Comparison of the Outcome of Thyroidectomy Using Ultrasonic Dissector with Conventional Knot Tying Technique

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ABSTRACT

Objective: Compare the outcome of thyroidectomy in patients with goiter by using ultrasonic dissector with conventional knot tying technique. **Study design:** Randomized control trial. **Sample size:** By using WHO calculator, it was 60 patients. **Settings:** Surgical Units of DHQ & Allied Hospital, Faisalabad with 1 year duration from **0**1-01-2015 to 31-12-2015. **Methodology:** After informed consent, patients were divided in Group A (ultrasonic dissector) and Group B (knot tying technique) using computer. All patients underwent total thyroidectomy by consultants. The named vessels, other small vessels and surrounding soft tissues was controlled by using ultrasonic dissector in group A. In group B, conventional hand-tied ligation for the named vessels and some arterial branches. A vacuum suction drain was placed in thyroid bed. Operating time and postoperative drainage fluid volume was noted that was recorded on proforma. **Results:** Comparison of mean operative time in both groups shows 62.33±4.60 minutes in Group-A and 123.33±5.11 minutes in Group-B, p value as 0.0001 showing a significant difference. Comparison of mean post-operative drainage fluid volume in both groups was recorded as 6.33±1.60 ml in Group-A and 65.07±4.31 ml in Group-B, p value was calculated as 0.0001 showing a significant difference. **Conclusion:** We concluded that outcome of thyroidectomy with ultrasonic dissector was significantly better when than conventional technique.

Keywords: Thyroidectomy, Ultrasonic dissector, Conventional knot tying, Mean operating time

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INTRODUCTION

Thyroidectomy is common operation. Total thyroidectomy for multinodular goiter is a safe option. It removes the disease process completely, has lower local recurrence rate and avoids the risk of reoperative surgery.[1]

Conventional haemostatic techniques used during thyroidectomy include clip and tie, suture ligature, electrocoagulation, and other devices. These techniques may cause damage to surrounding tissues by heat, pressure or instrumentation. Various new devices were introduced to do a safe division and haemostasis of thyroidal vessels for example Liga Sure and ultrasonic dissector.[2,3]

The ultrasonic dissector uses mechanism of vibration to coagulate and then cut tissue simultaneously. One of the main advantages of ultrasonic dissector as compared with a standard electrosurgical device is minimal lateral thermal tissue damage allowing a wide application in thyroid surgery.[4]The significant advantage of ultrasonic dissector is the simultaneously coagulating and dissecting function which subsequently reduces the duration of surgery necessary for conventional clamp-and-tie technique. The reduction of operative time has advantage of reducing costs of utilization of operating room significantly. The cut and coagulation functions also reduce the incidence of lymphorrea caused by dissection and ligations allowing for reduced hospital stay and cost.[5,6]

A meta-analysis showed advantage in terms of cost-effectiveness (reduction of operating room utilization and recovering) in patients operated with ultrasonic dissector, which is due to statistically significant reduction in duration of operation, intraoperative blood loss and of overall drainage volume during the first 24 hours.[7,8] Published data suggest that ultrasonic dissector when used during surgery are effective in reducing operating time and blood loss during the operation as compared to the conventional technique. The mean of operation time in ultrasonic dissector and conventional group was 60.00 ± 9.20 minutes and 121.91 ± 30.90 minutes respectively.[9] Total postoperative drainage fluid volume was significantly less in ultrasonic dissector group than in Conventional knot and tie technique group (5.6±3.48 ml vs. 68.07±23.26 ml p=0.001).[10,11]

The rationale of this study is using the Ultrasonic Dissector leads to reduction in hospital cost by both reducing operating time and post-operative complications. If it proves to be statistically significant, it can be introduced in local practice leading to significant reduction in operating time and intraoperative blood loss. This can lead to more effective utilization of hospital resources like Operation Theater time and decreasing morbidity of patients undergoing this management.

Objective

The objective of our study was to compare the outcome of thyroidectomy done using ultrasonic dissector with conventional knot tying technique in terms of mean operating time and postoperative drainage fluid volume in patients of goiter

Operational Definitions

Goiter: Enlargement of both lobes of thyroid gland is known as goiter

Symptoms and signs of goiter

1) Feeling of swelling in the neck that moves with deglutition clinically with or without feelings of difficulty in swallowing and any of the followings, inspiratory stridor, cough or hoarseness.
2) All patients having thyroid function tests within normal range:

(TSH: 0.3- 4 mIU/L)
(T_4:0.7 – 1.8 ng/dL)
(T_3:0.2 – 0.5 ng/dL)

Total thyroidectomy: Removal of macroscopic visible whole (both lobes and isthmus)of thyroid gland surgically is called total thyroidectomy

Operating time: From the skin incision to last skin stitch in minutes

Post operative Drainage: Total volume of fluid in milliliters collected in the drain placed in thyroid bed during surgery in 1st 24 hours post-operative period

METHODOLOGY

Study Design: Randomized control trial

Settings: OPD/Indoor Surgical Unit IV, DHQ/Allied Hospital, Faisalabad

Period: 1 year from 01-01-2015 to 31-12-2015

Sample Size: By using WHO sample size calculator for 2 means:

Test value of population mean= 60[3]
Anticipated population mean= 121.91[3]
Pooled standard deviation=22.8
Power of study= 90%
Level of significance= 5%
Sample size= 60 (30 in each group)

Sampling Technique: Non-probability consecutive sampling

SAMPLE SELECTION:

Inclusion Criteria

1. Both genders
2. Age group 15 -75 years
3. All the patients with goiter presenting in OPD undergoing total thyroidectomy.

Exclusion Criteria

1. Patients with solitary thyroid nodule because lobectomy and isthumectomy is done for solitary thyroid nodules confirmed clinically or via ultrasound neck.
2. Thyroid malignancy suspected clinically and confirmed via investigations.
3. History of previous neck surgery.
4. History of Radioiodine (I^{131}) therapy.
5. Pregnancy (gestational amenorrhea and positive pregnancy test).

Data Collection Procedure:

After approval from ethical review committee, patients were admitted through OPD and included in the study based on history and physical examination. Informed consent was obtained from all patients prior to surgery as a part of ethical practice. Patients were divided in Group A and Group B using computer generated random number table: Group A (ultrasonic dissector), Group B (knot tying technique).

Demographic information like name, age and gender was obtained. Contact number of patient was taken for follow up of patient. The history of their illness was obtained with regards to duration of their clinical features. Baseline investigations including hemoglobin, blood sugar level, hepatitis B&C markers were done and reported by the pathologist. In addition serum calcium levels, thyroid function tests, fine needle aspiration cytology was carried out from pathology department of hospital. Thyroid scan was obtained if indicated from the Pakistan institute of nuclear medicine (PINUM). All patients underwent total thyroidectomy by consultants. The named vessels of the superior, middle, and inferior thyroidal arteries and veins and other small vessels and surrounding soft tissues was controlled by using ultrasonic dissector in group A.

In group B, electrocautery was used for control of the small vessels of the gland and conventional hand-tied ligation for the named vessels and some arterial branches. The upper pole of the gland was divided carefully in order to avoid injury to the superior laryngeal nerves.

During surgery all parathyroid glands and recurrent laryngeal nerve were identified and saved. A vacuum suction drain was placed before closure of wound deep to the cervical fascia in thyroid bed. Operating time was noted from time of skin incision to its closure and postoperative drainage fluid volume was noted during first 24 hours after surgery.

All information was recorded on proforma by principal investigator.

Data Analysis Procedure:

Data was analyzed by using SPSS version 17. Descriptive statistics included mean ± standard deviation of continuous data that is age of patient and operation time and drainage fluid volume. Frequency was calculated for categorical data that is gender. Independent sample t-test was used to compare mean operating time and postoperative drainage fluid volume between both groups. Data was presented in forms of tables and graphs. p value equal to 0.05 was taken as significant.

RESULTS

A total of 60 cases (30 in each group) compared the outcome of thyroidectomy done using ultrasonic dissector with conventional knot tying technique in terms of mean operating time and postoperative drainage fluid volume in patients of goiter.

Age Distribution: Age distribution of the patients was done which shows that 56.67%(n=17) in Group-A and 36.67%(n=11) in Group-B were between 15-40 years of age while 43.33%(n=13) in Group-A and 63.33%(n=19) in Group-B were between 41-75 years of age, mean±sd was calculated as 43.43±10.29 in Group-A and 40.43±7.79 in Group-B respectively.

Table 1: Age distribution (n=60)

Age (in years)	Group-A (n=30)		Group-B (n=30)	
	No. of patients	%	No. of patients	%
15-40	17	56.67	11	36.67
41-75	13	43.33	19	63.33
Total	**30**	**100**	**30**	**100**
mean±sd	**40.73±10.29**		**43.43±7.79**	

Gender Distribution: Patients were distributed according to gender and 20%(n=6) in Group-A and 26.67%(n=8) in Group-B were male while 80%(n=24) in Group-A and 73.33%(n=22) in Group-B were females.

Table 2: Gender distribution (n=60)

Gender	Group-A (n=30)		Group-B (n=30)	
	No. of patients	%	No. of patients	%
Male	6	20	8	26.67
Female	24	80	22	73.33
Total	**30**	**100**	**30**	**100**

Operative Time: Comparison of mean operative time in both groups shows 62.33±4.60 minutes in Group-A and 123.33±5.11 minutes in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups.

Table 3: Comparison of mean operative time in both groups (n=60)

Mean operative time	Group-A (n=30)		Group-B (n=30)	
	Mean	SD	Mean	SD
	62.33	4.60	123.33	5.11

P value=0.00

Postoperative Drainage Fluid Volume: Comparison of mean post operative drainage fluid volume in both groups was recorded as 6.33±1.60 ml in Group-A and 65.07±4.31 ml in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups. (Table No. 4)

Table 4: Comparison of mean postoperative drainage fluid volume between both groups (n=60)

Mean fluid volume	Group-A (n=30)		Group-B (n=30)	
	Mean	SD	Mean	SD
	6.33	1.60	65.07	4.31

P value=0.00

DISCUSSION

Multinodular goiter is the commonest indication for thyroidectomy. Postoperative bleeding can be a lethal complication of thyroid surgery. Conventional haemostatic techniques in thyroidectomy are clip and tie, suture ligature, electrocoagulation and other devices. These techniques may cause damage to surrounding tissues by heat, pressure or instrumentation. Various devices were introduced in order to do a safe division and haemostasis of thyroidal vessels like Liga Sure and ultrasonic dissector.

In our study, out of 60(30 cases in each group), 56.67%(n=17) in Group-A and 36.67%(n=11) in Group-B were between 15-40 years of age while 43.33%(n=13) in Group-A and 63.33%(n=19) in Group-B were between 41-75 years of age, mean±sd was calculated as 43.43±10.29 in Group-A and 40.43±7.79 in Group-B respectively, 20%(n=6) in Group-A and 26.67%(n=8) in Group-B were male while 80%(n=24) in Group-A and 73.33%(n=22) in Group-B were females, comparison of mean operative time in both groups

shows 62.33±4.60 minutes in Group-A and 123.33±5.11 minutes in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups, comparison of mean post operative drainage fluid volume in both groups was recorded as 6.33±1.60 milliliters in Group-A and 65.07±4.31 milliliters in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups.

We compared our results with the previous study showing that the mean of operation time in ultrasonic dissector and conventional group was 60.00±9.20 minutes and 121.91±30.90 minutes respectively.[6] The total postoperative drainage fluid volume was significantly less in ultrasonic dissector group than in Conventional knot and tie technique group (5.6±3.48 ml vs. 68.07±23.26 ml p=0.001)[8] our findings are in agreement with the above studies.

Another recent local study[5] determined that the mean operative time, total amount of drainage, post operative hematoma formation and incidence of recurrent laryngeal nerve palsy in patients undergoing thyroid surgery with harmonic scalpel verses knot tying, they recorded that the mean operative time in the harmonic scalpel group was 81.93 minutes, and that in the knot and tie group was 106.80 minutes, and the difference was statistically significant. The post-operative drainage is also less in group 1 (47ml) as compared to group 2 (94ml), with a statistically significant difference. Harmonic scalpel is also not associated with increase in the rate of post-operative hematoma formation and the incidence of recurrent laryngeal nerve palsy, they concluded that mean operating time and post-operative drainage fluid is less with the use of Harmonic scalpel device is less as compared to that with knot tying during open thyroid surgery for multinodular goiter, without increase in the incidence of post-operative hematoma formation and recurrent laryngeal nerve palsy, our findings are in agreement with regards to mean operative time and postoperative drainage fluid volume was significantly higher in conventional group. A study by Iqbal MS also support these findings.[7]

Cirocchi R and colleagues[8] evaluated the benefits of the use of ultrasonic dissector (UAS) versus use of a conventional technique (vessel clamp and tie) in patients undergoing thyroid surgery for cancer and concluded that significant advantage proved by the study was represented by the cost-effectiveness (reduction of the usage of operating room) for patients treated with UAS, secondary to the significant reduction of the operative time, these findings are also in agreement with our findings.

CONCLUSION

We concluded that outcome of thyroidectomy done using ultrasonic dissector was significantly better when compared with conventional knot tying technique in terms of mean operating time and postoperative drainage fluid volume in patients of goiter.

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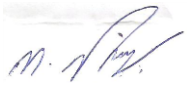
Dr. Muhammad Nasir Assistant Professor, Surgery FMU / Allied Hospital, Faisalabad	Main Author, Principal Investigator	
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