



Research Article

Incidence of Recurrent Laryngeal Nerve Injury for Patients Undergoing Thyroidectomy, an Audit from Dubai Hospital

Aliya Ishaq*, Muhammad Jamshaid Husain Khan, Safa Al Shmanee, Yara Walid Elsherbiny, Naema Ali Muhsen Awadh Ben Awadh, Sameera Naureen, Arfan Al Awa, Gamal Yousuf, Zaid Abdul Aziz

Dubai Hospital, Deira, Dubai, UAE

*Corresponding author: Aliya Ishaq, Dubai Hospital, Deira, Dubai, UAE

Citation: Ishaq A, Khan MJH, Al Shmanee S, Elsherbiny YW, Ben Awadh NAMA, et al. (2023) Incidence of Recurrent Laryngeal Nerve Injury for Patients Undergoing Thyroidectomy, an Audit from Dubai Hospital. Arch Surg 3: 116 DOI: 10.29011/AOS-116.000016

Received Date: 07 September, 2023; **Accepted Date:** 12 September, 2023; **Published Date:** 14 September, 2023

Abstract

Introduction: Recurrent laryngeal nerve injury is a feared complication of thyroidectomy and its incidence varies from 0.2 to 7% being lowest in institutes where routine use of post thyroidectomy indirect laryngoscopy is not practiced and being highest where post operative indirect laryngoscopy is routine.

Aim: To calculate the incidence of recurrent laryngeal nerve injury during thyroidectomy.

Materials and methods: Retrospective audit of all patients undergoing thyroidectomy in our hospital from Jan 2018 – June 2023.

Results: The incidence of transient recurrent laryngeal injury was 6.3 % (11/173 patients) while permanent injury was detected in 2 patient (1.1% 2/173). Indirect laryngoscopy was used to detect incidence of recurrent nerve injury post operatively but only those patients were subjected to indirect laryngoscopy who had symptoms of nerve injury.

Conclusion: Indirect laryngoscopy is gold standard for detection of actual incidence of recurrent laryngeal injury post thyroidectomy and should be routinely performed in all patients undergoing thyroidectomy between 4- 8weeks post operatively.

Introduction

The incidence of Injuries to the recurrent laryngeal nerve has been reported between 1% to 2% from different thyroid and parathyroid surgery centers when performed by experienced surgeons [1]. The incidence for temporary nerve injury is 3.8-9.5% while for permanent it is 0.2- 4.8% [2]. It is possible to have injury to recurrent laryngeal nerve despite visual inspection and use of nerve monitor with patient being asymptomatic on the other hand patient can be symptomatic with out nerve injury ,in fact the common scenario is when patient has nerve injury and its documented in operative as intact on visual inspection and nerve conduction [3]. The gold standard to detect recurrent laryngeal nerve injury post operatively is to do laryngoscopy [4]. Unfortunately there is no guidelines or consensus regarding routine

use of post operative laryngoscopy to detect recurrent laryngeal nerve injury [5].

In our institute only those patients under go indirect laryngoscopy post operatively who present with symptoms and in the absence of symptoms its not done .This is important as published data shows incidence of injury to be 0.3- 0.9 % where no post op laryngoscopy is done to a value up to 7% in institutes where it is routinely done [2]. There may be an alternation in vocal cord movement in between 1 and 2.4% of patients before surgery so its very important to get assessment of vocal cords before surgery [6]. Use of intraoperative nerve monitoring as well as visual inspection and nerve tracing through the entire course are the methods used during surgery to make sure that the nerve is intact but surprisingly where injury is detected often operative noted documented intact

nerve seen by visual inspection and traced up to entry as well as good conduction signals detected by nerve stimulator so these methods can not guaranty reliable that the nerve is not injured [7]. The positive predictive value of intraoperative nerve monitoring is low but its negative predictive value is very high that means if nerve monitor indicates a functionally preserved nerve at end of surgery then the risk of post operative nerve injury is 0 % to a maximum of 8 %. Even though with normal nerve conduction intraoperative mechanical pull as well as edema and hematoma at operative bed can still compromise nerve function and this can only be picked up on indirect laryngoscopy and patients having normal nerve conduction intraoperatively should not be excluded from getting post operative laryngoscopy done. Most of the post op cases of neuropraxia are due to nerve edema and anatomically nerve is intact and this usually resolves within 4-6 weeks . So if laryngoscopy is done very early within 2 weeks will detect a large number of nerve injuries on the other hand if we will delay it beyond 6 weeks then chances of detecting permanent injury are more as post op edema related injury usually settles in 2-4 weeks. The study done by Dionigi showed the cord palsy rate in 825 nerves at risk was 6.4% on the day of surgery, 6.7% on day 1, 4.8% on day 2 and 2.5% on day 14 and 0.8% at 6 weeks [8], So it is recommended that voice assessment should be performed between 2 weeks to 2 months as post anesthesia voice changes can last up to 14 days . Those found to have nerve can then be followed up by repeat laryngoscopy and can be started n therapy. Transient injuries have different recovery times (usually between 4 and 6 weeks to complete recovery), up to 12 months. If nerve function returns back to normal with normal vocal cord movement on indirect laryngoscopy within a period of one year it is said to be temporary nerve injury however if it persists beyond one year its considered as permanent [9].

Audit

Electronic medical records of Patients who underwent thyroidectomy in our hospital from Jan 2018 till June 2023 were retrospectively reviewed to look for incidence of recurrent laryngeal injury in specified period .

Rationale/Aim

In our hospital evaluation for recurrent laryngeal nerve injury is done only if a patient is complaining of dysphonia or any other symptoms related to nerve injury post thyroidectomy and every patient is not subjected to post operative laryngoscopy so this audit was conducted with a view to;

1. To calculate the incidence of recurrent laryngeal nerve injury for patients undergoing thyroidectomy in Dubai hospital both temporary and permanent injuries.
2. To get institution specific data in this respect and to correlate it with international figures.
3. To make a plan for post-operative detection and management of recurrent laryngeal nerve injury in symptomatic and asymptomatic patients.

Methodology

Study type: Retrospective audit.

Data collection: Data was collected from electronic record system (salama)

Study population: All patient undergoing thyroidectomy since Jan 2018- june 2023 were included .

Sample selection: Convenient sampling.

Inclusion criteria: All patient undergoing thyroidectomy since Jan 2018- june 2023 were included .

Exclusion criteria

- 1.Patient having evidence of recurrent laryngeal nerve injury on pre-operative laryngoscopy.
- 2.Patients having advanced cancer with clinical evidence of nerve involvement.
- 3.Patients with stroke.

Data Analysis

Data analysis was done with help of statistics department, and SPSS version 25 was used for data analysis.

Patients diagnosed with RLN injury whose pronunciation returned to normal and who exhibited normal vocal cord movement by laryngoscopy within 12 months after surgery were considered to have temporary injury;patients in whom the nerves had been separated during the operation or the vocal cord movement was abnormal after 12 months from surgery were considered to have permanent injury.

Results

Total cases operated 173 patients underwent thyroidectomy in our department in the specified period . 95/173 (54.91 % had hemithyroidectomy while 45.08% (78/173) underwent total thyroidectomy . This is explained in Table 1. 12 patients underwent minimal access surgery including trans axillary and vestibular approach while rest had open thyroidectomy as shown in Table 2. Pre operative FNAC results are shown in Table 3 while post operative histopathology is explained in Table 4, majority of patients had goiter and papillary thyroid cancer ,almost all papillary thyroid cancers were PT1a while 2 of them were more than 2 cm ,one being greater than 4 cm requiring total thyroidectomy and bilateral cervical lymph node dissection ,this patient ended up having transient recurrent laryngeal nerve in jury which improved after voice therapy and he was without symptoms with normal vocal cord mobility one year after surgery. Age and sex distribution is shown in Figure 1 Table 5 respectively ,majority of patients 129/173 (74.5%) were female.

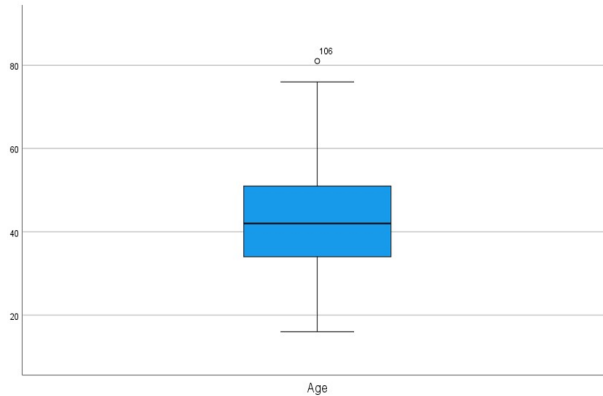


Figure 1: Age distribution.

Procedures		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	hemithyroidectomy	95	54.9	54.9	54.9
	total thyroidectomy	78	45	45	45
	Total	173	100	100	
Total		173	100		

Table 1: Type of procedure.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	open	161	93.1	93.1	93.1
	minimal access	12	6.9	6.9	100
	Total	173	100	100	

Table 2: Type of surgeries.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	papillary	39	22.5	23.4	23.4
	benign follicular	65	37.6	38.9	62.3
	follicular carcinoma	7	4	4.2	66.5
	atypia	26	15	15.6	82
	grave's	11	6.4	6.6	88.6
	toxic adenoma	3	0.6	0.6	89.2
	MNG	4	1.7	1.8	91
	hashimoto's	4	1.7	1.8	92.8
	Hurthle cell neoplasm	3	1.2	1.2	94
	non-diagnostic	11	5.8	6	100
	Total	173	100	100	
	System				
Total		173	100		

Table 3: Pre op FNAC.

H/P - Diagnosis		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Papillary thyroid cancer	38	22	22.5	22.5
	Benign follicular adenoma	26	15	15.4	37.9
	Follicular carcinoma	6	3.5	3.6	41.4
	Thyroid hyperplasia	15	8.7	8.9	50.3
	Graves	20	11.6	11.8	62.1
	Toxic adenoma	6	3.5	3.5	41.4
	Goiter	48	26	26	88.2
	Hashimoto's	5	0.6	0.6	88.8
	Hurthle cell neoplasm	11	6.4	6.5	95.3
	Thyroid cysts	1	0.6	0.6	98.8
Total	173	100	100		
Total	173	100			

Table 4: Post Op Histopathology.

SEX		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	129	74.5	74	74
	M	44	25.4	25.4	25.4
	Total	173	100	100	

Table 5: Sex Distribution.

Majority of patients 149 /173 (86.12 %) had no complications. Other complications were seroma (3/173 ,1.7%) ,hematoma (2/173,1.2%), keloid (1/173,0.6%), hypocalcemia transient (8/173 ,4.8 % ,1/173 ie 0.6% permanent).The incidence of transient recurrent laryngeal injury was 6.3 % (11/173 patients) while permanent injury was detected in 2 patient (1.1% 2/173), complications are explained in Table 6-8. All patients underwent pre operative indirect laryngoscopy and was normal in all patients except one and she was excluded from study. All patient underwent nerve exploration during surgery. Nerve stimulator and visual inspection was used to identify the nerve. No anatomical

variation described as per operative notes .All of patients with injury weather permanent or transient had dyspnea postoperatively only one patient was not able to be extubated immediately post operatively and was re intubated and has immobile both vocal cords ,this patient has huge goiter with Hashimoto's and was having recurrent surgery ,she ended up having permanent injury and tracheostomy and is still in follow up .Post op laryngoscopy was done only in symptomatic patients and they had treatment and follow up in voice clinic ,all of them recovered fully except 2 patients out of which one mentioned above had permanent tracheostomy and other one had unilateral lagging of cord with some hoarseness of voice.

complications		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(Dysphonia,inability to extubate)	11	6.5	6.5	6.5
	(hypocalcemia)	8	4.6	4.8	13.8
	(no complications)	149	83.6	83.6	95.6
	(seroma)	3	1.7	1.8	96.4
	(hematoma)	2	1.2	1.2	97.6
	(keloid)	1	0.6	0.6	100
	Total	167	96.5	100	
Total		173	100		

Table 6: Complications Immediate.

transient paralysis					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Transient injury	11	6.3	6.3	6.3
	No injury	162	93.6	93.6	93.6
	Total	173	100	100	

Table 7: Transient recurrent laryngeal paralysis.

permanent paralysis					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nerve injured	2	1.1	1.1	1.1
	No nerve injury	171	98.8	98.8	98.8
	Total	173	100	100	

Table 8: Permanent recurrent laryngeal paralysis.

When recurrent laryngeal nerve injury is co-related with type of histopathology as shown in Figure 2, it is found that majority of patients who had injury were found to have Hashimoto’s disease (5/11 ,45.45 %) followed by grave’s disease (4/11,36.36%), toxic adenoma (1/11 ,9.09%) and papillary thyroid cancer (1/11,9.09 %), this patient has large papillary thyroid cancer T4 and underwent total thyroidectomy with bilateral neck dissection. Frequency of injury was observed more with open thyroidectomy (10/11 ,90.9%) then with minimal access (01/11,9.09%) SHOWN IN Figure 3. Similarly ,the incidence of recurrent laryngeal nerve in jury was high in total thyroidectomy as compare to hemithyroidectomy (90% versus 9.09 %) highlighted in Figure 4.

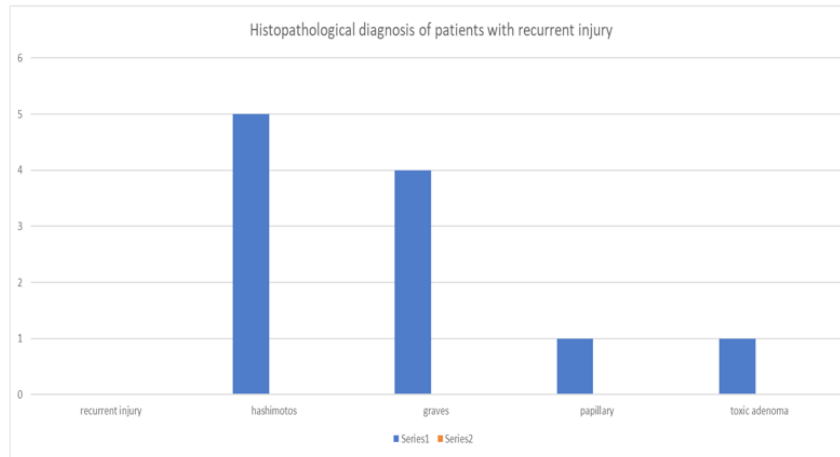


Figure 2: Histopathological diagnosis of patients with recurrent injury.

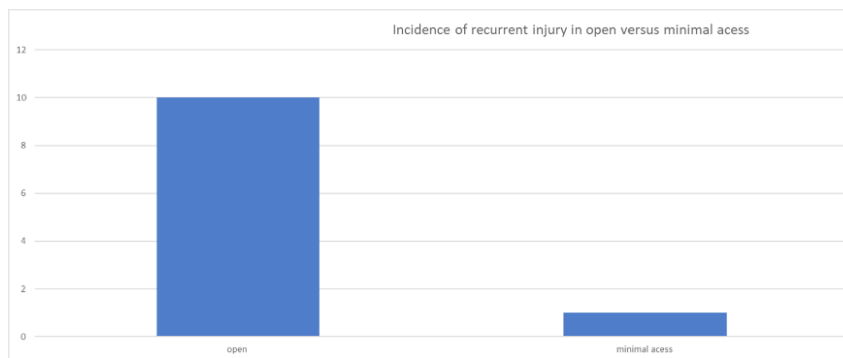


Figure 3: Incidence of injury in open versus minimal access surgeries.

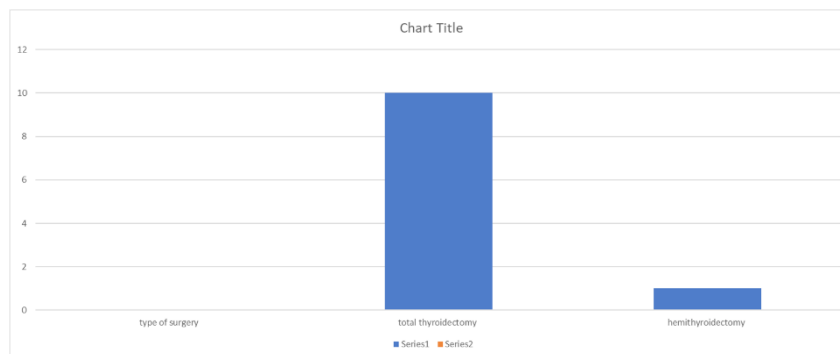


Figure 4: Incidence of recurrent injury in hemi/total thyroidectomy.

Discussion

Recurrent laryngeal nerve injury during thyroidectomy is observed with a percentage of 0.2% – 4.8% in literature. The incidence is reported more in studies where post operative laryngoscopy is routinely performed post thyroidectomy and less to minimal in institutes where there is no routine follow up by post op laryngoscopy [10,11]. Injury can be prevented by meticulous surgical technique and dissecting close to thyroid capsule with minimal use of energy devices near nerve along with avoidance of mechanical trauma [12]. Intraoperative nerve monitoring although used in our institute and almost all hospitals but does not guaranty no nerve injury 100 % as many cases where nerve is intact by using monitor have post op injury [13]. We noticed in our audit that nerve injury is related to type of surgery as it is more common in total then hemithyroidectomy as well as it is more in recurrent surgeries as one of our patient who had permeant injury was operated 3rd time with recurrent huge goiter and this is observed in literature as well . Also the larger the gland and more advanced the tumor is ,the greater the incidence of injury ,in this respect our results also shows the same results as other studies. We also noted that majority of our patients who had in jury were either Hashimoto's thyroiditis (45.5 % 0 or grave's disease (36.3 %) as patients with Hashimoto's thyroiditis which is an autoimmune disease that renders patients hypothyroid usually have sticky and densely adherent glands to surrounding structures and dissection of these glands is usually difficult and time consuming and tissue planes are difficult to identify. Also patients with grave's are highly vascular and are usually difficult to dissect as compare to other histopathology types. Our percentage meets international criteria as per figures shown in audit but we performed indirect laryngoscopy only in patients who were symptomatic so it is not a true representative of actual incidence of injury.

Recommendation and Action Plan from Audit

After this audit done in our department, the action taken was

- All patients undergoing thyroid surgery will have pre operative laryngoscopy as usual .
- Actual incidence of recurrent laryngeal nerve injury will be calculated by performing indirect laryngoscopy in all these patients included in audit and we had collaboration with our ENT team and appointments will be fixed for all these patients by ENT team and patients will be notified to come to have their indirect laryngoscopy done . We already had approval from ethical and research committee and will start working on it soon and will soon present our results.
- We have reached to consensus that all patients post op thyroidectomy will be referred from now onwards for indirect laryngoscopy between 4 - 8 weeks and results will be analyzed prospectively.
- Intra operative nerve monitoring will be used for detection of nerve along with visual inspection and tracing the nerve up to its entry at trachea-esophageal groove before removing thyroid from tracheal bed and before ligating mid and lower pole vessels.
- Post-operative nerve injury if detected will be managed by ENT team with voice therapy and other modalities as per need.

Conclusion

- We conclude that indirect laryngoscopy is gold standard to detect incidence of recurrent laryngoscopy post thyroidectomy and should be done in all patients post thyroidectomy between 4 weeks to 2 months to calculate the actual incidence of recurrent laryngeal injury as it is not necessary to have symptoms always while nerve in damaged at the same time patients with symptoms can have normal nerve.
- This time frame is necessary as neuropraxia takes time to settle, performing indirect laryngoscopy earlier than 4 weeks can exaggerate normal neuropraxia associated with surgical trauma . Similarly, delay beyond 2 months can miss injury and can cause delay in voice therapy and other treatment modalities needed for recovery and prevent permanent nerve injury .
- Patient detected to have injury or symptomatic patients should have more frequent visits to voice clinic and should be started on aggressive voice therapy and other means of therapy if needed to prevent permanent injury
- Injury can be prevented by Meticulous surgical technique by staying close to capsule during dissection of gland along with minimal to NO use of energy devices near nerve (rather use ties and clips) and avoidance of mechanical pull .

References

1. Rosenthal LH, Benninger MS, Deeb RH (2007) Vocal fold immobility: a longitudinal analysis of etiology over 20 years. *Laryngoscope* 117: 1864-1870.
2. Witt RL (2005) Recurrent laryngeal nerve electrophysiologic monitoring in thyroid surgery: the standard of care? *J Voice* 19: 497-500.
3. Mohil RS, Desai P, Narayan N, Sahoo M, Bhatnagar D, et al. (2011) Recurrent laryngeal nerve and voice preservation: routine identification and appropriate assessment - two important steps in thyroid surgery. *Ann R Coll Surg Engl* 93: 49-53.
4. Steurer M, Passler C, Denk DM, Schneider B, Niederle B, et al. (2002) Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the importance of preoperative and postoperative laryngoscopic examination in more than 1000 nerves at risk. *Laryngoscope* 112: 124-133.
5. Rybakovas A, Bausys A, Matulevicius A, Zaldokas G, Kvietkauskas M, et al. (2019) Recurrent laryngeal nerve injury assessment by intraoperative laryngeal ultrasonography: a prospective diagnostic test accuracy study. *Wideochir Inne Tech Maloinwazyjne* 14: 38-45.
6. Steurer M, Passler C, Denk DM, Schneider B, Niederle B, et al. (2002) Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the importance of preoperative and postoperative laryngoscopic examination in more than 100 nerves at risk. *Laryngoscope* 112: 124-33.
7. Malik R, Linos D (2016) Intraoperative neuromonitoring in thyroid surgery: a systematic review. *World J Surg* 40: 2051-2058.
8. Dionigi G, Boni L, Rovera F, Rausei S, Castelnuovo P, et al. (2010) Postoperative laryngoscopy in thyroid surgery: proper timing to detect

- recurrent laryngeal nerve injury. Langenbecks Arch Surg 395: 327-331.
9. Pantvaidya G, Mishra A, Deshmukh A, Pai PS, D'Cruz A (2018) Does the recurrent laryngeal nerve recover function after initial dysfunction in patients undergoing thyroidectomy? Laryngoscope Investig Otolaryngol 3: 249-252.
 10. Jeannon JP, Orabi AA, Bruch GA, et al. (2009) Diagnosis of recurrent laryngeal nerve palsy after thyroidectomy: a systematic review. Int J Clin Pract 63: 624-629.
 11. Lifante JC, Payet C, Menegaux F, et al. (2017) Can we consider immediate complications after thyroidectomy as a quality metric of operation? Surgery 161: 156-165.
 12. Liu N, Chen B, Li L, Zeng Q, Sheng L, et al. (2020) Mechanisms of Recurrent Laryngeal Nerve Injury near the Nerve Entry Point during Thyroid Surgery: A Retrospective Cohort Study. Int J Surg 83:125-130.
 13. Pei M, Zhu S, Zhang C, Wang G, Hu M (2021) The Value of Intraoperative Nerve Monitoring against Recurrent Laryngeal Nerve Injury in Thyroid Reoperations. Medicine 100: E28233.