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, flowed 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 (51.48 years). 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

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>NO</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change of voice</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Breathy voice</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Aspiration</td>
<td>30</td>
<td>37.5</td>
</tr>
<tr>
<td>Cough</td>
<td>30</td>
<td>37.5</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Difficult breathing</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Stridor</td>
<td>7</td>
<td>8.8</td>
</tr>
</tbody>
</table>
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 17 cases (21.5%), and less rate caused by Guillain-Barré syndrome one case (1.3%).

<table>
<thead>
<tr>
<th>Causes</th>
<th>NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic</td>
<td>26</td>
<td>32.5</td>
</tr>
<tr>
<td>Malignancy</td>
<td>25</td>
<td>31.2</td>
</tr>
<tr>
<td>Thyroid</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Pyriform fossa</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Nasopharyx</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Oesophagus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td>17</td>
<td>21.5</td>
</tr>
<tr>
<td>Thyroid</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Central</td>
<td>5</td>
<td>6.0</td>
</tr>
<tr>
<td>Guillain-Barre syndrome</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Totat</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

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 aphony 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. Howard [15] 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 ambiguous [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 Jayanthy 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%), Jayanthy 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].
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


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