A Study of use of bipolar cautery in thyroidectomy for coagulating vascular pedicles instead of conventional ligation

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Abstract

Aim: To present our experience with use of bipolar cautery in thyroid surgery.

Methods and materials: The study was done between August 2011- August 2013. Study included all patients undergoing thyroid surgeries for various benign and malignant conditions of thyroid. This study included all age group and both gender. Vascular pedicles were cauterized using conventional bipolar cautery without knot tying. Postoperative outcomes were analyzed.

Results: Out of 108 cases, 41 male (37.96%), 67 female (62.04%) patients. M:F 1:1.6. 50(46.29%) cases were malignant and 58(53.70%) benign. Among carcinoma thyroid 56% are papillary, 30% follicular, 10% anaplastic and 4% medullary.52 (48.14%) cases undergone total thyroidectomy, 34(31.48%) lobectomy, 22(20.37%) total thyroidectomy with functional neck dissection. Mean operating time for lobectomy was 20min; total thyroidectomy 35min, total thyroidectomy with functional neck dissection was 90min. Postoperative complications were observed in 11(10.18%) cases. No case of severe bleeding which required re-exploration. 2 (1.85%) surgical site infections. 2(1.85%) cases of unilateral recurrent laryngeal nerve injuries have occurred. Hypoparathyroidism seen in 4(3.7%) cases; 3 transient, 1 permanent due to infiltration by anaplastic carcinoma.

Conclusion: Use of conventional bipolar cautery is safe, effective and time saving in thyroid surgeries.

Keywords: Thyroidectomy, Bipolar Cautery, Conventional Knot Tying.

1. Introduction
Thyroidectomy is a very common surgical procedure performed worldwide. Homeostasis usually achieved by means of clamp and tie for ligation of thyroid vessels, other available methods were clips and electrocautery. Suture ligations, however, are time consuming and carry the risk of knot slipping, whereas clips carry the risk of dislodgment and stitch granuloma. Electro cautery, on the other hand, is an unattractive alternative because it produces remarkable thermal spread to adjacent tissue[1]. Here we present our experience with use of bipolar cautery in thyroid surgery.

2. Methodology
A prospective study conducted between August 2011 and August 2013, which included 108 patients who has undergone thyroid surgery for various benign and malignant conditions. This study included all age group and both gender. All patients were pre-operatively evaluated by history, physical examination, ultrasound neck, FNAC, thyroid profile, IDL. With the approval of ethical committee; patients were informed about surgery and had written consent. All cases were performed by same team of surgeons. Under GA, patient kept thyroid position, a transverse, curvilinear incision two finger breadths above the suprasternal notch taken, flaps raised. Strap muscles can either be split along the mid line raphe laterally retracted. The inferior, middle and superior thyroid vessels were then divided with bipolar cautery. The thyroid lobe was then medially rotated and after identification of the parathyroid glands and RLN, the thyroid gland was freed from its posterior vascular attachment. Same steps repeated for removal of the contralateral lobe. Wound closed in layers with suction drain. Functional neck dissection was carried out wherever indicated. Postoperative complications such as bleeding, injury to SLN, RLN transient or permanent, transient or permanent hypocalcaemia, hematoma, wound infection and seroma were evaluated and analysed. Patients were followed weekly for the first month and at 3, 6, and 12 months postoperatively.
In our present study of 108 cases there 41 male (37.96%) and 67 female (62.04%) patients with M:F ratio 1:1.6. Most of the patients who had undergone thyroid surgeries are under the age group of 30-50(70.36%) years.

**Table 1: Indication for Surgery**

| Indication          | Number | Percentage |
|---------------------|--------|------------|
| Solitary nodule     | 25     | 48.14%     |
| Multinodular goiter | 22     | 31.48%     |
| Carcinoma thyroid   | 30     | 48.14%     |
| Hashimotos thyroiditis | 2       |            |
| Thyrotoxicosis      | 3      |            |
| Others              | 6      |            |
| **Total**           | 108    | 100.00%    |

50(46.29%) cases were malignant and 58(53.70%) were various benign conditions. 25(23.14%) cases were solitary nodule of thyroid, 22(20.37%) cases were multinodular goiter, 2(1.85%) cases were operated for Hashimotos thyroiditis, 3(2.77%) cases were operated for thyrotoxicosis.

**Table 2: Type of Surgery**

| Type                                | Number | Percentage |
|-------------------------------------|--------|------------|
| Total thyroidectomy                 | 52     | 48.14%     |
| Lobectomy                           | 34     | 31.48%     |
| Total Thyroidectomy + Functional Neck Dissection | 22 | 20.37% |
| **Total**                           | 108    | 100.00%    |

**Table 3: Post-operative Complications**

| Sr. No | Complication                  | Number | %  |
|--------|--------------------------------|--------|----|
| 1      | Bleeding                       |        |    |
|        | Mild                           | 0      | 0% |
|        | Severe requiring exploration   | Nil    |    |
| 2      | Wound infection                | 2      | 1.85% |
|        | Minor                          | 2      |    |
|        | Severe                         | Nil    |    |
| 3      | Recurrent laryngeal nerve injury| 2      | 1.85% |
|        | Unilateral                     | 2      |    |
|        | Bilateral                      | Nil    |    |
| 4      | Hypoparathyroidism             | 4      | 3.7% |
|        | Transient                      | 3      |    |
|        | Permanent                      | 1      |    |
|        | Symptomatic                    | 1      |    |
|        | Asymptomatic(Biochemical)      | 3      |    |
| 5      | Superior laryngeal nerve injury| 3      | 2.7% |
|        | Total                          | 11     | 10.18% |

Postoperative complications were observed in 11(10.18%) cases. No case of severe bleeding occurred which required re-exploration. Minor surgical site infection seen in 2(1.85%) cases. 2(1.85%) cases of unilateral recurrent laryngeal nerve injuries have occurred. One was due to infiltration of nerve by the anaplastic carcinoma; other was transient which has resolved with conservative treatment. Hypoparathyroidism was seen in 4(3.7%) cases. 3 were transient, 1 permanent due to infiltration by anaplastic carcinoma.

**4. Discussion**

In our study of 108 cases there were 41 males (37.96%) and 67 female (62.04%) patients with M: F ratio 1:1.6. There is slight female preponderance. This is in accordance with most of the studies. 2(1.85%) 71% of patients lie in the age group of 30-50 years. 58(53.70%) cases were various benign conditions. 25(23.14%) cases were solitary nodule, 22(20.37%) cases multinodular goiter, 2(1.85%) Hashimotos thyroiditis, 3(2.77%) thyrotoxicosis.

50(46.29%) were malignant. 56% papillary, 30% follicular carcinoma, 10% anaplastic and 4% medullary.

52 cases (48.14%) had undergone total thyroidectomy.

34(31.48%) had undergone Lobectomy.

22(20.37%) Total thyroidectomy with functional neck dissection.

Mean operating time for lobectomy was 20min, total thyroidectomy 45min, total thyroidectomy with neck dissection 180min. This is consistent with most of the studies and is comparable with use of harmonic and Ligasure.

Manouras et al.[1] found that compared with the classic technique, surgical time was reduced significantly by about 20% when the bipolar vessel sealer or harmonic scalpel was used (93.3±12.5 vs. 74.3±14.2 and 73.8±13.8 min, P = 0.001, and P = 0.001, respectively).

Siperstein et al.[4] in 2002 in their study the mean operative time was shorter in the harmonic scalpel group compared with the conventional technique group for both lobectomy (89±20 minutes vs. 115±25 minutes; P<.01) and total thyroidectomy (132±39 minutes vs. 161±42 minutes; P<.01) procedures.

In this study no case of severe bleeding occurred which required re-exploration.

Ecker et al.[5] in 2010 did a meta-analysis on Hemostasis in thyroid surgery found that blood loss was reduced significantly by 20.03 mL by use of harmonic scalpel.

Petrakis et al.[6] in their study found intraoperative total blood loss was similar between the two groups, but postoperative drain volume was less in Ligasure group than in other (21±15 mL; p
<.01). In our study postoperative complications were observed in 11 (10.18%) cases. Barbaros et al [7] in 2006 used Ligasure in patients with hyperthyroidism and found the complication rates of the Ligasure and conventional thyroidecomy groups were 4 and 6%, respectively (p>0.05).

In our study hypoparathyroidism was seen in 4 (3.7%) cases. 3 were transient and one was permanent due to infiltration by anaplastic carcinoma. 2 (1.85%) cases of unilateral recurrent laryngeal nerve injuries have occurred. One was due to infiltration of nerve by the anaplastic carcinoma; other was transient which has resolved with conservative treatment.

Bove et al [8] found that the incidence of transient hypocalcemia was of 24.5%. There were not statistically significant differences in the incidence of transient hypocalcemia in the three groups of study. From 59 patients who experienced transient hypocalcemia, only 8 of them had clinical symptoms. Three cases of permanent hypoparathyroidism, continued postoperatively for six months, were found; two cases in the C [conventional technique of suture ligation] group and another case in the F [Harmonic Focus] group (1.2 % of the study’s patients), (p>0.05).

Ten temporary palsies of the RLN occurred (four in the F group, three in the L [Ligasure Precise®] group and three other cases in the C group), with full recovery in three months (4.1 % of all cases), (p>0.05). There was no case of permanent RLN palsy.

Saint Marc et al [9] in their study found the postoperative complication rate of 35% overall, including all transient postoperative disturbances. The incidence of cervical hematomas was 2%, but 3 patients (1.5%), 1 in the LigaSure group and 2 in the clamp-and-tie group, required repeat operations because of respiratory tract obstruction. The incidence of permanent complications was 2.5% overall, including 3 patients (1.5%) with permanent hypocalcemia and 2 patients (1%) with permanent RLN lesions.

Suture granuloma is a rare complication of thyroid surgery and is known to occur after the use of non-absorbable suture materials deep within the skin. Suture granuloma is clinically important in cancer patients because it can mimic tumor recurrence. Recently, Titton et al [10] reported that lesions developing in the operation bed after thyroidectomy with features suspicious of malignancy should be confirmed by FNAB.

5. Conclusion

The conventional bipolar cautery is a safe and useful, time-saving adjunct for thyroid surgeries and equally effective as compared to costly instruments like Ligasure and harmonic scalpel.

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