Evaluation of Vocal Cord Function Before Thyroidectomy: Experience from a Developing Country

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Abstract Vocal cord palsy (VCP) is a major complication of thyroidectomy. Some patients have preexisting VCP prompting the need for routine or selective preoperative evaluation of the vocal cords. The study aims at ascertaining the prevalence of preoperative VCP and making appropriate recommendations. This is a retrospective study of all adult patients who had thyroidectomy at the University of Nigeria Teaching Hospital. Case notes of patients who had thyroidectomy at the hospital from July 2010 to June 2015 were retrieved. Variables studied included biodata, duration of goiter, preoperative hoarseness, outcome of indirect laryngoscopy (IDL), histology of specimen, duration of follow-up, and incidence of postoperative hoarseness. Descriptive statistical analysis was done using SPSS version 20. Of the 91 patients aged 21–70 years (mean 42.08 years, SD 15.40), females outnumbered males with a M:F ratio of 1:10.4. Five patients had preoperative hoarseness, but only three had VCP. IDL was done for 25 (27.4%) patients out of which 22 (88.0%) had normal studies while the remaining three (all from the five with hoarseness) had VCP. Histology of the specimens showed malignancy in 10 (11%), benign in 55 (60.4%), and no report in 26 (28.6%). Five of the malignant histology

patients showed normal findings on IDL, three had VCP and two had no preoperative IDL. There was no case of asymptomatic VCP. Vocal cord evaluation is recommended for patients with voice symptoms and those with malignant goiter.

Keywords Vocal cord · Thyroidectomy · Evaluation · Developing country

Introduction

Thyroidectomy when performed by a trained and experienced surgeon is a safe procedure with virtually no mortality though some complications may arise. Vocal cord palsy (VCP) from injury to the recurrent laryngeal nerve (RLN) is a known complication of thyroidectomy which commonly produces hoarseness that could be devastating to professionals like singers, broadcasters, teachers, preachers, and town criers. Because damage to this nerve may not involve complete transection or following compensation from the contralateral vocal cord, most of these cases are temporary and the patients recover within 12 months after surgery. The risk of recurrent laryngeal nerve injury during thyroidectomy varies with the type of thyroidectomy (total, near total, or subtotal thyroidectomy) and the indication for operation. Significantly increased risk is found in re-operation, total/near total thyroidectomy, and in surgery for malignant thyroid diseases [1, 2].

In published reports, the prevalence of VCP immediately after surgery varies but may be as high as 9–10% [3–6]. Permanent postoperative VCP occurs in 2–3% of patients undergoing thyroid surgery [7].

Apart from thyroid operations, additional causes of VCP include other neck surgeries like carotid endarterectomy, anterior approach to the cervical spine, and skull-base surgery. Another group of causes is malignant tumor invasion. Other

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quoted less frequent etiologies of VCP include viral infections, drug induced, jugular vein thrombosis, central venous access procedures, stroke, and diabetic neuropathy. Most of these causes will, however, produce varying degrees of symptoms.

Asymptomatic VCP in previously non-operated patients without thyroid cancer has been reported to occur in 0.23 to 0.8% [8–13]. Patients with VCP may be asymptomatic, due to significant remaining vocal cord function, variability in the position of the paralyzed vocal cord, and functional compensation by the contralateral vocal cord [14].

The common means of vocal cord examination in our center is by the use of mirror (indirect laryngoscopy), but for patients that cannot tolerate mirror examination due to excessive gagging, flexible fiberoptic laryngoscopy or laryngeal ultrasound may be used. However, fiberoptic laryngoscopy gives more information about the vocal cord than laryngeal ultrasound [15]. Laryngeal ultrasonography is not readily available in most centers in Nigeria.

Although preoperative and postoperative laryngeal function assessment has been proposed as the standard of practice in patients scheduled for thyroid surgery, its routine use is controversial and the data appear conflicting [14, 16]. Arguments have been adduced for the routine preoperative examination of the vocal cords [7]. These include possible detection of VCP in a patient with no voice symptoms and hence alerts the surgeon on the need for greater care when mobilizing and removing the thyroid gland on the normal side to avoid converting unilateral VCP to bilateral VCP with more dire consequences. Secondly, the presence of VCP could suggest the presence of invasive malignancy which may call for more investigations and possibly alter the planned surgical procedure. Also when found at surgery, a nerve invaded by tumor may be better managed if there is previous knowledge of its functional state. Lastly, preoperative evaluation will provide a baseline for postoperative assessment and protects the surgeon from potential litigation when the condition first manifests postoperatively.

Are these reasons enough to advocate routine vocal cord examination of all thyroidectomy patients including asymptomatic ones who had no previous neck surgery?

The authors embarked on this study to find out the situation in our center, the University of Nigeria Teaching Hospital, Enugu, Southeast Nigeria. This is more so because of the peculiarities in our country like the additional cost for laryngoscopy and the inadequacy of available of trained personnel to perform it.

Patients and Methods

The medical records of all the patients who had thyroidectomy at the University of Nigeria Teaching Hospital Enugu Nigeria

from July 2010 to June 2015 were retrieved. None of the patients had previous thyroidectomy or other neck operations. A proforma was used to extract the desired variables which included biodata, duration of goiter, outcome of indirect laryngoscopy where it was performed, histology of specimen obtained postoperatively, duration of postoperative follow-up, and incidence of postoperative hoarseness. The indirect laryngoscopies were performed by consultant otorhinolaryngologists at the hospital Ear, Nose and Throat (ENT) clinic on outpatient basis. None of the patients had a need for fiberoptic laryngoscopy. The data were analyzed with descriptive statistics using SPSS version 20.

Results

A total of 91 patients were studied with ages ranging from 21 to 70 years (mean age 42.08 years, SD 11.43). There were 8 males (8.8%) and 83 females (91.2%) giving a male/female ratio of 1:10.4. The mean age for males was 40.75 years (SD 10.77) and that for females was slightly higher at 43.09 years (SD 9.50). The duration of the goiter before presentation ranged from 1 month to 22 years with a mean duration of 4.2 years (SD 4.46).

Of the 91 patients, indirect laryngoscopy was done for 25 (27.47%). Out of this number, 22 (88.0% of those that had indirect laryngoscopy) showed normal studies while 3 had VCP. These same patients also had preoperative hoarseness. There was not a single case of asymptomatic VCP. This result is depicted in Table 1.

Five patients (5.5%) had hoarseness preoperatively while 86 (94.5%) did not.

Among the five patients who had preoperative hoarseness, two had normal vocal cords, while three patients had VCP when evaluated with indirect laryngoscopy.

On the histology of the resected specimens, 55 (60.4%) were benign, 10 (11.0%) were malignant, and in 26 (28.6%), the histology was apparently not done. Five of the ten patients with malignant histology had normal findings on indirect laryngoscopy, three had VCP, and in two patients, indirect laryngoscopy was not done preoperatively. The results comparing histology with result of indirect laryngoscopy is shown in Table 2.

Table 1 Result of indirect laryngoscopy

	Frequency	Percent
Normal	22	24.2
Abnormal	3	3.3
No record	66	72.5
Total	91	100.0

Table 2 Result of indirect laryngoscopy and histology report

Indirect laryngoscopy	Histology report			Total
	Benign	Malignant	Not done	
Normal	12	5	5	22
Abnormal	0	3	0	3
Not done	43	2	21	66
Total	55	10	26	91

For the five patients who had preoperative hoarseness, the histology report was benign in three, malignant in one, and not done in the last patient. This is also shown in Table 3.

The patients were followed up for periods ranging from 1 to 48 months with a mean follow-up of approximately 7 months (SD 9.02).

Two of the patients had postoperative voice symptoms (hoarseness) which resolved within 12 months of follow-up without any active management.

Discussion

There is no hospital policy on screening thyroidectomy patients for VCP in our center. Out of tradition, many surgeons request for it but some others either out of previous experience or the challenges in carrying out the procedure no longer demand indirect laryngoscopy for asymptomatic patients coming for thyroidectomy. The cost of indirect laryngoscopy (the chief mode of vocal cord examination) is about five thousand naira (N5000.00) equivalent to about USD17.00. The National Health Insurance Scheme caters for less than 10% of the population; hence, most of the patients pay out of pocket. The situation is compounded by the fact that about 70% of the population live below USD1.00 per day [17]. Adding the cost of laryngoscopy to the other fees the patient has to pay for thyroidectomy further increases the patient's financial burden. In Nigeria with an estimated population of about 170 million, there are a little above 200 otorhinolaryngologists out of which about 15 practice in the South East geopolitical zone. These specialists are found mainly in tertiary centers and in urban areas whereas the preponderance of the population

reside in rural areas. In centers where they are available, it takes an average of 3 weeks for a patient referred to the ENT clinic to have indirect laryngoscopy done. This is due to long waiting list and a not very efficient health system.

Currently in our sub-region, specialist training of general surgeons who perform most thyroidectomies does not include laryngoscopy or any other form of vocal cord evaluation. This implies routine referral of all thyroidectomy patients to otorhinolaryngologists for laryngoscopy.

Probably this partly explains why only 25 out of 91 patients for thyroidectomy had indirect laryngoscopy. For revision of thyroid surgery, preoperative laryngeal examination rate was up to 60% in one study [4]. Of the 25 patients who had preoperative indirect laryngoscopy, 22 (88%) were normal while 3 (12%) had VCP. In a review article where the authors analyzed 20 case series, they found a prevalence of preoperative VCP of 1 to 6% [7]. This discrepancy might be due to a greater tendency in our center to evaluate patients who were symptomatic. The three patients with abnormal findings all had preoperative hoarseness, and the histology of the resected thyroid gland revealed malignant disease. In the same review article cited above, within the total group of 365 thyroidectomy patients, there were 16 cases of preoperative VCP and all except one were attributable to locally invasive thyroid cancer [7]. The current study did not involve patients with previous thyroidectomy or other neck operations. This scenario is one of the occasions where many workers would recommend vocal cord evaluation as the incidence of VCP is higher in such groups [14]. Although some workers documented the presence of asymptomatic VCP in the absence of thyroid cancer and re-operation, the prevalence varied between 0.23 and 0.8% [8–13]. Some authors recommended laryngoscopy for all thyroidectomy patients [14, 18]. But there is also substantial support for a more selective preoperative approach, given that patients without risk factors are very unlikely to harbor a preoperative VCP [9, 11, 19].

The guidelines on thyroid procedures of the American Thyroid Association, European Thyroid Association, the Spanish Association of Endocrinology and Nutrition and the American Association of Clinical Endocrinologists do not recommend laryngoscopy as a mandatory part of the preoperative work-up of patients undergoing thyroid surgery [20–23].

Our study did not find a single case of asymptomatic VCP.

The incidence of VCP is higher in patients who already had hoarseness preoperatively.

Five (5.5%) patients had preoperative hoarseness, but two of them had normal vocal cords implying other causes for the hoarseness. Some of these other possible causes include allergic laryngitis and gastroesophageal reflux disease [24–26]. On histologic examination of the resected specimens, only one of these patients turned out to have malignant goiter (Table 3). It is interesting that ten patients had histologic evidence of malignant goiter, but only three of them had VCP on indirect

Table 3 Preoperative hoarseness and histology report

Pre-op hoarseness	Histology report			Total
	Benign	Malignant	Not done	
Yes	3	1	1	5
No	52	9	25	86
Total	55	10	26	91

laryngoscopy, five had normal vocal cords, and in two patients, indirect laryngoscopy was not done (Table 2). Expectedly, if the thyroid cancer is non-invasive, hoarseness is unlikely to be present as neither the RLN or the vocal cords would be infiltrated.

Two patients had hoarseness postoperatively but that resolved within 12 months of follow-up without any active management. There was no record of indirect laryngoscopy to determine the possible etiology of the voice symptom. Resolution of voice symptom does not necessarily exclude RLN damage since the contralateral cord can compensate and normalize the voice [27]. Also, voice change can occur in the setting of intact RLN. Typically, these patients undergo progressive normalization within 3–6 months, postoperatively [28].

Conclusion

It is true that voice symptoms cannot detect every case of VCP. Based on this, some workers have recommended laryngoscopy for all patients going for thyroidectomy. However, in the absence of malignancy and previous neck surgery, the percentage of patients who present with asymptomatic VCP becomes very low. This has been our finding in this study where the number of this category of patients was zero. For thyroidectomy patients, therefore, the authors advocate selective laryngoscopy for patients who have malignant goiter, those undergoing re-operation or any other reason that warrants a strong suspicion of VCP. This position is made stronger by the extra financial burden vocal cord screening entails for patients in resource-poor countries and the difficulty encountered in getting trained personnel to perform the examination.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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