Risk of hypothyroidism following hemithyroidectomy: systematic review and meta-analysis of prognostic studies

Verloop H, Louwerens M, Schoones JW, Kievit J, Smit JW, Dekkers OM

CRD summary
This generally well-conducted review concluded that about 20% of patients develop low thyroid levels after removing half the thyroid gland; one in 25 have free thyroxine and thyroid stimulating hormone levels below normal. Uncertainty over the quality of the included studies and the diversity and limitations of the available evidence make the reliability of the conclusions uncertain.

Authors' objectives
To determine the overall risk of hypothyroidism, both clinical and subclinical, after hemithyroidectomy and identify postoperative risk factors for hypothyroidism.

Searching
PubMed, EMBASE, Web of Science, The Cochrane Library, CINAHL, Academic Search Premier and Science Direct databases, various Journal web sites and Google Scholar were searched from inception to August 2011 for studies published in English, Dutch, German or French. Specific search terms were not reported. Reference lists of included studies were searched. Meeting abstracts and unpublished studies were excluded.

Study selection
Studies that assessed thyroid function after hemithyroidectomy with preservation of the contralateral lobe in patients of any age with normal thyroid function pre-operatively were eligible for inclusion. Studies that included fewer than 15% of patients with pre-operative hyperthyroidism were included.

Across the included studies, mean age ranged from 37 to 71 years and 58% to 96% were female. Hemithyroidectomies were performed for a range of indications. Studies were published between 1983 and 2011. Where defined, hypothyroidism was an increased thyroid-stimulating hormone with or without subnormal thyroid hormone levels. Different assays and thresholds were used across the studies. Thyroid-stimulating hormone measurement varied from two weeks to three years post surgery; most were within six months.

Two independent reviewers selected studies for the review. Disagreements were resolved by consulting a third reviewer.

Assessment of study quality
Risk of bias was investigated in terms of patient selection, loss to follow-up and ascertainment of exposure status at baseline.

The authors did not state how many reviewers evaluated risk of bias.

Data extraction
Two independent reviewers extracted the number of patients who developed hypothyroidism; the proportion of the total and 95% confidence intervals (CI) were calculated. Disagreements were resolved by consulting a third reviewer. Study authors were contacted for missing information.

Methods of synthesis
Weighted incidence and weighted prevalence were calculated using a random-effects logistic regression. Pooled estimates were calculated for subclinical and clinical hypothyroidism (definitions provided) separately where possible. Studies that did not exclude patients with preoperative hypothyroidism or in which preoperative thyroid status was unknown were included in sensitivity analyses. Meta-regression was used to investigate the impact of the three potential sources of bias assessed.

Results of the review
Thirty-two cohorts (31 publications) were included in the review (4,899 participants, range 18 to 1,051). Twenty-four studies recruited consecutive patients, 19 studies reported no loss to follow-up, one study reported 30% loss to follow-up after 12 months, 16 studies recruited only patients who had normal thyroid function pre-operatively, two studies reported results for those with normal thyroid function separately; one included 10% hyperthyroid patients and one included 18%. Such details were not reported in the other included studies.

The weighted pooled incidence of hypothyroidism after hemithyroidectomy was 21% (95% CI 17 to 25; 22 studies). Pooled risk of hypothyroidism after hemithyroidectomy when restricted to studies that recruited only patients with normal thyroid function pre-operatively was similar at 22% (95% CI 19 to 27; 11 studies). The prevalence of hypothyroidism after hemithyroidectomy was 27% (95% CI 20 to 36; 11 studies, some preoperatively hypothyroid patients were included).

Meta-regression showed no impact of method of recruitment or absence of loss to follow-up. Overall risk (four studies) was 12% (95% CI 5 to 25) for subclinical hypothyroidism and 4% (95% CI 2 to 8) for clinical hypothyroidism. Results for subgroups investigating a range of risk factors were reported.

Authors’ conclusions
Approximately one in five patients will develop hypothyroidism after hemithyroidectomy, with clinical hypothyroidism in one of 25 operated patients. Thyroid-stimulating hormone levels in the higher-normal range and positive anti-thyroid peroxidase status are significant preoperative indicators of thyroid failure after surgery.

CRD commentary
The review addressed a clear research question with reproducible inclusion criteria. Several relevant sources were searched. Some attempts to minimise language bias were employed. There were no attempts to reduce potential for publication bias. Study selection and data extraction were conducted in duplicate; it was unclear whether similar methods were employed to reduce error and bias during the assessment of study quality. There was an assessment of study quality but this was limited and did not assess all the potential relevant sources of bias in the included studies. Several of the included studies did not report on the criteria assessed. Therefore the quality of the included studies was unclear. The included studies showed substantial clinical heterogeneity. The methods of synthesis seemed appropriate and relevant predictive factors were investigated. The authors acknowledged a range of limitations of the available evidence.

This was generally a well-conducted review but uncertainty over the quality of the included studies and the clinical heterogeneity and limitations of the evidence make the reliability and generalisability of the pooled results and conclusions uncertain.

Implications of the review for practice and research
Practice: The authors stated that although most advantages and disadvantages of the performance of hemithyroidectomy can be disentangled before surgery, the risk of hypothyroidism after hemithyroidectomy is an important element in decision-making for the individual patient and health care provider as well as the policy makers.

Research: The authors stated that more studies were required to assess in what proportion of patients hypothyroidism after thyroid lobectomy was a transient phenomenon.

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Bibliographic details

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.