

# Outcome of total thyroidectomy with the use of binocular loupe: A preliminary study

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## Abstract

**Background:** Total thyroidectomy is considered as a standard surgical procedure for benign and malignant conditions of thyroid gland. Sometimes it can be associated to complications such as permanent recurrent laryngeal nerve injury and permanent parathyroid gland injury, consequences of which can be disastrous to the patient. Use of magnification such as binocular loupe during surgery can enhance visualization and improve safety of total thyroidectomy. In This preliminary study we compare the outcome of total thyroidectomy with and without the use of binocular loupe. **Material and Methods:** total of 20 patients ten each in group A and B are studied. All the patients in group A underwent total thyroidectomy with the use of loupe and all the patients in group B underwent conventional thyroidectomy without the use of magnification. **Results:** There was statistically significant reduction in total operating time while using binocular loupe. There was also reduced incidences of transient and permanent injury to recurrent laryngeal nerves and parathyroid glands. **Conclusion:** Magnification during total thyroidectomy using loupe has definite advantage of reducing total operating time. It also improves the safety and efficacy of total thyroidectomy

**Keywords:** Total thyroidectomy, Binocular Loupe, Recurrent laryngeal nerve

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## INTRODUCTION

Thyroid disorders are one of the commonly encountered conditions in clinical practice and thyroid surgeries are increasingly becoming one of the commonly performed surgical procedures done in head and neck surgical practice. Total thyroidectomy is a procedure of choice for malignant conditions of thyroid gland and benign thyroid disorders involving both the lobes of thyroid gland<sup>1,2</sup>. Subtotal thyroidectomy and near total thyroidectomy are not considered standard procedures for benign thyroid

disorders due to higher chances of recurrence and considerable risks involved in revision surgery<sup>3</sup>. Important complications of total thyroidectomy are permanent injury to recurrent laryngeal nerve (RLN) and parathyroid glands. Injury to external branch of superior laryngeal nerve (EBSLN) is also considered a complication but it is not life threatening. Preservation of recurrent laryngeal nerve, external branch of superior laryngeal nerve and parathyroid gland consumes significant amount of time during total thyroidectomy procedure as all these structures are small and may not be readily visible to naked eye. Careful dissection and identification of all these structures is extremely important to prevent injury and permanent loss of function following total thyroidectomy<sup>2,4,5</sup>. Many surgeons worldwide have proposed use of magnification either using operating microscope or binocular loupe for total thyroidectomy. Magnification allows surgeons to identify critical structures faster and preserve those structures with intact function. Also, magnification allows to reduce operating time of the procedure. This preliminary study was carried out to evaluate safety and efficacy of using binocular loupes in total thyroidectomy outcome was

compared with conventional method of total thyroidectomy without any magnification.

## MATERIALS AND METHODS

Patients in this study were divided randomly into two group. Group A comprised of 10 patients and group B also comprised 10 patients. Patients in group A underwent total thyroidectomy with the use of binocular loupe and patients in group B underwent total thyroidectomy without use of any magnification. Written informed consent was obtained from all the patients included in this study. Following parameters were recorded in all the patients included in this study.

- i. Total operating time
- ii. Transient RLN injury
- iii. Permanent RLN injury
- iv. Identification of EBSLN
- v. Transient Hypoparathyroidism
- vi. Permanent Hypoparathyroidism

### Inclusion Criteria

All the patients of both the sexes with benign thyroid lesion involving bilateral thyroid lobes with clinical indication for primary total thyroidectomy.

### Exclusion criteria

Patients less than 18 years of age, malignant conditions of thyroid gland, revision thyroid surgeries and patients with previously diagnosed vocal cord palsy were excluded from the study.

### Pre-operative workup

All the patients in this study underwent thorough clinical examination, ultrasound scan of the neck, thyroid function tests, fine needle aspiration cytology, endoscopic examination of larynx (to assess the function of RLN and EBSLN). Few of the patients underwent computerized tomography.

### Intra operative workup

Patients in group A underwent standard total thyroidectomy where surgeon used a binocular loupe (2.5x) from beginning of the procedure. Total time from incision to closure was recorded for each procedure. Identification of EBSLN, RLN and parathyroid was photographed and recorded. If there is failure in identification of any of these structures, it was mentioned in the standard proforma. Patients in group B underwent similar standard total thyroidectomy but without the use of magnification. All the data similar to group A were collected.

### Post-operative workup

All the patients in the study underwent video laryngoscopy on first and seventh post-operative day. Normal vocal cord mobility during first and seventh post-operative day was considered as no injury to RLN and EBSLN. Patients with weakness of one or both the vocal cords were followed up

with serial laryngoscopies on 7<sup>th</sup>, 1 month and 3 months and no improvement seen after 3 months was considered permanent RLN injury. All the patients underwent serum calcium assessment on post-operative day one value of calcium between 8.2 to 10.2 mg/dL was considered normal parathyroid function. Patients with calcium levels less than normal are followed up with serial calcium levels till 6 months. Patients whose calcium levels returned to normal before 6 months were diagnosed having transient hypoparathyroidism and patients with less than normal serum calcium after 6 months of surgery were considered to be having permanent hypoparathyroidism.

## RESULTS

Both the groups A and B had eight female (80%) and two male (20%) patients. Mean age of patients in group A was 36.20 years with standard deviation of 11.91 years. 18 years and 52 years was the minimum and maximum age of the patients in group A respectively. Mean age of patients in group B was 41.90 years with standard deviation of 8.84 years respectively. 32 years and 62 years was the minimum and maximum age of the patients in group B respectively (Table. 1)

Table 1

Group		Age			
		Mean	Std Dev	Min	Max
A	A	36.20	11.91	18.0	52.0
	B	41.90	8.84	32.0	62.0

### Total operating time

Mean of total operating time for group A was 125.4 minutes with standard deviation of 12.048 minutes compared to 151.3 minutes with standard deviation of 12.570 minutes in group B. p value was less than 0.001 and was considered statistically significant (Table. 2).

Table 2

Group	N	Mean	Standard Deviation
A	10	125.4	12.048
B	10	151.3	12.57

### Identification of EBSLN

In group A identification of EBSLN of both the sides was successful in all the ten patients, where as in group B it was possible to identify EBSLN on both the sides only in 6 patients (Table.3). Though its statistically not significant (p value: 0.02535) study clearly shows increased identification rates for EBSLN with the use of binocular loupe.

Table 3

Group	SLN identified	SLN not identified	p Value
A	10	0	Not significant
B	6	4	

### Transient and Permanent Injury to RLN

Permanent RLN injury was observed in one patient of group B and none of the patients of group A had permanent RLN injury. Transient RLN injury was seen in two patients of group B and none of the patients of group A had transient RLN injury (Table. 4). Though none of these are statistically significant, there seem to be definite reduction in transient or permanent injury to these important nerves

Table 4

Group	Transient RLN injury	Permanent RLN injury	Statistical Significance
A	0	0	Not significant
B	2	1	

### Transient and permanent Hypoparathyroidism

In this preliminary study, two of the patients belonging to group A had transient hypoparathyroidism and four of the patients of group B had it. None of the patients of group A had permanent hypoparathyroidism where as one patient belonging to group B had it (Table.5)

Table 5

Group	Transient Hypoparathyroidism	Permanent Hypoparathyroidism	Statistical Significance
A	2	0	Not significant
B	4	1	

### DISCUSSION

Total Thyroidectomy is considered as a logical method in treatment of benign thyroid conditions involving both the thyroid lobes. This procedure avoids the risks of persistent symptoms and risk of recurrence<sup>6,7</sup>. Only real argument against total thyroidectomy against subtotal or near total thyroidectomy is increased risk of complications especially permanent hypoparathyroidism and bilateral RLN injury which can be life threatening. There is adequate evidence that good surgical techniques, meticulous dissections and quality training to residents can reduce such complications to very minimal<sup>8,11</sup>. Several authors have stressed upon use of simple binocular loupe for reducing complications of total thyroidectomy while others have advised use of operating microscope. There are not many studies which discuss the use of binocular loupe. We could find only few articles which study the advantages of using a loupe<sup>12,14</sup>. Hence, we decided to do a preliminary study to evaluate outcome of total thyroidectomy with the use of binocular loupe for magnification. Identification of RLN is a key step in total thyroidectomy as bilateral RLN injury is disastrous to the patient. RLN is a relatively thin nerve having variable course on either side of the thyroid gland. Its complex anatomy and small size make it difficult for the surgeon identify and preserve it with completely intact functions. In fact, some surgeons avoid identifying and dissecting

around RLN so as to prevent injury to it. We find use of surgical loupe extremely helpful in identification of RLN. Early identification of nerve during course of surgery makes total surgical time significantly lesser as shown in our study. We could identify bilateral RLN in all the patients while using loupe where as in two patients we could not identify both the RLNs in study group where no loupe was used. One of the patients had permanent unilateral RLN injury. Similar to RLN parathyroid gland preservation is extremely critical for normal recovery after total thyroidectomy. The application of lens magnification helps identifying parathyroid glands during thyroid surgery that contribute to prevent definitive hypoparathyroidism and also to decrease the postoperative incidence of transient hypocalcemia<sup>15,16</sup>. Since parathyroid glands are primarily supplied by branches of inferior thyroid artery its critical not to injure tiny branches of inferior thyroid artery while anatomically preserving parathyroid glands. Loupe has an immense value in visualization and preservation of the parathyroid glands. We feel without magnification its almost impossible to preserve parathyroid glands with intact function with high level of confidence. This preliminary study tries to evaluate outcome of using binocular loupe in total thyroidectomy and initial results are very encouraging. Because of small number of study subjects authors were unable to get statistically significant difference though there are obvious advantages seen when results are analyzed. Further studies with higher number of study subjects and comparing outcome of use of loupe and operating microscope can be more informative. Since binocular loupe are inexpensive, easy to use and readily available its recommended for all head and neck surgeons learn using them so as to enhance surgical efficacy and safety.

### CONCLUSION

Binocular loupes are excellent tools for enhancing speed and safety of total thyroidectomy. Our preliminary study clearly shows significant reduction in surgical time with the use of loupe. Even chances of permanent or transient injuries to RLN and parathyroid glands is less while using surgical loupe. We recommend its use by all the head and neck surgeons regularly performing thyroid surgeries. We also recommend all residents and trainees to learn use of loupe so as to improve their surgical precision and outcome.

### REFERENCES

1. Bron LP, O'Brien CJ. Total thyroidectomy for clinically benign disease of the thyroid gland. *Br J Surg* 2004;91:569-74.
2. Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, Pelizzo MR, Pezzullo L. Complications of

- thyroid surgery: analysis of a multicentric study on 14934 patients operated on in Italy over 5 years. *World J Surg* 2004;28:271–6.
3. Thomusch O, Sekulla C, Dralle H. Is primary total thyroidectomy justified in benign multinodular goiter? Results of a prospective quality assurance study of 45 hospitals offering different levels of care. *Der Chirurg* 2003;74:437–43.
  4. Thomusch O, Dralle H. Endokrine Chirurgie und Evidenzbasierte Medizin. *Der Chirurg* 2000;71:635–45.
  5. Hisham AN, Lukman MR. Recurrent laryngeal nerve in thyroid surgery: a critical appraisal. *Aust NZ J Surg* 2002;72:887–9.
  6. Efremidou EI, Papageorgiou MS, Liratzopoulos N, Manolas KJ The efficacy and safety of total thyroidectomy in the management of benign thyroid disease: a review of 932 cases. *Can J Surg* 2009;52:39–44.
  7. Friedman M, LoSavio P, Ibrahim H. Superior laryngeal nerve identification and preservation in thyroidectomy. *Arch Otolaryngol Head Neck Surg* 2002;128:296–303.
  8. Khadra M, Delbridge L, Reeve TS, Poole AG, Crummer P. Total thyroidectomy: its role in the management of thyroid disease. *Aust N Z J Surg* 1992;62:91–5.
  9. Gough IR. Total thyroidectomy: indications, technique and training. *Aust N Z J Surg* 1992;62:87–9.
  10. Cappellani A, Di Vita M, Zanghì A, Lo Menzo E, Cavallaro A, Alfano G, Giuffrida D. The recurrent goiter: prevention and management. *Ann Ital Chir* 2008;79:247–53.
  11. Thomusch O, Sekulla C, Dralle H. Is primary total thyroidectomy justified in benign multinodular goiter? Results of a prospective quality assurance study of 45 hospitals offering different levels of care. *Der Chirurg* 2003;74:437–43.
  12. Saber A, Rifaat M, Ellabban GM, Gad MA. Total thyroidectomy by loupe magnification: A comparative study. *Eur Surg - Acta Chir Austriaca*. 2011;43(1):49–54.
  13. D'Orazi V, Panunzi A, Di Lorenzo E, Ortensi A, Cialini M, Anichini S, *et al.* Use of loupes magnification and microsurgical technique in thyroid surgery: Ten years experience in a single center. *G di Chir*. 2016;37(3):101–7.
  14. Seneviratne RW, Kumara MMAJ, Abeywickrama R, Kumarasinghe JPM, De Silva PV. Can the operating time be reduced by use of magnification in Total Thyroidectomy? A preliminary Study. *J Ruhunu Clin Soc*. 2015;20(1):5.
  15. Testini M, Gurrado A, Lissidini G, Nacchiero M. Hypoparathyroidism after total thyroidectomy. *Minerva Chir* 2007;62: 409–15.
  16. Farahat FY, Hegazy NI, Saber A. Post-thyroidectomy complications: a surgical malpractice. *Zag U Med J* 2005;18(4):458–65.

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