Minimally Invasive Video-Assisted Thyroidectomy: Report of 16 Cases in Children Older Than 10 Years

By Claudio Spinelli, Alessia Bertocchini, Gianluca Donatini, and Paolo Miccoli

Pisa, Italy

Methods: From October 1998 to December 2002 in the Department of Surgery at the University of Pisa, 16 patients ages 18 years or younger (14 girls, 87.5%, and 2 boys, 12.5%; range, 11 to 18; mean age, 15 years, 8 months) underwent a surgical operation with video-assisted technique for thyroid pathology. These patients belong to a larger group of 270 patients treated with this technique. Surgical therapy with video-assisted technique was chosen; a lobectomy was used in 15 cases (90.0%) and a total thyroidectomy in 1 case (10%).

Results: Two patients (12.5%) underwent a second video-assisted operation to complete the thyroidectomy for a false-negative result at extemporal histologic examination during the first operation. The histologic examination found benign pathology in 14 cases (87.5%) and a malignant lesion (papillary type) in 2 cases (12.5%). No postoperative complications were observed.

Conclusions: The results of the mini-invasive video-assisted technique for thyroidectomy in this preliminary experience seem to be equal to those of the traditional open surgical technique (200 surgical operations for thyroid pathology for the ages 18 years or younger). Elective indications of the mini-invasive video-assisted technique are the volume of the nodule and histological type; this technique cannot be used in cases of voluminous goiter, medullary carcinomas and poorly differentiated carcinomas. The advantage that this technique offers, in addition to a better postoperation period, is an improved esthetic result, which is particularly important in young patients.

INDEX WORDS: Minimally invasive video-assisted neck surgery, endoscopic thyroidectomy.

Materials and Methods

From October 1998 to December 2002, 16 patients (14 girls and 2 boys with an average age of 15 years, 8 months [range, 11 to 18]) were selected for minimally invasive video-assisted thyroidectomy. All of these patients underwent a presurgical evaluation including hormonal dosage, thyroid ultrasound scan, thyroid scintigraphy, and fine-needle aspiration of the thyroid lesion.

Criteria for selecting these patients for surgery were a thyroid nodule with a maximum diameter of 35 mm, the absence of a previous neck operation or radiation in the cervical area, the absence of ultrasound scan and biochemical signs of thyroiditis, thyroid volume not superior to 20 mL, and the absence of suspected lymphadenopathies. After the operation all patients underwent a laryngoscopy, to assess the mobility of the vocal chords, and a cervical ultrasound scan; those patients who underwent total thyroidectomy for papillary cancer were given tests for blood calcium dosage, thyroglobulin, and total body iodine scintigraphy.

All the patients were assessed after surgical operation from an aesthetic point of view for the result of the surgical scar and were considered poor, acceptable, good, or excellent.

Surgical Technique

The patient is placed on the operating room table face upwards with his or her neck not stretched. The first phase of this surgical technique is carried out under direct vision after a horizontal incision of about 1.5 cm is placed in the skin 2 cm above presternum (sternal manubrium). The subcutis and the platysma are separated, and Hunter’s line is cut lengthwise for about 3 cm. The prethyroid muscles on the affected side are opened laterally (Fig 1). The thyroid lobe that is affected by lesion is positioned medially. An endoscope of 30° (5 mm) is inserted through the cut, and under endoscopic vision the dissection of the thyroid gland is carried out using small instruments (spatula, spatula-aspiration, scissors, and tweezers) (Fig 2).

The middle thyroid vein and the upper and lower funicolar vascular blood vessels are prepared and cut using ultracision (Fig 3). The magnification of the endoscope allows one to easily identify the recurrent nerve and the parathyroid glands (Fig 3). The thyroid lobe is brought out through the skin incision and completely removed under direct vision (Fig 3). A hemostatic material (Surgicel) is positioned in the thyroid lobe. Hunter’s line and the platysma are sutured, and the skin is closed with intradermal suture or with glue (cyanoacrylate; Fig 4).

Results

The average diameter of nodules, in patients up to a maximum age of 18 years was 21.4 (±/− 7.7 mm; range, 9 to 30 mm). No operation has been converted from
MIVA to open surgery. One patient underwent a total thyroidectomy and 15 patients a lobectomy, of whom 2 required a second operation with video-assisted technique to complete the thyroidectomy because of a false-negative histologic assessment at the extemporal examination during the first operation. The average operating time was 60 (±20) minutes (range, 35 to 100 minutes) for the lobectomy and 100 (±20) minutes (range, 70 to 120 minutes) for total thyroidectomy. The histologic examination showed 14 benign lesions (micro- and macrofolliculate) and 2 cases of malignant disease, (papillary cancer). The children remained in the hospital after operation for 24 hours. No hemorrhagic complications or injury to the recurrent nerve was observed. Therefore no instances of postoperative hypocalcemia. An ultrasound scan postoperatively confirmed the absence of parenchymal residues in the thyroid lodge in all patients. The Iodine-scintigraphy showed in 2 patients; who had underwent a total thyroidectomy, a pick-up of less than 2%. The esthetic result of the surgical scar was excellent in 10 patients (62.5 %), good in 4 (25%) and acceptable in 2 (12.5 %; Table 1).

DISCUSSION

The publication concerning thyroidectomy with minimally invasive video-assisted technique in the pediatric age group7 are sparse when compared with the adult where the reports in literature are numerous.3–6,8,9 The techniques for this minimal-access surgery are different based on the access utilized. The anterior cervical access is the most frequent approach and also is utilized at our institution. A single central incision of 1.5 cm to 3 cm is made over the presternum, and the procedure is gasless. The surgical space is maintained with the use of retractors.10,11 Shimizu et al12,13 describe
a method in which there is an incision down the clavicle. In this incision, the surgical instruments are introduced, and the thyroid is extracted. The surgical space is maintained with a complex system of external traction in the anterior region of the neck. Gagner and Husher et al describe the lateral cervical access in which there are small incisions of 5 mm. In these, trocars and instrumental endoscopes are introduced. The surgical field is maintained with a constant introducing of CO₂ at low pressure and the extraction of the surgical specimen by a retroauricular incision; Ikeda et al proposes axillary access in which there is an incision of the skin of 30 mm. In this instance a trocar of 12 mm and 3 trocars of 12 mm, 5 mm, and 5 mm diameter are introduced associated with introducing CO₂ at low pressure (4 mm Hg); Oghami et al proposed the mammary access, in which there is a presternum incision of 15 mm. In this, a trocar of 12 mm is introduced together with 2 bilateral incisions of 10 and 5 mm on the superior margin of the mammary areola; CO₂ at low pressure (6 mm Hg) is introduced for the dissection of the subcutis and the access to the thyroid lodge.

The surgical team must have good experience in thyroid open surgery and an excellent cognition of the surgical anatomy with a particular experience in the search for the recurrent laryngeal nerve and visualization of the parathyroids.

At the moment, the complexity of the MIVAT is less than in the past because there has been the introduction of the “ultracision.” This permits in a simple and a safe way to coagulate and dissect. In our experience, the surgical time has been reduced greatly in the last few years, and now the average time of this minimally invasive procedure is similar to that of the open thyroidectomy.

The very important advantages of this technique are a better postoperative period, a reduced length of hospital, stay less pain in the cervical region, and a better aesthetic result, which is very important in young patients. The selection of the patients to undergo the MIVAT must be very accurate. Small follicular nodules or adenomas with functional autonomy less or equal 3.5 cm represent the elective indication to undergo this method, including well-differentiated small papillary cancers.

Also, a prophylactic total thyroidectomy could be carried out with this technique in asymptomatic children...
but with positive DNA screening for the research of proto-oncogene RET mutations in subjects affected by MEN 2 syndrome.\textsuperscript{17}

The MIVAT is not indicated in poorly differentiated cancers or in medullary cancers. These histotypes frequently infiltrate the local tissues or are associated with adenopathy of the central and latero-cervical compartments.

REFERENCES


Table 1. Young Patients Undergoing MIVAT

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age Range (yr)</th>
<th>M/F</th>
<th>Nodule Diameter (mm)</th>
<th>Surgery</th>
<th>Operating Time</th>
<th>Histology</th>
<th>Aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>11–18</td>
<td>2/14</td>
<td>21.4 (range, 9–30)</td>
<td>lobectomy, 15</td>
<td>Lobectomy, 60 +/- 20 min</td>
<td>14 benign lesions</td>
<td>10 excellent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>↓ ↓</td>
<td>Total thyroidectomy, 2 total</td>
<td>2 malignant</td>
<td>4 good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thyroidectomy</td>
<td>thyroidectomy, 100 +/- 20 min</td>
<td>lesions</td>
<td>2 acceptable</td>
</tr>
</tbody>
</table>

Table 1. Young Patients Undergoing MIVAT

<table>
<thead>
<tr>
<th>Case</th>
<th>Age Range (yr)</th>
<th>M/F</th>
<th>Nodule Diameter (mm)</th>
<th>Surgery</th>
<th>Operating Time</th>
<th>Histology</th>
<th>Aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>11–18</td>
<td>2/14</td>
<td>21.4 (range, 9–30)</td>
<td>lobectomy, 15</td>
<td>Lobectomy, 60 +/- 20 min</td>
<td>14 benign lesions</td>
<td>10 excellent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>↓ ↓</td>
<td>Total thyroidectomy, 2 total</td>
<td>2 malignant</td>
<td>4 good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thyroidectomy</td>
<td>thyroidectomy, 100 +/- 20 min</td>
<td>lesions</td>
<td>2 acceptable</td>
</tr>
</tbody>
</table>