ORIGINAL ARTICLE

Effect of Basal Metabolic Rate on Blood Loss and Hospital Stay During Thyroidectomy among Pakistani patients with Harmonic Scalpel

AHSAN JAMIL[1], HASEEB KHAN[2], JAHANZAB SALIM[3], IJAZ AMIN [4], SABAHAT ZULFIQAR , TALHA LAIQUE[6*]
[1]*Department of Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot-Pakistan*
[2]*Department of Pharmacology, Akhtar Saeed Medical and Dental College, Lahore-Pakistan*
[3]*Department of Physiology, Akhtar Saeed Medical and Dental College, Lahore-Pakistan*
[4]*Department of Physical Therapy, Amin Welfare and Teaching Hospital, Sialkot-Pakistan*
[5]*Department of Anatomy, CMH Kharian Medical College, Kharian-Pakistan*
[6]*Department of Pharmacology, Lahore Medical and Dental College, Lahore-Pakistan*
Correspondence Dr. Talha Laique, Email: talhalaique51@gmail.com , Tel:+92-331-0346682

ABSTRACT

In general surgery thyroidectomy is the most common operative procedure. Blood loss with hospital stay of patients after surgery depends on the method adopted during it. In conventional method, silk sutures are employed.

Aim: To compare the effect of BMI on blood loss and hospital stay of Pakistani patients with multi-nodular goiter undergoing thyroidectomy with harmonic scalpel versus Conventional suture method.

Study design: It was prospective randomized controlled trial.

Methodology: All patients (60) underwent thyroidectomy for multinodular goiter were distributed into two assemblies, In Group-A, harmonic scalpel ligated all thyroid vessels. In Group-B, inferior middle and superior were tied using silk sutures 3/0, and all other vessels were sutured by 4/0 or electro cauterized. The two groups were compared for post-operative hospital stay and intra-operative bleeding during procedure.

Results: The mean blood loss and hospital stay of patients in group-A was 70.03±5.70ml and 2.9±0.8 days whereas in group-B was 96.43±5.93 ml and 4.2±0.7days with *p*-values of 0.00001 and 0.00002 respectively. **Statistical analysis**: All the data was entered and processed by analysis made using SPSS v23.0. **Conclusion**: Harmonic scalpel can be employed regularly as a safe procedure with good hemostatic control and short duration of hospital stay for thyroidectomy patients.

Key words: Harmonic scalpel, Multi-nodular goiter, Thyroidectomy.

INTRODUCTION

The most common procedure in general surgery is thyroidectomy. Thyroid gland is a highly vascular organ, so duration of hospital stay of patients depends on proper hemostasis post-operatively. Generally, hemostasis is secured by using ties and sutures, but this method is time consuming[1].

Globally, it is estimated that goiter affect as many as 200 million people who have a diet deficient in iodine. In the Wickham study from the United Kingdom, 16% of the population had a goiter[2]. In the Framingham study, ultrasonography revealed 3% of men above 60 years had thyroid nodules[3]. In one German study, 432 out of 635 (68%) subjects had thyroid nodules when screened. In another previous German study, ultrasonographic screening of more than 90,000 people detected thyroid nodules in 33% of the normal population[4].

Goiter is an enlarged thyroid gland. It can be diffused or multinodular. It can be caused by iodine deficiency, goitrogens and genetically synthetic thyroid disorders resulting in high production of thyroid stimulating hormone (TSH). Thus cellularity and hyperplasia of the thyroid gland occur leading to goiter development[5].

Medical as well as surgical procedures including thyroidectomy are available as goiter treatment options. Surgery is indicated in multi-nodular goiter and for risk of or confirmed thyroid malignancies[6]. It requires safe dissection, meticulous hemostasis, recurrent laryngeal nerve injury and to avoid airway obstruction7. In conventional procedures, a risk of slippage of ligature remains leading to re-exploration of operative wound. It results in increased morbidity due to blood loss, infection with long hospital stay of patients post-operatively[8].

Short operative time with good hemostatic control intra-operatively as well as less duration of hospital stay for the patients after surgical interventions are the need of hour due to heavy work load in our health centres. Thus, there is a trend towards the use of modern methods for short hospital stay with minimal blood loss[9,10]. Harmonic scalpel (HS) is a modern method as it is safe and effective with good hemostatic control[11]. It has limitations like it's an expensive instrument and skill hands are required for its practice[12]. The current project was designed to investigate the the effect of BMI on blood loss and hospital stay of Pakistani patients with multi-nodular goiter undergoing thyroidectomy with harmonic scalpel versus Conventional suture method.

METHODOLOGY

In current study, enrolled patients were 60 (30 in each group) by using 95% confidence level and 80% power of test. They were enrolled from April-October 2018 in the Department of General Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot[13]. The study design was prospective randomized controlled trial**.** Only patients fulfilling the inclusion criteria i.e., diagnosed with multi-

nodular goiter, both genders (16-60years) were included in the current study. BMI was calculated according to their weight and height and then noted. Ethical Committee approval was taken from hospital. Written informed consent was taken from all the patients. In Group-A, harmonic scalpel ligated all thyroid vessels. In Group-B, inferior middle and superior were tied using silk sutures 3/0, and all other vessels were sutured by 4/0 or electro cauterized. The two groups according to their BMI were compared for intra-operative blood loss and their post-operative duration of hospital stay.

Statistical Analysis: All the data were entered and processed by using SPSS v23.0. The intra-operative blood loss and hospital stay were described by using mean and standard deviation. Gender was described by using frequencies and percentages. Data was stratified for BMI to deal with effect modifiers. Post-stratification, student *t*-test with *p*-value of ≤ 0.05 (significant) was applied.

RESULTS

Patients (60) were divided in two equal groups i.e. Group-A (Harmonic Scalpel) and Group-B (Conventional Technique). Gender distribution(Table 1).

Comparison between two groups showed more blood loss (ml) happened i conventional technique. Results are summarized below (Table-2). Difference in blood loss was significant (Table 2).

Comparison between two groups showed long hospital stay (days) happened in conventional technique. Results are summarized (Table-3). Difference in hospital stay was significant. Table-3: Comparison of duration of hospital stay between groups (days)

The subjects were stratified for the comparison of blood loss during surgical procedure with respect to their BMI. The results were summarized in table 4 below that showed even over-weight and obese patients had less blood loss with harmonic scalpel as compared with conventional technique (Table 4).

The subjects were stratified for the comparison of hospital stay during surgical procedure with respect to their BMI. The results were summarized in table 5 below that showed even over-weight and obese patients had less duration of hospital stay with harmonic scalpel as compared with conventional technique (Table 5).

Table-1: Comparison of gender distribution between groups

Genders	Harmonic Scalpel (n=30)	Conventional Technique (n=30)	Total
Male (16)	9 (30.00%)	7 (23.33%)	16(26.70%)
Female (44)	21(70.00%)	23(76.70%)	44 (73.30%)

Table-2: Comparison of blood loss between groups (ml)

	Harmonic Scalpel (n=30)	Conventional Technique (n=30)	*P value*
Blood loss (ml)	70.03 ± 5.71	96.43 ± 5.93	0.00002*

*Statistically Significant

	Harmonic Scalpel (n=30)	Conventional Technique (n=30)	*P value*
Hospital stay (days)	2.90 ±0.80	4.20 ± 0.76	0.00001*

*Statistically Significant

Table-4: Stratification of comparison of blood loss between groups with respect to BMI

BMI	Harmonic Scalpel	Blood loss Mean (ml)	Conventional Technique	Blood loss Mean (ml)	p-value
Normal (18-24.9)	13	71.5	N=15	96.2	0.0001*
Overweight (25-29.9)	1	68.0	N=12	96.5	0.0001*
Obese (>30)	N=6	70	N=3	97	0.0001*

Table-5: Stratification of comparison of hospital stay between groups with respect to BMI

BMI	Harmonic Scalpel	Hospital stay Mean (days)	Conventional Technique	Blood loss Mean (ml)	p-value
Normal (18-24.9)	13	2.84	15	4.13	0.002*
Overweight (25-29.9)	11	2.90	12	4.41	0.001*
Obese (>30)	6	3.00	N=3	3.66	0.170*

DISSCUSSION

Through this study, an attempt was made to study the duration of hospital stay of patients undergoing thyroidectomy with harmonic scalpel method versus Conventional suture method. This study suggested that there is a significant reduction post-thyroidectomy hospital stay with harmonic scalpel. Hence, highest importance lies with the prevention of any complications and short hospital stay after thyroid surgery.

Method of enrollment was adopted in this research with some modifications[14]. Pakistani patients with diagnosed multinodular goiter were admitted from April-October 2018 in the Department of General Surgery to volunteer in current study. A written consent was taken from all the subjects. For traceability Identifiable codes were given to them.

Our sample size was 60 patients as in other studies 80 sample size was kept[14]. In contrast, another study was

carried that included 100 goiter patients in his study[15]. Hence, our work was similar as others previously.

In our study, both male and female patients with multinodular goiter were voluntarily enrolled. Males were 26.70% while females were 73.30% in present project. In other study, patients with multinodular goiter, that included 19% men and 81% women. Female gender dominated in both studies. Hence, our work was in line with previous studies[15].

Same methodology was adopted in our project as documented in one previous study with some modifications. Patients were divided randomly into 2 sets. The patients in group-I (n=40), the patients received conventional knot tying technique during thyroidectomy; in group-II (n=40), the harmonic scalpel method was employed for the procedure[14]. Hence, our work was in line with previous studies.

Mean blood loss was 104±32 in the tie and clip group and 84±17 in the harmonic scalpel group, with a P value of 0.0001 in one previous study. These results were comparable to those in our study in which the blood loss for the knot and tie group was 96.4ml and in harmonic scalpel group was 70.03ml, with a p-value of 0.00001[15]. Decrease in intraoperative blood loss was recorded in our study with harmonic scalpel as shown in other previous studies as well[16,17].

Mean duration of hospital stay in our setting was 2.90 ±0.80 post-thyroidectomy by harmonic scalpel whereas 4.20 ± 0.76 was observed in the tie and clip group with a significant P-value of 0.0001. There was a significant difference in duration of stay at hospital in our study. Paradoxically, in one study carried in Europe, there was no difference in hospital stay among two compared groups. Duration of stay was 2days in both groups[15]. Duration of stay following conventional technique in our setting is more because of many reasons like hygiene issues, facilities and lack of advancement in our medical setups.

Limitations: We admit that our study had a number of limitations. It included too small sample size and financial constrains with lack of resources.

Strengths: Current study, compared modern technique with conventional procedure for blood loss and duration of hospital stay during thyroidectomy among pakistani patients on the basis of their Basal metabolic rate. No comparable similar studies are available among Pakistani population for the above mentioned parameters by harmonic scalpel.

CONCLUSION

Harmonic scalpel provides a safe method for thyroidectomy with good intra-operative hemostatic control and short duration of hospital stay post-thyroidectomy.

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