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Video-assisted thyroidectomy: indications and results

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Abstract *Background and aims:*
Minimally invasive video-assisted
thyroidectomy (MIVAT) was set up
and introduced in our department in
1998. Its results, after an acceptable
relapse, can now be evaluated, also
speculating on new possible indica-
tions. *Patients and methods:* The
procedure is based on a unique inci-
sion in the central neck, 2 cm above
the sternal notch, using small con-
ventional retractors and needlescopic
(2 mm) reusable instruments.
Haemostasis is achieved by a
harmonic scalpel. Patients, 833, un-
derwent MIVAT since June 1998.
There were 715 females and 118
males (ratio 4:1). Lobectomy was
carried out in 323 (38.7%) patients,
total thyroidectomy in 510 (61.2%)
patients. *Results:* Mean operative
time of lobectomy was 36.2 min
(range: 20–120); for total thyroidec-
tomy, 46.1 min (30–130). Conversion
to standard cervicotomy was required
in 16 cases (1.9%); Operative com-
plications were represented by tran-
sient monolateral recurrent nerve
palsy in eight cases (0.9%), definitive
monolateral recurrent nerve palsy in
seven cases (0.8%). Twenty patients
exhibited a hypoparathyroidism,
which corresponds to 3.9% of total
thyroidectomies performed, but only
two showed permanent hypoparathy-
roidism (0.3%). *Conclusion:* MIVAT
can be considered a safe operation
offering significant cosmetic advan-
tages with possible new promising
indications such as prophylactic thy-
roidectomy in rearranged during
transfection (RET) gene mutation
carriers. It is still limited to a minority
of patients, in particular, in endemic
goitre countries.

Keywords Endoscopic
thyroidectomy · Video-assisted
thyroidectomy · Minimally invasive
thyroid surgery · Papillary thyroid
carcinoma · RET gene mutation

Introduction

Our experience with minimally invasive surgery of thyroid
started in 1998 when the central unique access was set up
[1]; initially, using a short insufflation just to dissect the
thyroid space in the early phase of the procedure and later
on, relying only on an external retraction. Other endoscopic
approaches were proposed for the mean time or shortly
after, either through the neck region [2, 3] or breast [4] and
axilla [5], respectively. Some prospective, controlled

studies have been published during the last 5 years showing
the advantages offered by these procedures [6–8] but all the
same, many authors are still reluctant to consider minimally
invasive thyroid surgery as a real progress. Their reluctance
is furthermore strengthened by the evidence that only a
small minority of the patients undergoing surgery for a
thyroid disease fulfil the inclusion criteria for a video-
assisted thyroidectomy [9]; in fact, an important limiting
factor is still the volume of the thyroid masses which often
exceed the present possibilities of endoscopic neck surgery.

Technically, the procedure we set up and currently used [10] is based on a unique incision (1.5-cm long) in the central neck, 2 cm above the sternal notch, the use of small conventional retractors and needlescopic (2 mm) reusable instruments. Haemostasis is guaranteed by a harmonic scalpel (Harmonic: Johnson and Johnson, Cincinnati, OH, USA), using neither clips nor ligatures.

Indications

The first and most important limit is the volume of the mass to be removed. This includes not only the nodule volume but more importantly, the total volume of both lobes, which should not exceed 25 ml, as estimated by ultrasound. Thyroiditis is an important contraindication because adhesions can make dissection difficult and jeopardize the recurrent nerve and parathyroid blood supply. Although we [1], and others [2], initially excluded cancer as an indication, a total thyroidectomy can be safely performed and we consider now "low risk" papillary carcinomas as an indication. The completeness of such a thyroidectomy has been demonstrated by measuring iodine uptake and serum levels of thyroglobulin which are similar to those after traditional open surgery. The endoscopic and open procedures are similar in completeness, when the intended treatment is near total thyroidectomy [10]. Another group of patients that could potentially be candidates for this procedure are the rearranged during transfection (RET) gene mutation carriers. They have small thyroids without nodules, and if serum levels of pentagastrin-stimulated calcitonin are normal, they need no central compartment lymph node clearance. These young patients may be ideal candidates for minimally invasive operations as clearly shown by our own experience (15 cases) and by others who [11] have successfully performed a lymphadenectomy using endoscopic procedure, both in the central and the lateral compartment.

General indications are summarized as follows:

a) Thyroid nodules smaller than 30 mm in their largest diameter harbouring in thyroid glands with a volume less than 25 ml.
b) Graves' diseases gland smaller than 20 ml in volume: although the great majority of these patients are treated with radioiodine, there are few cases where 131 I therapy is not indicated (e.g. expected pregnancy) or refused by the patient.
c) No history of thyroiditis
d) No previous neck surgery or irradiation
e) Follicular tumor or "low risk" papillary carcinoma
f) RET gene mutation carriers with normal pentagastrin-stimulated calcitonin levels (still to be validated).

Results

Since June 1998, 833 patients underwent a MIVAT. They were 9.7% of 8,580 patients undergoing thyroidectomy at our institution in the same period. There were 715 females and 118 males (ratio 4:1). Lobectomy was carried out in 323 (38.7%) patients, total thyroidectomy in 510 (61,2%) patients. In 15 patients with familial medullary carcinoma (gene RET mutation carriers), total thyroidectomy and central compartment lymphadenectomy was performed. Mean operative time of lobectomy was 36.2 min (range: 20–120), for total thyroidectomy, 46.1 min (30–130).

The three most frequent preoperative diagnoses were, respectively, papillary carcinoma ("low risk") in 247 patients (29.6%), follicular tumor in 226 patients (27.2%), multinodular goiter in 210 patients (25.2%). The other indications altogether account for not more than 18% of the total (Table 1).

Every patient undergoing MIVAT was submitted to laryngoscopy prior and after surgery to asses vocal cords motility. Calcemia was checked in every patient undergoing total thyroidectomy on the first and second postoperative day, then once a week for 1 month.

Conversion to standard cervicotomy was required in 16 cases (1.9%); in two cases, we converted to perform completion thyroidectomy after the frozen section was found to be positive for papillary carcinoma (in the early phase of our learning curve, we were concerned about the duration of the procedure through the video-assisted approach but since then we have performed a total video-assisted thyroidectomy in similar cases). In two cases, conversion was due to intraoperative bleeding from the upper peduncle. In nine cases, we converted due to unexpected esophageal infiltration, and the last two conversions were due to difficult dissection caused by a misdiagnosed thyroiditis.

In 13 cases where definitive diagnosis of carcinoma (either papillary or follicular) was made after video-assisted lobectomy, a completion total thyroidectomy was performed through the same access and using the same procedure on the opposite side.

Evaluation of radioiodine uptake and serum thyroglobulin, performed after thyroidectomy, showed no differences

Table 1 MIVAT: preoperative diagnosis

Follicular adenoma	227 (27.2%)
Papillary carcinoma	247 (29.6%)
Multinodular goiter	210 (25.2%)
Hurthle cell adenoma	63 (7.5%)
Toxic goiter	7 (0.8%)
Toxic adenoma	25 (3.0%)
Graves'	31 (3.7%)
Genetic RET mutation	15 (1,6%)
Completion thyroidectomy	13 (1.5%)
Thyroglossal duct carcinoma	1 (0.1%)

between patients who had undergone MIVAT and patients who had undergone a traditional thyroidectomy [10].

All 15 carriers of RET gene mutation who underwent a total thyroidectomy plus central compartment lymphadenectomy, had undetectable serum levels of calcitonin 6 months after surgery with a mean follow up of 15 months (range: 6–42 months).

Operative complications were represented by transient monolateral recurrent nerve palsy in eight cases (0.9%), definitive monolateral recurrent nerve palsy in seven cases (0.8%), bilateral transient recurrent nerve palsy in one case.

Twenty patients exhibited a hypoparathyroidism, which corresponds to 3.9% of the 510 total thyroidectomies performed, but only two complained of a permanent hypocalcemia which necessitated a substitutive therapy, thus, reducing the rate of permanent hypoparathyroidism to 0.3%. We registered in one case, postoperative bleeding requiring re-operation; wound sepsis occurred in two cases.

Discussion

In spite of the skepticism raised by MIVAT and other endoscopic procedures among endocrine surgeons [9], these operations proved to show the same complication rate as standard open surgery [12–14]. A new promising indication for MIVAT is, nowadays, prophylactic thyroidectomy for patients carrying a RET gene mutation: the first 15 cases already underwent a video-assisted thyroidectomy and central compartment node clearance in our department with results which can be favourably compared to those of conventional surgery; no major complications were registered in this small series. Moreover, in spite of the short follow up (6 to 42 months) the completeness and radicality of MIVAT seems to be beyond any debate: postoperative calcitonin is actually undetectable in all patients, and this encouraged us to go ahead with our experience up to the point to propose this procedure as a standard for these patients.

Nevertheless, there is a limit for MIVAT that must be carefully considered: its impact on the general population necessitating thyroid surgery. At present, only a minority of these patients fulfil the criteria for undergoing minimally invasive procedures; probably not more than 10–15 % of the cases, particularly in iodine deficient countries. In fact, big goitres and invasive thyroid malignancies, rather than "low risk" differentiated carcinomas and diagnostic procedures (follicular neoplasms), constitute the main indication for thyroid surgery [9], and this epidemiological background has limited the diffusion of neck minimally invasive surgery. Probably, these operations should be carried out in Tertiary Referral Centres where a great number of patients can be recruited so as to allow a correct learning curve, in particular, in terms of operative time.

"Low risk" papillary carcinoma, represented in this series, is the most frequent indication (29.7%). This is probably due to the fact that low risk papillary carcinoma usually arises in normal, small thyroids. In our institution, we currently treat papillary carcinoma by total thyroidectomy alone (without central neck compartment dissection, if there is no evidence of macroscopically involved lymph nodes) followed by activated radioiodine treatment. For this reason, we never attempted a central compartment clearance also during MIVAT, considering the presence of suspicious lymph nodes, a contraindication for the video-assisted approach and a reason for conversion. Comparing the MIVAT and the traditional operation in terms of oncological radicality, no conclusions can be drawn in terms of either recurrences or metastases but both postoperative thyroglobulin serum measurement and ^{131}I uptake did not show any statistically significant difference between the two groups, thus, demonstrating that the same radicality of traditional operation can be achieved by MIVAT.

The complication rate in this series does not show any increase with respect to traditional surgery [2, 13, 14]. Some might even argue that recurrent nerve palsy and hypoparathyroidism incidence are both surprisingly low, but this is no longer true when considering that the patients undergoing MIVAT have been selected for being the easiest cases (small glands with no lymph nodes and no extracapsular invasion).

The cosmetic advantage has been widely appreciated by patients themselves [6–8, 14] and actually, although the length of the incision has been reduced also in conventional surgery, there is still a significant difference between a scar of no more than 2 cm and a scar of at least 5–6 cm. [9].

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