Hemostatic Systems in Thyroid Surgery and Complications

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Abstract

Introduction: There have been significant technological advances for hemostasis in thyroid surgery, that allow more precise and safer vascular sealing than the traditional bond associated with mono- or bipolar electrocoagulation.

Objective: To compare the complications in total thyroidectomy using traditional techniques (ligation and electrocoagulation, including LigaSure) compared to the exclusive use of the Ultracision Harmonic scalpel, performing dissection, cutting and hemostasis simultaneously.

Methods: Retrospective descriptive non-randomised comparative study with 887 patients who underwent total thyroidectomy by the same surgeon. They were distributed into Group A (traditional techniques in 468 patients, January 1997 to September 2006) and Group B (Harmonic Ultracision in 419 patients, October 2006 to May 2010).

Results: There was a statistically significant lower incidence of complications in Group B (0.95% versus 4.06% in group A): bleeding (0.24% versus 1.92% in group A), tracheostomy (0% versus 1.28%) and intensive care unit stay (0% versus 4.06%). Improvement of surgical activity parameters was also significant for Group B: shorter operation time (60 min versus 180 min), fewer hospital stays (4.62 versus 8.5 stays) and increase in operations per month (9.63 versus 4 interventions). Persistent sequelae (recurrent paralysis [0.48%] and hypoparathyroidism [0.47%]) decreased in the second group but the difference was not statistically significant compared to Group A. The cost per patient was lower in Group B.

Conclusions: The Ultracision Harmonic scalpel system is the technique of choice for thyroid surgery.

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Introduction

Total thyroidectomy is the most commonly performed procedure in endocrine surgery, and like any other surgical procedure, it requires correct haemostasis to avoid intra-operative bleeding, obtain good visualisation of the surgical field and prevent injury to structures such as the parathyroid glands or laryngeal nerves. Haemorrhage, hypoparathyroidism, and recurrent paralysis, although infrequent in experienced centres, are potentially severe.\(^1\)

The solution to these problems has been the concern of surgeons, starting from the pioneers represented by Kocher, who with the improvement of haemostasis, managed to reduce perioperative mortality in thyroidectomy from 60% to 1% in a short period between 1878 and 1888.\(^2\) Technical advances in haemostasis (LigaSure\(^3\) and Ultracision Harmonic\(^4\)) allow vascular sealing with greater precision and safety than the traditional ligation associated with monopolar or bipolar electrocoagulation, considered as the reference.\(^4,5\) Initially developed for laparoscopic surgery, their application and implementation in hospitals for thyroid and parathyroid surgery has been uneven, probably due to a high initial cost.\(^6\) The publications report that the use of these devices in thyroid surgery reduces operating time, cost, hospital stay, postoperative pain and the incidence of haemorrhages.\(^7-9\) Their use also enables surgical approaches with smaller cutaneous incisions\(^9\) without increasing the incidence of complications compared with conventional haemostasis techniques.\(^7-10\)

LigaSure\(^6\) is a bipolar vascular sealing system that causes collagen and elastin denaturation in the vessels and surrounding tissues, making haemostasis in vessels up to 7 mm possible\(^11\) and significantly shortening the duration of the technique.\(^12\) The first publications related to thyroidectomy were dated in 2003.\(^13\)

The first citation for Ultracision Harmonic\(^4\) applied to thyroidectomy is from the year 2000,\(^13\) with successive versions.\(^7\) It has been used widely in thyroid, abdominal, thoracic and plastic surgeries.\(^14\) It uses mechanical energy through the vibration of the active branch of the instrument at 55 500 Hz and through its longitudinal displacement that can range from 30 to 100 μm.\(^15\) It produces vascular dissection, cutting and sealing simultaneously\(^16\); it produces more coagulation at low energy and has a faster cutting speed at high energy. The mechanical vibration disrupts hydrogen bonds in the tissue proteins at a relatively low temperature (from 37°C), causing less collateral thermal damage (less than 1.5 mm), up to 10 times lower compared with electrocoagulation or laser (150 at 400°C).\(^16,17,18\) It produces cavitation in tissue (vaporisation of extra- and intracellular water at 37°C), coaptation (haemostasis), coagulation (by increasing the temperature to about 63°C) and cutting (the tissue breaks when it reaches the limit of its elasticity). Collagen and proteoglycans are denatured and, when they mix with intracellular and interstitial fluid, form a gelatinous substance.\(^7,19\) The burst pressure withstood by tissues after the application of the Harmonic in pigs is of 1204 mmHg at 70% power, and of 1193 mmHg at 100%.\(^19\) It is recommended for vessels of up to 6 mm in diameter.\(^7,11\)

The studies are not definitive about the factors that increase the risk of complications in thyroid surgery.\(^2,20\) Intrathoracic goitre, Graves disease and anticoagulant therapy or coagulopathies increase the risk of haemorrhage between 2 and 7 h postoperatively\(^21-23\) (cases of bleeding on the fifth day have been described\(^24\)).

Influencing factors include the type of thyroid disease (thyroid cancer, Graves disease, hyperthyroidism), comorbidity,\(^25\) technique (reoperation, total thyroidectomy or association with lymphadenectomy), thyroid extension (volume, gland weight, substernal extension, invasion of adjacent structures) and the experience of the surgical team.\(^26\) In general, the most complex surgeries are those performed on recurrent thyroids, those with intrathoracic extension and cases of hyperthyroidism.\(^2\)

The aim of this study was to compare complications and surgical activity parameters observed after total thyroidectomy performed exclusively with the Harmonic system versus those observed in patients intervened with conventional scissors dissection techniques and haemostasis by ligation with wire or monopolar electrocoagulation.

Materials and Methods

This was a retrospective, descriptive, non-randomised comparative study on 887 patients who underwent total thyroidectomy. The study was conducted between January 1997 and September 2006 and consisted of 468 patients (group A: conventional haemostasis) and 419 patients (group B: Harmonic Ultracision). The surgical approach was total thyroidectomy, performed exclusively with the Harmonic system. The primary outcome measure was complications, defined as any technical problem during or after the surgery, requiring treatment and stopping the procedure.

**References:**

1. Haemorrhage, hypoparathyroidism, and recurrent paralysis are rare complications of thyroidectomy.\(^7\)
2. Total thyroidectomy is the most commonly performed procedure in endocrine surgery.\(^1\)
3. Technical advances in haemostasis (LigaSure and Ultracision Harmonic) allow vascular sealing with greater precision and safety than the traditional ligation associated with monopolar or bipolar electrocoagulation, considered as the reference.\(^4,5\)
4. Initially developed for laparoscopic surgery, their application and implementation in hospitals for thyroid and parathyroid surgery has been uneven, probably due to a high initial cost.\(^6\)
5. The publications report that the use of these devices in thyroid surgery reduces operating time, cost, hospital stay, postoperative pain and the incidence of haemorrhages.\(^7-9\)
6. LigaSure is a bipolar vascular sealing system that causes collagen and elastin denaturation in the vessels and surrounding tissues, making haemostasis in vessels up to 7 mm possible and significantly shortening the duration of the technique.\(^12\)
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8. The first citation for Ultracision Harmonic applied to thyroidectomy is from the year 2000,\(^13\) with successive versions.\(^7\) It has been used widely in thyroid, abdominal, thoracic and plastic surgeries.\(^14\) It uses mechanical energy through the vibration of the active branch of the instrument at 55 500 Hz and through its longitudinal displacement that can range from 30 to 100 μm.\(^15\) It produces vascular dissection, cutting and sealing simultaneously; it produces more coagulation at low energy and has a faster cutting speed at high energy. The mechanical vibration disrupts hydrogen bonds in the tissue proteins at a relatively low temperature (from 37°C), causing less collateral thermal damage (less than 1.5 mm), up to 10 times lower compared with electrocoagulation or laser (150 at 400°C).\(^16,17,18\) It produces cavitation in tissue (vaporisation of extra- and intracellular water at 37°C), coaptation (haemostasis), coagulation (by increasing the temperature to about 63°C) and cutting (the tissue breaks when it reaches the limit of its elasticity). Collagen and proteoglycans are denatured and, when they mix with intracellular and interstitial fluid, form a gelatinous substance.\(^7,19\) The burst pressure withstood by tissues after the application of the Harmonic in pigs is of 1204 mmHg at 70% power, and of 1193 mmHg at 100%.\(^19\) It is recommended for vessels of up to 6 mm in diameter.\(^7,11\)
9. The studies are not definitive about the factors that increase the risk of complications in thyroid surgery.\(^2,20\) Intrathoracic goitre, Graves disease and anticoagulant therapy or coagulopathies increase the risk of haemorrhage between 2 and 7 h postoperatively\(^21-23\) (cases of bleeding on the fifth day have been described\(^24\)).
10. Influencing factors include the type of thyroid disease (thyroid cancer, Graves disease, hyperthyroidism), comorbidity,\(^25\) technique (reoperation, total thyroidectomy or association with lymphadenectomy), thyroid extension (volume, gland weight, substernal extension, invasion of adjacent structures) and the experience of the surgical team.\(^26\) In general, the most complex surgeries are those performed on recurrent thyroids, those with intrathoracic extension and cases of hyperthyroidism.\(^2\)
thyroidectomy by the same otolaryngologist surgeon between January 1997 and May 2010.

Table 1 shows the characteristics of the sample.

To avoid the bias involved in the organisation of a unit specialising in thyroid and parathyroid surgery, we did not include the first 146 patients intervened by the same surgeon in the period 1992–1996.

The minimum follow-up period was 6 months, to confirm or rule out persistent sequelae.

All patients were previously evaluated by an endocrinologist and an anaesthesiologist and underwent a general ENT examination and indirect laryngoscopy with mirror and fiber-optic rhinolaryngoscope.

Patients were divided into 2 groups according to the haemostasis technique used:

- Group A: 468 patients operated on between 1 January 1997 and 2 October 2006. Haemostasis with ligation using absorbable suture made of polyglycolic acid in arterial and venous pedicles and mono- or bipolar electrocautery of smaller vessels. In addition, from 2004 to 2006, we also used an electrothermal bipolar vessel sealing system (LigaSure® LS Precise 1200) associated with the previous techniques (160 patients). Vascular clips were not used.

- Group B: 419 patients operated on between 3 October 2006 and 15 May 2010. For haemostasis of major and minor vessels, we used only the ultrasonic system (UltraCision Harmonic® with Ace and Focus terminal).

Wound drainage was placed for at least 48 h in all patients. We measured levels of parathyroid hormone (PTH) in the immediate postoperative period (beginning 15 min after the thyroidectomy was complete) and serial control of serum calcium every 6 h in the first 18 h.27

Hospital discharge took place 24 h after removing the drain or in the first 18 h in patients included in the short-stay program.

Both groups were homogeneous with respect to distribution by age, gender, risk factors, benign or malignant thyroid disease and surgical technique employed.

We recorded the following (see definitions in Table 2):

- Risk factors (RF): local (goitre with substernal extension, compressive goitre, the previous existence of laryngeal paralysis) and general (classification of the American Society of Anaesthesiologists [ASA III–IV],28 arterial hypertension, treatment with anticoagulants or antiplatelet drugs, obesity and Graves-Basedow disease).

- Complications in the surgical wound or alterations in the care plan: haemorrhage, deep haemorrhage, seroma, granuloma, need to stay in the Intensive Care Unit (ICU) or need for tracheotomy.

- Parameters of surgical activity: operative time, mean hospital stay and mean surgical interventions performed monthly.

We conducted a descriptive statistical study of the distribution of the sample. The confidence interval for the comparison of averages was 95%. We used the Pearson $\chi^2$ test for discrete variables and the Student $t$-test for the analysis of variance of continuous variables.

Results

The incidence of complications observed is shown in Table 3. There was a significant overall decrease of complications in group B. The decrease in cases of haemorrhage, seroma, tracheotomies performed and patients requiring ICU stay was statistically significant.

The average cost per patient was lower in group B (cost per stay and haemostasis material dated December 2011).

We performed a total of 6 tracheotomies (all patients belonged to group A); one intraoperative case due to tracheal fissure in a patient with tracheomalacia, who was decannulated on the ninth day; one case immediately after extubation due to recurrent bilateral paralysis, who was decannulated on day 42; and 4 cases of tracheotomy were carried out between 2 and 6 h postoperatively due to suffocating haematomata with difficulty for reintubation, all of which were decannulated between 6 and 11 days postoperatively.

The ICU admission criteria were progressively modified. In the period 1997–2002, 10 patients required ICU stay, all in relation to complications in the immediate postoperative period (suffocating haematomata, reintubation and laryngeal paralysis). In the period 2002–2006, 9 patients required programmed ICU stay due to increase in potential risk (difficult airway associated with increased risk of haemorrhage by treatment with anticoagulants or antiplatelet agents). Since October 2006, no patient has required ICU stay.

Both the time employed on the surgical technique and the average hospital stay were also significantly lower in group B. The increase in surgical activity was significantly higher in group B.

The reduction in group B of cases with superficial haematoma or ecchymosis, granulomas, recurrent paralysis, permanent hypoparathyroidism and wound infection was not statistically significant.

Considering 1774 recurrent nerves at risk, the visual identification of the recurrent laryngeal nerve was possible in 1422 (80%) cases. There were 10 nerves with persistent paralysis at 6 months (in one patient, the paralysis was bilateral with visual identification of both nerves associated to multicentre papillary carcinoma and postoperative haemorrhage, with surgical review after 4 h); identification was not possible in 8 paralysed nerves (80%). There were 3 cases associated with papillary carcinoma (2 left unilateral and one bilateral case) and 6 with mediastinal extension (right recurrent paralysis). Failure to identify the recurrent nerve increased the risk of paralysis in both groups (Table 4). The relative risk (RR) for all parameters was less than one in group B and greater than one in group A (Table 4).
Totalization to eliminate thyroid remnants increased the overall risk of complications in both groups.

Discussion

Thyroidectomy complications are due to various factors. Haemorrhage has been one of the most frequent, serious complications in thyroidectomy, which is not only affected by the technical precision but also by other factors such as vomiting,21 coughing,30,31 arterial hypertension, treatment with antiplatelet and anticoagulant drugs, technique employed (complete lymph node dissection, total thyroidectomy versus partial thyroidectomy, reoperation) and thyroid disease (hyperthyroidism, Graves-Basedow disease, malignant tumours, substernal extension of goitre).2,21-23,25,26 Meticulous technique and surgical experience are necessary but not sufficient, since the results vary depending on the technology used.

LigaSure and Harmonic haemostasis systems have represented a significant breakthrough in thyroid surgery and the works published in recent years are directed towards

Table 2  Definition of Terms Used.

<table>
<thead>
<tr>
<th>Surgical complication</th>
<th>Complication derived from the surgical technique that puts the life of the patient at risk or leaves persistent sequelae</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU stay</td>
<td>At least 1 unscheduled ICU stay resulting from a surgical complication</td>
</tr>
<tr>
<td>Hospital stay</td>
<td>Recorded at 00:00 h every day</td>
</tr>
<tr>
<td>Risk factors, RF</td>
<td>Associated comorbidity</td>
</tr>
<tr>
<td>Granuloma</td>
<td>Inflammatory reaction to a foreign body that required surgical removal</td>
</tr>
<tr>
<td>Superficial haematoma</td>
<td>Superficial haemorrhage or ecchymosis not requiring surgical review</td>
</tr>
<tr>
<td>Haemorrhage/deep haematoma</td>
<td>Deep haemorrhage or haematoma that required reoperation</td>
</tr>
<tr>
<td>Persistent hypoparathyroidism</td>
<td>Hypoparathyroidism verified by PTH determination that has not been recovered by the sixth postoperative month</td>
</tr>
<tr>
<td>Transient hypoparathyroidism</td>
<td>Hypoparathyroidism with verification of recovery of PTH levels within 6 postoperative months</td>
</tr>
<tr>
<td>Infection of wound</td>
<td>Inflammatory signs with microbiological verification</td>
</tr>
<tr>
<td>Recurrent paralysis</td>
<td>Persistent paralysis of the recurrent nerve that has not recovered by the sixth month</td>
</tr>
<tr>
<td>Seroma</td>
<td>Serous accumulation requiring drainage</td>
</tr>
<tr>
<td>Time of technique, min</td>
<td>Time interval elapsed from the incision until the suture of the skin plane</td>
</tr>
<tr>
<td>Totalization</td>
<td>Removal of thyroid remnants after performing partial thyroidectomy in a previous intervention</td>
</tr>
<tr>
<td>Tracheotomy</td>
<td>Unscheduled tracheotomy performed to resolve a case of acute respiratory failure associated with surgery (excluding those caused by tumour infiltration or previous laryngeal paralysis)</td>
</tr>
</tbody>
</table>
### Table 3  Complications and Outcomes of the Surgical Activity.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Group A</th>
<th>Group B</th>
<th>$\chi^2$</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 or more complications</td>
<td>887</td>
<td>468</td>
<td>419</td>
<td>8.44</td>
<td>$&lt;.01$</td>
</tr>
<tr>
<td>Haemorrhage</td>
<td>23 (2.6%)</td>
<td>19 (4%)</td>
<td>4 (0.95%)</td>
<td>5.63</td>
<td>$&lt;.05$</td>
</tr>
<tr>
<td>Ecchymosis</td>
<td>18 (2%)</td>
<td>10 (2.14%)</td>
<td>8 (1.9%)</td>
<td>0.06</td>
<td>$&lt;.05$</td>
</tr>
<tr>
<td>Seroma</td>
<td>17 (1.9%)</td>
<td>15 (3.21%)</td>
<td>2 (0.5%)</td>
<td>8.76</td>
<td>$&lt;.01$</td>
</tr>
<tr>
<td>Granuloma</td>
<td>2 (0.2%)</td>
<td>2 (0.43%)</td>
<td>0</td>
<td>1.79</td>
<td>$&lt;.05$</td>
</tr>
<tr>
<td>Recurrent nerves at risk</td>
<td>1774</td>
<td>936</td>
<td>838</td>
<td>0.211</td>
<td>$&gt;0.05$</td>
</tr>
<tr>
<td>Paralysed nerves</td>
<td>10 (0.56%)</td>
<td>6 (0.64%)</td>
<td>4 (0.48%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent paralysis (patients)</td>
<td>9 (0.5%)</td>
<td>5 (0.53%)</td>
<td>4 (0.48%)</td>
<td>0.028</td>
<td>$&gt;0.05$</td>
</tr>
<tr>
<td>Unilateral</td>
<td>8 (0.45%)</td>
<td>4 (0.43%)</td>
<td>4 (0.48%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral</td>
<td>1 (0.06%)</td>
<td>1 (0.11%)</td>
<td>0 (0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistent hypoparathyroidism</td>
<td>7 (0.8%)</td>
<td>5 (1.07%)</td>
<td>2 (0.47%)</td>
<td>0.99</td>
<td>$&gt;0.05$</td>
</tr>
<tr>
<td>Infection of wound</td>
<td>3 (5%)</td>
<td>2 (0.43%)</td>
<td>1 (0.24%)</td>
<td>0.23</td>
<td>$&gt;0.05$</td>
</tr>
<tr>
<td>Tracheotomy</td>
<td>6 (0.6%)</td>
<td>6 (1.28%)</td>
<td>0</td>
<td>5.41</td>
<td>$&gt;0.05$</td>
</tr>
<tr>
<td>ICU stay, patients</td>
<td>19 (0.3%)</td>
<td>19 (4.06%)</td>
<td>0</td>
<td>9.06</td>
<td>$&gt;0.05$</td>
</tr>
</tbody>
</table>

**Surgical activity data**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Time of technique, min</strong></td>
<td>180 ± 13.42</td>
<td>60 ± 7.75</td>
<td>$t$: 282.20</td>
<td>$&lt;.01$</td>
<td></td>
</tr>
<tr>
<td><strong>Mean hospital stay, days</strong></td>
<td>8.5 ± 2.92</td>
<td>4.6 ± 2.15</td>
<td>$t$: 605.37</td>
<td>$&lt;.01$</td>
<td></td>
</tr>
<tr>
<td><strong>Months of study</strong></td>
<td>160.5</td>
<td>117</td>
<td>43.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interventions per month, mean</strong></td>
<td>5.53 ± 2.35</td>
<td>4 ± 2</td>
<td>9.63 ± 3.1</td>
<td>5.63 ± 1.47</td>
<td>$&lt;.01$</td>
</tr>
<tr>
<td><strong>Mean cost per patient in euros (stay + haemostasis system)</strong></td>
<td>€2630</td>
<td>€1437</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison of both with respect to the traditional techniques of vascular ligation and electrocoagulation, 11,32,33 considered as the reference interventions. 5 Both significantly reduce operative time and cost per surgical intervention without increasing risks.1,16 Vascular ligation has the disadvantage of slipping and electrocoagulation, of thermal damage.26 It is important to reduce hyperpressure situations such as coughing or vomiting in the postoperative period, and it seems that bleeding is not reduced with the use of bandages.34 Numerous studies attempting to assess and provide recommendations based on evidence have found problems such as the scarcity of samples, lack of technique standardization and heterogeneity of design.5 The abundance of publications leads to confusion with redundant information and mixed results; these range from articles that report similar results in haemostasis with ligation and LigaSure12 to others reporting higher incidence of recurrent lesion and hypocalcemia with the use of Harmonic and LigaSure.35 In general, studies show that the

### Table 4  Relative Risk Calculated for Each Group.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample, n</strong></td>
<td>468</td>
<td>419</td>
</tr>
<tr>
<td><strong>Of suffering 1 or more complications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In primary surgery</td>
<td>1.59</td>
<td>0.36</td>
</tr>
<tr>
<td>In totalization</td>
<td>0.89</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Haemorrhage</strong></td>
<td>0.72</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>Ecchymosis</strong></td>
<td>1.05</td>
<td>0.94</td>
</tr>
<tr>
<td><strong>Seroma</strong></td>
<td>1.69</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Granulomas</strong></td>
<td>1.90</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Persistent recurrent paralysis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With visual identification</td>
<td>1.05</td>
<td>0.94</td>
</tr>
<tr>
<td>Without visual identification</td>
<td>0.5</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Permanent hypoparathyroidism</strong></td>
<td>1.36</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Infection of wound</strong></td>
<td>1.26</td>
<td>0.70</td>
</tr>
<tr>
<td><strong>Tracheotomy</strong></td>
<td>1.91</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>ICU stay</strong></td>
<td>1.91</td>
<td>0.00</td>
</tr>
</tbody>
</table>
surgical time invested with Harmonic is shorter,7,9,11,36-39 because a single instrument is used for dissection, cutting and haemostasis simultaneously. In addition, there are reports of a lower incidence of haemorrhage6,40,41 (even in thyroidectomy associated to lymph node dissection65) and reduced postoperative pain, probably due to less collateral tissue damage and to the fact that the period during which the patient has a hyperextended neck position is shorter, thus reducing headache and cervicalgia.11 Furthermore, the Harmonic system also enables smaller incisions in open surgery63 and the development of minimally invasive, video-assisted thyroidectomy techniques in selected cases.10,46-47

The reduction of surgical time (which enables more patients to be intervened at the same time) and of complications and patient discomfort (such as pain), involve a shorter hospital stay. These advantages enable shorter stay programs and outpatient surgery48 and, therefore, lower costs.11,38,41 These results are endorsed in the meta-analysis by Ecker et al.,14 which compares the results obtained with Harmonic versus other techniques.

In summary, the Harmonic system:

- Reduces surgical time.11
- Reduces the volume of bleeding.14
- Reduces the amount of fluid drained.14
- Reduces postoperative pain.4,14,40,49
- Reduces hospital stay.14
- Reduces complications such as hypocalcaemia35 and is equally safe with respect to haemorrhage and voice changes,3,8,38,39,50 (To minimise damage to the recurrent nerve and parathyroid glands, it is recommended to cool the callipers with cold saline solution, so as to prevent overheating; in addition, you should not approach within 2 mm, so as to prevent the mechanical action and coagulation of adjacent tissues.)
- Reduces the cost by shortening operative time and hospital stay and increasing activity.11,14,41

Since 1992, we have used the available haemostasis techniques applied to thyroid surgery:

- LigaSure and mono- and bipolar electrocoagulation (with no other ligation) (from 2004 to 2006).
- Harmonic (from 2006), which is currently the standard technique for thyroidectomy at our hospital.

Safety in haemostasis has led to doubts about the effectiveness of drainage in thyroidectomy and to the criteria against using drainage being commonplace in the literature that specifically addresses the topic.51 Drains are not needed because the incidence of haemorrhage is low (0.3%-1%)52 and there is no significant difference in the need for reoperation due to bleeding between groups of patients in whom drainage was placed or not (5% versus 7%, respectively53). The drains used are generally of small diameter and do not prevent the formation of haematoma, which may occur in up to 4% of patients in whom aspiration drainage was placed,54 drains can become clogged and not alert of a deep haematoma, can increase the rate of infection,55 are uncomfortable and increase local pain,56 increase hospital stay and costs,57 worsen the aesthetic results,58 increase hospital stay and inconvenience to patients59 and do not increase safety.21 Nevertheless, most centres use drainage.39,60 This drainage would be limited to patients with increased risk of haemorrhage (Graves-Basedow disease, cervicomediastinal goitre and patients with haemastasis disorders51,61). In our centre, we maintain the use of aspiration drainage because it ensures better control of the evolution of the surgical wound in the first postoperative hours by the personnel responsible for patient care. The study presented shows an overall improvement of results in the group treated with Harmonic scalpel, with reduction of complications, surgical time and hospital stay.

Conclusions

The effectiveness and efficiency of the Harmonic system have been sufficiently demonstrated in the literature. The results above show that this technique is associated with a significantly lower overall incidence of complications, with a statistically significant reduction of cases of postoperative haemorrhage, seroma, tracheostomy, and ICU stay. Moreover, the reduction in surgical time and length of hospital stay and increase in number of patients operated was also statistically significant.

On the other hand, the reduction of cases of recurrent paralasis, hypoparathyroidism, and wound infection were not statistically significant with respect to the group of patients treated with traditional techniques.

It must be stressed that, since this is a non-randomised retrospective study on non-homogeneous samples, the statistical significance may be biased.

We believe that the technique with the Ultracision Harmonic system is of choice for thyroidectomy because its mechanism of action causes less tissue damage, carries out dissection, haemostasis and cutting with a single instrument accurately and safely and is significantly faster.

Conflict of Interests

The authors have no conflicts of interest to declare.

References


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