Minimally invasive video-assisted thyroidectomy in pediatric patients

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Abstract

Background: Minimally invasive video-assisted thyroidectomy (MIVAT) proved to be safe and effective in the treatment of both benign diseases and malignancies. We report our experience in thyroid surgery in pediatric patients.

Methods: From October 1998 to December 2005, 35 patients (27 females and 8 males) underwent MIVAT for thyroid disease. The mean age was 14.0 years (range, 8-18 years); mean ecographically estimated thyroid volume was 11.13 mL (range, 8-25 mL).

Results: A total thyroidectomy was performed in 22 patients, whereas lobectomy was performed in 13. Two patients of the latter group had a second lobectomy for a false-negative result at frozen section during the first operation. One patient underwent also a prophylactic central neck lymphadenectomy for positive RET oncogene. The histologic examination found a papillary carcinoma in 11 patients, a microfollicular nodule in 7 patients, and multinodular goiter in 17 patients. The mean operative time was 54.1 minutes for thyroidectomy (range, 25-110 minutes) and 38.5 minutes for lobectomy (range, 20-65 minutes). All patients but one was discharged on the first postoperative day. One transient hypoparathyroidism was observed in the patient who underwent total thyroidectomy plus central neck lymphadenectomy.

Conclusions: The MIVAT technique proved to be as safe and effective as conventional thyroidectomy with Kocher approach to treat patients with both benign and malignant diseases of the thyroid gland. The advantages of MIVAT are represented by a better and faster postoperative course and an improved aesthetic result, which is particularly important in this group of patients.

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Since 1996, when Gagner [1] first described the endoscopic parathyroidectomy, different types of minimally invasive video-assisted or endoscopic approaches have been described for thyroid surgery [2-6]. Despite easy fascination linked with these techniques [7], the different experiences reported in literature nowadays have widely cleared the questions about the safety (in intraoperative and postoperative complications) and the completeness of the resection for both benign diseases [8-10] and malignancies when a minimally invasive approach is performed [11-15]. Minimally invasive video-assisted thyroidectomy (MIVAT) described by Miccoli [5,9-11] has also been applied in the treatment of thyroid pathologic condition in children [16].

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In this article, we present our experience of MIVAT in pediatric patients.

1. Patients and methods

From October 1998 to December 2005, 35 patients (27 females and 8 males) were admitted to the Department of General Surgery of the University of Pisa (Pisa, Italy) to undergo thyroid surgery. The mean age was 14.0 years (range, 8-18 years). All of these patients underwent a complete preoperative assessment including hormonal profile, neck ultrasound evaluation, thyroid scintigraphy, and fine-needle aspiration.

Inclusion criteria for MIVAT techniques were thyroid estimated volume less than 30 mL, thyroid nodule less than 35 mm, absence of enlarged lymph nodes, absence of biochemical signs of thyroiditis, and previous thyroid surgery with cervicotomic approach. Only patients with low risk (pT1N0) papillary carcinoma were included in the MIVAT group. One of the patients had a positive RET oncogene and was scheduled for a prophylactic thyroidectomy plus central neck lymphadenectomy.

1.1. Surgical technique

The patient is placed in a supine position with the neck not hyperextended. Minimally invasive video-assisted thyroidectomy is accomplished by means of a median unique incision of 1.5 to 2.0 cm, 2 cm above the sternal notch. The first step of the procedure is carried out under direct vision and, after the incision of the Hunter’s line on the strap muscles, a 30° 5 mm endoscope is introduced through the incision and the operation is then performed using a specifically designed kit (Miccoli kit; Storz). Hemostasis was achieved using the Harmonic CS-14C (Ethicon Endosurgery, Cincinnati, OH). The neck incision is closed using surgical glue. No drains were used in all cases. In the patient with positive RET oncogene, the central neck compartment was approached by placing the endoscope at the head of the patient thus allowing a full vision of the superior mediastinum, with a change in the position of the equipment in the operative theater. The recurrent laryngeal nerve is followed as the main anatomical landmark (Fig. 1), dissecting all the lymphatic tissue between the carotid sheath and the trachea, until the innominate trunk is reached, first on the right side, then on the left side. Now, all the lymphatic tissue is extracted through the central incision, and it is divided from the tracheal plane on the midline under direct vision.

2. Results

All the MIVAT procedures were successfully carried out, with no need for conversion. The mean ecographically estimated thyroid volume was 11.13 mL (range, 8.0-25.0 mL); the mean nodule diameter was 1.4 cm (range, 1.0-3.0 cm).

Twenty-two patients underwent a total thyroidectomy, whereas a lobectomy was performed in 13 patients. Two patients of the latter group required a second procedure (contralateral lobectomy) performed with MIVAT technique for a false-negative result at frozen section during the first operation. Of the 22 patients, one also underwent a prophylactic central neck dissection—this patient, an 8-year-old girl, had a family history of medullary carcinoma and was diagnosed with a positive RET oncogene.

The mean operative time for total thyroidectomy was 54.1 minutes for thyroidectomy (range, 25-110 minutes) and 38.5 minutes for lobectomy (range, 20-65 minutes). The operative time in the patient in whom a central neck lymphadenectomy was performed with a total thyroidectomy was 65.0 minutes. No drains were used. All patients but one was discharged on the first postoperative day. They were asked to come back after 24 hours to have a second serum calcium and parathormone measurement. No hemorrhage or laryngeal nerve palsy was registered; one transient hypoparathyroidism was observed in the patient who underwent total thyroidectomy plus central neck lymphadenectomy, and she fully recovered after 21 days of oral calcium/Vitamin D3 supplementation. At 6 months after the surgery serum calcium and parathormone levels were 8.7 mg/dL and 26 pg/mL, respectively. At the 21-month follow-up, the calcitonin level is undetectable.

A histologic examination revealed a multinodular goiter in 17 patients, a papillary carcinoma in 10 patients, a microfollicular nodule in 7 patients, and 1 microfocus of medullary carcinoma (2 mm) in 1 patient. The number of lymph nodes removed in the RET-positive oncogene was 11, all negative for metastatic disease.
3. Discussion

Minimally invasive video-assisted techniques are nowadays routinely used for the treatment of both benign and malignant thyroid diseases in the adult populations [2-5,8-14,17-20]. Comparing the different approaches proposed as minimally invasive [2-5], thus less traumatic, it appears that a truly endoscopic thyroidectomy such as the one performed by Gagner [1,5] would not be easily applied to a pediatric population for the obvious CO2 insufflation problems (hypercarbia, neck emphysema). The procedures proposed by Shimizu [2], Ikeda [3], and Oghami [4], unless useful to avoid a central neck scar, appear to be quite longer than the Miccoli technique [9] comparing the mean operative time, and they are really complex in the feasibility requiring the use of multiple trocars [3,4] or a traction device to open the operatory space [2]. Moreover, the 2 endoscopic techniques of Ikeda [3] and Oghami [4] do not safeguard the patients from the problems of using CO2. The MIVAT technique allow the surgeons to perform a total thyroidectomy and, when needed, a lymph node dissection from the same incision [13,14], reducing the trauma to the patients, with the same completeness of resection and complications rate when compared to conventional procedures [11]. Minimally invasive video-assisted thyroidectomy proved to be a safe and feasible technique for treatment of both benign and malignant thyroid diseases, with advantages of postoperative pain, reduced postoperative hospital stay, and better aesthetic results. The present study improves the knowledge of our center about MIVAT and confirms its safety and effectiveness on a greater group of patients, as compared to our previous publication in the same Journal in 2004 [16]. Minimally invasive video-assisted thyroidectomy also proved to be a valid option in a RET-positive oncogene patient, who required total thyroidectomy associated with central neck prophylactic lymphadenectomy, as reported in other studies [21].

Surgical experience in open conventional endocrine surgery [22] is mandatory for the surgeon who wants to use MIVAT. The learning curve for MIVAT, in our experience, dramatically decreased after 30 to 40 cases, and moreover, the introduction of the Harmonic shear in the year 2000 reduced the mean operative time for both lobectomy and thyroidectomy even more. Minimally invasive video-assisted thyroidectomy still cannot be used for patients who do not match the inclusion criteria (no >10%-12% of the overall number of patients with thyroid pathologic finding), and great care must be used in treating children with papillary carcinoma to avoid over indication (a diameter of >2.0 cm or neck lymph nodes with metastatic disease).

4. Conclusions

The MIVAT approach is safe and effective in the treatment of thyroid pathologic condition in children. To reach the high effectiveness of the procedure, in any case, the surgeon might follow the inclusion criteria quite strictly, not including midrisk or high-risk papillary carcinoma, medullary carcinoma, or patients with metastatic disease to the lymph nodes.

References