International Journal of Surgery 28 (2016) S7–S12

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Review

Bilateral benign multinodular goiter: What is the adequate surgical therapy? A review of literature

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ARTICLE INFO

Article history:
Available online 18 December 2015

Keywords:
Benign multinodular goiter
Dunhill procedure
Subtotal thyroidectomy
Total thyroidectomy
Goiter recurrence
Post-operative complications

ABSTRACT

Background: Benign multinodular goiter (BMNG) is the most common endocrine disease requiring surgery. During the last few years a more aggressive approach has become the trend for bilateral BMNG treatment.
Method: Randomized clinical trials of any size that compared bilateral subtotal resection, Dunhill procedure and total thyroidectomy for benign multinodular goiter, published between January 2000 and the end of March 2015, were reviewed.
Discussion: Total thyroidectomy can be considered the most reliable approach in preventing recurrence. The Dunhill procedure is related to a higher rate of recurrence, but rarely recurrences after Dunhill procedure lead to reoperation. Total thyroidectomy avoid completion thyroidectomy for incidental carcinoma and its related risks. Recurrent laryngeal nerve (RLN) palsy becomes less common as surgical experience increases. Transient and permanent hypoparathyroidism is strictly related to the extent of neck dissection.
In the risk-cost analysis we must consider the type of patient candidated to surgery and the impact of the surgical protocol we apply. When thyroid surgery is taken in consideration, specific complication rates of different procedures in each hospital must be analyzed accordingly to patient-specific risk factors and local expertise.
Conclusion: The Dunhill procedure seems to be a good compromise between radicality and prevention of complications, avoiding reoperation for recurrence or completion thyroidectomy for incidental thyroid carcinoma. More follow-up studies and prospective studies are necessary to better evaluate, definitively, whether to prefer total thyroidectomy or Dunhill procedure in case of benign goiter surgery.

1. Introduction

Benign multinodular goiter (BMNG) is the most common endocrine disease, especially in endemic iodine-deficiency areas [1,2].

BMNG indications for surgery are: compressive symptoms (dysphagia, shortness of breath), suspected malignancy, large substernal development, drug-resistant hyperthyroidism, cosmetic concerns [3,4].

When BMNG is one lobe limited the surgical procedure consists in an hemithyroidectomy; counterlateral involvement must be excluded by preoperative ultrasound examination and intraoperative palpation.

Bilateral subtotal thyroidectomy has been suggested as the

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http://dx.doi.org/10.1016/j.ijsu.2015.12.041
1743-9191/

surgical option of choice for bilateral BMNG to avoid excessive complication risks linked to total and near-total thyroidectomy (recurrent laryngeal nerve palsy, hypoparathyroidism) [5]. During the last few years a more aggressive approach has become the trend for bilateral BMNG treatment. The European and American associations of endocrine surgery guidelines suggest total thyroidectomy as the treatment for bilateral BMNG, in order to prevent a reoperation in case of recurrence or incidental diagnosis of thyroid carcinoma [3,4,6,7].

In fact, reoperations are associated with higher complication rates compared with primary surgical procedures [8,9].

Total and near-total thyroidectomy are associated with a low rate of recurrence and complications when performed in specialized centers for endocrine surgery.

The Dunhill procedure (hemithyroidectomy with counterlateral subtotal resection) seems to be a good compromise between radicality and prevention of complications, avoiding reoperation for recurrence or completion thyroidectomy for incidental thyroid carcinoma [10].

We reviewed the literature in order to compare the different surgical approaches for the treatment of bilateral BMNG.

2. Material and methods

Randomized clinical trials of any size that compared bilateral subtotal resection, Dunhill procedure and total thyroidectomy for benign multinodular goiter, published in full peer-reviewed journals in the English language, between January 2000 and the end of March 2015, were included. Unpublished studies and abstracts presented at national and international meetings were excluded. Trials and retrospective studies were identified by conducting a comprehensive search of Medline, Embase, Science Citation Index, Current Contents, and PubMed databases, using medical subject headings (MESH) 'bilateral benign multinodular goiter', 'surgery', 'comparative study', 'prospective studies', 'randomized controlled trials', 'random allocation', and 'clinical trial'. A manual search of the bibliographies of relevant papers was also carried out to identify relevant studies for possible inclusion. Data extraction and critical appraisal were carried out by three authors independently (GM, AC, CM). Six outcome variables were considered most suitable for analysis: operating time, hospital stay, incidental thyroid carcinoma, recurrences, postoperative transient and permanent hypoparathyroidism, transient and permanent recurrent laryngeal nerve palsy. The quality of the randomized clinical trials was assessed using Jadad's scoring system [11] by the authors. Finally 21 articles were included, 3 randomized controlled trials (RCTs) and 18 retrospective studies were analyzed [12–32]. The detailed steps of our literature search are shown in Fig. 1.

3. Results

The recurrence rate after subtotal resection for BMNG reported in the two most cited meta-analyses varies widely from 0% to 50% [1,2,10]. Moalem et al. reported only one longitudinal study in which, for BMNG treated with total thyroidectomy, the recurrence rate was 0.3%. This is the reason why the authors of both meta-analyses state total thyroidectomy as the best surgical approach for bilateral BMNG. The main limitations of the two meta-analyses are related to the differences among the publications considered for the studies: different definitions of recurrence, different duration of post-operative follow-up, lacking information about the adopted surgical technique. Moreover, the articles considered for the meta-analyses are almost all retrospective studies [10]. Regarding recurrence rate after surgery for BMNG only two prospective studies have been published recently. Barczynski et al. [30] compared three surgical approaches from 2000 to 2004: total thyroidectomy, Dunhill procedure and bilateral subtotal resection. If thyroid remnant was left in place, it was no larger than 2 g in size. All patients were treated with L-thyroxine postoperatively. After a 5-year follow-up period, recurrence (one or more nodules <1 cm) occurred in 0.5% of patients treated with total thyroidectomy, 5% of patients treated with Dunhill procedure and 12% of patients who underwent bilateral subtotal resection. Recurrences were clinically relevant, requiring reoperation, in only one total thyroidectomy-patient, one Dunhill-patient and 2 subtotal thyroidectomy-patients. Rayes et al. [31] performed 100 Dunhill procedure and 100 bilateral subtotal resections. The thyroid remnant in the subtotal sides was <5 mL and all patients received L-thyroxine. After a mean follow-up period of 11 years, 6% of patients treated with Dunhill procedure and 8% of patients who underwent bilateral subtotal resection had recurrence (at least one nodule <1 cm revealed by ultrasonography). Surgery was necessary only for one patient after bilateral subtotal resection. Bilateral subtotal thyroidectomy has been suggested as the best surgical option for bilateral BMNG, in order to avoid unnecessary risks of complication related to total and near-total thyroidectomy (recurrent laryngeal nerve palsy, hypoparathyroidism) [5]. According to Delbridge's study (1999), subtotal bilateral resection for BMNG is related to reoperation for recurrence in 13–20% of patients, with a peak of recurrence 13 years after the first operation. Moreover, reoperations are associated with higher complication rates compared with primary surgical procedures [8]. In summary, total thyroidectomy can be considered the most reliable approach in preventing recurrence. The Dunhill procedure is related to a higher rate of recurrence, but rarely recurrences after Dunhill procedure lead to reoperation. The incidental finding of a thyroid cancer in permanent histological sections, after a subtotal resection for BMNG, can require a completion thyroidectomy. This reoperation has much higher risk of recurrent laryngeal nerve (RLN) palsy and hypoparathyroidism than the primary procedure, especially if the completion is performed after more than 3 days from primary operation [33]. One of the advantages of total thyroidectomy is avoiding completion thyroidectomy for incidental carcinoma and its related risks [34].

Actually, completion thyroidectomy is rarely required. In fact, the large part of incidental carcinomas are papillary microcarcinomas <1 cm (60–80%), well treated by hemithyroidectomy [35].

In Barczynski's prospective study, completion thyroidectomy for incidental carcinoma was performed in 2 patients after Dunhill procedure and 5 patients who first underwent bilateral subtotal resection [30].

Specific thyroidectomy complications are temporary dysphonia, that occurs in 5–11% of cases and may be permanent in 1–3.5% of cases, and temporary hypoparathyroidism, that occurs in 20–30% of cases and may be permanent in 1–4% of cases [36]. RLN injury, either unilateral or bilateral, varies, with a mean incidence at one year, from 2.3% to 9.8% in the immediate postoperative period; depending on the diagnostic modality, it shows an incidence ranging from less than 2%–6% depending on whether indirect laryngoscopy or the preferable fiber-optic laryngoscopy is performed [37]. Unilateral recurrent laryngeal nerve injury results in hoarseness or dysphonia due to laryngeal paralysis with unilateral vocal cord immobility. It is often associated with upper airway dyspnea and swallowing problems, particularly for liquids. Bilateral recurrent laryngeal nerve palsy results in dramatic symptoms such as acute life-threatening dyspnea. This is a rare complication; its incidence is difficult to assess from literature but Rosato et al. estimated it as 0.4% [38]. The risk of RLN injury depends on the type of surgery (reoperation vs. primary surgery), the underlying thyroid