Original Article

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Comparison of the Outcome between Ligasure and Conventional Suture Tie Techniques in Patients Undergoing Thyroidectomy

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Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2,3]analysis, or interpretation of data for the work, [5]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: To compare the outcome between ligasure and conventional suture tie techniques in patients undergoing thyroidectomy.

Methodology: This study was conducted in the department of general surgery, DHQ hospital Dera Ghazi Khan, over a period of one year from September 2022 to September 2023. This randomized controlled study was conducted on 60 patients divided in two groups, group a (ligasure technique and group b (conventional suture technique) having age 30-65 years either male or female gender presented to undergo thyroidectomy. Patients undergoing chemotherapy, recurrent cases and bleeding diathesis (INR > 1.5) were excluded. The participants were randomly assigned to group A and group B through draws method using sealed opaque envelopes. All the surgical procedures were performed as per institutional protocol by consultant surgeon with ≥ 5-year post-fellowship experience. All the patients received anesthesia as per hospital protocol.

Results: This study was conducted on 60 patients divided in two groups equally, group a (ligasure technique) and group b (conventional technique). The mean age in group A was 47.80±11.54 years and 44.83±10.38 years in group B. among patient in group A 10 (33.3%) patients had total thyroidectomy while 20 (66.7%) patients had subtotal thyroidectomy and in group B 12 (10%) patients had total thyroidectomy while 18 (60%) patients had subtotal thyroidectomy. Group A had significantly shorter operative time (62.07±3.09 mins vs 69.70±3.18 mins, P = 0.0001) as compared to group B. According to the comparison of total blood loss between both groups, group A had significantly lower blood loss (56.27±2.50 ml vs 68.57±2.92) as compared to group B.

Conclusion: It can be concluded that ligasure technique had better outcomes as compared to conventional suture tie technique. The mean operative time and blood loss was significantly lower in ligasure technique as compared to conventional suture technique.

Keywords: Conventional technique, ligasure, mean operative time, post-operative blood loss, thyroidectomy

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Introduction

Thyroidectomy has been considered a treatment of choice for thyroid malignancies. It has recently gained popularity as gold standard for benign thyroid disorders requiring surgical treatment. [1,2] According to American Thyroid Association approximately 150,000 patients undergo thyroidectomy every year in the United States for benign or malignant disease.[3] Transient hypocalcemia and recurrent laryngeal nerve (RLN) injury are the most commonly reported complications (5%-15%).[4] Because of higher complication rate associated with total thyroidectomy, it is still considered an adventurous endeavor.[5]

Most important improvements in thyroid surgery include laparoscopic thyroidectomy, energy-based devices (EBD) like Harmonic Focus® and LigaSure® for dissection and hemostasis, intraoperative neuromonitoring, and parathyroid hormone (PTH) assay technology.[6,7] Better hemostasis allows for early removal of drain and decreased hospital stay. Some authors do consider the increased healthcare costs associated with use of EBDs to be somewhat of a disadvantage.[7] Most importantly EBDs are indispensable in almost all endoscopic procedures for cutting and hemostasis without increasing the risk of postoperative complications.[8]

Bhettani MK et al conducted a study in 102 patients who underwent thyroid surgery for benign thyroid diseases. Mean operative time in group A (Ligasure used for hemostasis) was significantly lower (92 ± 9.61 min) than group B (conventional suture) (123 ± 7.96 min) ($p < 0.01$). Mean intraoperative blood loss in group A was estimated to be 51.73 ± 5.65 mL and 139.42 ± 7.31 mL in group B ($p < 0.01$).[9] Akram M et al studied 130 patients undergoing thyroidectomy. They observed that mean operative time was 62.11+4.07 minutes in Ligasure technique group and 73.05+4.01 minutes in conventional technique group ($p=0.0001$). Mean blood loss was 57.28+3.42 ml in Ligasure technique group and 70.85+4.12 ml in conventional technique group ($p=0.0001$).[10]

This study has been planned with the aim of comparing conventional suture tie technique and LigaSure technique in thyroidectomy, in terms of operative time, and mean blood loss in patients undergoing thyroidectomy in our local setting. The study results will provide evidence whether LigaSure technique is superior over conventional tie technique.

Methodology

This randomized comparative study was carried out at the department of general surgery, DHQ hospital Dera Ghazi Khan. The study was carried out from September 2022 to September 2023 over a period of one year. The sample size was calculated with open epi software using formula for mean difference. Where, Mean blood loss in ligasure technique group = 57.28+3.42 ml, Mean blood loss in conventional group = 70.85+4.12 ml, Power of the study = 80%, Confidence level = 95%[10]. The calculated sample size was 60. Therefore a total of 60 patients were enrolled (30 in each group). Non-probability consecutive sampling technique was used. The inclusion criteria for our study were patients of age 30 – 65 years, ether male or female gender and planned to undergo thyroidectomy whereas exclusion criteria were patients undergoing chemotherapy, recurrent cases, bleeding diathesis (INR > 1.5). The study was conducted after approval of institutional ethics review committee. A total of 60 patients planned for thyroidectomy, fulfilled the inclusion criteria, and were enrolled in the study after informed consent. Baseline data including age (years), gender (male / female) and type of surgery (total / subtotal thyroidectomy) were recorded. The participants were randomly assigned to group A and group B through draws method using sealed opaque envelopes. All the surgical procedures were performed as per institutional protocol by consultant surgeon with ≥ 5-year post-fellowship experience. All the patients received anesthesia as per hospital protocol.

Group A included patient in whom ligasure was used for hemostasis and dissection during thyroidectomy. Group B included patients who underwent thyroidectomy by traditional clamp, tie, and electrocautery method for hemostasis and dissection. Superior pole of thyroid gland was ligated by using vicryl 1/0 suture and inferior thyroid artery will be ligated using vicryl 2/0 suture. The staff nurse not aware of research hypothesis recorded time from induction of anesthesia to extubation and total blood loss on the basis of difference in weight of swabs. The swabs used during operation were collected and their weight was obtained before use and after operation. One-gram gain in weight represents approximately one millilitre of blood lost. All the data were recorded on proforma. SPSS version 23 was used for data analysis. The quantitative variables like age, blood loss and operative time were presented as mean and standard deviation. The qualitative variables like gender and type of surgery were presented as frequency and percentages. The blood loss and operative time between two groups were compared using independent sample t-test and p-value ≤ 0.05 will be taken as significant.

Results

This study was conducted on 60 patients divided in two groups equally, group A (ligasure technique) and group B (conventional technique). The mean age of patients of group A was 47.80±11.54 years and 44.83±10.38 years of group B. The mean operative time of group A was 62.07±3.09 minutes and 69.70±3.18 minutes of group B. The mean blood loss of patient in group A was 56.27±2.50 ml while 68.57±2.92 ml in group B (Table 1).

Table 1. Descriptive statistics (n = 60)

Groups	Age (years)	Operative time (mins)	Blood loss (ml)
Group A (Ligasure technique)			
Mean	47.80	62.07	56.27
N	30	30	30
Std. Deviation	11.544	3.095	2.504
Group B (Conventional technique)			
Mean	44.83	69.70	68.57
N	30	30	30
Std. Deviation	10.383	3.186	2.921

Regarding age distribution there were 11 (36.7%) patients in the age group of 30 to 40 years in group A while 13 (43.3%) in group B. In the age group of 41 to 50 years there were 6 (20%) patients in group A while 8 (26.7%) in group B. In the age group of 51 to 65 years there were 13 (43.3%) patients in group A while 9 (30%) in group B (Table 2).

Table 2. Age distribution

Groups	Age distribution			Total
	30 to 40 yrs	41 to 50 yrs	51 to 65 yrs	
Group A (Ligasure technique)	11	6	13	30
	36.7 %	20.0 %	43.3 %	100.0 %
Group B (Conventional technique)	13	8	9	30
	43.3 %	26.7 %	30.0 %	100.0 %
Total	24	14	22	60
	40.0 %	23.3 %	36.7 %	100.0 %

Regarding gender distribution there were 20 (66.7%) male while 10 (33.3%) female patients in group A and 19 (63.3%) male while 11 (36.7%) female patients in group B (Table 3).

Table 3. Gender distribution

Groups	Gender		Total
	Male	Female	
Group A (Ligasure technique)	20	10	30
	66.7%	33.3%	100.0%
Group B (Conventional technique)	19	11	30
	63.3%	36.7%	100.0%
Total	39	21	60
	65.0%	35.0%	100.0%

According to the type of surgery in group A 10 (33.3%) patients had total thyroidectomy while 20 (66.7%) patients had subtotal thyroidectomy and in group B 12 (10%) patients had total thyroidectomy while 18 (60%) patients had subtotal thyroidectomy (Table 4).

Table 4. Type of surgery

Groups	Type of surgery		Total
	Total thyroidectomy	Subtotal thyroidectomy	
Group A (Ligasure technique)	10	20	30
	33.3%	66.7%	100.0%
Group B (Conventional technique)	12	18	30
	40.0%	60.0%	100.0%
Total	22	38	60
	36.7%	63.3%	100.0%

According to the comparison of operative time between both groups, group A had significantly shorter operative time as compared to group B (62.07±3.09 mins vs 69.70±3.18 mins, P = 0.0001). According to the comparison of total blood loss between both groups, group A had significantly lower blood loss as compared to group B (56.27±2.50 ml vs 68.57±2.92) (Table 5)

Table 5. Comparison of operative time and blood loss between both groups

Variables				
Groups	**N**	**Mean**	**Std. Deviation**	**P value**
Operative time (mins)				
Group A (Ligasure technique)	30	62.07	3.095	0.0001
Group B (Conventional technique)	30	69.70	3.186	
Blood loss (ml)				
Group A (Ligasure technique)	30	56.27	2.504	0.0001
Group B (Conventional technique)	30	68.57	2.921	

Discussion

Around 20 million people in Pakistan live in endemic areas where they are susceptible to thyroid illnesses, which are widespread around the world. In our nation, benign thyroid illness is frequent and primarily affects women, especially those who live in iodine-deficient regions. Along with lobectomy for benign disorders and total thyroidectomy for cancerous lesions, subtotal thyroidectomy is the treatment that is carried out the most frequently. Hemostasis, along with meticulous dissection and identification of the parathyroid gland and recurrent laryngeal nerve, is crucial in thyroid surgery to prevent

post-operative problems such hematoma formation that can result in airway blockage.[11]

In thyroid surgery, Theodar Kocher was a pioneer in the use of ligatures to stop bleeding. With the advent of tiny sutures, clips, diathermy, and bipolar cautery, procedures were later enhanced.[12-14] The use of diathermy for tiny caliber vessels is constrained by the lengthy process of vessel ligation and division as well as the delicate blood supply to the parathyroid gland and the existence of the recurrent laryngeal nerve. Haemostatic devices can avoid ligature slippage and other life-threatening issues even when using competent methods and suture material.[15, 16]

The usage of Ligasure is most suited for the thyroid because it is more vascular and has fragile structures close by. Less blood loss is linked to thyroidectomy with Ligasure. By avoiding instrument exchange during surgery, the use of ligatures, and vessel division, operational time is also reduced. Ligasure has the ability to seal, cut, blunt dissection, and gripping without trauma all at once. [17]Ligasure usage has been found to significantly reduce operative time and blood loss, but further research is required to create a gold standard for thyroid surgery.[18]

The current study was conducted on 60 patients who were divided in two groups equally, group A (ligasure technique) and group B (conventional technique). The mean age in group A was 47.80±11.54 years and 44.83±10.38 years in group B. The mean operative time in group A was 62.07±3.09 minutes and 69.70±3.18 minutes in group B. These findings are in line with the findings of the previous study done by Cheema et al. who reported comparable results and reported less operative time in patients of ligasure technique as compared to conventional technique.[19]

The mean blood loss in group A was 56.27±2.50 ml while 68.57±2.92 ml in group B. These findings are comparable with the findings of the previous study done by Cheema et al. who reported that 61.31 (±4.37) ml blood loss in Group-A and 72.11 (±3.83) ml blood loss in group B.[19]

Our results are similar to a research that found that a thyroidectomy performed with ligasure resulted in a lower intraoperative blood loss (62.06 +/- 7.34 ml) than a thyroidectomy performed with a conventional thread ligation approach (75.84 +/- 9.21 ml), which demonstrated a higher intraoperative blood loss.[20] We compared the mean operative time 62.07±3.09 minutes in LigasureTM technique group with 69.70±3.18 in conventional technique group. P value was calculated as 0.0001 showing a significant difference. We also compared the mean blood loss 56.27±2.50 ml in LigasureTM technique group with 68.57±2.92 ml in conventional technique group. P value was calculated as 0.0001 showing a significant difference. Our results were similar with a study[10] which reported mean operative time was 62.11+4.07 minutes in Ligasure technique group and 73.05+4.01 minutes in conventional technique group (p=0.0001). Mean blood loss was 57.28+3,42 ml in Ligasure technique group and 70.85+4.12 ml in conventional technique group (p=0,0001). After describing the benefits and drawbacks of using Ligasure and reviewing the literature and their own experience, Ashkenazi D. and colleagues [21] came to the conclusion that ligasure is useful in preventing operative bleeding during thyroid surgery and does not increase the risk of complications or lengthen the time of surgery. Ligasure was shown to be the most successful sealing technique when compared to other approaches. The expense of the ligasure remains a worry, however. They suggested using Ligasure during thyroid surgery.

Conclusion

From our study we conclude that ligasure technique had better outcomes as compared to conventional suture tie technique. The mean operative time and blood loss was significantly lower in ligasure technique as compared to conventional suture technique.

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