ORIGINAL ARTICLE

ANNALS OF PUNJAB MEDICAL COLLEGE

Intraoperative and Postoperative Blood Loss in Subtotal Thyroidectomy Using Ligasure versus Conventional Thread Knot and Cautery

Muhammad Yaqoob[1], Soofia Irfan[2], Sajid Rehman Randhawa[3], Durre-I-Chaman[4], Muhammad Dilawaiz Mujahid[5], Saima Zafar[6], Muhammad Sajid[7]

1 ***Assistant Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
Data collection for analysis besides searching literature on the topic for writing up manuscript

2 ***Assistant Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
Literature review

3 ***Associate Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
Compiling the results

4 ***Assistant Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
References layout

5 ***Assistant Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
Literature review, Discussion

6 ***Consultant Surgeon Jhumra, Faisalabad Pakistan***
Data analysis

7 ***Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan***
Supervision, Proof reading

CORRESPONDING AUTHOR
Dr. Muhammad Yaqoob
Assistant Professor, Department of Surgery, Faisalabad Medical University, Faisalabad Pakistan
Email: dryaqoob@hotmail.com

Submitted for Publication: 07-04-2021
Accepted for Publication 06-10-2021

How to Cite: Yaqoob M, Irfan S, Randhawa SR, Chaman D, Mujahid MD, Zafar S, Sajid M. Intraoperative and Postoperative Blood Loss in Subtotal Thyroidectomy Using Ligasure versus Conventional Thread Knot and Cautery. APMC 2022;16(1):65-68.**DOI: 10.29054/APMC/2022.1211**

ABSTRACT

Background: Thyroidectomy is a common procedure performed & thyroid gland being highly vascular, its surgery results in lot of bleeding. New energy devices like, ligasure are being commonly used nowadays in thyroid surgery to reduce per-operative bleeding. **Objective:** To compare intraoperative and postoperative blood loss in subtotal thyroidectomy using small jaw Ligasure versus conventional vessel knotting and Cautery. **Study Design:** Randomized controlled trial. **Settings:** Department of General Surgery, Allied Hospital, Faisalabad Pakistan. **Duration:** Six months from 11-09-2020 to 10-03-2021. **Methods:** Total 160 patients 80 in each group) with benign multinodular goiter were included in the study. Patients having thyroid malignancy, recurrent goiter requiring redo surgery and coagulopathies were excluded. Group A patients underwent subtotal thyroidectomy with conventional thread vessel knotting and Cautery and group B patients were operated with Ligasure small jaw device. Intraoperative and postoperative blood loss of all patients was measured and documented. Data was analyzed by SPSS 23.0. A p-value ≤0.05 was taken as significant. **Results:** Mean intra-operative blood loss was calculated as 116 ± 4ml in group-A and 59 ± 4ml in group-B and (p=0.001). The mean post-operative blood loss was calculated to be 81 ± 3ml in group-A and 53 ± 3ml in group-B (p=0.001). **Conclusion:** Subtotal thyroidectomy in benign multinodular goiters with Ligasure small jaw device has significantly less blood loss both intraoperative and postoperatively as compared to conventional Cautery and thread vessel knotting.

Keywords: *Subtotal thyroidectomy, Intraoperative blood loss, Postoperative blood loss.*

INTRODUCTION

Thyroid is an endocrine gland. Its enlargement may be diffused, multinodular, multinodular with dominant nodule, or solitary nodule. Patient with goiter may be euthyroid, hyperthyroid or hypothyroid. Thyroid nodule may be adenomas or carcinomas, with or without toxicity. Common indications for thyroid surgery are pressure symptoms, cosmetic, toxicity and malignancy. Commonly performed thyroid surgeries include Lobectomy with isthmusectomy, subtotal thyroidectomy and total or near total thyroidectomy.[1] Thyroidectomy techniques being used today are modifications of Kocher and Billroth procedures.[2] Thyroid gland is highly vascular and its surgery requires meticulous hemostasis[3] to reduce risk of intraoperative and postoperative hemorrhage.[4] Due to better understanding of surgical pathologies, experience of surgeons and use of latest surgical gadgets both intraoperative and postoperative complications including blood loss are reduced. Different techniques being used to reduce blood loss includes conventional thread knotting of bleeders, use of electrocautery and the use of small jaw Ligasure.[5]

Ligasure is an energy device using low voltage high current and having a feedback mechanism system which delivers and stops the power automatically when tissue between the jaws is coagulated.[6] Many studies have been conducted showing reduction in intraoperative and postoperative hemorrhage by using Ligasure. Objective of my study was to compare intraoperative and postoperative blood loss in subtotal thyroidectomy by using Ligasure versus conventional electrocautery, vessel clamping and thread knotting in benign multinodular goiters.

METHODS

This prospective study was conducted in surgical department of Allied hospital Faisalabad. Study period was one year from August 11, 2020 to August 10, 2021. Total 160 patients undergoing subtotal thyroidectomy for benign multinodular goiter were included in this study. Patient of either sex with benign multinodular goiter requiring surgery for pressure symptoms, cosmetic reasons having age between 15 to 70 years and ASA grade 1, 2, 3 were investigated on OPD basis. Investigations included CBC, HBSAG, ANTIHCV ANTIBODIES, RBS, THYROID FUNCTION TESTS, IDL, SERUM CALCIUM LEVEL, ECG. Patients having thyroid malignancies, redo surgeries, ASA 4 and 5 were excluded from study. Patients either hyperthyroid or hypothyroid were made euthyroid after treating with carbimazole and thyroxine respectively. Patients were admitted in ward and divided into two groups A and B by lottery method. These patients were operated on next coming operation list. Patients in group A underwent thyroidectomy with conventional Cautery and vessel thread knotting method while patients in group-B underwent thyroidectomy with Ligasure.

In group A after making skin incision subplatysmal superior and inferior flaps were raised using electrocautery and ligating major bleeders with vicryl suture. Middle thyroid vein, superior pedicle and inferior pedicle were also secured with vicryl suture. Subtotal thyroidectomy was completed by using multiple hemostats followed by securing hemostasis with suturing and knotting with vicryl suture. In group B superior and inferior flaps were raised and bleeding was secured by using small jaw Ligasure. Middle thyroid vein, superior and inferior pedicles were secured with Ligasure without any thread use. Subtotal thyroidectomy was completed by small jaw Ligasure for both dissection and coagulation. Before closure suction drain was placed in both cases. Intraoperative blood loss was assessed by measuring blood collected in suction bottle and by calculating difference in weight of dry and blood-soaked swabs. The difference of one gram was taken as one milliliter of blood.

Post-operative blood loss was calculated by total amount of blood collected in suction bottle before its removal. All data including patient name, age, sex, address, hospital registration number, date of admission, date of operation, group A OR B, intraoperative blood loss, postoperative blood loss and date of discharge was recorded in proforma. Data was entered and analyzed using SPSS version23.0.

RESULTS

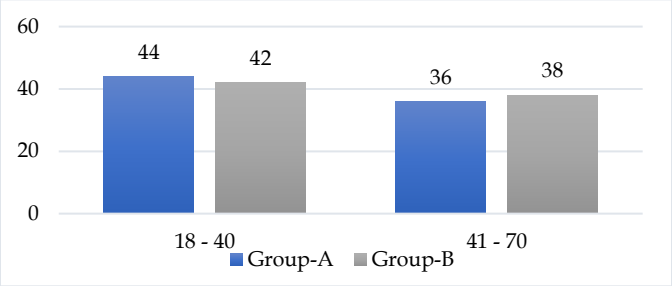
A total of 160 cases (80 in each group) fulfilling the selection criteria were enrolled to compare intraoperative and postoperative blood loss in subtotal thyroidectomy using small jaw Ligasure versus conventional vessel knotting and Cautery.

Age distribution shows that 55% (n=44) in Group-A and 52.5% (n=42) in Group-B were between 18-40 years of age whereas 45% (n=36) in Group-A and 47.5% (n=38) in Group-B were between 41-70 years of age, mean ± SD was calculated as 40.74 ± 10.08 years in Group-Band 40.23 ± 10.05 years in Group-A. (Table 1)

Table 1: Age Distribution (n=160)

Age (In years)	Group-A (n=80)		Group-B (n=80)	
	No. of patients	%	No. of patients	%
18-40	44	55	42	52.5
41-70	36	45	38	47.5
Total	**80**	**100**	**80**	**100**
Mean ± SD	**40.23 ± 10.05**		**40.74 ± 10.08**	

Figure 1: Age Distribution Group A, Group B



Gender distribution shows that 37.5% (n=30) in Group-B and 35% (n=28) in Group-A were male whereas 62.5% (n=50) in Group-B and 65%(n=52) in Group-A were females. (Table 2)

Table 2: Gender Distribution (n=160)

Gender	Group-A (n=80)		Group-B (n=80)	
	No. of patients	%	No. of patients	%
Male	28	37.5	30	35
Female	52	62.5	50	65
Total	**80**	**100**	**80**	**100**

Average intra-operative blood loss in Group A was calculated as 116 ML and 59 mL in Group-B. The difference between the two groups was statistically significant (p=0.001). Similarly, the post-operative blood loss between the two groups was also found to be statistically significant (p=0.001). The average post-operative blood loss was calculated to be 81mL in Group-A and 53 mL in Group-B patients respectively. 5 patients in group A required per-operative blood transfusion while no one from group B required blood transfusion. No patient in either group developed postoperative hematoma.

Figure 2: Average intra-operative blood loss

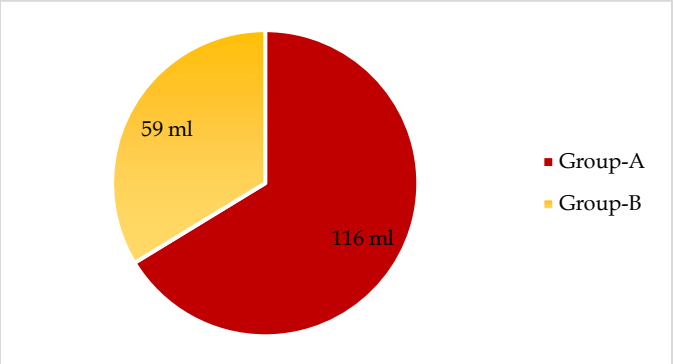
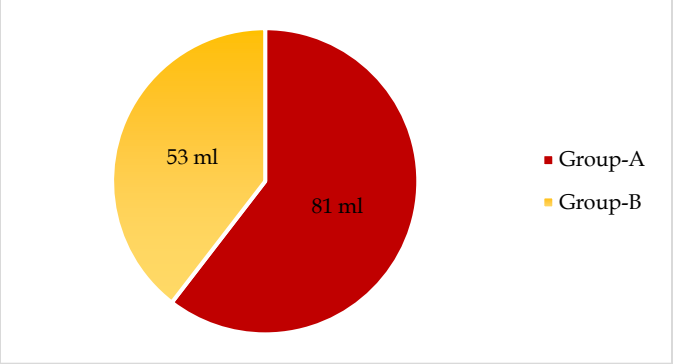


Figure 3: Average post-operative blood loss



DISCUSSION

Thyroidectomy is one of the commonly performed elective operations. Due to rich blood supply thyroid surgery is having high risk of intraoperative and postoperative hemorrhage. Thyroid surgery evolved rapidly with help of advanced equipment, better understanding of thyroid anatomy and pathology, and of course with experience of surgeons. In thyroid surgery bloodless surgical field is important to avoid complications of thyroid surgery like recurrent laryngeal nerve injury, parathyroid damage etc. this bloodless field can be achieved by accurate dissection, dissection in avascular planes and adequate hemostasis. Every effort has been made to improve ways of hemostasis but still an ideal way of hemostasis is awaited.[7]

Figure 4: Operative view of thyroidectomy

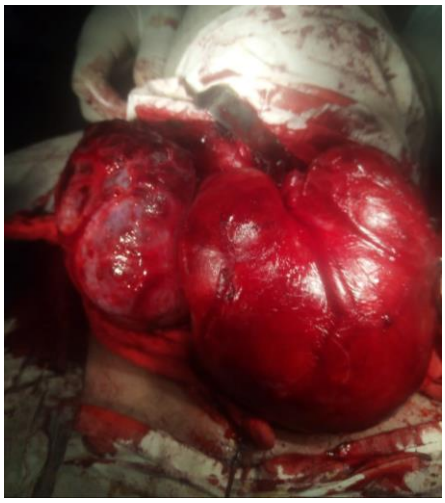


Figure 5: Thyroid specimen after thyroidectomy

Different methods used to secure hemostasis in thyroid surgery are vessel clamping and thread knotting, monopolar or bipolar electrocautery, small jaw Ligasure, harmonic vessel sealing.

In our study there were 102 female patients and 58 male patients. This is in consistent with study of AlJuraibi W *et al*[8] which show that goiter is more common in female than male. Most of patients in our study were between age of 20 years to 50 years.

The average intraoperative blood loss in 116 mL in group-A and group B was calculated as 59 ML. This is more than the study of Waqas *et al*[3] but comparable with the study performed by Ramouz *et al* in which blood loss in Ligasure group was 49.64 ± 17.92ml and in conventional Cautery 64.42 ± 20.72ml.[9] Total blood loss in our study is more than study of Waqas *et al*[3] and it may be due to fact that most of patients present with large goiters and many of them have controlled toxic goiters. Because vascularity of toxic goiters is increased, so in-spite of being made euthyroid with antithyroid and beta blocker drugs these goiters are more vascular and prone to have more bleeding. As has been mentioned earlier that goiter is more common in female than male and female especially

from peripheries of Faisalabad use to hide goiter under DOPATA. They do not seek medical advice till goiter peeps out of dopata or they get pressure symptoms. So, they present with large goiters and as already mentioned large goiters bleed more. As far as site of bleeding is concerned there was no significant difference in bleeding from pedicles in both groups, because surgeon was trained enough to identify, isolate pedicles and either ligate or coagulate with Ligasure. Main sites of bleeding were surface veins and bed of goiter. There was significantly more bleeding from thyroid bed in group A as compare to group B. Thyroid was dissected, coagulated and cut with Ligasure which resulted in minimal bleeding from bed of thyroid. Our study shows that thyroidectomy with small jaw Ligasure has significant less per-operative bleeding as compared to conventional vessel clamping and thread knotting. This is comparable with the findings of many other studies,[10,11,12] which show that thyroidectomy with small jaw Ligasure have significant less per-operative hemorrhage.

Postoperative blood loss which was calculated by measuring the blood collected in bottle of suction drain was also significantly less in group B i.e., Ligasure assisted thyroidectomy as compared to conventional vessel clamping and thread knotting group A. These findings are similar to findings of Zhang *et al* who found that postoperative blood loss was less in thyroidectomies done with help of Ligasure.[13] Ligasure vessel sealer is an excellent hemostatic instrument. This instrument has ability to coagulate up to 7mm sized vessel.[14] Additional benefits of Ligasure are less thermal damage to surrounding structures, coagulation along with cutting and its automated delivery of energy which stops automatically when tissue is coagulated.[6] However main disadvantage of this instrument is its cost, its main generator is costly and its hand instruments are also disposable and costly.

CONCLUSION

Thyroidectomy with small jaw Ligasure has significantly less intraoperative and postoperative blood loss, thus minimizing the need for blood transfusion in thyroidectomy. So, we recommend that thyroid surgery should be performed using small jaw ligasure.

LIMITATIONS

The only limitation is the unavailability of hand piece of Ligasure, which at times is temporarily unavailable.

SUGGESTIONS / RECOMMENDATIONS

As it is recognized that Ligasure is beneficial so in public sector it should be arranged.

CONFLICT OF INTEREST / DISCLOSURE

The authors declare no competing conflicts of interest.

ACKNOWLEDGEMENTS

We are thankful to our colleagues and patients who helped in this study.

REFERENCES

1. Faisal AA, Al-Salih RM, Assi AN. Study of effect of Thyroidectomy on Serum Oxidant-Antioxidants Status. Int J Curr Microbiol App Sci. 2015;4(4):1051-60.
2. Baloch MN, Anwer M, Nusrat S, Naeem M, Kumar D. Outcomes of comparative study between ultrasonic harmonic scalpel versus conventional hemostasis in open thyroidectomy. Pak J Surg. 2016;32(2):62-5.
3. A Waqas, I Taseer, I Khalid, M Rabia. Ligasure Small Jaw Device Vs Conventional Vascular Ligature Technique Pak Armed Forces Med J 2019; 69(2): 291-95.
4. Çakabay B, Sevinç MM, Gömceli Í, Yenidoğan E, Ülkü A, Koç S. LigaSure versus clamp-and-tie in thyroidectomy: a single-center experience. Advances in therapy. 2009 Nov;26(11):1035-41.
5. Materazzi G, Ambrosini CE, Fregoli L, De Napoli L, Frustaci G, Matteucci V, Papini P, Bakkar S, Miccoli P. Prevention and management of bleeding in thyroid surgery. Gland surgery. 2017 Oct;6(5):510.
6. Liang J, Xing H, Chang Y. Thermal damage width and hemostatic effect of bipolar electrocoagulation, LigaSure, and Ultracision techniques on goat mesenteric vessels and optimal power for bipolar electrocoagulation. BMC surgery. 2019 Dec;19(1):1-7.
7. C Bahri, Sevinç M M, I Gomceli I, Yenidogan E, Ulku A, Koç S. LigaSure versus clamp-and-tie in thyroidectomy: a single-center experience. Advances in Therapy 2009 Nov;26(11):1035-41.
8. AlJuraibi W, Mohamed R, Saber A. Use of ligasure sealing versus conventional suture-ligation in total thyroidectomy. J Surg. 2016;4(3-1):34-8.
9. Ramouz A, Rasihashemi SZ, Hosseini M. Comparing Postoperative Complication of LigaSure Small Jaw Instrument with Clamp and Tie Method in Thyroidectomy Patients: A Randomized Controlled Trial. Journal of the American College of Surgeons. 2018 Oct 1;227(4):e117.
10. Bhettani MK, Rehman M, Khan MS, Altaf HN, Khan KH, Farooqui F, et al. Safety and cost-effectiveness of LigaSure® in total thyroidectomy in comparison with conventional suture tie technique. Cureus. 2019 Dec 12;11(12).
11. Coiro S, Frattaroli FM, De Lucia F, Manna E, Fabi F, Frattaroli JM, et al. A comparison of the outcome using Ligasure™ small jaw and clamp-and-tie technique in thyroidectomy: a randomized single center study. Langenbeck's archives of surgery. 2015 Feb;400(2):247-52.
12. Khafagy AH, Abdelnaby I. Total thyroidectomy: Ligasure versus Clamp & Know technique for intraoperative hemostasis. Egypt J Ear, Nose, Throat Allied Sci 2013;14:59-65.
13. Zhang L, Li N, Yang X, Chen J. A meta-analysis comparing the outcomes of LigaSure Small Jaw versus clamp-and-tie technique or Harmonic Focus Scalpel in thyroidectomy. Medicine. 2017 Mar;96(11).
14. Velotti N, Manigrasso M, Di Lauro K, Vitiello A, Berardi G, Manzolillo D, et al. Comparison between LigaSure™ and Harmonic® in laparoscopic sleeve gastrectomy: a single-center experience on 422 patients. Journal of Obesity. 2019 Jan 3;2019.