The Incidence Of Recurrent Laryngeal Nerve Injury During Thyroid Surgery

* **Laith Hindosh** *CABS*, ** **Mumtaz Alnasr** *FRCS*,
*** **Raid E. Rassam** *DGS, FICMS*

Abstract

Background: Recurrent laryngeal nerve injury is an important post-thyroidectomy complication for which different modalities of treatment were practiced to lower its incidence.

Objectives: To estimate the incidence of recurrent laryngeal nerve injury in thyroid surgeries in relation to type of surgery, type of gland diseases & nerve identification.

Methods: Different types of goiters prepared preoperatively by indirect laryngoscopy, operated upon with different types of surgeries, postoperative direct laryngoscopy by the anaesthetist were done and indirect laryngoscopy done as needed.

Results: Of of 200 patients, the overall incidence of recurrent laryngeal nerve injury was 9 Patients (4.5%), 7 patients (77.8%) were unilateral nerve injury & 2 patients (22.2%) were bilateral nerve injury. The percent of temporary nerve injury was 8 patients (88.89%) & permanent injury 1 patient (11.11%).the incidence of injury in females was (4.57%) & in males was (4%). Injury was 1 patient out of 13 (7.69%) in total thyroidectomy, 1 patient out of 11 (9.09%) in completion thyroidectomy. Injury in malignant goiter was 2 patients (10%).finally it was higher if nerve was not identified (6.15%) than if identified (1.42%).

Conclusion: Recurrent laryngeal nerve injury is more in malignant goiters, in more extensive surgery & if peroperative nerve identification was not practiced.

Keywords: recurrent laryngeal nerve injury, thyroidectomy, peroperative identification

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Introduction

Recurrent laryngeal nerve(RLN) injury in thyroid surgery is one of serious complications as it may jeopardize the quality of life of the patient as hoarseness of voice, dyspnea and often life threatening glottal obstruction[1-3]. The incidence of RLN injury ranges from 1-2% at best, getting higher in less experienced surgeons[4-6] or in malignant thyroid surgery, sometimes RLN sacrificed if involved intimately in a malignant goitre[7]. Permanent RLN injury is seen in (1-3%) of thyroid surgeries; while temporary palsy is more frequent; overall incidence is (0.5-5%); Right nerve injury is more than left side injury because of its more lateral position on this side and because incidence of non recurrent laryngeal nerve is more on the right side[8-10]. When the nerve is identified and dissected, the reported RLN injury rate during thyroidectomy is (0-2.1%). This rate is reportedly higher if surgery is repeated (2-12%) or if the nerve is not clearly identified (4-6.6%) [11]. Routine identification can minimize the risk of injury; Intraparenchymal dissection or subtotal excision can be performed if failure to identify RLN occur [12]. Visual identification, digital palpation & laryngeal electromyography or intraoperative neuro monitoring all can be used for identification, yet unexpected RLN palsy can still take place[13-16].standardized intraoperative neuro monitoring may further reduce this incidence[17,18]. Echternach et al. concluded that laryngeal injury during thyroid surgery is mainly due to vocal cords trauma from intubation and less due to RLN injury [19]

Methods

This is a prospective study concerning the incidence of RLN injury in 200 patients who underwent thyroid surgery in al-kindy teaching hospital from October 2008 till

October 2010. The age incidence was 10-49 years with mean 33 (±2), of those 25 males & 175 females with female:male ratio of 7:1. Of the 200 patients; 155 patients were euthyroid while 45 patients were hyperthyroid. One hundred seventy five patients (87.5%) had multinodular goiter of which 154 (77%) were females & 21 (10.5%) were males. Diffuse goiters were seen in 5 patients (2.5%) of those 3(1.5%) were females and 2(1%) were males.

A detailed clinical ,radiological andlaboratory assessments were done to those patients preoperatively including complete blood count ,blood grouping andRh typing ,fasting blood sugar ,blood urea ,serum creatinine, serum sodium ,serum potassium ,corrected serum calcium (included serum calcium and serum albumin), general urine examination, thyroid function test, ECG, chest x-ray, anteroposterior neck x-ray, cervical ultrasound , fine needle aspiration cytology, indirect laryngoscopy by an ENT specialist and consultation for a specialist physician if needed. Types of surgery included lobectomy in 48 patients, subtotal thyroidectomy in 128 patients, total thyroidectomy in 13 patients and completion thyroidectomy in 11 patients according to preoperative diagnosis, suspected diagnosis or whether RLN identified or not . During surgery RLN was identified using visual and tactile sensations only in the level of nerve needed accordingly .Routine postoperative direct laryngoscopy done to all patients by the anaesthetist while postoperative indirect laryngoscopy by an ENT specialist was done as needed .Permanent RLN palsy was diagnosed when no recovery took place 6 months postoperatively. Statistical analysis using Minitab statistical version 14 considered P value < 0.05 significant.

Results

Table 1 no. (%) distribution of thyroid surgery according to age & sex

Age (years)	Female NO (%)	Male NO (%)	Total NO. (%)
10-19	2(1%)	0(0%)	2(1%)
20-29	5(2.5%)	4(2%)	9(4.5%)
30-39	90(45%)	12(6%)	102(51%)
40-49	78(39%)	9(4.5%)	87(43.5%)
Total	175(87.5%)	25(12.5%)	200(100%)

Age incidence 10-49 with a mean age 33 (±2).
Incidence was mostly in age between 30-39 in both sexes.
Female:male ratio 7:1 .
A p value of 0.045 indicates a significant difference in distribution among age groups.
Of total of 200 patients the overall incidence of recurrent laryngeal nerve injury was 9 patients (4.5%), 7 patients (77.8%) were unilateral nerve injury and2 patients (22.2%) were bilateral nerve injury.

Table 2 unilateral Vs bilateral recurrent laryngeal nerve injury correlated to the age groups

Age	NO.	Unilateral nerve injury	Bilateral nerve in jury	Total NO. (%)
10-19	2	0 (0%)	0 (0%)	0 (0%)
20-29	9	1 (11.11%)	0 (0%)	1 (11.11%)
30-39	102	3 (2.94%)	1 (0.98%)	4 (3.92%)
40-49	87	3 (3.45%)	1 (1.15%)	4 (4.59%)
Total	200	7 (3.5%)	2 (1%)	9 (4.5%)

Total percentage of RLN injury was 4.5% mainly unilateral 3.5%. Patients' age incidence percentage was mostly in 3rd decade of life

Table 3 Sex Incidence Of RLN Injury

Sex	**NO.**	**Unilateral nerve injury NO.(%)**	**Bilateral nerve injury NO.(%)**	**Total NO. (%)**
Female	175	6(3.05)	2(1.52%)	8 (4.57%)
Male	25	1(4%)	0(0%)	1(4%)
Total	200	7(3.5%)	2(1%)	9(4.5%)

Sex incidence distribution was insignificantly variable as P value of 0.999 > 0.05.

Table 4 correlation of thyroid function to RLN injury

Thyroid function	**NO.**	**Unilateral nerve injury (%)**	**Bilateral nerve injury (%)**	**Total NO. (%)**
Euthyroid	155	6(3.86%)	1(0.64%)	7(4.5%)
Hyperthyroidism	45	1(2.22%)	1(2.22%)	2(4.44%)
Total	200	7(3.5%)	2(1%)	9(4.5%)

No significant variation of RLN injury in correlation to thyroid function as p value of 0.41 > 0.05

Table 5 sex distribution of different thyroid enlargements

Sex	**Solitary thyroid nodule**	**Multinodular goiter**	**Diffuse goiter**	**Total NO.(%)**
Female	18(9%)	154(77%)	3(1.5%)	175(87.5%)
Male	2(1%)	21(10.5%)	2(1%)	25(12.5%)
Total	20(10%)	175(87.5%)	5(2.5%)	200(100%)

Incidence of multinodular goiter was significantly higher as p value of 0.001 < 0.05

Table 6 incidence of RLN injury in correlation to type of surgery

Type of surgery	NO. of patients	Temporary injury	Permanent injury	Unilateral injury	Bilateral injury	Total NO.(%)
Subtotal thyroidectomy	128	6(4.6%)	0(0%)	6(4.6%)	0(0%)	6(4.6%)
Lobectomy	48	1(2.08%)	0(0%)	1(2.08%)	0(0%)	1(2.08%)
Total thyroidectomy	13	1(7.69%)	0(0%)	0(0%)	1(7.69%)	1(7.69%)
Completion Thyroidectomy	11	0(0%)	1(9.09%)	0(0%)	1(9.09%)	1(9.09%)
Total	200	8(4%)	1(0.5%)	7(3.5%)	2(1%)	9(4.5%)

P value 0.222

Highest incidence of RLN injury was in completion thyroidectomy (9.09%).

Temporary RLN injury 8 (4%) was the commonest, permanent RLN injury was only 1 (0.5%).

RLN injury in correlation to type of surgery is not significant as p>0.05.

Table 7 Relation between RLN injury & histopathology of the thyroid gland

Histopathology of thyroid gland	NO. of patients	Unilateral temporary RLN injury	Bilateral permanent RLN injury	Total (%)
Benign	180	7(3.8%)	0(0%)	7(3.8%)
Malignant	20	1(5%)	1(5%)	2(10%)
Total	200	8(4%)	1(0.5%)	9(4.5%)

Incidence of RLN injury was higher in malignant lesions (10%) than in benign lesions (3.8%)

P value 0.001 which is statistically significant as it is < 0.05

Table 8 THE relation between RLN injury & preoperative RLN identification

RLN identification status	NO. of operations	Unilateral nerve injury	Bilateral nerve injury	Total (%)
Identified	70	1(1.4%)	0(0%)	1(1.4%)
Non-Identified	130	7(5.4%)	1(0.7%)	8(6.1%)
Total	200	8(4%)	1(0.5%)	9(4.5%)

RLN injury was higher in the non-identified group (6.1%) than in the identified group (1.4%)

This was statistically significant as P value 0.003 < 0.05

Discussion

Most of thyroid diseases in our study took place in 30-39 years age group, ranging from 10-49 years ,with mean age 33 (±2), female:male ratio 7:1**(table I)** p value < 0.05 for age distribution, while p value > 0.05 for sex distribution.

Unilateral RLN injury was 3.5%, most cases were in the 3rd decade of life **(table II)**, and this result is comparable to Hazem M. et al study [20] while our study showed more bilateral (1%) RLN injury incidence than Hazem M. et al study.

RLN injury was 4.57% in females & 4% in males mostly unilateral **(table III)**, which was statistically insignificant p value>0.05 as was shown by Hazem M.et al [20].

Thyroid function did not affect RLN injury (4.5%) for euthyroid Vs (4.44%) for toxic goitre p value > 0.05 **(table IV)**.

Multinodular goitre was the commonest in our study (87.5%) p value < 0.05 **(table V)**.

The incidence of RLN injury increased with more extensive surgery (9.09%) in completion thyroidectomy, (7.69%) in total thyroidectomy, while the least in lobectomy (2.08%), while Hazem M. et al[20] showed same incidence in total thyroidectomy, higher in completion thyroidectomy and lower in subtotal thyroidectomy, others showed less incidence in subtotal more in total & completion thyroidectomies[21-23]; As (4%) had temporary nerve injury & (0.5%) had permanent injury which was bilateral needed tracheostomy p value > 0.05 **(table VI)**, this incidence was comparable to Hazem M. et al [20].

Malignant goitre showed higher incidence of RLN injury during surgery than benign goitre (10%) Vs (3.8%) p value < 0.05 **(table VII)**, also comparable to others [20-23], while Chiang et al [24] showed lower incidence of RLN injury in malignant than benign goitres although the permanent injury was more in malignant than in benign.

Finally RLN injury was more when the nerve was not identified (6.1%) than when identified (1.4%) p value < 0.05 as shown in **(table VIII)**, this is a little lower than Hazem M. et al [20]. The comparison with other studies is shown in **(table IX)**.

Table 9 Comparison between Our Study and Other Studies

PARAMETERS OF COMPARISON	OUR STUDY	FRIED-RICH 1998	WAGNER 1999	BAKER & AL-JARRAH 2001	CHIANG 2005	HAZEM M. 2011
NO. OF PATIENTS	200	725	1027	100	40	340
NERVE PALSY **%**	4.5	7.6	5.9	6	6	*(NA)*[*]
TEMPORARY PALSY **%**	4	5.1	3.5	3	5.1	*(NA)*[*]
PERMANENT PALSY **%**	0.5	2.5	2.4	3	0.9	*(NA)*[*]
SUBTOTAL THYROIDECTOMY **%**	4.6	*(NA)*[*]	2.9	1.8	*(NA)*[*]	1.9
TOTAL THYROIDECTOMY **%**	7.69	*(NA)*[*]	8.1	20.8	*(NA)*[*]	7.2
COMPLETION THYROIDECTOMY **%**	9.09	11	10	20	18.9	21.7
CARCINOMA **%**	10	10	10	14.3	2.7	12.8
BENIGN **%**	3.8	*(NA)*[*]	*(NA)*[*]	*(NA)*[*]	4.2	2.9
IDENTIFICATION **%**	1.4	1.1	*(NA)*[*]	*(NA)*[*]	*(NA)*[*]	2.6
NON-IDENTIFICATION **%**	6.1	4.2	*(NA)*[*]	*(NA)*[*]	*(NA)*[*]	7.6

(NA)[*] means specific figure for this specific parameter of comparison is not available in the study

Conclusion

In our study the nerve injury was more in malignant goiters than benign & still more with more extensive surgery.

RLN identification was protective more than non-identification & consequently peroperative nerve identification is strongly recommended specially if other modalities of nerve integrity assessment like intraoperative neuromonitoring is not available as in our practice. As the nerve injury was more in malignant & recurrent goiters so we recommend identification of the RLN especially in total & completion thyroidectomies.

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****From the Department of surgery AL-kindy teaching hospital, Baghdad; Iraq***
Corespondence Address to :Dr. Laith n. Hindosh
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