Outcome of Surgery for Thyroid Diseases

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Abstract

Background: The aim of this study is to assess the outcome of patients who have been treated surgically for thyroid disorders with the objective to compare the outcomes of total thyroidectomy to subtotal and other thyroidectomy procedures.

Methods: This is a retrospective study of all patients who have undergone any surgical procedure on the thyroid gland from 1st January 2007 to 31st December 2007.

Results: Of the 117 patients, L-thyroxine supplementation was required in 55.5% patients following near total thyroidectomy and 38.5% patients following subtotal thyroidectomy and 4.9% patients following hemi thyroidectomy. Permanent hypothyroidism is seen in 1.7% patients following total thyroidectomy group and 0.9% patients following completion thyroidectomy group. Unilateral recurrent laryngeal nerve paralysis was seen in 1.9% patients following total thyroidectomy.

Conclusion: The intra operative parameters and post operative parameters including the associated complications are not significantly different in total thyroidectomy in comparison to other lesser thyroidectomy procedures.

Introduction

The surgical treatment of benign thyroid disease is still controversial. Except for single hyperfunctioning adenomas, which can be successfully treated by lobectomy, subtotal and total thyroidectomy are now the surgical options available for all other benign thyroid diseases. Despite numerous studies on operative strategies, we know of no clear evidence about which of these two options is best. Traditionally, subtotal thyroidectomy has been considered standard surgical treatment for benign thyroid disorders, especially multinodular goiters. Subtotal thyroidectomy was considered safe compared to total thyroidectomy because of its lower incidence of iatrogenic injuries (recurrent nerve palsy and hypoparathyroidism), and it was thought that leaving behind some thyroid tissue would prevent thyroxine supplementation. But with longterm follow up it was found that nodular goiter often recurs after surgery and the recurrence rate increases with time. Although reoperations have been associated with high morbidity, the high morbidity associated with total thyroidectomy is presumptive. With appropriate surgical technique, the complication rate of initial total thyroidectomy can be minimized. Several studies have shown that total thyroidectomy can be performed with a morbidity rate comparable to that of less radical surgeries. Hence it is argued that if total thyroidectomy can be performed as safely as lesser procedures for benign disease the indications for its use may be justifiably expanded to situations where recurrent disease is a significant problem. Hence this study was undertaken to assess morbidity of surgical procedures done for thyroid disorders and to compare total thyroidectomy to subtotal thyroidectomy.

Materials and methods

This is a retrospective study of all patients who have undergone any surgical procedure on the thyroid gland from 1st January 2007 to 31st December 2007. Medical records were used for collecting datas including preoperative investigations, operative and histopathological reports. Inpatient records were used for collecting datas of the immediate postoperative period (until discharge or 40 days – whichever is later) and the outpatient records for additional information including follow up. The median period of follow up is 18 months. Data were entered in SPSS and students t test was used to compare the result.

Results and discussion

The mean age of the patients in our study was 40.4 ± 11.4 years. This is similar to age group reported in the literature. Anjali Mishra[1] studied benign thyroid disease in endemic area in India. The mean age of the patients in their study was 39.7±12.45 years. Orhan Aligmoglu[2] studied the benign toxic multinodular goiter in Turkey and the mean age of the patients in their study was 47±13.7 years.

The patients were predominantly females with the male female ratio of 1.0:5.2. In the study done by
Anjali Mishra[1] who studied benign thyroid disease in endemic area in India, the sex ratio was 1.0: 2.5. Ayhan Koyunç et al [3] reported a sex ratio of 1: 5.45 (M:F) in their study.

In our study the sensitivity and specificity of detecting malignancy by fine needle aspiration cytology was 63% and 100% respectively. The negative predictive value is 83.9%. This is similar to the various literature. Morgan JL [4] in their study reported the sensitivity of FNAC detecting thyroid neoplasia was 55.0%, specificity 73.7% and accuracy 67.2%. Boutin P [5] in their study reported the fine needle aspiration biopsy had a sensitivity of 40% and a specificity of 100% in detecting thyroid neoplasm.

In our study completion thyroidecomy was done in 11 patients. The indication in majority of the patients was latent papillary carcinoma. In the literature latent papillary carcinoma in the thyroid specimen operated for benign thyroid disorders were as high as 7.1% [6]. Of the 4 patients who had recurrent multi nodular goiter, 2 patients had recurrence after 10 years following hemi thyroidectomy, 1 patient had recurrence 18 years following hemi thyroidectomy and 1 patient had recurrence 15 years after a sub total thyroidectomy. Tzu-Chieh Choa [7] reported the mean interval between the initial and reoperation for recurrent multi nodular goiter in his study as 4096±349 days (range from 240 days to 33 years). The complication rate between completion thyroidectomy and total thyroidectomy was not stastically significant in our study. Beahrs and Vandertoll [8] reported an increased incidence of complications in patients undergoing revision thyroid operations for both benign and malignant diseases. Eight percent of their patients underwent two and 22% who underwent three and more surgical procedures for benign disease sustained permanent vocal cord palsy. In patients with recurrent carcinoma, 12% of the patients who underwent two operations and 36% of the patients who underwent three or more operations had permanent recurrent laryngeal nerve injuries. Permanent hypoparathyroidism developed in 3.4% of patients undergoing two or more operations for benign disease and in 13.3% undergoing operations for recurrent cancer. Martensson and Terins [9] documented permanent recurrent laryngeal nerve palsies in 14% of their patients undergoing reoperation in contrast to 5.8% at the initial operation. Thompson and Harness [10] reported a 6.6% incidence of permanent hypoparathyroidism in patients for whom total thyroidectomy was second or third procedure. As the technique and experience have improved, this incidence of complications has gradually decreased [11]. Reeve et al [11] reported a 1.5% incidence of recurrent laryngeal nerve palsy and 1.6% to 3.5% rate of hypoparathyroidism in their patients requiring repeat thyroid operations. Calabro et al [12] have reported no permanent complications in a series of 66 patients who underwent completion thyroidectomy as a second procedure for initially misdiagnosed thyroid carcinoma on frozen section. They also advocate reoperation when thyroid carcinoma is diagnosed at permanent section because of low morbidity rate of the procedure and high incidence of multicentric disease. But in 1996, Seiler et al [13] reported a 5.6% rate of permanent RLN palsy in 166 patients undergoing revision thyroid operation. Eroglu et al [14], permanent RLN palsy was reported in 5.5% of the 165 patients who underwent completion thyroidectomy. Recently in 1998, Wilson et al [15] concluded from their study that the risk of complications, although acceptable, is higher than that for primary thyroidectomy. Because of the devastating nature of these complications when they do occur, every effort should be made to avoid reoperations by providing definitive initial treatment. But in our study, the complication rate between completion thyroidectomy (0.9%) and total thyroidectomy (1.8%) was not stastically significant.

In our study, majority of surgery were done by general surgeons. This is because thyroid diseases are mainly referred to general surgery for its management and surgical oncologist were referred proven thyroid malignancy and thyroid malignancy with metastasis. Traditionally, thyroidectomies have been performed by both general surgeons and ENT surgeons. Comparison of different medical and surgical specialties with respect to outcome parameters is currently the subject of intensive investigation and is beginning to impact the delivery of health care. Mark R Burge [16] in his study compared the outcomes of thyroid surgeries among different specialty. In their study, 29% of patients who had thyroidectomy by ENT surgeons developed permanent hypothyroidism and 5% of thyroidectomy by general surgeons developed permanent hypothyroidism. They concluded that the patient undergoing thyroidectomy by ENT surgeon may be at a higher risk of permanent post operative hypoparathyroidism than patients who undergo thyroidectomy by general surgeons. In our study, there is no difference in the complication rate between Professors (6.8%), Associate professors (7.4%) and Assistant Professors (5.4%) and also between general surgeon (1.2%) and ENT surgeon(1.8%).
In our study, 2 patients (1.8%) developed neck hematoma following total thyroidectomy [Table-1]. One patient required surgical re-exploration. The incidence of hematoma development reported in the literature is 0% to 1.6% [17–19]. There are numerous possible etiologies for hematoma formation including: slipping of a ligature on a major vessel, reopening of cauterized veins, retching during recovery, valsalva maneuvers during reversal of anesthesia, increased blood pressure in the immediate postoperative period, and oozing from the cut edge of the thyroid gland in partial thyroidectomies [20]. Coughing or vomiting after removal of the endotracheal tube increases venous pressure, which permits insignificant vessels that were not ligated to bleed profusely. Extensive dissection increases the risk of this particular complication [21]. A majority of hematomas developed within 4 hours of surgery and almost all hematomas occurred within 24 hours. Reeve and Thompson [18], Bergamaschi et al [19], Burkey et al [17], and Shandilya et al [22] were the only other groups to report a neck hematoma that developed more than 24 hours after surgery. However, surgeons should be aware that neck hematoma may develop greater than 24 hours following thyroidectomy.

Post operatively surgical site infection was seen in 1(0.9%) patient following hemi thyroidectomy. In the study by Orhan Alimoglu [2] none of the patient developed wound infection post operatively. Anjali Mishra [1] in their study reported 4.8% incidence of wound infection following total thyroidectomy.

The mean duration of post operative stay following total thyroidectomy was 7.5± 9.8, following near total thyroidectomy was 5.8±1.9 and following subtotal thyroidectomy was 5.9±1.9. Orhan Alimoglu [2] reported a median post operative period of 4 for total thyroidectomy, 3 for near total thyroidectomy and 3 for sub total thyroidectomy. The post operative duration was more in our study because most of our patient wants discharge from hospital only after the suture removal, which was usually done between fifth to seventh post operative day.

In our study, unilateral recurrent laryngeal nerve paralysis was seen in 2 (1.9%) patients, one occurred following total thyroidectomy and another occurred following total thyroidectomy with lymph node dissection [Table-2]. Bilateral recurrent laryngeal nerve paralysis occurred in 1(0.9%) patient following total thyroidectomy with lymph node dissection and superior laryngeal nerve paralysis occurred in 1(0.9%) patient following total thyroidectomy and re-exploration for hematoma. Neil Bhattacharya [23] reported the incidence of unilateral and bilateral vocal cord paralysis in 0.77% and 0.39%. Clarks reports an incidence of 1% permanent hypoparathyroidism and no permanent recurrent laryngeal damage in 82 consecutive total thyroidectomies[24]. More than one third of these were performed for benign thyroid disease. In 250 total thyroidectomise for nodular goiter, Perzik [25] reported an incidence of only 0.4% nerve injury and no hypoparathyroidism. This contrasted with 5% nerve injury and 3% hypoparathyroidism when the total thyroidectomy was performed for thyroid cancer. These latter complications were attributable to the more extensive dissection done because of degree of spread of the malignancy rather than to operative technique. Martensson and Terins showed a progressive increase in the incidence of nerve injury from 5% for unilateral lobectomy upto 18% for total and subtotal lobectomy [26].Mechanisms of iatrogenic injury include intubation, transection, crush, traction, inadvertent ligature placement, and thermal injury. Aggressive thyroid malignancies may invade and injure the recurrent laryngeal nerve[27]. Compression by large thyroid goiters, benign neoplasms, and nonthyroid malignancies, such as the laryngeal carcinoma, may also injure the nerve. Iatrogenic trauma during thyroidectomy has been historically accepted as the most frequent cause of superior laryngeal nerve paralysis [28]. Irrespective from recurrent laryngeal nerve and/or injuries to the external branch of the superior laryngeal nerve, voice may temporarily be affected by thyroidectomy. Most of the subjective complaints and acoustic voice parameters return to normal in a few months after surgery [29]. 50% of patients with unilateral recurrent laryngeal nerve palsy can be asymptomatic [30]. It is not always possible to preserve normal postoperative voice function, even though the identification and preservation of the recurrent laryngeal nerve has become a routine approach in modern thyroid surgery [23].

Post operative hypocalcemia after total thyroidectomy has been reported to range from 1% to 40%. Recently Sasson and associates [31] reported on a 9 year series of 141 thyroidectomies. In that total thyroidectomy was strongly associated with postoperative hypocalcemia(13%) when compared to other forms of thyroid surgeries. Overall the pathogenesis of postoperative hypocalcemia is likely to be multifactorial. Neil Bhatacharrya [23] in his study reported post operative hypocalcemia in 6.2% of the patients. In our study 2(1.7%) patients in total thyroidectomy group and 1(0.9%) in completion thyroidectomy group developed hypoparathyroidism.
In our study L-thyroxine supplementation was required in 5 of 9 patients (55.5%) following near total thyroidectomy and in 13 of 13 (85%) patients following subtotal thyroidectomy and in 2 of 13 (15%) patients following hemithyroidectomy. Chun-Fan Ku [32] in their study comparing surgical treatment for Graves disease reported that 72.3% in the STT group required thyroxine replacement. M Vaiman [33] reported twenty-eight percent of the hemithyroidectomy patients suffered permanent hypothyroidism compared to 100% of the near-total and 87% of the subtotal patients. They concluded that subtotal and near-total thyroidectomise produced a rate of hypoparathyroidism close to that of total thyroidectomy compared to 28% after hemithyroidectomy.

In our study, the duration of post operative stay, duration of surgery, estimated blood loss, the time of drainage tube removal and suture removal were found to be marginally favourable to performing total thyroidectomy in comparison to other lesser surgical procedures though none of the parameters revealed statistical significance. Hypoparathyroidism and recurrent laryngeal nerve injury were found to be marginally unfavorable to performing total thyroidectomy in comparison to other lesser surgical procedures though none of the parameters revealed statistical significance. The limitation of the study is, the study population is small and is carried out in a single tertiary care center.

We conclude that the intra operative parameters and post operative parameters including the associated complications are not significantly different in total thyroidectomy in comparison to other lesser thyroidectomy procedures.

References

Illustrations

Illustration 1

Types of thyroidectomies in our study

n=117

- Total thyroidectomy (41, 35%)
- Near total thyroidectomy (11, 9%)
- Subtotal thyroidectomy (13, 11%)
- Hemithyroidectomy (lobectomy) (9, 8%)
- Total thyroidectomy + Lymph node dissection (34, 29%)
- Completion thyroidectomy (11, 9%)
Illustration 2

Histopathology in various thyroidectomies
Illustration 3

Table 1: Incidence of various complications

<table>
<thead>
<tr>
<th>Complications</th>
<th>Total thyroidectomy n=34</th>
<th>Near total thyroidectomy n=9</th>
<th>Sub total thyroidectomy n=13</th>
<th>Hemi thyroidectomy n=41</th>
<th>Completion thyroidectomy n=11</th>
<th>Total thyroidectomy+ Lymph node dissection n=11</th>
</tr>
</thead>
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<tr>
<td>No complication</td>
<td>28 (23.9%)</td>
<td>9 (7.7%)</td>
<td>13 (11.1%)</td>
<td>40 (34.2%)</td>
<td>10 (8.5%)</td>
<td>8 (6.8%)</td>
</tr>
<tr>
<td>Hematoma n=2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managed conservatively</td>
<td>1 (0.9%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Managed surgically</td>
<td>1 (0.9%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>SSI n=2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (0.9%)</td>
<td>0</td>
<td>1 (0.9%)</td>
</tr>
<tr>
<td>Hypocalcemia requiring IV n=7</td>
<td>4 (3.4%)</td>
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<td>0</td>
<td>0</td>
<td>1 (0.9%)</td>
<td>2 (1.7%)</td>
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</table>
Illustration 4

Table 2: Postoperative indirect laryngoscopy

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Indirect laryngoscope n = 102</th>
<th>Total thyroidectomy n = 34</th>
<th>Near total thyroidectomy n = 9</th>
<th>Sub total thyroidectomy n = 13</th>
<th>Hemithyroidectomy n = 41</th>
<th>Completion thyroidectomy n = 11</th>
<th>Total thyroidectomy+Lymph node dissection n = 11</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>24 (23.5%)</td>
<td>5 (4.3%)</td>
<td>10 (8.5%)</td>
<td>35 (29.9%)</td>
<td>10 (8.5%)</td>
<td>6 (5.9%)</td>
<td>91 (87.3%)</td>
<td></td>
</tr>
<tr>
<td>Unilateral paralysis</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>2 (2.0%)</td>
<td>1 (1.0%)</td>
<td>4 (3.9%)</td>
<td>11 (10.8%)</td>
<td></td>
</tr>
<tr>
<td>Bilateral paralysis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td></td>
</tr>
<tr>
<td>SLN injury</td>
<td>1 (1.0%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (1.0%)</td>
<td></td>
</tr>
<tr>
<td>Not done</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
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