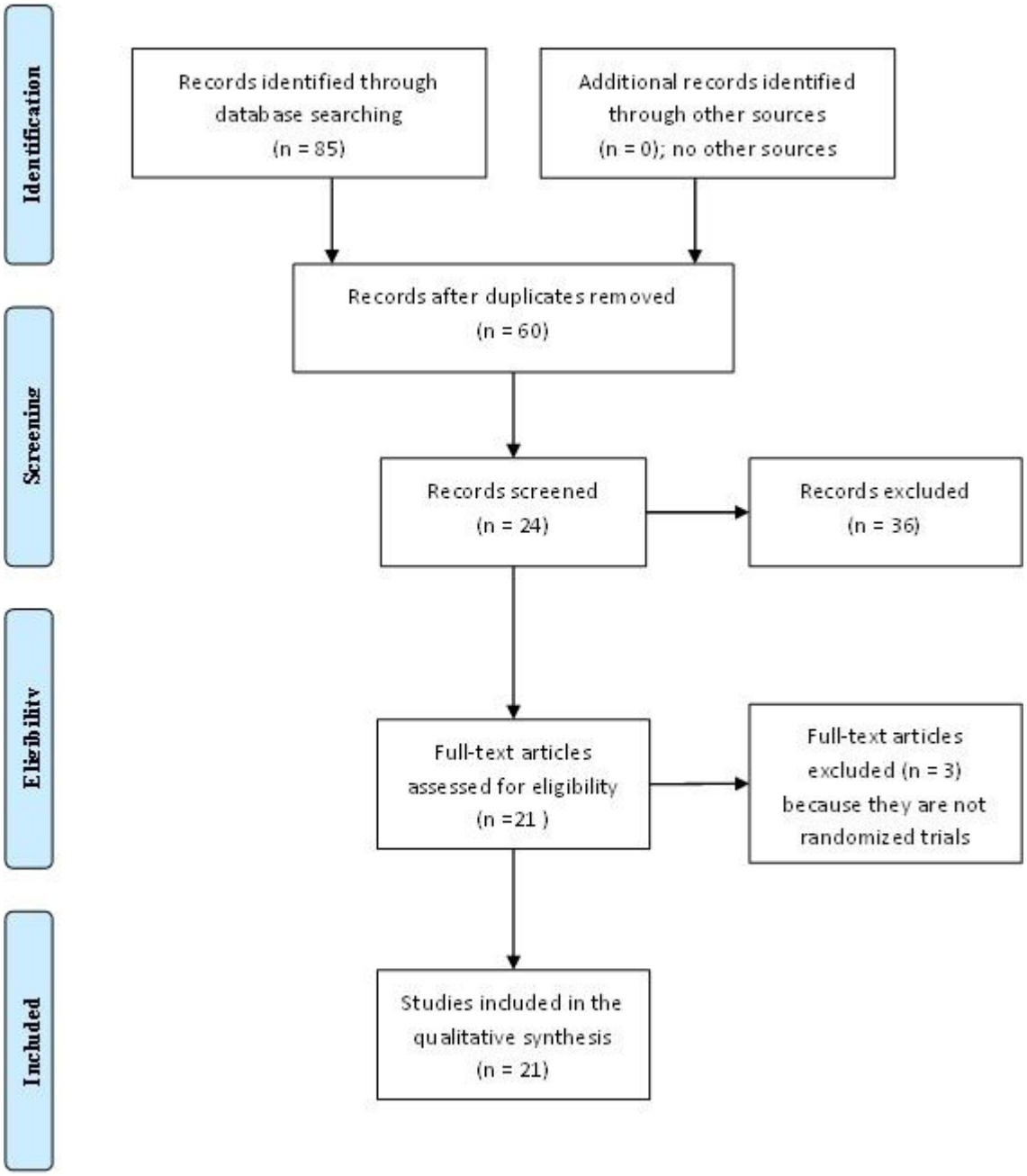

Table 1: Lobectomy versus total thyroidectomy in differentiated thyroid carcinoma

author	year	country	type	patients	result
Shah et al.	1993	USA	Prospective	931 patients	Low-risk patients undergoing lobectomy are likely to do as well as those undergoing total thyroidectomy
Santini et al.	1999	France	Review		Weigh the risks and hazards
Zerey et al.	2009	USA	Retrospective	13,854 patients of well-differentiated carcinoma	Complete thyroidectomy is associated with increased morbidity, total charges, and length of stay
Doi et al.	2010	Australia	Retrospective	614 PTC patients	Improved outcomes in TT and post-surgical ablation
Leiker et al.	2013	USA	Retrospective		TT is more cost-effective
Kuo et al.	2013	USA	Retrospective	564 follicular thyroid microcarcinoma and Hurthle cell microcarcinoma (<1 cm);	No survival benefits
Lee et al.	2013	South Korea	Comparative analysis	2014 papillary microcarcinoma	Death and locoregional recurrence were similar in patients with PTMC who underwent LT with CCND and those who underwent TT with central compartment node dissection.
Ebina et al.	2014	Japan	Retrospective	1187 patients with PTC >1cm	Low-risk patients possessing risk factors for distant recurrence would be likely to benefit from total thyroidectomy followed by radioactive iodine
Adam et al.	2014	USA	Retrospective	61,775 PTC 1-4cm	No survival benefits, Older age, male sex, black race, lower-income, tumor size, and presence of nodal or distant metastases were independently associated with compromised survival
Macedo et al.	2015	USA	A meta-analysis	unilateral (≤1 cm) PTC	Inconclusive, lower mortality in TT, consider other factors including multifocality, locoregional involvement, mode of presentation and age at diagnosis
Megwalu et al.	2016	USA	Retrospective	203 microfollicular carcinoma	No survival benefit of TT over lobectomy
Kluijfhout et al.	2016	Canada	Retrospective	1000 low-risk well-differentiated thyroid cancer 1-4cm	Completion TT recommended in 43%, balance the relative benefits, risks, and costs of initial TT versus the possible need for preoperative completion TT
Aburjania et al.	2017	USA	Prospective	68 encapsulated form of follicular variant of	The encapsulated variant can be managed more conservatively

				papillary thyroid cancer vs. the nonencapsulated variant	
Kuba et al.	2017	Japan	retrospective	173 patients with 1- to 5-cm stage cN0 and cM0 PTC	Equivalent prognosis of TT vs. lobectomy
Kim et al.	2017	South Korea	retrospective	8,676 thyroid microcarcinoma	lobectomy may be a safe operative option for select patients with papillary thyroid microcarcinoma without multifocality
Gartland et al.	2018	USA	Review of PTC measuring 1-4cm	6	Comparable outcomes of lobectomy and thyroidectomy
Rajjoub et al.	2018	USA	Retrospective	33,816 of conventional papillary thyroid cancer vs. follicular-variant papillary thyroid cancer	Total thyroidectomy improved survival for conventional PTC (2.3.9 cm) but not 1-1.9 cm. Equivalent outcomes for follicular variant PTC
Mainthia et al.	2018	USA	Retrospective	1335 noninvasive encapsulated follicular variant of papillary thyroid cancer to noninvasive follicular thyroid neoplasm with papillary-like nuclear features	The impact on the extent of surgery is limited
Liu et al.	2019	China	Retrospective	4230 intermediate risk PTC	No advantage of total thyroidectomy over lobectomy
de Rienzo-Madero B et al.	2019	France	Retrospective	2675 patients with a single nodule or unilateral multinodular goiter	Lobectomy is the treatment of choice
James et al.	2019	USA	Retrospective	44,537	The incidence of total thyroidectomy has not decreased despite recommendations encouraging consideration of lobectomy for patients with small papillary thyroid cancers
Benjamin et al.	2019	India	Retrospective	114/562 low-risk thyroid carcinoma patients	TT recommended due to high contralateral lobe involvement