

Comparison of the Results of Subtotal Thyroidectomy with Hartley-Dunhill Operation in Surgical Patients

Mohsen Eshraghi¹, Mostafa Vahedian², Amrollah Salimi¹, Enayatollah Noori^{1*}, Sediogheh Mossavi¹

1. Department of Surgery, School of Medicine, Qom University of Medical Sciences, Qom, Iran

2. Department of Family and Community Medicine, School of Medicine, Qom University of Medical Sciences, Qom, Iran



ABSTRACT

Background: Thyroid resection surgeries used to treat many thyroid diseases may be performed as a total or subtotal thyroidectomy. This study aimed to compare two methods of subtotal thyroidectomy (omission from both sides) with the Hartley-Dunhill procedure in patients with thyroid diseases.

Methods: In this retrospective study, the records of all patients who underwent thyroidectomy between 2017 and 2018 were evaluated. Demographic information (age and sex) of patients, initial diagnosis and pathology, type of surgery, serum calcium level on the fourth day after surgery, parathyroid nerve damage, and hematoma were collected using patients' files. Finally, complications in the two groups were measured.

Results: A total number of 100 patients, including 67 female (67%) and 33 male (33%) individuals, were studied. The mean age of patients in the Hartley-Dunhill subtotal thyroidectomy group was 12.65 ± 40.75 years and in the non-Hartley-Dunhill surgery group was 12.86 ± 38.91 years. There was no association between two groups in terms of indications of surgery ($P=0.235$), postoperative pathology ($P=0.754$), postoperative hematoma ($P=0.11$), postoperative recurrence ($P=0.714$), and the postoperative calcium level ($P=0.816$). However, the difference in recurrent laryngeal nerve injury occurrence was statistically significant between the groups ($P=0.03$).

Conclusion: Findings of this study showed that there was no significant difference between the groups regarding complications of the surgery, except nerve damage, and the recurrence rate in both methods was clinically pretty low.

Keywords: Hartley-Dunhill, Subtotal, Thyroidectomy

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***Correspondence:** Enayatollah Noori; Email: enoori@muq.ac.ir

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Introduction

Current treatments for hyperthyroidism (Graves' disease) include antithyroid drugs, radioactive iodine, and surgery (1). If antithyroid drugs fail to improve the condition, thyroidectomy may be a treatment option for Graves' disease (GD) (2). In surgical treatment, thyroid resection is one of the definitive treatment options for GD. There are currently three accepted resection strategies for GD, including total thyroidectomy (TT), near-total thyroidectomy (NTT) with bilateral remnants of less than one gram, and hemithyroidectomy with total resection (total residual of 2-4 g) from the opposite location (Hartley-Dunhill method) (3). During a subtotal thyroidectomy, remnants of thyroid tissue remain on both sides (bilateral subtotal thyroidectomy) or a complete lobectomy can be performed on one side and a subtotal thyroidectomy the other side, which is called the Hartley-Dunhill procedure. The results are similar in both methods, but the Hartley-Dunhill method is theoretically along with fewer complications and in case of recurrence, reoperation is done only by opening one side of the neck. However, most studies do not show any difference in the incidence of complications between the two methods (4). Several studies have suggested that less invasive surgery methods (e.g., subtotal thyroidectomy and total proximal thyroidectomy) can reduce the overall complication rate compared with total thyroidectomy (TT) (5-8). Because thyroid surgery is performed in an area with complex anatomy, the nerves, parathyroid glands, and surrounding arteries are at risk of damage (9). This study aimed to compare two Hartley-Dunhill subtotal thyroidectomy surgeries (omission from both sides) with complete unilateral resection and brief omission of the other side in thyroidectomy patients in Shahid Beheshti Educational and Medical Center from 2015 to 2017.

Materials and Methods

This study was performed as a retrospective cohort. The statistical population included all patients who underwent thyroidectomy between 2015 and 2017. According to the formula of the sample size and considering the probability of the first type error equal to 5%, the power of 0.8, and the standard deviation of hospitalization days in the two surgical groups equal to 6.5 and 5.1 days with $d=3.2$ based on previous studies (10), the minimum number of required samples

was calculated as 50 people in each group; therefore, a total of 100 patients were included in the study. Sampling was performed by available methods. Inclusion criteria consisted of all files related to thyroid resections performed by experienced surgeons. Exclusion criteria carried patients with calcium abnormalities, bone cancer, calcium malabsorption, patients undergoing chemotherapy, and incomplete records. The studied data were collected through the medical records unit of Shahid Beheshti hospital by evaluating the records of all patients who had undergone thyroidectomy. The researcher checklist completed using the patients' files, included demographic information (i.e., age and sex), initial diagnosis and pathology of the patients, type of surgery, serum calcium level on the 4th day after surgery, and complications such as neck hematoma, recurrent laryngeal nerve damage, and recurrence with follow-up till one year in patients whose problem was not resolved at the time of discharge or were followed up in the clinical follow-up. In this study, calcium level lower than 8.5 mg/dL was considered hypocalcemia. Follow-up data in the period ranging from six months to one year was collected to evaluate the nerve damage (by observing symptoms and laryngoscopy) and recurrence (by sonography). Finally, all data obtained from the study were analyzed by SPSS version 22. The characteristics of each group were presented by descriptive statistical methods including central indices, dispersion, and frequency distribution. The independent sample t-test was used to analyze small values in the patient groups and Chi-square test was used for analysis of qualitative values. Statistical significance level was considered at $P<0.05$.

Ethical approval

This human subject research complied with all the relevant national regulations, institutional policies, and tenets of the Helsinki Declaration, and also, was approved by the Ethics Committee of Qom University of Medical Sciences, Qom, Iran (Ethical Code: IR.MUQ.REC.1399.101).

Results

A total number of 100 patients, including 67 female (67%) and 33 male (33%) individuals, were studied and there was no statistically significant difference between the two surgical groups ($P=0.499$). The mean age of patients in the Hartley-Dunhill subtotal thyroidectomy

group was 12.65 ± 40.75 years and in the non-Hartley-Dunhill surgery group was 12.86 ± 38.91 years; there was no statistically significant difference between the two groups ($P=0.499$).

The highest indication for surgery (49%) in both groups was hyperthyroidism and the lowest one for surgery (11%) was malignancy in both groups; there was no significant difference between the two groups. Other causes for surgery were 87 (87.0%). Postoperative pathologies were benign and postoperative hematoma was reported in two cases (6%) in the Hartley-Dunhill group and in no cases in the non-Hartley-Dunhill group. In two cases of the Hartley Dunhill group (22.3%) and 31 cases of

the non-Hartley-Dunhill group (34.1%), recurrence was observed and there was no association between recurrence and type of surgery. There was no statistically significant difference between the two groups regarding the cause of surgery ($P=0.235$), postoperative pathology ($P=0.754$), (Table 1).

Postoperative hematoma ($P=0.11$), and postoperative recurrence ($P=0.714$). Postoperative nerve damage was reported in three cases (9%) in the non-Hartley-Dunhill group and in no cases in the Hartley-Dunhill group; a statistically significant difference was found between the two groups ($P=0.03$) (Table 2).

Table 1. Comparison of the two surgical methods in the two groups

| | | Type of Surgery | | Total | P-value |
|-----------------------|------------|-----------------|---------------------|-----------|---------|
| | | Hartley-Dunhill | Non-Hartley-Dunhill | | |
| Indication of surgery | Malignancy | 6(18.2%) | 5(7.5%) | 11(11%) | 0.235 |
| | Hyper | 17(51.5%) | 32(47.8%) | 49(49%) | |
| | Mass | 7(21.2%) | 16(23.9%) | 23(23%) | |
| | Other | 3(9.1%) | 14(20.9%) | 17(17%) | |
| Pathology | Malignant | 5(15.2%) | 8(11.9%) | 13(13.0%) | 0.754 |
| | Benign | 28(84.8%) | 59(88.1%) | 87(87.0%) | |
| Total | | 67(100.0%) | 33(100.0%) | 100(100%) | |

The mean amounts of calcium after surgery in the Hartley-Dunhill and non-Hartley-Dunhill groups were 0.99 ± 8.5 and 1.08 ± 8.4 mg/dL, respectively, and there was a statistically

significant difference between the two groups regarding postoperative calcium level ($P=0.816$).

Table 2. Comparison of the complications of two methods of thyroidectomy that include hematoma, hypocalcaemia, recurrent laryngeal nerve damage, and recurrence

| | | Type of Surgery | | Total | p |
|----------------------|----------|-----------------|---------------------|------------|-------|
| | | Hartley-Dunhill | Non-Hartley-Dunhill | | |
| Recurrence | Positive | 2(22.3 %) | 7(77.7 %) | 9(33%) | 0.714 |
| | Negative | 31(34.1 %) | 60(65.9 %) | 91(67%) | |
| Hematoma | Positive | 2(6.1%) | 0(0.0%) | 2(2.0%) | 0.11 |
| | Negative | 31(93.9%) | 67(100.0%) | 98(98.0%) | |
| Nerve injury | Positive | 3(9.1%) | 0(0%) | 3(3.0%) | 0.03 |
| | Negative | 30(90.9%) | 67(100.0%) | 97(97.0%) | |
| Calcium level | | 8.50 ± 0.99 | 8.45 ± 1.08 | 100 (100%) | 0.81 |

Discussion

Recently, there has been a change in surgical procedures for thyroidectomy with bilateral subtotal resection being replaced by complete resection (10). In subtotal operations, surgical treatment of benign thyroid disease is still a challenging issue. In this study, two different methods for this type of surgery were compared, following hemithyroidectomy for tumor

resection, the risk of hypoparathyroidism and RLN paralysis is lower than bilateral tumor resection because exploration on only one side is necessary. In addition, complete removal of the affected lobe should be a treatment option in patients with non-goiter or solitary nodules (11). Based on the results of this study, in postoperative complications, only in the case of postoperative nerve damage, there was a

significant difference between the two methods: postoperative nerve damage in Hartley-Dunhill surgery was observed in three cases (9%) while it was not reported in any cases in the non-Hartley-Dunhill method. However, no significant differences were found between the two methods in terms of complications such as postoperative hematoma or transforming to hypocalcemia. In a similar study by Barczynski et al., the recurrence rate was not significantly different in the three surgical methods of total thyroidectomy, Hartley-Dunhill, and bilateral subtotal thyroidectomy (12). So far, most authors have claimed that subtotal removal is completely safer than a Dunhill operation. However, in a prospective study, two surgical procedures were compared in patients with bilateral multinodular goiter, particularly regarding postoperative hypoparathyroidism. The two methods were compared in terms of time and average harvest weight and no significant differences were found in the incidence of postoperative bleeding, wound infection, RLN paralysis, and hypoparathyroidism (10). Although this study was performed in a teaching hospital with 37 surgeons, unlike the present study, the incidence of complications was relatively low. Most researchers agree that the experience of surgeons is not an important factor for complications (11,13). Hemithyroidectomy, in addition to subcutaneous resection (Dunhill operation), offers a variety of surgical operations and special benefits. First, only one side has to be re-examined in the case of recurrence. Second, if there is papillary microcarcinoma in the protruding lobe, hemithyroidectomy is sufficient

and complete thyroidectomy can be prevented. In addition, how to maintain RLN and parathyroid should be considered even during hemithyroidectomy (14). Consistent with the results of the present study, the results of a retrospective study showed that lobectomy can be performed in addition to local contralateral resection and total bilateral resection with a low incidence of permanent hypocalcemia and RLN paralysis (15).

Conclusion

The results of this study showed that there was no significant difference between the two surgery groups in terms of the postoperative complications, except nerve damage, and the recurrence rate in both methods was clinically pretty low.

Suggestion

It is suggested to conduct multicenter studies with larger sample sizes in the future. Also, to achieve better and more accurate results, the studies should be done in a trial and prospective manner with follow-up improvement to be performed in a long period of time.

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Conflict of interests

The authors declare that there is no conflict of interests.

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