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**ORIGINAL ARTICLE**

# Comparison of Complications of Harmonic Scalpel Versus Conventional Homeostasis in Patients Undergoing Near-Total Thyroidectomy at a Tertiary Care Hospital

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## ABSTRACT

**Aim:** To compare advantages and postoperative outcomes of harmonic scalpel versus conventional homeostasis in patients undergoing near-total thyroidectomy at a tertiary care hospital.

**Material and Methods:** Total 34 patients were recruited in the study, and were equally distributed in two groups using blocked randomization. Operative time, post-operative fluid drainage, post-operative blood loss, mean hospital length, and occurrence of hypocalcemia were assessed in two groups.

**Results:** In group A**,** mean operative time was 89.71±13.34 Mins while in group B it was 105±6.75 Mins, statistically significant difference was observed. In group A, post-operative blood loss observed was 61.47±8.27 ml, and in group B 74.47±12.80 ml ($P < 0.05$). The mean post-operative fluid drainage recorded in group A was 45.29±6.98 ml and in group B 69.06±10.83 ml ($P < 0.05$). In group A, mean hospital length was 2.18±0.72 days and in group B 3.41±1.12 days ($P < 0.05$). In group A, occurrence of hypocalcemia was 2 (11.8%) and in group B 3 (17.6%) ($P > 0.05$).

**Conclusion:** In terms of operation duration, mean hospital stay, postoperative fluid drainage, and postoperative blood loss, harmonic thyroidectomy provides a secure and efficient substitute for traditional homeostasis.

**Keywords:** Conventional Homeostasis, Postoperative Blood Loss, Harmonic Scalpel, Thyroidectomy

## INTRODUCTION

Thyroidectomy is a widely adopted procedure that involves the excision of the thyroid gland. It is a common approach in medical advancements, and it is being used to treat benign, and malignant ailments, or hormonal impairment that is resistant to current therapies [1]. Thyroidectomy is a complex and challenging technique to accomplish effectively and successfully due to its sensitive morphology of the anterior neck, the crucial significance of nearby tissues, and narrow working spaces. Thyroidectomy as a practice has progressed throughout time as anatomic awareness and surgical procedures have evolved. It was introduced the classic thyroidectomy back in the 1870s, which estimated an 8% mortality rate, and was thought to be a considerable success at that time [2, 3].

Thyroid surgery has established a unique reputation indicated by speedy recovery and minimal complications risk, with the determination that thyroid surgery could be undertaken on day case basis [4]. To sustain hemostasis, suture knotting and the utilization of clips are widely used, alternative approaches involve diathermy, and the Harmonic Scalpel (HS) [5].

Thyroid surgical hemorrhaging can lead to life-threatening airway collapse and bleeding. In the presence of bleeding, locating the recurrent laryngeal nerve (RLN) and parathyroid might be challenging [6].

New methods for hemostasis are intended to provide immediate and efficient management of bleeding. The time utilized ligating and separating vessels with the conventional technique i.e. knot-tie helps minimize the operating time with this technique. As a result, both the operating time and the operative costs are reduced [7].

HS became widely used in a range of surgeries. This device is expected to have even less lateral heat damage and no current delivered to the body related to diathermy. Devices such as Bipolar sealing and the Harmonic Scalpel are currently becoming increasingly common in lowering the surgical time, and minimizing bleeding though ensuring a constant tolerability [8].

The goal of this study is to compare the outcomes of thyroidectomy in terms of drainage, hospital stay, operative time, post-operative blood loss, and hypocalcemia by employing the harmonic scalpel versus conventional homeostasis.

## MATERIAL AND METHODS

From October 2021 to March 2022, a Randomized Control Trial was conducted at ABC's Surgical Department. Block randomization was used to sample the population. Total number of 34 patients were equally divided into two groups of seventeen each. With, 95 percent confidence interval of 2.10.9 days in group A, and 3.21.3 days in group B[9], the sample size was estimated by utilizing openepi with a power of 80 percent. Patients between the ages of 30 and 60 who had benign thyroid diseases, such as a nodule, multinodular goiter, thyroid cyst, or toxic adenoma, were included, while those with neck dissection, persistent thyroid swelling, carcinoma thyroid or an unusually big goiter were omitted. Written informed consent was taken and patients were allocated to Group A (Harmonic scalpel) and Group B (Conventional hemostasis).

Baseline examinations involved thyroid functions evaluation, X-ray thoracic inlet, Chest X-ray, ECG,and thyroid ultrasound performed after the history and examination. Thyroid scans were performed. Anesthesia was administered to the patients, as well as a cardiac examination. A Kocher's incision of 4-6 cm was achieved after general anesthesia for optimal placement, monitoring, and draping. Vicryl 2/0 sutures were used to ligate the superior and inferior thyroid vessels in group A, whereas solubilized 4/0 vicryl sutures and conventional diathermy were utilized to ligate the other vessels..

The FOCUS Harmonic Scalpel was used to seal all of the vessels in group B. Two separate sections of the superior and inferior thyroid vessels were tied up with HS. Only the distal portion of the artery was coagulated with HS. The tissue was sliced in the proximal region. The rest of the surgery was the same for both groups. In every case, the recurrent laryngeal nerve and parathyroids were identified. The Radivac drain that was placed under the strap muscles was removed on the first and second postoperative days. Vicryl 4/0 absorbable sutures were used to seal the strap muscles and platysma. Prolene 3/0 was used to close the skin subcuticular.

Advantages and postoperative outcomes like operative time, postoperative blood loss, post-operative fluid drainage, hospital length, and hypocalcemia were assessed in both groups.

Data were analyzed using IBM SPSS 23, for categorical variables frequencies and percentages were used and for numerical data Mean and SD were calculated. The numerical outcomes in both groups were assessed using the Independent Samples T-Test while for categorical outcomes Chi-Square test was performed. A P-value of 0.05 or less was regarded as significant statistically..

## RESULTS

The mean age in Group A was 42.12 + 9.41 while in Group B it was 44.35 + 8.78. The gender distribution showed that group A had 7 (41.2%) males while group B contained 5 (29.4%) males. In group A females were 10 (58.8%), compared to 12 (70.6%) females of group B. (Table 1). The mean operative time in group A was 89.71+13.34 Mins and 105+6.75 Mins in group B; the difference was statistically significant in terms of the benefits and postoperative outcomes in both groups. The difference between the postoperative blood loss in group A and group B 61.47+8.27 ml vs. 74.47+12.80 ml was significant statistically. The difference between the mean postoperative fluid drainage in groups A and B, which was 45.29+6.98 ml and 69.06+10.83 ml respectively, was significant statistically. The difference in the mean hospital stays in groups A and B was 2.18+0.72 days compared to 3.41+1.12 days, significant statistically. Hypocalcemia occurred in 2 (11.8%) in group A and 3 (17.6%) in group B, although the variation was not statistically meaningful. (Table 2)

Table 1: Demographics

| Demographics | | Group a | Group b |
|---|---|---|---|
| Gender | Male | 7 (41.2%) | 5 (29.4%) |
| | Female | 10 (58.8%) | 12 (70.6%) |
| Age | | 42.12±9.41 | 44.35±8.78 |

Table 2: Postoperative outcomes

| Outcomes | Group A | Group B | P value |
|---|---|---|---|
| Operative time (mins) | 89.71±13.34 | 105±6.75 | 0.003 |
| Postop blood loss (ml) | 61.47±8.27 | 74.47±12.80 | 0.001 |
| Postop fluid drained | 45.29±6.98 | 69.06±10.83 | 0.0001 |
| Hospital length (days) | 2.18±0.72 | 3.41±1.12 | 0.001 |
| Hypocalcemia | 2 (11.8%) | 3 (17.6%) | 0.62 |

## DISCUSSION

Among the most routinely conducted surgical procedures is a total thyroidectomy. Being a highly vascularized organ, the thyroid gland, ensuring rapid and convenient hemostasis is a significant stage in the surgery. There is significant controversy over the safest, most productive, and affordable methods for accomplishing such objectives. In order to perform a complete thyroidectomy with a clear surgical field, minimize the probability of structural damage, stop post-operative bleeding, and avoid the necessity of surgical drains, accurate dissection and hemostasis are necessary[10].

Since the introduction of sutureless procedure, commonly known as the period of bloodless procdure, the use of HS has been a considerable improvement in hemostasis[11]. In a highly vascular medical environment, sutureless thyroidectomy has been extensively utilised and shown to be efficacious; it delivers enough hemostasis and is less perilous than using typical knots. Number of studies have demonstrated that sutureless thyroidectomy is preferable to the conventional knot tying approach.[12].

In this study, the difference in the mean operating times for Groups A and B was shown to be significant statistically at 89.71+13.34 mins in Group A and 105+6.75 mins in Group B. The findings are consistent with the earlier studies. So according Mohamed et al.[13], the sutureless group's operating time was 66 minutes, although the conventional group's operating time was 97 minutes. Moreover, as per Ali et al.[14,] the sutureless group's operating time (min) (mean + SD) was 55.40+7.894 minutes, compared to 108.14+11.186 minutes for the conventional group. Contin et al.[15] observed the similar result. However, all writers' differences were significant statistically.

The mean operating time in Group A (sutureless) was 93.29 minutes, contrasted to 106.59 minutes in Group B (conventional), as per Singhal et al[16;] although, this difference was not significant statistically. Yener et al.[9] reported that the use of the ultrasonic technology lowered operating time in patients undergoing hemithyroidectomy, which is consistent with our observations (47.2 min vs 79.2 min, p-value: 0.001). The operating duration in the ultrasonic group was 67.21 minutes in the study by Aslam et al.[17], contrasted to 109.6 minutes in the conventional group, which was significant statistically.

The volume of postoperative blood loss evaluated in our investigation using conventional absorbent gauze measurement was 61.478.2 ml in group A and 74.4712.8 ml in group B, with the variation being deemed significant. The ocular approach and examination were employed to gauge postoperative blood loss. The usual absorbent gauze measuring 30 cm was also used to visually assess blood loss. Similar trends were also obtained in a research by Ali M et al. The HS group experienced significantly less postoperative blood loss than the conventional group.

In this study, group A had a mean postoperative fluid drain of 45.296.9 ml, while group B had a mean drain of 69.0610.83 ml. This difference is deemed statistically relevant. These findings are in agreement with those of other investigators, along with Wael AJ et al[19], who revealed that the sutureless group's fluid drainage was 40–70 ml (54.16–9.21) compared with conventional group's drainage, which was 50–80 ml (66.28–8.99), and that this difference was deemed statistically meaningful. Moreover, Noori IF et al. [20] demonstrated that the harmonic group's postoperative drainage volume was much lower than the conventional group's (106 ml vs. 324).

The postoperative drainage volume was 12.67 ml in the sutureless group and 30.46 ml in the conventional group, thus according Mohamed et al[13]. The sutureless group's post-operative drainage volume was 19.304.442 ml, meanwhile the conventional group's was 47.4912.125 ml, according to Ali et al.

In comparison to Group B, which had a mean hospital stay of 3.41 days, Group A had a mean hospital stay of 2.1 days, which was considerably shorter (p 0.001). The findings are consistent with those of other experts, like Noori et al.20, who reported that in his study, the harmonic scalpel group's average hospital stay was noticeably lower than that of the conventional technique (20 h vs. 32 h). Further, Duan et al.'s21 investigation revealed how a focal harmonic scalpel can shorten hospital stays and surgical times.Cheng et al.22 observed that the mean length of hospital stay in focal harmonic groups was substantially decreased by 0.68 days, or around 26.4%, in a systematic review of 14 trials (focus harmonic 1.89 days vs. 2.58 days for conventional technique). In their analysis, Mohamed et al.13 showed that the hospital stay for the harmonic group was 2.97 days, compared to 3.86 days for the conventional group. In their analysis, Ali et al.14 observed that Group S (sutureless) needs less time in the hospital than Group C (conventional), with a difference of 1.970.183 days that was significant.

In our study, the frequency of hypocalcemia was 2 (11.8%) in group A, and 3 (17.6%) in group B. The difference was not significant statistically. Similar results were reported by an Egyptian study.[23]

## CONCLUSION

Thyroidectomy with harmonic scalpel is both effective and safe. When compared to conventional procedures, it reduces operative time, postoperative drainage volume, postoperative blood loss, and hospital stay considerably. In our study the aforementioned outcomes were significantly less in Group A as compared to Group B.

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