International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

Sutureless Thyroidectomy vs Conventional Thyroidectomy: A Comparative Study

Dr Mohan Rao Voruganti[1], Dr Nalin Krishna Neelagiri[2], Dr Pradeep Gudipati[3], Dr B Anil Kumar[4]

[1]Associate Professor, Department of General Surgery, DR. PSIMS & RF, Chinna Avutapalli, Krishna Dist, Andhra Pradesh, India
Email– *mohanraovoruganti[at]outlook.com*

[2]Residents, Department of General Surgery, DR. PSIMS & RF, Chinna Avutapalli, Krishna Dist, Andhra Pradesh, India

[3]Assistant Professor, Department of General Surgery, DR. PSIMS & RF, Chinna Avutapalli, Krishna Dist, Andhra Pradesh, India

[4]Professor & HOD, Department of General Surgery, DR. PSIMS & RF, Chinna Avutapalli, Krishna Dist, Andhra Pradesh, India

Abstract: ***Surgery for thyroid is associated with complications of bleeding, injury to Recurrent and superior Laryngeal nerves and parathyroid injury. Some of these can cause life crippling consequences. With advent of modern energy devices like ultrasonic coagulation and bipolar vessel sealers haemostasis has become easier and quicker. A prospective comparative study was done with 15 cases of each of sutureless vs conventional (suture ligation technique) open thyroidectomy. All cases were multinodular goitres requiring hemi or total thyroidectomy. Energy device used was bipolar vessel sealer Ligasure. Study show less bleeding 35ml vs 60ml average. Decreased operating time of 70 vs 96 minutes is noted. Postoperative complications of injury to laryngeal nerves and parathyroids is less. This is a small group study with encouraging reports in favour of sutureless thyroidectomy with bipolar vessel sealer.***

Keywords: Sutureless Thyroidectomy,ligasure, operative time, hypocalcaemia, laryngeal nerve palsy

1. Introduction

In 925 AD the first total thyroidectomy for goitre was reported by Abu al-Qasim. Thyroid surgery in middle ages was invariably associated with death due to bleeding and other complications like hypocalcaemia and vocal cord palsy, Emil Theodore Kocher, was the first to use precise surgical technique and meticulous haemostasisto reduce the mortality rate to 0.5% in more than 5000 thyroidectomiestohis work in thyroid surgery.[1]Hereceived a Nobel Prize in1909 for his work.[2] The modern thyroid surgery as we know it today began sometime in the 1860s at Vienna with the school of Billroth. The recorded history of thyroid surgery is as old as Billroth, Kocher and Halsted. They were responsible for development of the technique for thyroidectomy between1873 and 1910[3]. The essential objectives for thyroidectomy have however always been the conservation of the parathyroid glands, avoidance of injury to the recurrent and external laryngeal nerve nerves, an accurate hemostasis and an excellent cosmesis [3]. Thyroid gland is a highly-vascularized organ and surgical resection require a meticulous surgical technique and haemostasis. Meticulous haemostasis is essential for obtaining good visualization of the surgical field, to avoid intraoperative complications and prevent damage to structures such as parathyroid glands and laryngeal nerves[4]. Large case series suggest that rates of these complications are: haematoma 1.3%, transient hypoparathyroidism 27.8%, permanent hypoparathyroidism4.8%, transient RLN injury 1.6% and permanent RLN injury, 0·9%[5]. complications increase length of stay in hospital, the number of consultations, diagnostic tests and treatments needed, and overall cost. Permanent RLN palsy and hypoparathyroidism significantly impair patient's quality of life [5]. In the last 20 years, major improvements and new technologies have been proposed and applied inthyroid surgery; amongthese are mini-invasive thyroidectomy, new devices for achieving haemostasis and dissection, regional anaesthesia and intra-operative neuromonitoring. With the advent of energy devices such as ultrasonic coagulation (Harmonic Scalpel, Ethicon) and bipolar energy (LigaSure, Valleylab), cutting and haemostasis is increasingly being done for vessel ligation and division without increased post-operative complications[6].

2. Objectives

To compare Sutureless versus Conventional Open Thyroidectomy in the following parameters - Operative time, Intra operative blood loss, Drainage volume, Transient/permanent Hypocalcaemia, Recurrent laryngeal nerve palsy, Duration of hospital stay.

3. Materials and Methods

A prospective institutional study for a period of one year was done for patients undergoing Open Total or hemiThyroidectomy for Multinodular Goitre. All patients underwent standard evaluation for thyroid surgery including routine blood investigations including thyroid function tests,Fine needle aspiration cytology, Ultrasonography of neck, Indirect laryngoscopy. Written, informed and understood consent was obtained from the patients before starting the study.Patients also gave consent for the data to be reported and published.

Exclusion criteria

In order to obtain groups which were more homogeneous, patients with toxic nodular goitre, neoplastic disease and relapse (reoperation) were not included in the study because both cases require more complex surgical procedures, thus eliminating a confounding factor.

The parameters that have been evaluated in each of 30 patients were: Preoperatively: age, gender, diagnosis, thyroid hormones (TSH, T3 and T4), and calcium levels. All the patients taken up for surgery are in euthyroid state and with normal calcium levels During the operation: duration of the operation (measured in minutes), complications. Postoperatively: complications, body's temperature, calcium levels in the 1st and 3rd postoperative day, hospital stay and finally presence or absence of dysphonia. In all patients, the assessment of the motility of the vocal cords was performed pre-operatively and postoperatively with laryngoscopy. Postoperative hypocalcemia: All patients with postoperative calcium levels below the lower limit of normal range (8 mg/dL) were considered as having hypocalcemia and received oral calcium carbonate and vitamin D3 supplementation. serum calcium levels were tested every day until discharge from hospital.

4. Operative Procedure

After endotracheal intubation under general anaesthesia, patient was positioned in reverse Trendelenburg position. Kocher's neck incision was placed and extended from one sternocleidomastoid to other. Upper and lower flaps were raised up till thyroid notch and suprasternal notch. Deep fascia was incised vertically in midline. Strap muscles were retracted. Two tributaries of middle thyroid vein were identified and cauterized with bipolar vessel sealer Ligasure. Superior thyroid pedicle was dissected. The superior vascular pedicles of each thyroid lobe were ligated thrice with Vicryl 2.0 suture [in conventional thyroidectomy group] or coagulated and divided with ligasure in Sutureless thyroidectomy group. No hormonic scalpel was used in this series. All terminal branches of superior thyroid artery, inferior thyroid artery and other unnamed vessels were cauterized and cut. Normal saline is sprayed with syringe during bipolar cauterization to prevent the lateral spread of heat to prevent damage to parathyroid glands.Recurrent laryngeal nerve was identified on both the sides and safe guarded. Parathyroid glands were identified and preserved in all possible conditions. The thyroid lobe was progressively dissected off trachea after the recurrent laryngeal nerves and parathyroid glands were identified and dissected off the thyroid capsule. Proper hemostasis was achieved.Suction drain kept in all cases. Deep fascia and Platysma were sutured with vicryl. Skin margins were approximated with monocryl. Vocal cords were assessed by anaesthesiologist and surgeon during extubation. Suction drain was removed when drain was less than 5ml. Patients were given broad-spectrum antibiotics for 2 days and most patients were discharged on 3rd postoperative day. Follow-up of the patients was done after 10 days, 6 weeks and 12 weeks for any recurrent laryngeal nerve palsy, hypocalcemia.

5. Results

30 patients, between April 2018 and March 2019 with thyroid disease requiring surgical treatment and fulfilled our inclusion criteria, were operated at the Department of Surgery.Patients were classified randomly into two groups Sutureless thyroidectomy group and conventional thyroidectomy group.15 patients (50%) had sutureless thyroidectomy and 15 patients (50%) had conventional thyroidectomy. 10 patients were operated with hemi thyroidectemy and 5 were operated with total thyroidectomy in both groups. Average age is 41.27 years in sutureless thyroidectomy and 44.67 years in conventional group. Females to male ratio is 11:4 in sutureless Thyroidectomy group and 12:3 in conventional group. . Females to male ratio is 11:4 in sutureless Thyroidectomy group and 12:3 in conventional group.

Table 1

Parameter	Conventional	Sutureless
OPERATIVE TIME Total thyroidectomy Hemi thyroidectomy	 96 +/- 20 min 64+/- 15 min	 70 +/- 15min 48 +/- 12 min
Intraoperative Blood Loss	60 +/- 15 ml	35 +/- 10 ml
Post Operative Drainage Volume	35 +/- 10 ml	15 +/- 3 ml
Transient Hypocalcemia	2	1
Recurrent Laryngeal Nerve Palsy	1	0
Hospital Stay	4 days	3 days

6. Discussion

Thyroidectomy is one of the most commonly performed surgical procedures. Thyroid gland is known to be a highly-vascularized organ, so rapid and effective haemostasis is a critical step of the procedure. Total thyroidectomy requires meticulous surgical technique in order to identify and respect pertinent anatomical structures. A strict control of haemostasis is required in order to avoid serious complications and to reduce the incidence of common post-operative complications involving recurrent laryngeal nerve and parathyroid glands. The appearance and major developments in energy devices such as ultrasonic coagulation systems (e.g., Harmonic Scalpel, SonoSurg and LigaSure) lead to improvement of the result of surgery and reduce complication rate [7].The results of this study showed that Sutureless thyroidectomy using bipolar vessel sealer significantly reduced operative time, intraoperativeblood loss, Post-operative drainage volume, recurrent laryngeal nerve injury, hypocalcaemia, post-operative wound infections and hospital stay. The advantage of the Bipolar vessel sealer is that it makes the procedure easy without the need for multiple suture ligations and achieving good hemostasis. Ligasure is capable of hemostasis of blood vessels up to 7 mm in diameter with a thermal damage limited to 2-3 mm. Bipolar vessel sealer seems to be a reliable device and simple in its use. Another advantage of Ligasure is that dissection is kept very close to the thyroid gland whereas the conventional method the tying of vessels takes place away from gland with chance of trapping the laryngeal nerves and parathyroid glands. Compared with the ultrasound hemostatic devices, the learning curve of the LigaSure is minimal. It significantly decreased operative time, blood loss, postoperative drainage volume and hospital stay compared with the conventional total thyroidectomy.The result of this study reported shorter operative time in Sutureless thyroidectomy group which corroborated with several studies and metanalysis which showed that use of energized vessel sealers reduces operative time. This is due to the reduction of bleeding and efficient rapid hemostasis.Many studies showed that Sutureless thyroidectomy reduce the post-operative drainage volume. Our result also showed that Sutureless total

thyroidectomy significantly decreases the postoperative drainage volume. This study reported that the use of the bipolar vessel sealers significantly reduced postoperative hypocalcemia. A similar result was reported by the meta-analysis of Melck[8], while Garas[9] reported decreased incidence of hypocalcemia in Sutureless total thyroidectomy group. The study done by Cirocchi[10] reported no difference between both groups as regard postoperative hypocalcemia.We did have a case of temporary palsy of the recurrent laryngeal nerve which resolved within 6 weeks. However, there was no permanent palsy of the recurrent laryngeal nerve. An increased incidence was initially reported by Marchesi when the Harmonic Scalpel was first introduced. But as surgeons gained experience with its use and refinement Hormonic scalpel limiting of the lateral thermal damage induced, this case does not represent anymore a common event. The hospital stay was significantly shorter in Sutureless thyroidectomy group in this study this due to decrease the overall complications rate in Sutureless thyroidectomy group. A similar result was detected by Ecker[11] and Garas[9] in their meta analysis. Hormonic scalpel and ligasure has definite advantage ofreduced the volume of blood loss and operating time. A systemic review and meta-analysis[12] comparing efficacy of Hormonic scalpel vs Ligasure show no difference in operating time, intra operative blood loss or post-operative drainage. There was no or very small difference in the rate of complications, overall morbidity, and hospital stay between the two devices.[12]The disadvantage of Hormonic scalpel is it's high cost due to disposal parts.This is one reason for not including Hormonic scalpel in our study as our institute caters for low income group of people from rural areas. The complications of Inferior Laryngeal nerve palsy and hypocalcaermia are surgeon dependent rather than the efficacy of instrument. The main limitation of this study is the small number of cases and it was not a randomized study.

7. Conclusion

The result of this study support the use of Sutureless Thyroidectomy as an effective alternative to Conventional Thyroidectomy for treatment of thyroid diseases as it had shorter operative time, lower blood loss and post operative drainage andoverall complications rate and good function results. This is a small study with encouraging results needs a further study with all types of thyroid pathologies.

References

[1] Hannan SA. The magnificent seven: a history of modern thyroid surgery. Int J Surg. 2006; 4:187-91
[2] McGreevy PS, Miller FA. Biography of Theodor Kocher. Surgery. 1969; 65:990.
[3] Dr Chintamani. Ten Commandments of Safe and Optimum Thyroid Surgery, Editorial, Indian J Surg (November–December 2010) 72(6):421–426 DOI 10.1007/s12262-010-0217-y
[4] Mohamed WBA et al. Sutureless versus conventional thyroidectomy: Int journal of Surgery 2017, Apr: 4(4):1385-1388
[5] Karamanakos SN, Markou KB, Panagopoulos K, Karavias D, Vagianos CE, Scopa CD et al. Complications and risk factors related to the extent of surgery in thyroidectomy. Results from 2043 procedures. Hormones (Athens) 2010; 9: 318–325
[6] The Surgical Outcomes Monitoring and Improvement Program (SOMIP) report. Coordinated by the Quality and Safety Division of the Hong Kong Hospital Authority. Vol 2. 2009. Available from: www.ha.org.hk/visitor/ha_index.
[7] Contin P, Gooßen K, Grummich K, Jensen K, Schmitz-Winnenthal H, Büchler MW, et al. Energized vessel Seal. Syst. versus CONventionalhemostasis Tech. thyroid Surg. - Enercon Syst. Rev. Netw. meta-analysis. 2013;398:1039-56.
[8] Melck AL, Wiseman SM. Harmonic scalpel compared to conventional hemostasis in thyroid surgery: a meta-analysis of randomized clinical trials, Int. J. Surg. Oncol. 2010;306079.
[9] Garas G, Okabayashi K, Ashrafian H, Shetty K, Palazzo F, Tolley N, et al. Zacharakis, Which hemostatic device in thyroid surgery? A Network meta-analysis of surgical Technologies, Thyroid. 2013:1138-50.
[10] Cirocchi R, D'Ajello F, Trastulli S, Santoro A, Rocco GD, Vendettuoli D, et al. Avenia, Meta-analysis of thyroidectomy with ultrasonic dissector versus conventional clamp and tie, World J. Surg. Oncol. 2010;23:8-112.
[11] Ecker T, Carvalho AL, Choe JH, Walosek G, Preuss KJ. Hemostasis in thyroid surgery: harmonic scalpel versus other techniques: a meta-analysis, Otolaryngol. Head Neck Surg. J. 2010;143:17-25.
[12] A systemic review and meta analysis comparing the efficacy and surgical outcome of total thyroidectomy between hormonic scalpel and Ligasure. Brian Hung-Hin Lang, Sze-Ho Ng et al. Annals of surgical Oncology, 2013, 20:1918-1926