

# Evaluation of Hematoma Formation after Thyroidectomy Surgery and Its Related Factors

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## ABSTRACT

**Background:** In the last decade, the number of patients undergoing thyroidectomy has increased. Compared to other methods, thyroidectomy is a relatively safe method for treating various types of thyroid diseases. However, the blood flow rate in the thyroid gland is high, and hematoma after thyroidectomy is one of its complications. We aimed to evaluate hematoma after thyroidectomy and its related factors.

**Methods:** In this retrospective study, 2320 patients over 20 years of age who underwent thyroidectomy in Imam Khomeini, Arvand, and Mehr Ahvaz hospitals, Khuzestan Province, southern Iran between 2011 and 2022 were enrolled. Data were analyzed using SPSS software, version 22.

**Results:** 70.7% of the patients were in the age range of 20-50 years. Twenty-five (1.1%) of patients developed a hematoma after thyroidectomy. Males are more likely to hematoma after surgery ( $P=0.01$ ). Hematoma was significantly higher in patients with a history of hypertension ( $P=0.001$ ). Moreover, a significant association was found between male gender, and age over 50 years with the risk of hematoma ( $P<0.05$ ). The incidence of hematoma had a statistically remarkable correlation with follicular thyroid cancer pathology ( $P=0.001$ ). Other pathology diagnoses were not significantly related to hematoma formation after thyroidectomy.

**Conclusions:** Hematoma after thyroidectomy surgery is a rare, but dangerous and life-threatening complication. It is important to identify risk factors for hematoma formation.

## KEYWORDS

Thyroidectomy; Hematoma; Surgery; Risk factor; Complication

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## INTRODUCTION

A thyroidectomy is surgery to remove partial or total thyroid gland<sup>1</sup>. Cancer is one of the most common reasons for thyroidectomy, where a large part of the thyroid is removed during surgery<sup>2</sup>. Moreover, some benign thyroid diseases is often required thyroidectomy<sup>3</sup>. Although thyroidectomy is a relatively safe procedure, it may be associated with some worrisome and dangerous postoperative clinical complications<sup>4-7</sup>. Serious complications occurs in less than 1% of cases during thyroid

surgery, and two of the most common complications are laryngeal nerve damage and hypocalcemia<sup>8</sup>. Other major complications include hematoma, infection, thoracic duct injury, as well as injury to neck nerves, collateral arteries, and veins<sup>9</sup>. In different investigations, the incidence of hematoma after thyroidectomy has been reported between 0.7 and 4.7%<sup>5, 10, 11</sup>.

Recently, due to the progress of new tools, including bipolar scalpels, ultrasonic scissors, and energy platforms, outpatient thyroid surgery has become more accurate and prevalent as a result of shorter hospital stays and lower costs<sup>12, 13</sup>. Although, postoperative hematoma remains a potentially serious complication<sup>14</sup>. Hematoma formation after thyroidectomy may be related to patient aptitude, surgical method, and thyroid pathology<sup>5, 15</sup>.

In several reports, coexisting morbidities, male sex, older age, extent of thyroidectomy, volume of thyroid removed, some thyroid diseases, reoperations, High blood pressure after surgery, antithrombotic agents, and smoking have been mentioned as risk factors for hematoma after thyroidectomy<sup>11, 16</sup>.

Due to the complications of thyroidectomy, patients who undergo thyroid surgery should be closely monitored for signs of hematoma after surgery. As an increasing number of patients with thyroid nodules are selected for outpatient thyroid surgery, one of the main concerns of outpatient thyroid surgery is the risk of bleeding after thyroidectomy<sup>17</sup>. A better understanding of the risk factors for bleeding after thyroidectomy can guide physicians in selecting patients for outpatient thyroid surgery. We aimed to evaluate the hematoma formation after thyroidectomy and its related factors.

## MATERIALS AND METHOD

In this retrospective study, 2320 patients over 20 years of age who underwent thyroidectomy in Imam Khomeini, Arvand, and Mehr Ahvaz hospitals, southern Iran between 2011 and 2022 were included. Patients with preoperative hyperparathyroidism, bleeding disorders, chronic kidney disease, or a history of dysphonia were excluded from the study. All demographic, clinical, laboratory and imaging data after surgery and pathology of the patients were available in the surgical department archive. The presence of infection was defined as the need for wound drainage and not the prescription

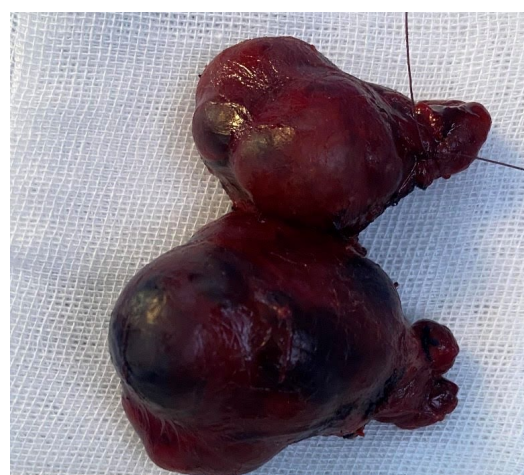
of antibiotics. The presence of hematoma was considered in case of need for medical or surgical intervention. After the surgery, the patients were routinely examined by the anesthesiologist regarding the condition of the vocal cords. Those who had hoarseness after surgery were referred to an otolaryngologist for consultation. During hospitalization after surgery, serum calcium was regularly checked, and clinical evidence of hypocalcemia was controlled.

A questionnaire was designed to extract information from the patients' medical records, which included age, gender, type of thyroid disease, laryngeal nerve injury, hypocalcemia, hematoma formation, wound infection, hoarseness, seroma, tracheal injury, and thoracic duct injury.

This study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Ethics number: IR.AJUMS.HGOLESTAN.REC.1402.082). Written informed consent was obtained from all patients. **Figure 1** shows the patient's thyroid gland.

## Statistical analysis

Statistical analysis was performed by SPSS software version 22 (IBM, Chicago, USA). The qualitative variables were indicated as number (percentage). Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test for the distribution. Pearson's and Spearman's correlation coefficient, and paired t-test were used to analyze quantitative variables. *P*-value less than 0.05 was considered statistically significant.



**Figure 1:** The patient's thyroid gland

## RESULTS

In this retrospective study, 2320 thyroidectomy patients above 20 years old were included, of which 1925 patients were female (83%). Only 1.1% of patients had hematoma after surgery (25 patients) (Table 1).

According to Table 2, the incidence of bleeding in patients over 50 years of age was higher than patients less than 20 years and patients between 20-50 years. This difference showed a statistically significant difference ( $P=0.01$ ). In addition, males are more likely to hematoma after surgery ( $P=0.01$ ). Hematoma was significantly higher in patients with a history of hypertension ( $P=0.001$ ). Moreover, a significant association was found between male

gender, and age over 50 years with the risk of hematoma ( $P<0.05$ ).

The incidence of hematoma had a statistically remarkable correlation with follicular thyroid cancer pathology ( $P=0.001$ ). Other pathology diagnoses were not significantly related to hematoma formation after thyroidectomy (Table 3).

## DISCUSSION

Hematoma after thyroidectomy is a serious and potentially life-threatening complication. The formation of hematoma at the surgical site may lead to airway obstruction or respiratory distress in some cases, and urgent surgical intervention is required to prevent suffocation, cardiac arrest or even death<sup>18, 19</sup>.

Table 1: Demographic and clinical characteristics of patients

| Variable                           | Frequency | Percentage |
|------------------------------------|-----------|------------|
| Age (yr)                           |           |            |
| Less than 20 years                 | 72        | 3.1        |
| Between 20-50                      | 1641      | 70.7       |
| Over 50 years old                  | 607       | 26.2       |
| Sex (Female)                       | 1925      | 83.0       |
| Hematoma                           | 25        | 1.1        |
| History of HTN                     | 73        | 3.1        |
| Radiation history                  | 5         | 0.2        |
| Anticoagulant use history          | 26        | 1.1        |
| History of previous surgery        | 190       | 8.2        |
| History of iodine therapy          | 60        | 2.6        |
| Lobectomy surgery                  | 816       | 35.2       |
| Total thyroidectomy surgery        | 1278      | 55.1       |
| Total thyroidectomy surgery + MRND | 170       | 7.3        |
| Lobectomy surgery + LND            | 8         | 0.3        |

HTN: Hypertension, MRND: Modified radical neck dissection, LND: Lymph node dissection.

Table 2: Correlation of bleeding after thyroidectomy with demographic and clinical variables

| Variable                     | Hematoma | No hematoma | P- value |
|------------------------------|----------|-------------|----------|
| Sex; n (%)                   |          |             |          |
| Female                       | 12 (0.5) | 1904 (82.4) | 0.001    |
| Male                         | 13 (0.6) | 382 (16.5)  |          |
| Age; n (%)                   |          |             |          |
| Less than 20 years           | 2 (0.1)  | 69 (3)      | 0.001    |
| Between 20-50 years          | 8 (0.3)  | 1626 (70.4) |          |
| Over 50 years old            | 15 (0.6) | 591 (25.6)  |          |
| Antithrombotic agents; n (%) |          |             |          |
| Yes                          | 0 (0)    | 26 (1.1)    | 0.592    |
| No                           | 25 (1.1) | 2260 (97.8) |          |
| Previous thyroid surgery     |          |             |          |
| Yes                          | 2 (0.1)  | 185 (8)     | 0.987    |
| No                           | 23 (1)   | 2101 (90.9) |          |
| History of HTN               |          |             |          |
| Yes                          | 15 (0.6) | 58 (2.5)    | 0.001    |
| No                           | 10 (0.4) | 2228 (96.4) |          |

HTN: Hypertension.

**Table 3:** Correlation between the hematoma after thyroidectomy and the type of disease pathology

| Variable                                   |     | Hematoma | No hematoma | P- value |
|--------------------------------------------|-----|----------|-------------|----------|
| Pathology of Hurthle cell; n (%)           | Yes | 0 (0)    | 43 (1.9)    | 0.489    |
|                                            | No  | 25 (1.1) | 2243 (97.1) |          |
| Pathology of goiter; n (%)                 | Yes | 7 (0.3)  | 836 (36.2)  | 0.376    |
|                                            | No  | 18 (0.8) | 1450 (62.7) |          |
| Pathology of FTC; n (%)                    | Yes | 4 (0.2)  | 36 (1.6)    | 0.001    |
|                                            | No  | 21 (0.9) | 2250 (97.4) |          |
| Pathology of MTC; n (%)                    | Yes | 1 (0.1)  | 20 (0.8)    | 0.101    |
|                                            | No  | 24 (1)   | 2266 (98.1) |          |
| Unifocal PTC; n (%)                        | Yes | 8 (0.3)  | 451 (19.5)  | P=0.126  |
|                                            | No  | 17 (0.7) | 1835 (79.4) |          |
| Multifocal PTC; n (%)                      | Yes | 4 (0.2)  | 315 (13.6)  | 0.749    |
|                                            | No  | 21 (0.9) | 1971 (85.3) |          |
| Hashimoto's pathology; n (%)               | Yes | 0 (0)    | 87 (3.8)    | 0.320    |
|                                            | No  | 25 (1.1) | 2199 (95.2) |          |
| Pathology of follicular hyperplasia; n (%) | Yes | 0 (0)    | 62 (2.7)    | 0.404    |
|                                            | No  | 25 (1.1) | 2224 (96.2) |          |
| Pathology of follicular adenoma; n (%)     | Yes | 2 (0.1)  | 82 (3.5)    | 0.241    |
|                                            | No  | 23 (1)   | 2204 (95.4) |          |

FTC: Follicular thyroid cancer, MTC: Medullary thyroid carcinoma, PTC: papillary thyroid carcinoma.

The aim of this current study is to evaluate hematoma formation after thyroidectomy and its related factors. We founded hematoma was significantly higher in patients with a history of hypertension. Also, a considerable relation was found between male gender, and age over 50 years with risk of hematoma. Based on our findings, the incidence of hematoma had a statistically remarkable correlation with follicular thyroid cancer pathology. In our study, the incidence of hematoma formation was 1.1%, which is similar to previous investigations<sup>15, 16, 20</sup>. In study by Oltmann, postoperative hematoma developed in 0.5% of patients (0.5 %) <sup>21</sup>. Some studies have been conducted to investigate hematoma after thyroidectomy and its risk factors<sup>11</sup>.

Age is a risk factor for bleeding and hematoma formation after thyroidectomy <sup>5, 21, 22</sup>. In the present study, the incidence of bleeding was considerably higher in patients over 50 years of age than in the other two groups, which indicates that older patients are at a higher risk for bleeding, which is consistent with the results of previous studies. The cause can be attributed to the increased fragility of blood vessels in elderly patients. With increasing age, blood vessels may become less elastic, possibly reducing vasoconstriction. Finally, bleeding or hematoma formation may occur<sup>22</sup>.

According to our results, male is more likely to hematoma after surgery. Male gender is one of the

risk factors for thyroid cancer, and therefore male are more prone to metastasis to the lymph nodes. Therefore, thyroid surgery in male may be more complicated and the extent of the surgery may be more extensive, resulting in more blood vessel damage and bleeding, and can be one of the risk factors of bleeding and hematoma formation<sup>6, 23</sup>. In the study of Calò et al, male gender had a statistically significant correlation with the occurrence of bleeding and hematoma formation at the surgical site<sup>6</sup>, which is in line with the results of our study.

One of the most important risk factors for postoperative bleeding is high blood pressure, and early control of this modifiable risk factor can improve surgical results and patient satisfaction<sup>4, 24</sup>. These results were in line with our findings.

Fan et al. stated that male sex, age, Graves' disease, hypertension, use of antithrombotic drugs, history of previous thyroid surgery are risk factors for hematoma occurrence after thyroidectomy<sup>13</sup>. The findings of this study were in line with our study.

Contrary to our results, Alqahtani et al. did not find any significant relationship between age, gender, final pathology, thyroidectomy rate and hematoma risk<sup>15</sup>. The reason for this discrepancy may be the difference in the surgical method and the sample size of the two studies.

Similar to present results, Weiss et al. noted that use of anticoagulant use did not affect hematoma

formation<sup>25</sup>. Whereas, Oltmann et al. found patients requiring clopidogrel or any anticoagulant medicine are at much higher risk for formation of hematoma<sup>21</sup>. The efficacy of antiplatelet and anticoagulant treatments on postoperative hemostasis is not the same<sup>26</sup>.

The strength of our study was the large sample size. This study has limitations due to the retrospective nature of its design. However, due to the rare nature of this complication, it is difficult to study hematoma formation after thyroidectomy in a prospective manner. Another limitation, tumor size and thyroid gland were not available in our database, they may act as confounding factors.

## CONCLUSION

Bleeding and hematoma formation after thyroid surgery remains a rare complication, occurring in only 1.1 % over the 12-year study period. We showed that male gender, age over 50 years and history of high blood pressure are the most important risk factors for bleeding after surgery, and the formation of hematoma at the surgical site. Patients with several identified risk factors for hematoma should be considered for a period of observation after thyroidectomy.

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## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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