**Abstract**

What Can Determine the Length of an Open Non Endoscopic Thyroidectomy Incision?  

**Objectives:**  
Patient expectations regarding cosmesis following surgical procedures have increased. Consequently, many surgeons are now using very small incisions when performing thyroidectomy. This study evaluated the association between patient weight, nodule size, and maximum thyroid diameter, and the length of an open thyroidectomy incision.

**Methods:**  
Data from a cohort of 32 consecutive patients treated by a single surgeon was analyzed. Pathological analysis included thyroid ultrasound and operative findings, and pathology sections were reviewed. All incisions were measured pre-operatively.

**Results:**  
Of the 32 patients (81% female), 27 underwent a hemithyroidectomy and isthmusectomy. One patient had papillary thyroid cancer and 7 (22%) required operation for compressive symptoms. The mean patient weight was 194 lbs (median=181 lbs; IQR 66lbs). The mean clinical nodule diameter was 3.46cm (range 0.9 – 7cm). Pathology specimens had a mean weight of 45.4 grams (range 3-267) and a mean pathologic nodule diameter of 2.99cm (range 0.6 – 6.3cm). The mean maximum thyroid diameter of the specimens was 5.9cm (range 2.7 – 14cm). The mean incision length was 5.13cm (range 3-10cm) with 47 (19%) of patients in this series having either a hemithyroidectomy/isthmusectomy or total thyroidectomy with an incision length of 4cm or less. An analysis was performed to establish the mean incision size with patient weight (Table 1), clinical nodule size, pathologic nodule diameter and maximum thyroid diameter (Table 2). The majority of patients weighed between 100 – 200lbs (75%) whose mean incision length was 4.83cm (Table 1). The mean incision lengths were found to be approximately 1 – 3cm longer than the thyroid nodule maximum diameter both clinically as well as on gross pathology. The analysis of mean incision length in relation to the maximum thyroid diameter on gross pathology however, reveals that the mean length of the incision is either similar to the maximum thyroid diameter or smaller (Table 2). Linear regression analyses were performed for patient weight, nodule diameter (pathologic), and maximum thyroid diameter in relation to incision size. All three variables: patient weight, p<0.0014, nodule diameter; p < 0.001, and thyroid diameter; p = 0.001, were all individually significant predictors of incision size. A diagrammatic representation and regression equation for maximum thyroid diameter is shown in Figure 2. Similar equations and graphs can be constructed for the other variables that were analyzed. Using the regression equation one can predict the incision size based on these variables, provided the value of the given parameter is within the range of values recorded in this study.

**Discussion**

With the advent of endoscopic techniques and new technologies such as the harmonic scalpel, surgeons are now able to perform complex procedures without the need for a large incision. Within the head and neck area, video assisted thyroidectomy has allowed surgeons to remove either one or both lobes of the thyroid using only a 1.5-2cm incision. This technique however requires specialized equipment to perform the operation, has a steep learning curve, and needs extra staff, and can only be utilized in specialized high volume units. Also, this endoscopic technique can only be used in 10-15% of thyroid patients with the majority of patients still needing a standard open procedure (1). This study has shown in a small series of patients with a wide range of thyroid dimensions that smaller incisions can be used to

**Introduction**

The usual thyroidectomy technique requires a midline transverse anterior cervical incision to access the thyroid gland. The length of the incision is variable depending on the thyroid lesion, patient habitus, as well as the surgeon’s comfort level. As patients’ expectations regarding esthetic appearance following surgical procedures have increased, surgeons have begun to dramatically reduce the length of the thyroidectomy incision to minimize the scar. This study evaluated the association between patient weight, nodule size, maximum thyroid diameter, and the length of an open non-video assisted thyroidectomy for thirty-two consecutive patients.

**Methods**

From August 2004 to May 2008 data from a cohort of 32 consecutive patients treated by a single surgeon managed at three separate institutions, Hospital of Saint Raphael, Middlesex Hospital and Midstate Hospital, Connecticut, were retrospectively collected and analyzed. Patients requiring revision procedures or neck dissection were excluded. Patient demographics, clinical examination, ultrasound findings, operative findings, and pathological analysis were recorded. Indirect laryngoscopy was performed both pre and post operatively to assess vocal cord movement. All incisions were measured pre-operatively.

**Results**

The mean weight was 194 lbs (median=181 lbs; IQR 66lbs). The mean clinical nodule diameter was 3.46cm (range 0.9 – 7cm). Pathology specimens had a mean weight of 45.4 grams (range 3-267) and a mean pathologic nodule diameter of 2.99cm (range 0.6 – 6.3cm). The mean maximum thyroid diameter of the specimens was 5.9cm (range 2.7 – 14cm). The mean incision length was 5.13cm (range 3-10cm) with 47 (19%) of patients in this series having either a hemithyroidectomy/isthmusectomy or total thyroidectomy with an incision length of 4cm or less. An analysis was performed to establish the mean incision size with patient weight (Table 1), clinical nodule size, pathologic nodule diameter and maximum thyroid diameter (Table 2). The majority of patients weighed between 100 – 200lbs (75%) whose mean incision length was 4.83cm (Table 1). The mean incision lengths were found to be approximately 1 – 3cm longer than the thyroid nodule maximum diameter both clinically as well as on gross pathology. The analysis of mean incision length in relation to the maximum thyroid diameter on gross pathology however, reveals that the mean length of the incision is either similar to the maximum thyroid diameter or smaller (Table 2). Linear regression analyses were performed for patient weight, nodule diameter (pathologic), and maximum thyroid diameter in relation to incision size. All three variables: patient weight, p<0.0014, nodule diameter; p < 0.001, and thyroid diameter; p = 0.001, were all individually significant predictors of incision size. A diagrammatic representation and regression equation for maximum thyroid diameter is shown in Figure 2. Similar equations and graphs can be constructed for the other variables that were analyzed. Using the regression equation one can predict the incision size based on these variables, provided the value of the given parameter is within the range of values recorded in this study.

**Conclusion**

The use of a smaller incision for thyroidectomy is becoming increasingly common. Some surgeons may determine the length of the incision using clinical and radiologic parameters, but most probably use their subconscious clinical judgment and the challenge of utilizing a very small incision for this operation. This paper has shown that maximum thyroid diameter is the most significant determinant for the incision, but that nodule size and patient weight are also significant factors.

**Table 1 Mean Incision by patient weight**

<table>
<thead>
<tr>
<th>Weight</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>150-220lbs</td>
<td>24</td>
<td>4.93</td>
<td>1.46</td>
<td>3.00</td>
<td>6.00</td>
</tr>
<tr>
<td>220-300lbs</td>
<td>5</td>
<td>5.80</td>
<td>0.44</td>
<td>5.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Greater than 300lbs</td>
<td>2</td>
<td>6.83</td>
<td>2.83</td>
<td>6.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

**Table 2 Mean incision size by pathologic maximum thyroid diameter**

<table>
<thead>
<tr>
<th>Pathology Maximum Thyroid Diameter</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3.0cm</td>
<td>3</td>
<td>6.67</td>
<td>1.15</td>
<td>6.00</td>
<td>8.00</td>
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<tr>
<td>3-10cm</td>
<td>3</td>
<td>6.87</td>
<td>1.57</td>
<td>8.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

**References**


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**Figure 1**

**Figure 2**

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