

## Operative time and postoperative pain following minimally invasive video-assisted parathyroidectomy

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**SUMMARY:** Operative time and postoperative pain following minimally invasive video-assisted parathyroidectomy.

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**Background.** *Minimally invasive surgical techniques have been proposed to treat the patients affected by parathyroid adenoma starting by endoscopically-assisted parathyroidectomy up to video-assisted and radio-guided approaches*

**Patients and methods.** *Our technique, minimally invasive video-assisted parathyroidectomy (MIVAP), in accord with Miccoli's technique, has been introduced in our center since 2006 after extensive experience with MIVAT (minimally invasive videoassisted thyroidectomy). From September 2006 to October 2008 we performed 32 MIVAP on 32 patients, 21 female and 11 males with a mean age of 53.4 years (range 25-77) affected by parathyroid adenoma. Patients have been divided in two groups in chronological order: Group A included the first 15 patients, Group B the second ones.*

**Results.** *Mean operative time from incision to skin closure has been 47.4±14.2 minutes for group A and 34±10.3 minutes for group B (p<0.01). Postoperative pain, scored from 0 to 10 evaluated at time 0 and after 24 hours from the procedure, has been of 2.6±0.5 and 1.4±0.5 in group A (p<0.001) while in group B of 2.58±0.51 and 1.16±0.38 (p<0.001) respectively. The difference in postoperative pain was not significant between the two groups and the pain was controlled by the administration of paracetamol 1 g. On the other side, the comparison between postoperative pain in patients operated via traditional bilateral cervical exploration and MIVAP (2.61±0.5 vs 3.55±0.51 and 1.38±0.5 vs 2.16±0.61 at 0 and 24 hours respectively), was statistically significant (p<0.001) and in favour of MIVAP.*

**Conclusions.** *We showed a shorter operative time between the A group and B group. 15 cases are sufficient as good learning curve if the surgeon is experienced in videoassisted neck procedure. The postoperative pain is lower in videoassisted procedure than cervical bilateral approach.*

**RIASSUNTO:** Tempi operatori e dolore postoperatorio nella paratiroidectomia mininvasiva videoassistita.

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**Razionale.** *Le tecniche chirurgiche mininvasive sono state proposte nel trattamento dei pazienti affetti da adenoma paratiroideo partendo dalla paratiroidectomia endoscopica assistita fino alla videoassistita e radioguidata.*

**Pazienti e metodi.** *La paratiroidectomia mininvasiva videoassistita (MIVAP) secondo la tecnica di Miccoli è stata introdotta nel nostro centro dal 2006 dopo avere sviluppato l'esperienza della tiroidectomia videoassistita (MIVAT). Dal settembre 2006 ad ottobre 2008 abbiamo eseguito 32 MIVAP in 32 pazienti, di cui 21 di sesso femminile e 11 di sesso maschile, con età media pari a 53.4 anni (range 25-77 anni), tutti affetti da adenoma paratiroideo. I pazienti sono stati suddivisi in due gruppi in ordine cronologico: il gruppo A includeva i primi 15 casi trattati, il gruppo B i rimanenti 17 casi.*

**Risultati.** *Il tempo medio operatorio dall'incisione alla chiusura della cute è stato di 47.4±14.2 minuti per il gruppo A e 34±10.3 minuti per il gruppo B (p<0.001). Il dolore postoperatorio, registrato da 0 a 10 e stimato al tempo 0 e dopo 24 ore dalla procedura, è stato di 2.6±0.5 e 1.4±0.5 nel gruppo A (p<0.001) e nel gruppo B di 2.58±0.51 e 1.16±0.38 (p<0.001) rispettivamente. La differenza in termini di dolore postoperatorio non è stata significativa tra i due gruppi e il dolore era controllato dalla assunzione di 1 g di paracetamolo. Il confronto del dolore postoperatorio tra i pazienti operati per via tradizionale con esplorazione cervicotomica bilaterale e quelli sottoposti a MIVAP (2.61±0.5 vs 3.55±0.51 e 1.38±0.5 vs 2.16±0.61, rispettivamente a 0 e 24 ore dalla procedura chirurgica) è risultato statisticamente significativo (p<0.001) e in favore della MIVAP.*

**Conclusioni.** *Abbiamo evidenziato un tempo operatorio medio più breve tra il gruppo A ed il gruppo B. Quindici casi sono sufficienti per una corretta learning curve se il chirurgo ha una buona esperienza in tecniche videoassistite della regione cervicale. Il dolore postoperatorio è inferiore nella procedura videoassistita rispetto all'approccio tradizionale.*

KEY WORDS: Parathyroid adenoma - Parathyroidectomy - MIVAP.  
Adenoma paratiroideo - Paratiroidectomia - MIVAP.

## Introduction

The incidence of PHPT (primary hyperparathyroidism) is significantly increased since the Seventies, secondary to the introduction of the screening test for pla-

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sma calcium levels. In the last 10 years sestamibi-scintigraphy allowed to identify with a certain degree of reliability the location of the disease, especially in the subgroup of patient, which constitutes the large majority (85-90%), for whom the PHPT is consequent to a parathyroid adenoma (1). For this reason more attention focused on this population and minimally invasive surgical techniques have been proposed to treat this subgroup of patients, starting from Gagner (2), who in 1996 proposed an endoscopically-assisted parathyroidectomy, up to video-assisted and radio-guided approaches (3, 4).

Our technique, minimally invasive video-assisted parathyroidectomy (MIVAP), in accord with Miccoli's technique (3), has been introduced in our center since 2006 after extensive experience with MIVAT (minimally invasive videoassisted thyroidectomy) (5); it involves the use of a single suprasternal 2 cm access through which a 5 mm 30 degrees camera is introduced. Intraoperative PTH (iPTH) has been recently introduced in our series. The enrollment of the patients in this study started after the learning curve of the surgeon was considered completed in endocrine surgery videossisted cervical procedure.

## Patients and methods

From September 2006 to October 2008 we performed 32 MIVAP on 32 patients affected by primary hyperparathyroidism, 21 female and 11 males with a mean age of 53.4 years (range 25-77). Inclusion criteria in our study were:

- sporadic PHPT;
- preoperative identification of a parathyroid gland smaller than 3 cm;
- no clinical suspicion for parathyroid cancer;
- absence of thyroiditis.

All patients underwent general anesthesia. The learning curve of the surgeon, started with minimally video-assisted thyroidectomy, included 50 procedures for each of the surgeons involved in the study. The introduction of MIVAP has been delayed in our hospital due to logistic difficulties to set up intraoperative PTH testing, mandatory for this technique. Preoperative evaluation included: plasma Calcium and PTH levels, cervical ultrasound to rule out comorbidities and sestamibi scintigraphy to identify the location of the adenoma.

Patients have been divided in 2 groups in a chronological order: group A included the first 15 patients while Group B the second 17 ones.

Every patient signed a detailed and specific informed consent for the procedure.

The factors included in the statistical analysis were: pre and postoperative plasma calcium level, postoperative pain (immediate after surgery-time 0, and delayed, after 24 hours). Evaluation of postoperative pain for our series has been compared to the data from 18 patients that had previously underwent bilateral cervical exploration from September 2005 to September 2006 in our center.

### *Surgical technique*

MIVAP was performed in a standardized technique (3). Patient was supine without neck hyperextension. The position of the team members was the following: surgeon is on the right side, first assi-

stant opposite to the surgeon, second assistant at the head of the patient. Technique included a 1.5-2 cm cervical incision 2 cm above the jugular notch followed by incision of the midline along the cervical linea alba, through which a 5mm, 30 degree camera was introduced. Visualization and mobilization of the pathologic gland was obtained. When extensive mobilization of the homolateral thyroid lobe was necessary Ultracision CS 14 has been used.

Intraoperative PTH assay has been performed after induction of general anesthesia, 5' and 10' after the removal of the suspected pathological gland. If iPTH level decreased of the 50% or more compared to the initial value, the specimen removed was considered to be responsible for PHPT and the search for other potential adenomas was interrupted (6). All procedures have been performed by the same surgical team.

Statistical analysis was obtained by Kyplot 5.0 (KyensLab Inc, USA). Student's t test has been performed. Values of  $p < 0.05$  has been considered statistically significant.

## Results

From September 2006 to October 2008, of the 35 cases referred to our center for PHPT, 23 (65.7%) had a preoperative ultrasound indicating a parathyroid adenoma and 31 (88.5%) had a sestamibi-scintigraphy proving an increased uptake of the radionuclide compatible with parathyroid adenoma and defining its location. In one case scintigraphy was negative and localization of the pathological gland has been achieved through ultrasound. Bilateral cervical exploration was performed in a traditional fashion for 3 patients for whom neither scintigraphy nor ultrasound were able to identify any pathological gland. These latter cases have not been included in the present study.

In 3 of the 32 patients operated with MIVAP, we converted to traditional bilateral exploration for technical difficulties due to intraoperative PTH assay and for preoperative unknown thyroiditis.

Mean operative time from incision to skin closure has been  $47.4 \pm 14.2$  minutes for group A and  $34 \pm 10.3$  minutes for group B ( $p < 0.01$ ) (Tab. 1).

Postoperative pain, scored from 0 to 10 and evaluated at time 0 and after 24 hours from the procedure, has been of  $2.6 \pm 0.5$  and  $1.4 \pm 0.5$  in group A ( $p < 0.001$ ) while in group B of  $2.58 \pm 0.51$  and  $1.16 \pm 0.38$  ( $p < 0.001$ ) respectively (Tab. 2). The difference in postoperative pain was not significant between the two groups and the pain was controlled by the administration of paracetamol 1 g. On the other side, the comparison between postoperative pain between patients operated via traditional bilateral cervical exploration and MIVAP, i.e.  $2.61 \pm 0.5$  vs  $3.55 \pm 0.51$  and  $1.38 \pm 0.5$  vs  $2.16 \pm 0.61$  at 0 and 24 hours respectively, was statistically significant ( $p < 0.001$ ) and in favour of MIVAP (Tab. 3).

24-hours serum calcium level has normalized in all treated patients. No transient injuries to the recurrent nerve have been observed. One patient necessitated pro-

longued hemostasis at the end of the MIVAP procedure for endoclip dislocation.

Postoperative PTH decreased in all patients. In 3 patients transient hypoparathyroidism developed. No permanent hypoparathyroidism was observed in our series. One patient, affected by multigland disease, one month after surgery had persistent hyperparathyroidism due to a false positive intraoperative PTH assay. In 28 patients treated with MIVAP pathology confirmed parathyroid adenoma and in one case the diagnosis was parathyroid hyperplasia.

## Discussion

Minimally invasive video-assisted procedures for thyroid and parathyroid surgery, after an initially slow diffusion, spread widely among endocrine surgeons.

Previous series of traditional bilateral neck exploration reported rates of success as 90-95% of cases (7-10). In 2003 Berti et al. (11) suggested that 30 is a sufficient number of procedures to complete the learning curve of the surgeon and to guarantee operative times equivalent to traditional approaches. Some authors have also confirmed the safety of MIVAP and reported improved results, in terms of postoperative hypocalcemia, compared to bilateral cervical exploration, likely attributed to the absence of parathyroid manipulation during MIVAP (12, 13).

The learning curve progressively showed a decrease in the operative times. For MIVAP there is a time frame which does not depend on the surgeon experience, which is the one involved with intraoperative PTH assay (14-16). In our study, the learning curve had been considered previously completed because extensive experience with MIVAT had been obtained for all surgeons.

The advantage of the surgeon performing MIVAP compared to other minimally invasive procedure, such as endoscopic procedure, is that he operates in very contained spaces without the need to a change in position and view.

Our series has been divided in two groups in a chronological order, which is directly associated with the degree of confidence and experience gained by the surgeon, and a significant difference in the operative times has been noted in favor of the second group (Table 1).

In terms of postoperative pain, there was no difference between the groups but there was a significant higher pain experienced by patient operated in the traditional fashion, both in the early phase and also after 24 hours (Tables 2 and 3).

The accuracy of preoperative diagnosis is of the utmost importance, especially in areas of endemic goiter. In those cases, the synergy between ultrasound of the

TABLE 1 - OPERATIVE TIME.

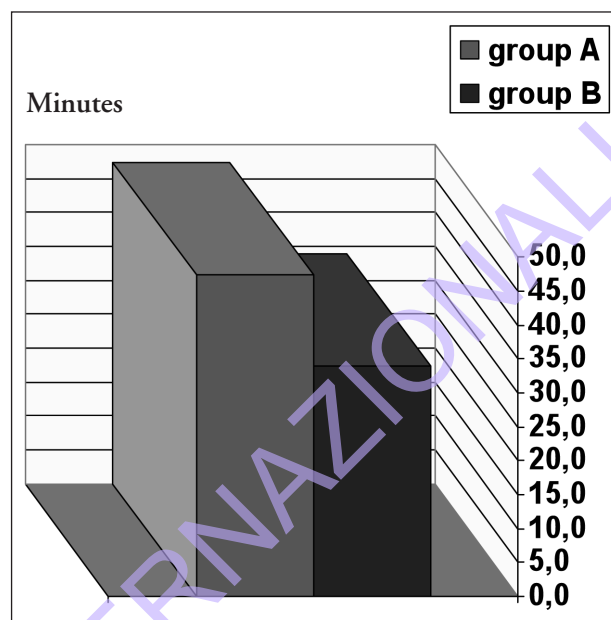


TABLE 2 - POSTOPERATIVE PAIN.

	Time 0	Post 24 h	p
Group A	2,6±0,5	1,4±0,5	0,001
Group B	2,58±0,51	1,16±0,38	0,001
P	NS	NS	

TABLE 3 - POSTOPERATIVE PAIN: MIVAP VERSUS OPEN PARATHYROIDECTOMY.

	Time 0	At 24 h	p
MIVAP	2,61±0,5	1,38±0,5	< 0,001
Open	3,55±0,51	2,16±0,61	< 0,001
P	<0,001	< 0,001	

neck and sestamibi scintigraphy decreases the incidence of false positives, characterized by a high concentration of mitochondria in thyroid nodules of follicular proliferation or when reduced thyroid function can interfere with the uptake of the radionuclide. These refinements in preoperative radiology allowed the spread of minimally invasive surgical techniques to take place.

MIVAP has been proved safe also in our study and we believe, in compliant selected cases, this procedure could be indicated on a day surgery basis with regional anesthesia.

A recent report from Miccoli et al. (17) demonstrated how, in case of logistic and financial difficulties to organize intraoperative PTH assay, bilateral video-assisted exploration can be performed with results equivalent

lent to MIVAP with no increase in operative times.

The above mentioned procedure can be taken into consideration also when the indication for surgery is a double adenoma or parathyroid hyperplasia. However, in the large majority of cases MIVAP with intraoperative PTH assay is preferred to avoid the removal of lar-

ge but functionally and pathologically normal glands.

It is to be noted that the cost of MIVAP is mainly due to intraoperative PTH measurement rather than to the surgical equipment which is non disposable, a part from the clipper charger, and can be used multiple times.

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