



Impact of Harmonic Scalpel on operative time during video-assisted thyroidectomy

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Abstract

Background: Minimally invasive video-assisted thyroidectomy (MIVAT) has been practiced in our department since 1998. It has some advantages over conventional surgery in terms of postoperative pain and cosmetic result. The aim of this study was to evaluate the use of the Harmonic scalpel (HS) on the performance of this procedure.

Methods: Between October 1998 and January 2001, 116 patients underwent MIVAT. The HS was used for the last 26 operations. We compared this group of patients (HS-G) with a control group (C-G) of 26 patients who had undergone MIVAT before the introduction of the HS. The following parameters were considered: age, gender, preoperative diagnosis, size of the lesion, type of operation (lobectomy or total thyroidectomy), operative time, complication rate, and postoperative hospital stay.

Results: The two groups were well matched for age, gender, preoperative diagnosis, lesion size, and type of operation. The mean operative time was significantly reduced in the HS-G for both lobectomy (37.3 ± 8.4 vs 49.4 ± 18.0 min) and total thyroidectomy (53.8 ± 16.3 vs 90.6 ± 22.1 min). No differences were found for postoperative stay. One patient in the C-G experienced a transient recurrent nerve palsy. There were no other complications.

Conclusions: This study showed that the utilization of the HS for MIVAT is safe and associated with a shorter operative time. A reduction of the rates for such complications such as hypoparathyroidism and recurrent nerve injuries was not possible to demonstrate in the present study. Much larger series are needed for further evaluation of this instrument.

Key words: Thyroidectomy — video-assisted thyroidectomy — harmonic scalpel — minimally invasive thyroidectomy

In the last few years, several endoscopic and/or video-assisted techniques for the removal of small thyroid nodules have been described [1, 4, 5, 10, 12, 13]. We have used a technique for minimally invasive video-assisted thyroidectomy (MTVAT) since 1998 and have already published our results with this procedure [6, 7]. Moreover, we recently demonstrated in a prospective randomized study that MIVAT has some advantages over conventional thyroidectomy (CT) in terms of postoperative pain and cosmetic results, although CT still has the advantage in terms of operative time [7].

Recently, we have begun to use the Harmonic Scalpel (HS) for MIVAT. The HS is a new surgical tool that cuts and coagulates by converting electric energy into ultrasonic mechanical vibrations; it allows reliable, safe, and rapid hemostasis and division to be achieved with a single tool [8]. It has recently been demonstrated in other fields of surgery that the utilization of HS is safe and results in a reduction in the operative time and complications rate [2, 3, 9, 11]. The aim of this study was to evaluate the utility of the HS for MIVAT.

Materials and methods

From October 1998 to January 2001, 116 patients underwent MIVAT. As previously reported [7, 8], the patients were selected for this approach on the basis of the following: thyroid nodule ≤ 35 mm in maximum diameter, absence of both echographic and biochemical signs of thyroiditis, thyroid volume ≤ 20 ml, no previous neck surgery or neck irradiation, and small (T1), low-risk thyroid carcinoma.

The last 26 operations were performed using Harmonic Scalpel (Ethicon Endo-Surgery, Cincinnati, OH, USA) for dissection and to achieve hemostasis. We compared this group of patients (HS-G) with a control group (C-G) of 26 patients who underwent MIVAT before the introduction of the HS. The medical records of these patients were reviewed. The following parameters were recorded for this study: age, gender, preoperative diagnosis, size of the lesion, type of operation (lobectomy or total thyroidectomy), operative time, complication rate, postoperative hospital stay.

Postoperative follow-up included direct laryngoscopy to check vocal cord mobility and neck ultrasonography. Serum calcium was also measured in patients who had undergone total thyroidectomy.

Table 1. Characteristics of the two groups of patients who underwent MIVAT with (HS-G) and without (C-G) utilization of the Harmonic Scalpel

	HS-G	C-G
Sex (male/female)	3/23	3/23
Age (\pm SD)(yrs)	39.8 \pm 13.3 (15–65)	38.5 \pm 14.3 (13–65)
Mean maximum diameter of the lesions (\pm SD) (mm)	18.7 \pm 7.2 (10–30)	18.2 \pm 7.3 (10–30)
preoperative diagnosis		
Follicular lesion	13	13
Benign goiter	10	7
PTC	3	6
Scope of operation (TT/LT)	9/17	8/18
Operative time (\pm SD) (min)		
Lobectomy	37.3 \pm 8.4 (30–50)	49.4 \pm 18.0 (25–90)
Total thyroidectomy	53.9 \pm 16.3 (30–80)	90.6 \pm 22.1 (70–120)
Complications	—	1 transient recurrent nerve palsy
Postoperative stay (\pm SD) (d)	1.7 \pm 0.5	1.7 \pm 0.4

SD, standard deviation; PTC, papillary thyroid carcinoma; TT/LT, total thyroidectomy/thyroid lobectomy

Surgical procedure

Briefly, MIVAT [7, 8] is characterized by a single 1.5-cm access in the middle area of the neck, 2 cm above the sternal notch. The midline is incised and a blunt dissection is carried out with tiny spatulas to separate the strap muscles from the underlying thyroid lobe. From this point on, the procedure is performed endoscopically on a gasless basis, with external retraction. A 5-mm 30° endoscope is used. The optical magnification allows excellent visualization of both the external branch of the superior laryngeal nerve and the recurrent nerve, which are dissected together with the upper parathyroid gland. The vessels are ligated between clips (C-G) or with the HS (HS-G) until the lobe, having been completely freed, can be extracted by gently pulling it out through the skin incision. Even though the maximum diameter of the lesion can reach 3 cm, the nodule can be easily removed via its shorter diameter, since generally these lobes are generally elliptical and quite soft. The isthmus is then dissected from the trachea and divided. The HS is used for all steps of the procedures performed in the HS-G. After another check of the recurrent laryngeal nerve, the lobe is finally removed. The incision is closed by means of two subcuticular stitches and a skin sealant. No drainage is necessary.

Results

There were 46 women (88.5%) and 6 men (11.5%). Their mean age was 39.1 \pm 13.7 years (range 13–65). The HS-G included 23 women and 3 men (mean age, 39.8 \pm 13.3 years [range; 15–65]). The C-G included 23 women and 3 men (mean age, 38.5 \pm 14.3 years [range; 13–65]). The characteristics of the two groups of patients are reported in Table 1. The two groups were well matched for age, gender, preoperative diagnosis, and lesion size. The mean operative time was significantly reduced in the HS-G for both lobectomy (37.3 \pm 8.4 vs 49.4 \pm 18.0 min) and total thyroidectomy (53.8 \pm 16.3 vs 90.6 \pm 22.1 min). No difference was found in postoperative stay. One patient in the C-G experienced a transient recurrent nerve palsy. There were no other complications.

Discussion

The HS is a new surgical instrument that allows intraoperative cutting and coagulation by means of the same

instrument. It converts electric energy into ultrasonic mechanical vibrations. It has been demonstrated to be safe and reliable for several areas of application, especially during laparoscopic surgery, and to significantly reduce the operative time of different procedures [3, 9, 11].

The availability of a new 5-mm, 14-cm-long scissors led us to try this tool for MIVAT. Hemostasis with the HS is reliable; no major bleedings have been documented in relatively large series [9]. The quality of the hemostasis is related both to the duration of the pressure and the level of the power output. The HS has also been reported to be safe for relatively large vascular pedicles (inferiomesenteric, right and left colic, and ileocolic) [9]. The present series confirmed the reliability of the hemostasis achieved by means of HS. No intraoperative or postoperative bleeding was recorded. The HS was also used to prepare, coagulate, and cut the upper pedicle of the thyroid, which has always been considered by surgeons to be a major source of risk of postoperative bleeding. Of course, it must be stressed that, following the inclusion criteria, only small thyroid glands are appropriate for endoscopic procedures. In large thyroids with a higher degree of vascularization such as those where Graves' disease is present, the use of the HS alone to control hemostasis could be hazardous and should probably be avoided. Another step in the procedure where HS proved to be particularly useful was the section of the isthmus at the end of thyroid lobectomy, again due to the quality of the hemostasis.

It has been reported that the use of the HS results in a reduction of the operative time in other fields of surgery [3, 9]. In our series the operative time for patients who underwent MIVAT with the HS was significantly lower for both lobectomy (37.3 \pm 8.4 vs 49.4 \pm 18.0 min) and total thyroidectomy (53.8 \pm 16.3 vs 90.6 \pm 22.1 min) — in other words, a reduction of 25% for lobectomy and 41% for total thyroidectomy. This significant reduction in operative time is probably due to the fact that, as compared to other cauterization procedures, combined coagulation and division with the same instrument saves time because there is no need to

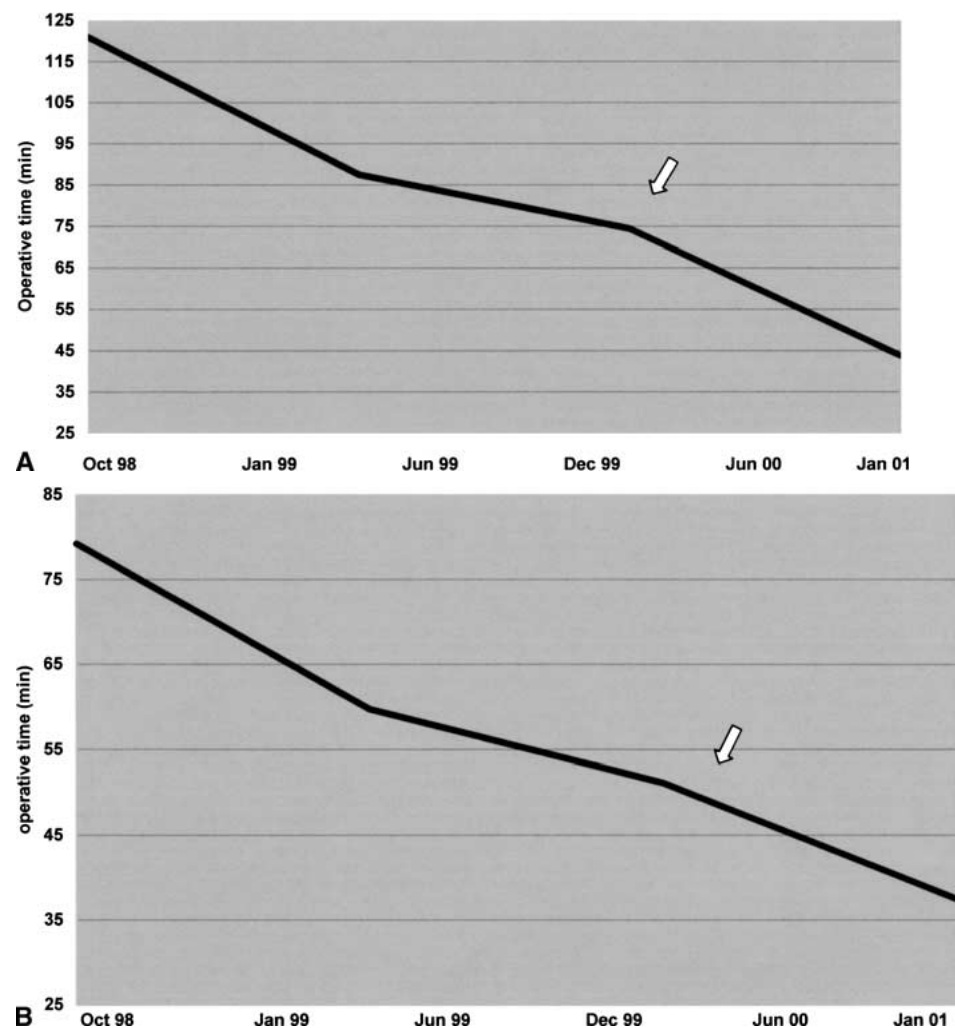


Fig. 1. **A** Learning curve for Video-assisted thyroidectomy. **B** Learning curve for video-assisted lobectomy. Arrows indicate beginning of the utilization of the Harmonic Scalpel.

change tools. However, it is also possible that a small percentage of the reduction in operative time is attributable to the larger experience of the surgical team with MIVAT, since the learning curve (Fig. 1) shows a persistent decrease in the operation's duration and a further slope that corresponds with the time when the HS was introduced in our unit.

The safety of the HS, with no thermal injury or energy diffusion, has already been demonstrated by other authors [3, 9]. When compared with other types of coagulation processes (monopolar and bipolar), the HS was found to be associated with fewer necrotic and fibrotic lesions to the liver, stomach, and nerves, as well as fewer complications [3, 9]. The absence, or the reduction, of thermal injury or energy diffusion is particularly important during thyroid surgery when dealing with the inferior recurrent laryngeal nerve and the parathyroid gland. Inferior laryngeal nerve palsy and hypoparathyroidism are major complications of thyroid and neck surgery. In this series, the only complication was a transient recurrent nerve palsy in a C-G patient. No significant differences were observed in the complication rate in this series.

In conclusion, this study shows that the HS is a reliable and safe tool for MIVAT. Its utilization is associated with a shorter operative time. However, no reduction in the complication rate could be demonstrated in this study. Much larger series are needed to explore this point, since the incidence of hypoparathyroidism and recurrent nerve injuries is very low in conventional surgery.

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