

# Original Article

## Harmonic scalpel versus conventional hemostasis in thyroid surgery

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### ABSTRACT:

**Background:** The mainstay for achieving hemostasis in thyroid surgery has been tying and/or clipping of blood vessels, both effective but time-consuming techniques. The present study was conducted to compare harmonic scalpel compared to conventional hemostasis in thyroid surgery. **Materials & Methods:** 110 patients undergoing various thyroid surgical procedures of both genders were classified into 2 groups of 55 each. In group I, conventional technique was followed and in group II the harmonic scalpel was used for surgery. Parameters such as operative time, drainage volume during the first 24 hours after surgery, postoperative pain, hospital stay, and incidence of complications etc. were recorded. **Results:** Diagnosis was simple multinodular goiter in 68 and toxic multinodular goiter in 42 cases. The mean operative time (mins) was 68.4 in group I and 46.3 in group II. Postoperative drainage at 24 hours (mL) was 56.2 in group I and 38.5 in group II and hospital stay (days) was 3.2 in group I and 2.4 in group II. The difference was significant ( $P < 0.05$ ). **Conclusion:** In total thyroidectomy, harmonic scalpel is a reliable and safe tool and its use is more effective than conventional hemostasis technique.

**Key words:** Hemostasis, thyroid surgery, multinodular goiter

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### INTRODUCTION:

Thyroid surgery has evolved in the last century since Theodore Kocher and Theodore Billroth first developed acceptable and efficient operative techniques.<sup>1</sup> Thus, during the twentieth century, monopolar and bipolar coagulation have been introduced. Anatomically, the concept of capsular dissection has been introduced by Delbridge and co-workers. Furthermore, the identification of the recurrent laryngeal nerve is considered mandatory.<sup>2</sup> The mainstay for achieving hemostasis in thyroid surgery has been tying and/or clipping of blood vessels, both effective but time-consuming techniques. In the current climate of healthcare constraints and long surgical waiting lists, any methodology that can reduce operative times while maintaining acceptable complication rates warrants investigation.<sup>3</sup> The harmonic scalpel was introduced into the surgeon's armamentarium almost two decades ago. Using mechanical vibrations at 55.5 kHz, this device is able to cut and coagulate tissue simultaneously. The harmonic scalpel has a different effect on the tissue due to the mechanism of energy generation.<sup>4</sup> The primary results are protein denaturation, as well as increased viscosity, and the adhesion properties on the cutting edges of the blades provide closure of the vessels and bleeding

control. By using electro-surgery, heat is transferred to the tissue with coagulation. Since the adoption of the harmonic scalpel (HS) into modern surgical practice, its utility for a wide variety of operations has been well documented.<sup>5</sup> The present study was conducted to compare harmonic scalpel compared to conventional hemostasis in thyroid surgery.

### MATERIALS & METHODS:

The present study comprised of 110 patients undergoing various thyroid surgical procedures of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. They were classified into 2 groups of 55 each. In group I, conventional technique was followed and in group II the harmonic scalpel was used for surgery. Preoperative assessment with serum thyrotropin levels, ultrasonography to evaluate nodule size and gland volume, and fine-needle aspiration cytology was done. Parameters such as operative time, drainage volume during the first 24 hours after surgery, postoperative pain, hospital stay, and incidence of complications etc. were recorded. Data thus obtained were subjected to statistical analysis.  $P$  value  $< 0.05$  was considered significant.

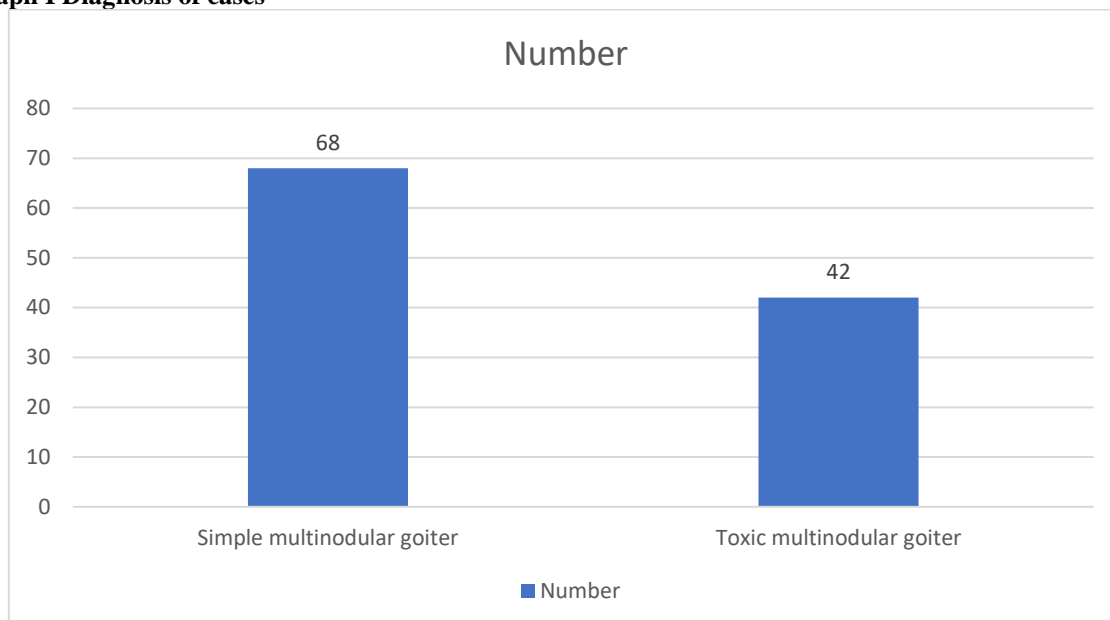
**RESULTS:**

**Table I Diagnosis of cases**

Diagnosis	Number	P value
Simple multinodular goiter	68	0.05
Toxic multinodular goiter	42	

Table I, graph I shows that diagnosis was simple multinodular goiter in 68 and toxic multinodular goiter in 42 cases. The difference was significant ( $P < 0.05$ ).

**Graph I Diagnosis of cases**

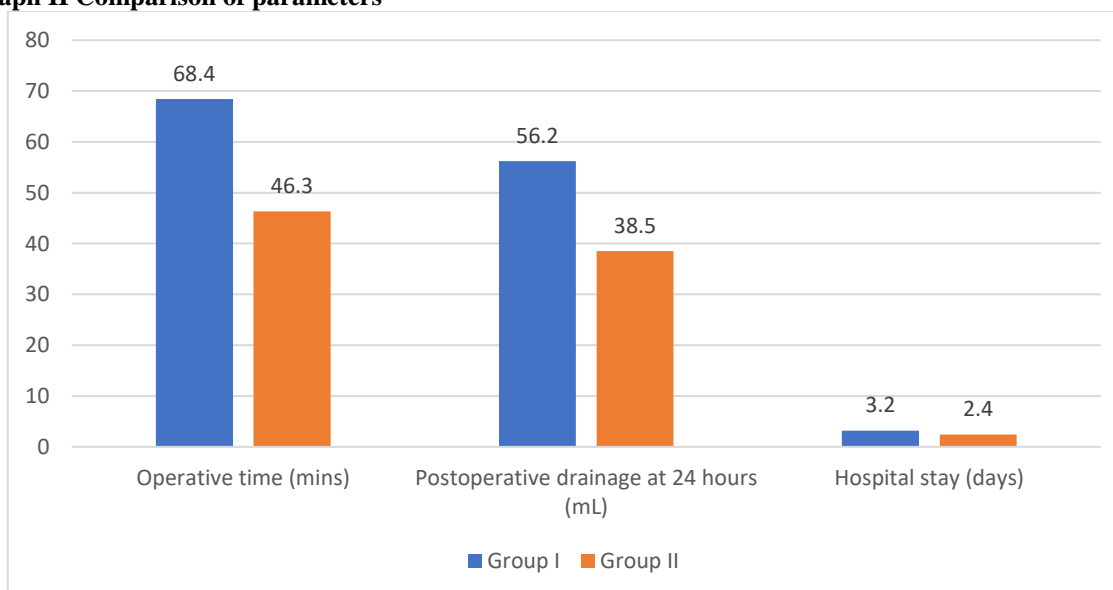


**Table II Comparison of parameters**

Parameters	Group I	Group II	P value
Operative time (mins)	68.4	46.3	0.02
Postoperative drainage at 24 hours (mL)	56.2	38.5	0.05
Hospital stay (days)	3.2	2.4	0.12

Table II, graph II shows that operative time (mins) was 68.4 in group I and 46.3 in group II. Postoperative drainage at 24 hours (mL) was 56.2 in group I and 38.5 in group II and hospital stay (days) was 3.2 in group I and 2.4 in group II. The difference was significant ( $P < 0.05$ ).

**Graph II Comparison of parameters**



**DISCUSSION:**

In thyroid surgery, bleeding can sometimes be troublesome, and therefore, new techniques for haemostasis have been sought. Conventional haemostatic techniques in thyroidectomy include knot tying and electro-coagulation.<sup>6</sup> The successful introduction of the harmonic scalpel (HS), a device that cuts and coagulates simultaneously using high-frequency mechanical energy, has led to further research to compare this new technique with conventional methods for haemostasis. Thyroidectomy in patients with thyrotoxicosis is considered a difficult procedure in endocrine neck surgery mainly because of high vascularisation of the thyroid gland with risk for peri- and post-operative bleeding. There have been previous reports on the use of harmonic scalpel in thyroid surgery.<sup>7</sup> However, these studies have comprised inhomogeneous groups of patients and have been performed in highly specialised centres. The thyroid is a highly vascularised organ, and therefore it is important to achieve good haemostasis during thyroid surgery.<sup>8</sup> Using ligatures are probably the most common way to accomplish a good haemostasis. The use of clips and mono- or bipolar diathermy is also common, but they are regularly not efficient enough for larger vessels like the superior thyroid arteries.<sup>9</sup> Influenced by its favourable use in other surgical fields, the harmonic scalpel has, since the 1990s, become more frequently used also in thyroid surgery. Several publications have suggested that the harmonic scalpel shortens the operative time without any increases in complications and costs.<sup>10</sup> The present study was conducted to compare harmonic scalpel compared to conventional hemostasis in thyroid surgery.

We found that diagnosis was simple multinodular goiter in 68 and toxic multinodular goiter in 42 cases. Hallgrímsson P et al<sup>11</sup> in their study fifty-one patients (39 women and 12 men) with the pre-operative diagnosis of Graves' disease treated at two endocrine centers were randomised to total thyroidectomy with the use of the HS or with conventional haemostatic techniques. Twenty-seven patients were randomised to the harmonic group and 24 to the conventional group. The operating time was shorter in the HS group (median, 121 min; range, 84–213 min) compared to the conventional group (median, 172 min; range, 66–268 min;  $p=0.011$ ).

We observed that operative time (mins) was 68.4 in group I and 46.3 in group II. Postoperative drainage at 24 hours (mL) was 56.2 in group I and 38.5 in group II and hospital stay (days) was 3.2 in group I and 2.4 in group II. Yener et al<sup>12</sup> in their study 85 consecutive patients undergone open thyroidectomy were randomized into two groups: group CH (conventional hemostasis with classic technique of tying and knots, resorbable ligature, bipolar diathermy) and group HS (harmonic scalpel). Demographics, pathological characteristics, thyroid size, operative time, blood loss, and complications

were compared. The two groups were similar regarding age and sex. There were no intraoperative complications. There was no difference between the two techniques regarding the amount of blood loss for different procedures. No significant differences were found between the two groups concerning mean thyroid weight and mean hospital stay (2.2 days in HS vs. 3.7 in CH;  $P>0.05$ ). The mean operative time was significantly shorter in the HS group (47.2 min vs. 79.2 min).

Sherman<sup>13</sup> found an advantage of 40 min reductions in operating time in the total thyroidectomies performed with the help of the harmonic scalpel in comparison with operations performed with conventional haemostatic techniques. However, it was a heterogeneous cohort of patients including large cervical goitres, intrathoracic goitres, toxic glands and thyroid cancers. Voutilainen et al<sup>14</sup> has also observed a gain in operating time when using harmonic scalpel in a matched-pair study as well as in a subsequent randomised study.

**CONCLUSION:**

Authors found that in total thyroidectomy, harmonic scalpel is a reliable and safe tool and its use is more effective than conventional hemostasis technique.

**REFERENCES:**

1. Sturniolo G, D'Alia C, Tonante A, Gagliano E, Taranto F, Lo Schiavo MG (1999) The recurrent laryngeal nerve related to thyroid surgery. *Am J Surg* 177:485–488.
2. Voutilainen PE, Haglund Caj H (2000) Ultrasonically activated shears in thyroidectomies: a randomised trial. *Ann Surg* 231:322–328.
3. Horne SK, Gal TJ, Brennan JA (2007) Prevalence and patterns of intraoperative nerve monitoring for thyroidectomy. *Otolaryngol Head Neck Surg* 136:952–956.
4. Hermann M, Alk G, Roka R, Glaser K, Freissmuth M (2002) Laryngeal recurrent nerve injury in surgery for benign thyroid diseases. *Ann Surg* 235:261–268.
5. Marchesi M, Biffoni M, Cresti R, Mulas MM, Turriziani V, Berni A et al (2003) Ultrasonic scalpel in thyroid surgery. *Chir Ital* 55(2):299–308
6. Defechereux T, Rincken F, Mawjeja S et al (2003) Evaluation of the ultrasonic dissector in thyroid surgery. A prospective randomised study. *Acta Chir Belg* 103(3):274–277.
7. Miccoli P, Berti P, Dionigi G et al (2006) Randomized controlled trial of harmonic scalpel use during thyroidectomy. *Arch Otolaryngol Head Neck Surg* 132(10):1069–1073.
8. Salami A, Bavazzano M, Mora R et al (2008) Harmonic scalpel in pharyngolaryngectomy with radical neck dissection. *J Otolaryngol Head Neck Surg* 37(5):633–637.
9. Chowbey PK, Mann V, Khullar R, Sharma A, Baijal M, Vashistha A (1999) Endoscopic neck surgery: expanding horizons. *J Laparoendosc Adv Surg Tech A* 9:397–400.
10. Petrakis IE, Kogerakis NE, Lasithiotakis KG et al (2004) Ligasure versus clamp-and-tie thyroidectomy

- for benign nodular disease. *Head Neck* 26(10):903–909.
11. Hallgrímsson P, Loven L, Westerdahl J et al. Use of the harmonic scalpel versus conventional haemostatic techniques in patients with Grave disease undergoing total thyroidectomy: A prospective randomised controlled trial. *Langenbeck Arch Surg* 2008;393(5):675–680.
  12. Yener O, Demir M, Yılmaz A, Yığıtbaşı R, Atak T. Harmonic scalpel compared to conventional hemostasis in thyroid surgery. *Indian Journal of Surgery*. 2014 Feb;76(1):66-9.
  13. Shemen L (2002) Thyroidectomy using harmonic scalpel: analysis of 105 consecutive cases. *Otolaryngol Head Neck* 127:284–288.
  14. Voutilainen PE, Haapiainen RK, Haglund Caj H (1998) Ultrasonically activated shears in thyroid surgery. *Am J Surg* 175:491–493.