

Total Thyroidectomy with LigaSure Small Jaw versus Conventional Thyroidectomy - a Clinical Study

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Rezumat

Tiroidectomia totală cu LigaSure Small Jaw versus tiroidectomia clasică - studiu clinic

Introducere: Apariția tehnologiei LigaSure în practica chirurgicală aduce o serie de beneficii reale în chirurgia glandei tiroide. Utilizarea LigaSure Small Jaw în tiroidectomiile totale reprezintă un pas important în chirurgia glandei tiroide. Scopul acestei lucrări este acela de a prezenta experiența inițială a colectivului Clinicii Chirurgie I din Târgu Mureș în ceea ce privește utilizarea acestui procedeu de tiroidectomie totală (fără ligaturi) comparativ cu tehnicile clasice (cu ligaturi). **Material și metodă:** Studiul cuprinde 20 de pacienți consecutivi (19 femei și un bărbat), care au fost supuși tiroidectomiei totale în clinica Chirurgie I, Spitalului Clinic Județean de Urgență Târgu Mureș, în perioada septembrie 2012 – februarie 2013. Lotul I a cuprins 10 pacienți pentru care s-a practicat tiroidectomia totală utilizând sistemul Ligasure Small Jaw (fără ligaturi); al doilea lot a inclus 10 pacienți la care tiroidectomia totală s-a realizat în mod clasic (utilizând ligaturile vasculare). Loturile au fost analizate comparativ statistic urmărind următorii parametri: patologia glandei tiroide, durata intervenției chirurgicale, numărul zilelor de spitalizare, durata analgeziei, complicațiile postoperatorii imediate.

Rezultate: Utilizarea acestui sistem asigură o scădere semnificativă statistic a duratei intervenției chirurgicale și a spitalizării.

Concluzii: Utilizarea sistemului LigaSure Small Jaw în chirurgia glandei tiroide este o metodă sigură, cu complicații minime.

Cuvinte cheie: LigaSure Small Jaw, tiroidectomie totală, hemostază

Abstract

Introduction: The emergence of LigaSure device in surgical practice brings some real benefits in thyroid surgery. Using LigaSure Small Jaw device in total thyroidectomy is an important step in thyroid surgery. The aim of this study is to present the initial experience of Surgical Clinic I Târgu Mureș staff in terms of total thyroidectomy using this procedure, without ligatures compared to the conventional technique with ligatures.

Material and Method: The study included 20 consecutive patients (19 females and one male) who have undergone total thyroidectomy in Surgical Clinic I of the Emergency County Hospital Târgu Mureș, between September 2012 - February 2013. Group I included 10 patients who underwent total thyroidectomy using the LigaSure Small Jaw device (without ligatures) while the second group included 10 patients in whom total thyroidectomy was performed by classical procedure (using vascular ligatures). The two groups were compared using statistical analysis following the next parameters: the thyroid pathology, operation time, number of hospitalization days, analgesia and immediate postoperative complications.

Results: This method provides a statistically significant

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decrease of the operative time and hospitalization days.

Conclusion: Using LigaSure Small Jaw device in thyroid surgery is a safe procedure with little complications rate.

Key words: LigaSure Small Jaw, total thyroidectomy, hemostasis

Introduction

Through its anatomical position, the thyroid gland has a rich blood supply, arterial and venous sources, close to the main laterocervical vessels (carotid artery, jugular vein). Prompt and effective hemostasis is crucial in thyroid surgery, but ligation of blood vessels is often time consuming (1,2). The use of sutures and their application technique require experience and a prolonged learning curve. Performing total thyroidectomy by using sealing, ligation, section and dissection devices, as LigaSure Small Jaw, in our opinion can be a rapid and elegant alternative technique. This device is a recent acquisition in Surgical Clinic I of Târgu Mureş allowing effective hemostasis for blood vessels with diameters up to 7 mm. The possibility of dissection and removal of the thyroid gland from the tracheal support, sparing the recurrent nerves and parathyroid glands and the surrounding heat dispersion being much smaller (1 mm) compared with the use of monopolar electrocautery, recommend use of this type of instrument for performing total thyroidectomy (3,4). Decreased operative time is a critical problem for both the patient and anestheologist, for the surgeon also, and contributes to a faster postoperative recovery (5).

Data from the literature regarding the use of LigaSure device in thyroid surgeries are relatively poor and controversial (6). The purpose of this study is to present the initial experience of Surgical Clinic I Târgu Mureş regarding the use of LigaSure Small Jaw device (without ligatures) for performing total thyroidectomy compared to the conventional technique (with ligatures).

Material and Method

The study includes 20 consecutive patients (19 females, 1 male) who have undergone total thyroidectomy at Surgical Clinic I (of the) Târgu Mureş Clinical Emergency County Hospital. The patients were admitted in our service between 01.09.2012 and 28.02.2013. We have distributed the subjects in two groups as follows: group 1 (n=10) who underwent total thyroidectomy during which haemostasis was achieved using the LigaSure Small Jaw device, without the need of classic vascular ligatures. Group 2 (n=10) who underwent total thyroidectomy performed in the classic manner, using vascular ligatures. The two groups have been comparatively analysed using the following parameters: thyroid pathology, operative time, number of hospitalization days, postoperative analgesia, early postoperative complications (Fig. 1).

The Ligasure Small Jaw instrument was used for the

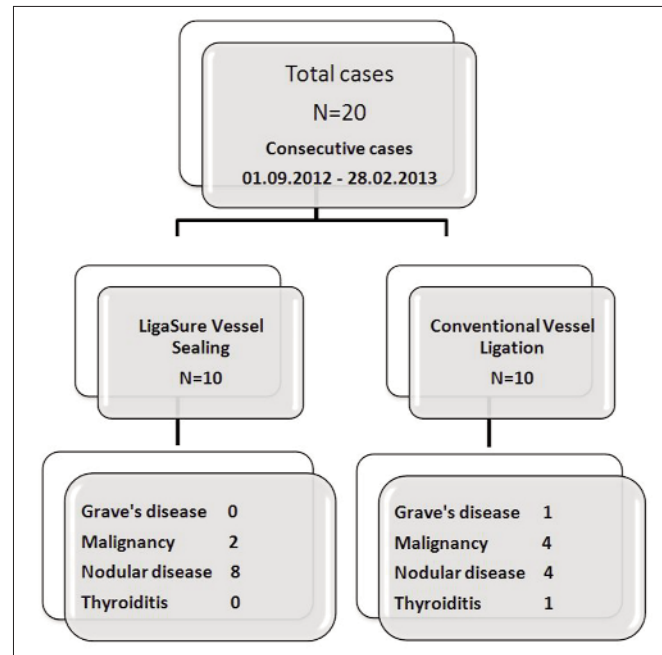


Figure 1. The distribution of the two groups according to the performed procedure and thyroid pathology

dissection of the vascular pedicles of the thyroid gland (inferior, middle and superior), for achieving haemostasis and lymphostasis, for dissecting the thyroid gland from the trachea while preserving the parathyroid glands and the laryngeal recurrent nerves and also for the division of thyroid isthmus.

The patients in group 2 were operated using classic instruments like monopolar electrocautery, and vascular ligatures being applied using both absorbable and non-absorbable suture material. The encountered early postoperative complications (bleeding, transient hypoparathyroidism, dyspnoea, dysphonia, haematoma of the skin flaps) were comparatively analysed (7).

The statistical analysis was performed using MedCalc Software (bvba Version 12.3.0, Mariakerke, Belgium). During the statistical processing, the Student test was used for the evaluation of the differences between the means of continuous variables (expressed by mean $\pm$ Standard Deviation). Differences between non-parametrical variables (expressed by median, range) were compared using the Mann-Whitney U-test. The dates were interpreted against a predetermined significance level of $p=0.05$ and statistical significance was considered for p -values less than the significance level.

Results

The two groups included in our study had similar demographic characteristics (age, sex, area of provenience), the pathology of the thyroid gland also being the same. In both groups we haven't had any association between hyperthyroidism and malignancy, as showed by other authors (8). Surgery consisted of performing total thyroidectomy and double drainage of the thyroid compartment. The mean operative time was less in the group where the LigaSure Small Jaw instrument had been used (80 minutes), in comparison with the second group, where

classic surgery procedures and vascular ligatures had been used (106 minutes); showing a mean time economy of 26 minutes (Table 1).

For the statistical data analysis referring to the age of the patients, we have used the Student's t-test but we did not obtain statistically significant results ($p=0.8$). The mean age of the patients in group 1 was 51.2 ± 11.3 , while in group 2 it was 49.7 ± 14.7 (Table 2).

To appreciate the length of hospital stay, we applied the non-parametric Mann-Whitney test, since the two groups didn't have a Gaussian distribution pattern, because of the value of 14 days in group 1 and of 15 days in group 2. For group 1 the mean hospitalization time was of 4 days (range: 2-14 days), and for group 2 it was also 4 days (range: 3-15 days). We haven't found statistically significant differences relating to these parameters of the patients in the two groups, regardless of the statistic method applied (Table 3).

The evaluation of postoperative analgesia was performed by measuring the dose of analgesic drugs administered to each patient. We mention that the analgesic requirement of each patient is subjective and depends on the pain threshold as well as the duration of hospital stay. The non-parametric Mann-Whitney test had been applied considering that the two groups didn't have a Gaussian distribution (because of a maximal value of 10 days observed in the LigaSure-group and a maximal value of 10 days identified in the conventional group). The mean period of analgesia in group 1 was 2.5 days (range 1-10 days), while in group 2 it was 3 days (range: 2-10 days). There was no statistically significant difference between the period of analgesic drug requirement in the two groups ($p=0.06$) (Table 4).

In the evaluation of the operative time measured from the moment of the skin incision to wound closure, we have found that statistical data followed a Gaussian distribution and it could be interpreted by Student's t-test. The mean operative time in group 1 (LigaSure) was 80 ± 12.4 minutes, which is significantly less than the operative time in the second group (conventional) 106 ± 23.5 minutes, $p=0.006$ (Table 5).

There is no statistic significant difference between the incidence of early postoperative complications in the two groups (we found an equal number of haematoma and dysphonia in the two groups) ($p > 0.05$) (Fig. 4).

Discussion

The introduction of new sealing devices in thyroid surgery benefits both patients and surgeons. Using the LigaSure Small Jaw device to perform total thyroidectomy is a reliable option, an observation we have also ascertained, as Samerland. S and Kornenkov M have (3).

The complication rates after total thyroidectomy without using ligatures are not different from those observed after conventional techniques, the advantages of this modern approach being significant:

- provides an easy identification of the anatomical elements allowing a "complete" total thyroidectomy, which is necessary, as observed by other authors (9);

Table 1. Results obtained on operative time and postoperative analgesia

Total cases (N=20)	LigaSure group (N=10)	Conventional group (N=10)
Postoperative analgesia (average number of days)	2.9	3.8
Operating time (average time in minutes)	80	106

Table 2. Distribution of patients in the two groups according to age

	Age	
	Group I (n-10)	Group II (n-10)
Minimum	26.00	26.00
Median	53.50	49.50
Maximum	64.00	70.00
Mean	51.20	49.70
Standard Deviation	11.34	14.72

Table 3. Distribution of patients depending on length of hospitalization

	Hospitalization days	
	Group I (n-10)	Group II (n-10)
Minimum	2.000	3.000
Median	4.000	4.000
Maximum	14.00	15.00
Mean	4.500	5.200
Standard Deviation	3.408	3.521

Table 4. Distribution of patients according to duration of postoperative analgesia

	Postoperative analgesia	
	Group I (n-10)	Group II (n-10)
Minimum	1.000	2.000
Median	2.500	3.000
Maximum	10.00	10.00
Mean	2.900	3.800
Standard Deviation	2.644	2.251

Table 5. Distribution of patients according to the operative time

	Operative time	
	Group I (n-10)	Group II (n-10)
Minimum	60.00	80.00
Median	80.00	100.0
Maximum	100.0	150.0
Mean	80.00	106.0
Standard Deviation	12.47	23.55



Figure 2. The Surgical kit used for total thyroidectomy

- creates a bloodless surgical field providing better visibility, observed also by Kirdak T (10);
- allows easy compression of the specimen during surgery without the risk of ligature detachment;
- avoids additional maneuvering of the wound during vessel ligation and between the operator and the helping nurse;
- no need for exposing the vascular pedicles, their dissection being possible using the LigaSure Small Jaw forceps;
- allows thyroid isthmusectomy and avoids repeated tipping maneuvers during pedicle ligation;
- performs safe sealing of blood vessels and lymphatics, observed also by Marazzo A and Lepner U (11,12);
- avoids thread granuloma formation and the risk of loading on to the needle different anatomical structures that must be spared
- does not require a long learning curve in mastering the technique as long as the classic anatomic-clinical concepts are followed;
- reduces the operating time and hospital stay, observed also by Gac P, Cabane P and Hou Shan Yao (13,14).
- allows the use of "airy" surgical kits (Fig. 3) under the endowment of operating rooms with the Valleylab Force Triad platform and LigaSure Small Jaw (Fig. 4).

Conclusions

We believe that the LigaSure Small Jaw system will replace "suture-ligation" procedures in the surgical approach of thyroid gland pathology, under proper endowment of the operating rooms. Favorable postoperative evolution is the desire of every surgical patient, the possibility of a safe and elegant procedure in the surgical pathology of the thyroid gland being the right of any patient, regardless of the socio-economic conditions that we are currently facing in the health system.



Figure 3. Valleylab Force Triad platform and Small Jaw LigaSure device

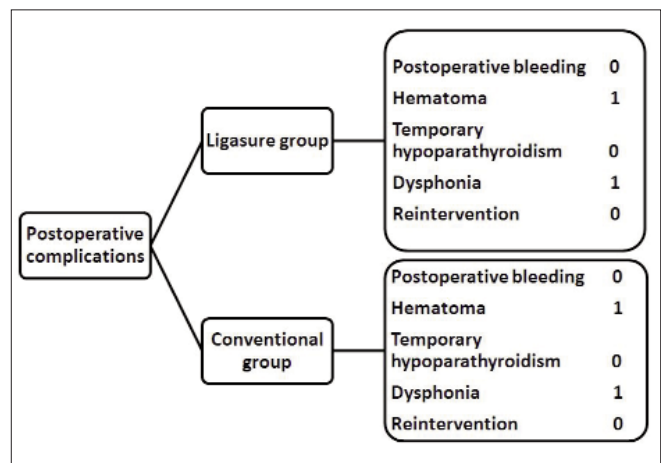


Figure 4. Postoperative complications

References

1. Wheeler MH. The technique of thyroidectomy. J R Soc Med. 1998;91 Suppl 33:12-6.
2. Olteanu G, Balazi L, Gherman I, Carmen T. Actualități în prevenția și tratamentul hematomului postoperator în chirurgia tiroidiană. Clujul Medical. 2007;80(3):571-5.
3. Kiriakopoulos A, Dimitrios T, Dimitrios L. Use of a diathermy system in thyroid surgery. Arch Surg. 2004;139(9):997-1000.
4. Samerland S, Kornenkov M. LigaSure for vessel ligation in thyroidectomy. Arch Surg. 2010;145(5):501; author reply 501-2.
5. Lachanas VA, Prokopakis EP, Mpenakis AA, Karatzanis AD, Velegarakis GA. The use of Ligasure Vessel Sealing System in thyroid surgery. Otolaryngol Head Neck Surg. 2005;132(3):487-9.
6. Shen WT1, Baumbusch MA, Kebebew E, Duh QY. Use of the electrothermal vessel sealing system versus standard vessel ligation in thyroidectomy. Asian J Surg. 2005;28(2):86-9.
7. Moldovanu R, Filip V, Niculescu D, Cotea E, Georgescu S,

- Dănilă N, et al. Tiroidectomia totală prin disecție capsulară. *Jurnalul de Chirurgie (Iasi)*. 2008;4(1):1584-9341.
8. Diaconescu MR1, Lazăr C, Chifan M, Dobrescu G. Hyperthyroidism and coexistent thyroid carcinoma. *Chirurgia (Bucur)*. 2004; 99(3):143-50. Romanian
 9. Diaconescu MR, Glod M, Costea I, Palade M, Grigorovici M. Reoperations of the thyroid gland. *Chirurgia (Bucur)*. 2007; 102(3):297-302. Romanian
 10. Kirdak T, Korun N, Özguc H. Use of ligasure in thyroidectomy procedures: results of a prospective comparative study. *World J Surg*. 2005;29(6):771-4.
 11. Marrazzo A, Casà L, David M, Lo Gerfo D, Noto A, Riili I, et al. Thyroidectomy with LigaSure versus traditional thyroidectomy: our experience *Chir Ital*. 2007;59(3):361-5. Italian
 12. Lepner U, Vassana T. Ligasure vessel sealing system versus conventional vessel ligation in thyroidectomy. *Scand J Surg*. 2007;96(1):31-4.
 13. Gac P, Cabane P, Amat J, Rodriguez F, Cardemil F, Parada F et al. Tiroidectomia sin ligaturas: evaluando Ligasure Precise. *Chilena de Cirurgia, Abril*. 2008;60(2):127-131.
 14. Yao HS, Wang Q, Wang WJ, Ruan CP. Prospective clinical trials of thyroidectomy with LigaSure vs conventional vessel ligation: a systematic review and meta-analysis. *Arch Surg*. 2009;144(12):1167-74.