

Systematic Evaluation of Vocal Cord Function is Critical for Thyroid Cancer Patients: A Patient of Left Papillary Thyroid Carcinoma with Left Vocal Cord Paralysis

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ABSTRACT

Temporary or permanent vocal cord paralysis caused by recurrent laryngeal nerve injury is one of the relatively common and serious complications of thyroid surgery. At the same time, there are many reasons for recurrent laryngeal nerve injury. Therefore, the recurrent laryngeal nerve should be paid attention to before, during and after thyroid surgery.

A 51-year-old woman was diagnosed with left papillary thyroid carcinoma. Unfortunately, the patient had a history of hoarseness following a patent ductus arteriosus ligation. We operated on her for thyroid cancer. Preoperative electronic laryngoscopy revealed paralysis of the left vocal cord, and intraoperative nerve monitor showed no signal of the left vagus nerve and recurrent laryngeal nerve. There was no improvement in hoarseness symptoms during postoperative follow-up three months.

There are many causes of vocal cord paralysis. In addition to the central injury, any nerve injury of vagus nerve from the brainstem nucleus suspicious to the laryngeal muscle pathway it innervates can cause vocal cord paralysis. Paying attention to the recurrent laryngeal nerve before, during and after surgery can effectively reduce the vocalization of recurrent laryngeal nerve injury.

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How to cite this article: Wu Z, Zhou C, Wu X, Hou Z, Yao Y, Wang Y. Systematic Evaluation of Vocal Cord Function is Critical for Thyroid Cancer Patients: A Patient of Left Papillary Thyroid Carcinoma with Left Vocal Cord Paralysis. Journal of Complementary Medicine Research, Vol. 14, No. 1, 2023 (pp. 28-30)

INTRODUCTION

Temporary or permanent vocal cord paralysis caused by recurrent laryngeal nerve injury is one of the relatively common and serious complications of thyroid surgery.^{1,2} At the same time, there are many reasons for vocal cord paralysis, which can be divided into central injury and peripheral injury. Central injuries include cerebral hemorrhage, cerebral infarction, cerebral trauma, Parkinson's disease, medullary tumor, syringomyelia and so on. Peripheral injury is an injury of the vagus nerve at any point along the pathway from the brainstem nucleus suspicious to the innervating laryngeal muscle. For example, iatrogenic injuries caused by surgery on thyroid, thoracic, mediastinum, neck, and lateral skull base; injury caused by compression or invasion of various tumors.^{3,4}

In order to evaluate the patient's preoperative vocal cord condition, provide reference for surgical decision, and compare with postoperative condition, preoperative routine laryngoscopy is very important.⁵ At the same time, the use of intraoperative neuromonitoring (IONM) during thyroid surgery to protect the recurrent laryngeal nerve (RLN) has been widely accepted.⁶

Recently, we admitted a patient with left papillary thyroid carcinoma who developed left vocal cord paralysis after ligation of patent ductus arteriosus. To our knowledge, there have been reports of left recurrent laryngeal nerve palsy after patent ductus arteriosus ligation, but no cases of concurrent left thyroid cancer have been reported.

KEYWORDS:

Patent ductus arteriosus ,
Recurrent laryngeal nerve,
Thyroid carcinoma,
Vocal cord paralysis.

ARTICLE HISTORY:

Received : Nov 15, 2022
Accepted : Dec 14, 2022
Published: Jan 10, 2023

DOI:

10.5455/jcmr.2023.14.01.05

CASE HISTORY

A 51-year-old female was admitted to hospital because “thyroid nodules were found on physical examination, which was diagnosed as suspected papillary carcinoma by needle aspiration pathology for 1 week”. The patient had been diagnosed with patent ductus arteriosus since childhood and had not been treated. At the age of 30, she developed symptoms of heart failure, such as recurrent cough, pink foaming sputum, sitting breathing and hoarseness. A thoracotomy ligation of the ductus arteriosus was performed. Postoperative symptoms of heart failure were relieved, but hoarseness was not. At this admission, electronic fiber laryngoscopy revealed left vocal cord paralysis (figure 1).

After admission, open thyroid surgery was performed, which was confirmed by intraoperative pathology as thyroid micropapillary carcinoma invading the thyroid capsule. The left thyroid gland lobe was removed and lymph nodes in the left central region were dissected, and the left recurrent laryngeal nerve was fully exposed (figure 2). During the operation, no vagus nerve signal V1 and recurrent laryngeal nerve signal R1 were detected by nerve monitor, and no R2 and V2 signals were detected by re-monitoring after thyroidectomy. Postoperative pathology of the patient was as follows: minimal papillary carcinoma of thyroid on the left side, with a volume of 0.5cm x 0.5cm x 0.3cm. The tumor tissue invaded the thyroid capsule, and no typical intravascular tumor plug or nerve invasion was observed. There was no metastasis in the central lymph nodes 0/8. After discharge, the patient received oral sodiumlevothyroxine, and the hoarseness symptom did not improve during the 3-month follow-up.

DISCUSSION

The incidence of thyroid cancer is increasing year by year, especially papillary thyroid cancer⁸. Surgical treatment is the main treatment for thyroid cancer, but the incidence of recurrent laryngeal nerve injury and parathyroid gland injury during surgery is still high.⁹ Although the incidence, causes, and preventative measures associated with laryngeal nerve paralysis have been examined extensively, there have

been further discussion on the systematic evaluation and management of Recurrent laryngeal nerve paralysis in thyroid cancer patients. We believe that it is particularly important to observe the recurrent laryngeal nerve dynamically and systematically before, during and after surgery to effectively reduce the probability of recurrent laryngeal nerve injury.

Preoperative electronic laryngoscopy can be used to determine the movement of vocal cords, while computerized tomography scan and ultrasound can be used to determine the location of the cancer, which is conducive to finding whether the tumor has invaded the recurrent laryngeal nerve.¹⁰

The application of intraoperative neuromonitoring (IONM) is helpful to identify recurrent laryngeal nerve, verify the integrity of nerve function, indicate nerve direction, reduce nerve injury and improve surgical safety. When the recurrent laryngeal nerve is monitored with IONM, the vagal nerve signal V1 is generally monitored first, followed by the recurrent laryngeal nerve signal R1, and the recurrent laryngeal nerve signal R2 and vagal nerve signal V2 are monitored again before the end of surgery. If the two monitoring signal values decreased by more than 20%, the presence of recurrent laryngeal nerve injury¹¹. In this case, V1, R1, R2, V2 signals were not detected, suggesting that the vagus nerve pathway was damaged, and the most likely damaged node was the beginning of the recurrent laryngeal nerve. At the same time, intraoperative anatomic exposure of the recurrent laryngeal nerve can effectively reduce the probability of nerve damage.

Postoperative, we should also pay attention to follow up the patient’s voice changes. Recurrent laryngeal nerve injury can lead to hoarseness in patients. Even if there is no obvious recurrent laryngeal nerve injury during surgery, some patients also show persistent hoarseness, decreased pitch, vocal fatigue and other symptoms. At this time, electronic fiber laryngoscopy can be performed to check the movement of vocal cords, and exclude the causes of vocal cord mucosal injury, cricothyroid muscle movement disorder, and injury of external branches of the superior laryngeal nerve caused by tracheal intubation. Systematic voice training can improve voice problems in these patients.

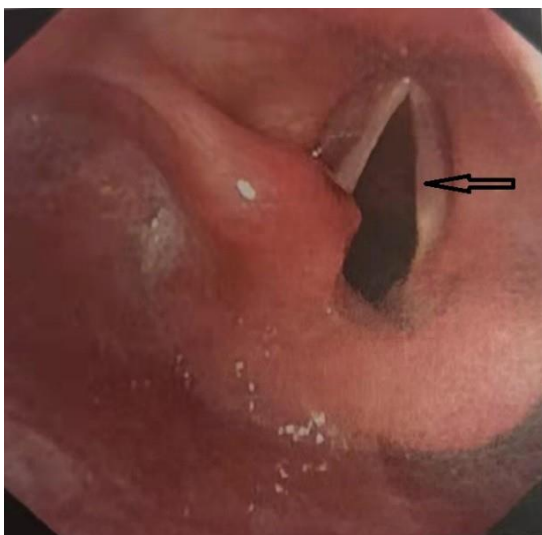


Fig. 1: As indicated by the arrow, electronic fiber laryngoscopy revealed limited abduction of the left vocal cord



Fig. 2: During the operation, the left recurrent laryngeal nerve was dissected and the nerve integrity was confirmed

Reviewing this case, we know that patent ductus arteriosus is not uncommon in clinical practice. When patent ductus arteriosus causes enlargement and thickening of the lateral infundibular part of the aorta, especially when pulmonary artery pressure increases, resulting in pulmonary artery dilation and pulling compression of the left recurrent laryngeal nerve, left vocal cord paralysis will occur. This may be the reason why the patient was hoarse before the patent ductus arteriosus ligation. However, the symptoms of heart failure were relieved after the ligation of patent ductus arteriosus, but hoarseness was not. It was considered that the left recurrent laryngeal nerve was damaged by blind ligation of the catheter during the ligation of patent ductus arteriosus, resulting in left vocalcord paralysis. At the same time, the left recurrent laryngeal nerve has a slightly lower starting point and travels up to the neck around the subaortic arch, which is longer than the right recurrent laryngeal nerve that travels around the subclavian artery to the laryngeal muscle and is more vulnerable to injury¹².

CONCLUSION

Based on the clinical data of a patient with left papillary thyroid carcinoma who had left vocal cord paralysis after patent ductus arteriosus surgery, we systematically reviewed the importance of dynamic observation of the recurrent laryngeal nerve before, during and after thyroid surgery, and systematic observation and follow-up can effectively reduce the probability of recurrent laryngeal nerve damage.

REFERENCES

1. Sinclair C, Bumpous J, Haugen B, Chala A, Meltzer D, Miller B, et al. Laryngeal examination in thyroid and parathyroid surgery:

An American Head and Neck Society consensus statement: AHSN Consensus Statement. 2016; 38:811-9.

- Schneider M, Dahm V, Passler C, Sterrer E, Mancusi G, Repasi R, et al. Complete and incomplete recurrent laryngeal nerve injury after thyroid and parathyroid surgery: Characterizing paralysis and paresis. 2019; 166:369-74.
- Woodson GJTJol, otology. Evolving concepts of laryngeal paralysis. 2008; 122:437-41.
- Merati A, Halum S, Smith TJTL. Diagnostic testing for vocal fold paralysis: survey of practice and evidence-based medicine review. 2006; 116:1539-52.
- Franch-Arcas G, González-Sánchez C, Aguilera-Molina Y, Rozo-Coronel O, Estévez-Alonso J, Muñoz-Herrera ÁJGs. Is there a case for selective, rather than routine, preoperative laryngoscopy in thyroid surgery? 2015; 4:8-18.
- Kim J, Kim S, Xu Z, Kwak J, Ahn J, Yu H, et al. Efficacy of Intraoperative Neuromonitoring in Reoperation for Recurrent Thyroid Cancer Patients. 2020; 35:918-24.
- Nakao M, Sawayama T, Samukawa M, Mitake H, Nezu S, Fuseno H, et al. Left recurrent laryngeal nerve palsy associated with primary pulmonary hypertension and patent ductus arteriosus. 1985; 5:788-92.
- Kim J, Gosnell J, Roman SJNrE. Geographic influences in the global rise of thyroid cancer. 2020; 16:17-29.
- Adam M, Pura J, Gu L, Dinan M, Tyler D, Reed S, et al. Extent of surgery for papillary thyroid cancer is not associated with survival: an analysis of 61,775 patients. 2014; 260:601-5; discussion 5-7.
- Chiang F, Lin J, Lee K, Wang L, Tsai K, Wu C, et al. Thyroid tumors with preoperative recurrent laryngeal nerve palsy: clinicopathologic features and treatment outcome. 2006; 140:413-7.
- Tomoda C, Hirokawa Y, Uruno T, Takamura Y, Ito Y, Miya A, et al. Sensitivity and specificity of intraoperative recurrent laryngeal nerve stimulation test for predicting vocal cord palsy after thyroid surgery. 2006; 30:1230-3.
- Saito Y, Takeuchi H, Fukuda K, Suda K, Nakamura R, Wada N, et al. Size of recurrent laryngeal nerve as a new risk factor for postoperative vocal cord paralysis. 2018; 31.