

THE HARMONIC SCALPEL APPLICATION IN THYROID SURGERY

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ABSTRACT:

New, modern devices for tissue resection have been introduced in the surgical treatment of thyroid diseases recent years.

Aim: To present our experience with the use of the harmonic scalpel in thyroid surgery.

Patients and methods: For the period 2008 - 2011, 1398 patients (6 to 74 years old) with various thyroid diseases were operated on in our clinic. The resection was performed through a classic Kocher's collar incision in 583 patients, using minimally invasive open access in 641 patients and with video-assisted technique in 174 patients. In all patients a harmonic scalpel device (Ethicon Endosurgery Care Inc) has been used. The length of surgical incision, use of haemostatic instruments and ligatures, extent of resection, need of draining, operative time, intra- and postoperative complications, length of postoperative hospital stay have been examined.

Results: The volume of resection ranged from isthmusectomy to total thyroidectomy. During all operation haemostatic instruments and ligatures have not been used. Lack of bleeding and shortend operating time - up to 45% were found. The use of draining is significantly reduced, regardless of the extent of resection. There was no increase in the incidence of intra- and postoperative complications. The postoperative stay was significantly reduced.

Conclusion: In our opinion, the introduction in use of the harmonic scalpel changes the face of modern thyroid surgery providing reliable hemostasis and shortening the operating time significantly.

Key words: Thyroid surgery, harmonic scalpel.

AIM:

The conventional thyroid resections are linked with the mandatory use of many haemostatic instruments and vascular ligations, which leads to a significant increase in the operation time, as well as to severe tissue injuries.

As a rule, these operations require the placement of one or more drains in the thyroid place.

In recent years, new methods have been introduced in the field of thyroid surgery, such as minimally invasive, video-assisted and open approach techniques, with different access points. They all aim to minimize thyroid tissue trauma while preserving comparable efficiency and safety and providing better cosmetic results^{1,2,3,4}. The implementation of these new techniques is linked with the development of new methods for tissue dissection and ligation of blood vessels such as harmonic scalpel and argon-plasma coagulator.

The **objective** of the current work is to present our experience with the use of harmonic scalpel in the surgery of thyroid gland.

PATIENTS AND METHODS

For the period from 2008 to 2011, 1398 patients at the age between 6 to 74 years, with various thyroid diseases were operated on in our clinic. The resection was performed through a classic Kocher's collar incision in 583 patients, using minimally invasive open access in 641 patients and with video-assisted method in 174 patients (table. 1).

Table. 1. Use of different surgical approaches in combination with harmonic scalpel.

Surgical approach	patients	
	n	%
Classic Kocher incision	583	41,7
Minimally invasive open access	641	45,9
Videoassisted technique	174	12,4
Total	1398	100

All patients were operated on with the use of the harmonic scalpel of the company Ethicon Endo-Surgery Care (Fig.1).



Fig.1. Ultrasound (Harmonic scalpel) handpiece devices used in our thyroid resections.

Using the aforementioned devices, the strap muscles were divided then the intended extent of thyroid resection was performed, including the discontinuation of all thyroid vessels.

A comparative examination of the following parameters was made: length of the surgical incision, use of haemostatic instruments, extent of thyroid resection, use of draining, operative time duration, intra- and postoperative complications, length of postoperative hospital stay.

RESULTS

The length of the operative incision in the patients group operated on through a classic cervical approach was between 3,5 and 4,5 cm. In the group with minimally invasive open approach it was between 2 and 3 cm. And the patients who underwent video-assisted resection had an incision between 1,5 and 2 cm in size (Fig.2).



Fig.2: The length of incision with video-assisted surgery.

The extent of thyroid resection ranged from isthmusectomy to thyroidectomy. All operations were

performed without need to use hemostatic instruments and ligatures. Figure 3 shows the complete equipment which is necessary to perform a thyroid resection with harmonic scalpel.



Fig.3: Instruments and sutures necessary to perform thyroid resection with harmonic scalpel.

Bleeding from the resected thyroid parenchyma or disrupted thyroid vessels was not observed. The operative time in all three groups was shortened with 45%. Draining the thyroid bed was required much less than resection through conventional method.

The need of draining the thyroid bed was significantly reduced in comparison to the conventional technique, regardless of the volume of resection (Fig. 4).



Fig.4: Thyroidectomy with harmonic scalpel using minimally invasive open approach, without use of draining.

There was no increase in the incidence of intra- and postoperative complications. The length of the postoperative hospital stay was significantly decreased. All patients were discharged in the first 8 to 24 postoperative hours.

DISCUSSION

The meticulous haemostasis is of crucial importance for the success of thyroid surgery. It prevents the intra- and postoperative complications and helps to improve the quality and shorten the postoperative hospital stay. The conventional thyroid resections, using Kocher's technique require a massive amount of instruments, mainly for placing ligatures. In recent years other tools as electrocautery, argon plasma coagulation, Ultrascion and LigaSure as well as various clips have been introduced in thyroid surgery^{5, 6, 7}.

The harmonic scalpel was developed in the early 90's. An active titanium blade vibrates with a frequency 55000 cycles per second and is used to simultaneously cut and coagulate the tissues. The harmonic scalpel ensures safe and effective haemostasis for blood vessels in diameter up to 5 mm⁸. The sharp tip of the blade and the reduced heat generation permits to preserve the tissue and minimize the of the surrounding tissue injury⁹.

Several advantages of the harmonic scalpel, such as the minimized tissue trauma, reduced smoke production, avoidance of neuro-muscular stimulation and electricity conductance through the human's body, thrust on the device in the field of modern thyroid surgery.

Our study includes patients with various thyroid diseases, which demonstrates the possibility to perform any extent of thyroid resection with improved anatomic dissection and visual control during the exploration of the gland and the surrounding structures in the neck.

Furthermore, in the absence of bleeding it is easily to find the underlying parathyroid glands and the nearby recurrent laryngeal nerve. The latter is precondition for lesser postoperative complications. Harmonic scalpel application permits to decrease the traction and manipulation of the thyroid, especially when dissecting and cutting the upper vascular pedicle of the gland. The improved control over the upper thyroid pole vessels achieved with the harmonic scalpel leads to additional operative incision length reduction, especially with the video-assisted technique and as a consequence, improved cosmetic results^{10, 11, 12, 13}. The use of 30-degree, 5mm optics makes easier to identify the parathyroid glands and recurrent laryngeal nerve and also to visualize the upper thyroid vessels before cutting them with harmonic scalpel. Our results demonstrate that the technique can be applied not only for solitary thyroid nodules but also for multinodular goiter. The most important determinant for the technique is the size of the dominant thyroid node and the size of thyroid lobe, because of the limited working space. We have accepted that the maximal lobe size should not exceed 7 cm in length and 3,5 cm in width. The volume of one thyroid lobe should not exceed 25 ml on ultrasound examination. The reduced number of hemostatic instruments followed by decrease in placement of ligatures leads to operative time shortening up to 45% compared with the conventional resections as well as to reduced tissue trauma. Resulting in decreased transudation and exudation processes in the thyroid bed, all this helps to reduce the amount of fluid requiring draining and the need for placing drainage in the thyroid bed.

Our experience confirms significantly better postoperative pain control and fastend recovery for the patients where the harmonic scalpel has been used. The latter allows to shorten the postoperative hospital stay and to increase the planned patients admissions¹².

CONCLUSIONS

Our results demonstrate that the harmonic scalpel is extremely safe and effective for surgical treatment of thyroid diseases. It allows extremely good and reliable hemostasis, shortens the operative time, reduces the complications, fastens the recovery of the patient with improved pain control, reduced postoperative stay and improved cosmetic results

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