



Unilateral Vocal Fold Paralysis in Adults: Etiological Factors in Yemen

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ABSTRACT

Background: Unilateral vocal fold paralysis is common finding in otolaryngology practice. It is not a diagnosis by itself. The exact incidence of unilateral vocal fold paralysis has been difficult to find out because of multiple reasons. Various etiologies known to cause this condition are neck surgery, cancer, neck trauma, and neurological disorders.

Objective: The aim of this study was to determine the possible etiologies of unilateral vocal fold paralysis in adult patients.

Methods: A hospital-based study was conducted at OtoLaryngology Department, Al-Thawra Teaching Hospital, Sana'a, Yemen, between January 2014 -June 2018. Patients have unilateral vocal fold paralysis were enrolling in this study. All patients underwent to history, clinical examination, laboratory investigations, and radiological studies, X- ray, CT, MRI).

Results: A total of 80 patients with unilateral vocal fold paralysis, males 59 (73.6%), females 21 (26.4%). Age ranged from 18-80 years, mean age 51.5 years. Left vocal fold paralysis (72.5%), while right side was (27.5%). Peripheral causes (93.7%). Idiopathic (32.5%), malignancy (31.2%), trauma (21.2%), TB (7.5%), while central causes were (6.3%), and Guillain Barre (GB) syndrome (1.3%).

Conclusion: Left vocal fold paralysis was the most common finding. Idiopathic was the most common cause, followed by malignancies and trauma. Thyroidectomy continues to be the single most surgical procedures responsible for unilateral vocal fold paralysis. For this reason, pre and post thyroidectomy laryngoscopy should be considered in all patients undergoing thyroid surgeries

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1. Introduction:

Unilateral vocal fold paralysis (UVFP) is defined as immobility of the vocal cord due to disruption of the motor nerve supply the larynx [1]. Various etiologies known to cause this condition are neck surgery, cancer, trauma, neurological disorders and inflammatory

diseases [2,3,4]. Unilateral paralysis of the intrinsic laryngeal muscles preventing the vocal fold on affected side adduction to the midline lead to severe breathy or whispered air wastage [3]. Paralysis of recurrent laryngeal nerve (RLN) due to either surgical, iatrogenic injury or extra-laryngeal malignancies at any point along

its course from the jugular foramen to mediastinum [5,6]. The patients are presenting with hoarseness of voice, aspiration, and shortness of breathing [7].

However, many of patients are clinically asymptomatic and the presence of UVFP may be only incidentally detected. In many such asymptomatic cases, a slow growing malignancy with secondary involvement of the vagus or RLNs may result in computed tomography imaging findings that presented the clinical manifestations of VFP [8,9]. Trauma, cancer and surgery are the most common causes of vocal fold paralysis.

Nevertheless, some cases are associated with idiopathic causes. For this reason, in case of vocal cord paralysis, the actual effect should be observed in detail [10]. In ascertaining the cause, the physician needs to differentiate between central and peripheral lesion, as well as unilateral versus bilateral [11].

The aim of this study is to determine the possible etiologies of acquired UVFP in Adult patients.

2. Subjects and Methods:

A hospital-based study conducted at the Department of OtoRhinoLaryngology, Head & Neck Surgery, Al-Thawra Teaching Hospital, Sana'a, Yemen. A total of 80 patients have unilateral vocal fold paralysis were enrolled in this study, between January 2014 and June 2018. A detailed history was taken from each patient. A complete clinical examination of each patient also performed to detect the causes of the lesion. Each patient was examined endoscopy and radiology. All patients are examined by flexible endoscopy and direct laryngoscope. A high-resolution CT imaging of the neck, brain and chest for each patient was also performed. We excluded children, patients with cancer larynx. and cricoaryteoid joint fixation T, B. cases were diagnosed at medical department, they were on anti T.B. drugs and referred to E.N. T. department for evaluation, while cancer cases diagnosed by biopsy and histological study. All files of the patients reviewed and the following

information was recorded: patients age sex, presenting feature and causes of vocal fold paralysis. If all procedures are performed and no etiology is found, patients with vocal fold paralysis is placed in "idiopathic" category. The study was approved by Ethic Board of the Department of OtoRhinoLaryngology, Head and Neck Surgery. Informed consent was obtained from each patient.

3. Statistical analysis:

The data was checked for completeness, coded then entered into computer by statistical package for social sciences. Obtained data was analyzed using descriptive statistical tools (frequencies and percentages). Finally, the data was presented in tables and graphs by using computer applications.

4. Results

A total of 80 patients has unilateral vocal fold paralysis, males 59 (73.6%), females 21 (26.4%). Their age ranged from 18-80 years with a mean age (51.48years). Patient symptoms shown in table (1). Change of voice was found in all patients, breathy voice found in 40 patients (50%), aspiration and cough occurred in 30 patients (37.5%) for each. The left side UVFP was 58 (72.5%) of the patients, while right side affection was 22 (27.5%) of the patients. Peripheral causes were 75 (93.7%) patients and central causes in 5(6.3%) patients. Regarding position of the vocal fold paralysis, paramedian position was found in 70 (87.5%) patients, while lateral position was occurred in 10 (12.5%) patients, one of them due to chest lesion.

Table 1. Symptoms of unilateral vocal fold paralysis, n=80

Symptoms	NO	%
Change of voice	80	100
Breathy voice	40	50
Aspiration	30	37.5
Cough	30	37.5
Dysphagia	12	15
Difficult breathing	8	10
Stridor	7	8.8

Causes of unilateral vocal fold paralysis shown in table (2) and figure (1) shown the main etiological groups. The main cause of unilateral vocal fold paralysis in our study was idiopathic 26 cases (32.5%), followed by malignancy 25

cases (31.2%), neck trauma, either surgical or accidental 17cases (21.5%), and less rate caused by Guillain^s Barre syndrome one case (1.3%).

Table 2. Causes of unilateral vocal fold paralysis, n=8

Causes	NO.	%
Idiopathic	26	32.5
Malignancy	25	• Thyroid 8
		• Pyriform fossa 5
		• Nasopharynx 5
		• Oesophagus 4
		• Lung 3
Trauma	17	▪ Thyroid 7
		▪ Neck 5
		▪ Cardiac 5
TB	6	7.5
Central	5	6.0
Guillain-Barre syndrome	1	1.3
Totat	80	100

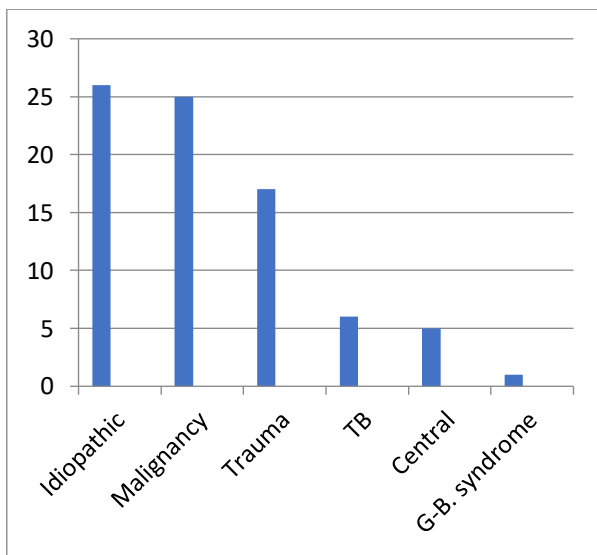


Fig.1.Etiological groups.

5. Discussion.

Unilateral vocal fold paralysis occurs due to the damage of (RLN) or vagus nerve which innervate the larynx. Patients present with breathy sound because of incomplete closure of the vocal cords. However, they may complaint of aphonia or shortness of breath [12,13]. Recurrent laryngeal nerve paralysis (abductor paralysis of the larynx) may occur with left RLN paralysis more than right side. This type of lesion results

in paralysis of all the intrinsic muscles of the larynx except the cricothyroid muscle which is innervated by the superior laryngeal nerve [14]. The left RLN is more vulnerable to injury than the right, because the left RLN course is longer. [15, 16-17], In our study, we found the left side paralysis in (72.5%) and right side (27.5) this result similar to previous studies [14-18]. Regarding the position of vocal fold, we found in the paramedian position in (78.5%) and in the lateral position (12.5%). The patients with RLN paralysis were presented with paramedian position of paralysed vocal folds, while the lateral position was found when the causes located in the base of the skull or intracranial due to affection of the superior laryngeal nerve and recurrent laryngeal nerve. These results consistent with previous studies [13,14].

One case suffering of cancer lung was presented with the left vocal fold paralysis in the lateral position. Howard¹⁵ reported that clinically it is not uncommon to see patients with intrathoracic lesion (which produce a pure recurrent palsy) with paralysed vocal cord in the lateral position. Purported explanations for this are stretching of the nerve by the intrathoracic lesion thus pulling the vagus nerve down from the skull base and injuring the superior laryngeal nerve and possible retrograde atrophy of the

vagus nerve to the nucleus ambiguus [15]. Change of voice, breathy voice, aspiration, and cough were common presenting symptoms. Aspiration was occurred because of loss and disordered cough reflex. These results similar to the previous studies [7,16,17], which reported that hoarseness of voice, intermittent stridor, breathy voice and aspiration. The patients that suffering of pyriform, oesophageal, and advanced thyroid cancers, complaining of dysphagia (15%) in addition to respiratory symptoms we believed that caused by pressure effect of the mass and invasion of RLN by cancers. This is consistent with results reported another study, were suggested that this symptom is result of compression of adjacent structures by the mass and/ or invasion of the RLN by malignancies. Unilateral vocal fold paralysis has multiple etiologies, a neoplasm, trauma, mechanical dysfunction, or central nervous system dysfunction; also, it may be a sequela of extensive thoracic surgical treatment or thyroidectomy [19,20,21]. Idiopathic UVFP was the most common cause in our study, occurred in (32.5%) of cases. Incidence of idiopathic UVFP in previous studies were ranged from (18.-33.3%) Urguhart and Luis [21], reported that (18.1%) of cases due to idiopathic, Al-khtoum et al.[22] found idiopathic in (18.9%) of cases, Havas et al.[23] reported that (33.3%) cases due to idiopathic, while Pavithran et al.[24] reported that (42.1%) of cases were due to idiopathic causes. There is variation in the incidence of idiopathic ULVF paralysis between different studies, this may be due to follow up and methods of investigations of cases. With recent improved imaging techniques, causative reason for vocal fold paralysis is often identified, resulting in decrease in the incidence of cases labeled as "idiopathic" after clinical examination [25]. Malignant neoplasm was second cause of UVFP in our study (31.2%) of cases. the most of them due to thyroid malignant (32%), followed by pyriform fossa, and nasopharynx (20%) for every area, esophagus and lung cancers had been found as causes of UVFP. Malignant neoplasm has been as the most common cause of

extralaryngeal UVFP [26]. Neoplasms of the thyroid, esophagus, mediastinum and the lung are not infrequently complicated by recurrent laryngeal nerve paralysis [22]. Previous studies found the most common malignancy causing UVFP originated from the lung [5,27]. Varghese et al.[11] found the commonest cause for unilateral fixity of vocal cord is its paralysis due to damage to RLN or vagus nerve due to malignant infiltration. Traumatic causes found in (21.3%) of cases in our study, post-thyroidectomy UVFP was found in (41.2%) of traumatic cases. Thyroidectomy was the most individual surgical procedure responsible for iatrogenic UVFP. But the incidence of non-thyroidectomy surgeries, neck and cardiac trauma (58.8%). The results of our study consist with the previous studies, Rosenthal et al.[5] reported that thyroidectomy caused (34%) of iatrogenic UVFP, non-thyroidectomy trauma caused (66%) of VFP Jayanthi et al.[24] reported that thyroidectomy was caused (40.7%), and non-thyroidectomy (59.9%). However, two studies by Ko et al.[10] and Srirompoton et al.[28] have reported that the incidence of thyroidectomy that leads to UVFP was more than non-thyroidectomy trauma (neck trauma and cardiac surgery), Rosenthal et al.[5] found that among non-thyroidectomy, anterior cervical spine surgery (15%), and cardiac surgery (9%), Jayanthi et al.[24] reported that (5.9%) of UVFP caused by cardiac surgery. This results less than our results. Neck non-surgical trauma in our study, found in (29.4%) of cases due to gun-shot and stab wound, where these types of trauma are common in our country, so its higher than that reported in other studies.[24,29]. TB chest estimated (7.5%) of cases in our study, because this disease is high prevalence in our country. The incidence of mediastinal masses was reported 4- 9/10,000.¹⁷ While investigating the causes of RLN paralysis, malignancies and tuberculosis should be considered in developed countries and in immigrants of the developed industrialized countries [30]. Fibrosis in chronic pulmonary tuberculosis in upper lobes and scar tissue may affect the RLN[31]. Damaged RLN

may be due to lymph node compression and mediastinal fibrosis [12,32]. Guillain-Barre syndrome (GBS) found in (1.3) in our study. GBS syndrome, considers as very rare cause of unilateral vocal cord paralysis [33].

Central causes of UVFP occurred in (6.5%) of our patients, three patients due to cerebrovascular accidents, and two patients secondary to intracranial cancer. Previous studies [24,29] reported (12.4%) and (15%) UVFP due to central causes, these were double our results. The previous studies patients were old age above 50 years (48.3%), in our study, the old patients above 50 years were (20%) only this may be the reason for difference in these results.

Today it is possible for the clinician to utilize the information obtained from electrodiagnostic method and postoperative laryngeal electromyography, to characterized nerve injury and predict temporal and function results of healing process. It is important to do so in order to be prepared for additional, intervention, such as voice therapy, medicalization, or regeneration / reinnervation therapy.

6. Conclusion.

Unilateral vocal fold paralysis has got a variable etiology. Idiopathic was the most common cause followed by malignancies, and trauma. Thyroidectomy continues to be the single most common surgical procedure responsible for unilateral vocal fold paralysis. For this reason, pre and postoperative laryngoscopy should be considered in all surgeries with potential risk for recurrent nerve paralysis to reduce the postoperative morbidity. However, understanding the etiology of vocal fold paralysis should play a significant role in prevention and management of paralysis [34,35].

7. References

[1] Daya H, Hosni A, Bejar-solar I, Evans JN, Bailey CM. Paediatric vocal fold paralysis: Along term retrospective study. Arch Otolaryngol Head Neck Surg 2000;126:21-5.

[2] Sapundzhiev N, Lichtenberger G, Eckel HL, Friedrich G, Zenev I, Toohill RJ, et al. Surgery of adult bilateral vocal fold paralysis in addiction: History and trend. Eur Arch Otorhinolaryngol 2008;265:1501-14.

[3] Dursun G, Sataloff R, Spiegel J, Mandal S, Hemer R, Rosen D. Superior laryngeal nerve paresis and paralysis. J Voice 1996;10:206-11.

[4] Cohen MC, Mehta DK, Maguire RC, Simons JP. Injection medialization laryngoplasty in children. Arch Otolaryngol Head Neck Surg 2011;137(3):264-8.

[5] Rosenthal LH, Benninger MS, Deeb RH. Vocal fold immobility, a longitudinal analysis of etiology over 20 years. Laryngoscope 2007;117(10):1864-70.

[6] Zhao X, Roth K, Fung K. Type 1 thyroplasty: Risk stratification approach. J Otolaryngol Head and Neck Surg 2010;39:757-61.

[7] Friedman AD, Burns JA, Heaton JJ, Zeitels SM. Early versus late injection medialization for unilateral vocal cord paralysis. Laryngoscope 2010;120(10):2042-6.

[8] Collaso-clavell ML, Gharib H, Maragos NE. Relationship between vocal cord paralysis and benign thyroid disease. J Head Neck Surg 1995;17:24-30.

[9] Paquette CM, Manos DS, Psooy BJ. Unilateral vocal cord paralysis: A review of CT findings, mediastinal causes, and the course of recurrent laryngeal nerve. Radiographics 2012;32:721-40.

[10] Ko HC, Lee LA, Li HY, Fag T. Etiological features in patients with unilateral vocal fold paralysis in Taiwan. Chang Gung Med J 2009;32(3):290-6.

[11] Varghese BT, Sebastian P, Divya GM. An usual cause for cord palsy: Case record. I J O P L 2012;2(2):88-90.

[12] Dikici O, Bayar Muluk N. Left vocal cord paralysis due to lymphadenopathy of mediastinal tuberculosis. J Med Update 2013;3(2):98-100.

[13] Hughes RGM, Morrison M. Vocal cord medialization by transcutaneous injection of calcium hydroxylapatite. J Voice 2005;19:674-82.

[14] Chang MH, Wang CP, Anliu S. Prognostic indicators of unilateral vocal fold paralysis. Arch Otolaryngol Head Neck Surg 2008;134(4):380-8.

[15] Howard D. Neurological affections of the pharynx and larynx. In: John Hibbert (eds). Scott-Brown's Otolaryngology Head Neck surgery (6th ed). Butterworth-Heinemann, Oxford 1997;5/9/1-20.

[16] Barnett GC, Smith IE, Well FC, Shneerson JM. Vocal fold palsy due to Plombage for tuberculosis: Clinical report. J Laryngol Otol 2005;119:138-9.

- [17] Yidiz D, Turut H, Sirmali M, et al. Mediastinal kitlelerde cerrahiyaklasim: 142 olgunum derlendirmesi. Suleyman Deirel Universitesi Tip Fakultesi Dergisi 2005;12:1-5.
- [18] Samita S, Chouksey S. A study of clinicopathological profile of hoarseness of voice. Indian J. of Otolaryngol Head and Neck Surgery 2017, 69(2): 244-247
- [19] Sinniappan S, Krishnan G, Kumar C S, Paniker A M, Nair V K, Radhakrishnan S. Clinico-etiological profile of vocal cord paralysis. Bengal J. of Otolaryngol, Head and Neck Surgery 2019, 27 (3): 230-35
- [20] Ryu S, Nam SY, Han MW, Choi S H, Kim SY, Roh JL. Long-term voice outcomes after thyroplasty for unilateral vocal fold paralysis. Arch Otolaryngol Head Neck Surg 2012;138-(4):347-51.
- [21] Urguhart AC, Luis ES. Idiopathic vocal cord palsies and associated neurological conditions. Arch Otolaryngol Head Neck Surg 2005;131(12) 1086-9.
- [22] Al-khtoum N, Shawakfeh N, Al-safadi E, Al-momani O, Hamasha K. Acquired unilateral vocal fold paralysis: retrospective analysis of a single institutional experience. North Am J Med Sci 2013;5((12):699-702.
- [23] Havas T, Lowinger D, Priestly J. Unilateral vocal fold paralysis causes, option and outcomes. Aust NZJ Surg 1999;69;509-13.
- [24] Jayanthi P, Menon JR. Unilateral vocal fold palsy: An etiological study. I J O P L 2011;1(1):1-5.
- [25] Robinson S, Pitkaranta A. Radiological findings in adult patients with vocal fold paralysis. Clin Radio 2006;61:863-7.
- [26] Kearsely JH. Vocal fold paralysis (VCP)-An aetiological review of 100 over 20 years. Aust NZJ Med 1981;11:663-6.
- [27] Yumoto E, Minoda R, Hyodo M, Yamagata T. Causes of recurrent laryngeal nerve paralysis. Auris Nasus Larynx 2002;29:41-5.
- [28] Srirompotong S, Sae-Seow P, Srirompotong S. The cause and evaluation of unilateral vocal cord paralysis. J Med Assoc Thai 2001;84:855-8.
- [29] Gupta J, Varshney S, Bhagat S. Clinico-Etiological study of vocal cord paralysis. Indian J Otolaryngol Head Neck Surg 2013;65 (1) 16-19.
- [30] Meral M, Akgun S, Kaynar H, Mirici A, Gorguner M, Saglam L, et al. Mediastinal lymphadenopathy due to mycobacterial infection. Jpn J Infect Dis 2004;57:124-6.
- [31] Gupta SK. The syndrome of spontaneous laryngeal palsy in pulmonary Tuberculosis. J Laryngol Otol 1960;74:106-13.
- [32] Rafay MA. Tuberculosis lymphadenopathy of superior mediastinum causing vocal cord paralysis. Ann Thorac Surg 2000;70:2142-3.
- [33] Yoskovitch A, Kantor S. Cervical osteophytes presenting as unilateral vocal fold paralysis and dysphagia. J Laryngol Otol 2001;115:422-4.
- [34] Phelan E, Schneider R, Lorenz K, Dralle H, Kamani D, Potenza A, et al. Continuous vagal IONM prevents recurrent laryngeal nerve paralysis by revealing initial EMG changes of impending neuropraxic injury: a prospective, multicenter study. Laryngoscope 2014; 124(6):1498-505.
- [35] Matsson P, Hydman J, Sevansson M. Recovery of laryngeal function after intraoperative injury to recurrent laryngeal nerve. Gland Surg 2015;4(1):27-35.