

Respiratory and phonatory impairment due to iatrogenic vocal fold paralysis and paresis. A retrospective study of 188 patients

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Abstract: Purpose: We conducted a retrospective descriptive study comprising the patients diagnosed with vocal cords paralysis in the ENT Clinic from Coltea Clinical Hospital Bucharest in order to inventory the iatrogenic cases.

Scientific background: The leading causes are trauma for vocal fold paralysis and paresis both surgical and nonsurgical, neoplasm and central nervous system diseases. Even with the multitude of current modern diagnostic investigations a large number of cases remain idiopathic. Adults suffer unilateral paresis more often than bilateral disease and left-sided lesions account for around two thirds of unilateral cases. The leading operation responsible for iatrogenic injury to both vocal folds is the total thyroidectomy. Intubation injuries commonly cause bilateral disease.

Patients and methods: The descriptive analysis of our study group focused on gender distribution, age groups distribution, types of lesions according to ICD10 criteria and identifying current etiologies such as: surgery, neoplasm, idiopathic, CNS lesions, intubation, etc.

Results and discussions: According to our data the study group presents numerous specific characteristics: male predominance, almost equal distribution between rural and urban living environment, maximum number of cases in between the ages of 55 and 74 years, etc. We have identified 23,40% iatrogenic lesions. Unfortunately almost all the bilateral lesions were associated with thyroid surgery.

Conclusions: There are a great number of bilateral and unilateral iatrogenic lesions associated with surgical procedures because Romania is endemic for thyroid pathology

Key Words: vocal fold paralysis and paresis, iatrogenic injury, total thyroidectomy, laryngeal nerve lesions, phonosurgery.

The nerve supply to the larynx is long and circuitous, highlighted by the left recurrent laryngeal nerve (RLN) coursing around the aortic arch. Complete interruption of laryngeal nerve pathway results in vocal fold paralysis. It should be stressed that a true paralysis is a rare condition, and that most patients have a partial nerve deficit, or paresis. Complete paralysis of the larynx is usually seen with complete transection of the RLN and superior laryngeal nerve (SLN). More often an injury results in neuropraxic damage to a portion of the motor nerve.

Other causes of partial deficits include an interrupted vascular supply and nerve regeneration resulting in laryngeal function months after the initial nerve injury. Therefore, most patients present with a paresis. The differential diagnosis and evaluation of vocal fold paralysis and paresis differ based on known or unknown etiology, bilateral versus unilateral disease, and whether the patient is a child or an adult [1,2].

The etiologies of vocal fold paralysis and paresis are numerous. Trauma (both surgical and nonsurgical), neoplasm, and central nervous system disease are the leading causes in both children and adults.

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Often after an extensive evaluation a large number of cases remain idiopathic. Comparing unilateral and bilateral vocal fold paresis across age classification demonstrates that adults suffer unilateral paresis more often than bilateral disease [3].

Left-sided lesions account for around two thirds of unilateral cases, as the long anatomic course of the left RLN is more frequently interrupted during surgery and by pulmonary neoplasm [4].

Across the past three decades the etiology of adult unilateral vocal fold immobility has remained stable. The primary causes are surgical trauma and extralaryngeal malignancy, with pulmonary and mediastinal tumor representing the most common locations [5,6]. The next largest category is idiopathic, ranging from 11 to 42% [6].

Central nervous system disorders, nonsurgical trauma, and intubation are common but less frequent causes of unilateral laryngeal nerve deficit. Iatrogenic injury is the leading cause of adult bilateral vocal fold paralysis. The singular operation responsible for the surgical trauma to both vocal folds is the total thyroidectomy. Fortunately, recent studies demonstrate a decreasing proportion of bilateral vocal fold paralysis due to thyroidectomy, decreasing from 58% to 30% [7].

This decrease may be a function of subspecialization, as endocrine specialists are now primarily responsible for surgical management of thyroid disease. Intubation injuries commonly cause bilateral disease; however, it is rare for a malignancy to affect both RLNs. When malignancies result in bilateral disease, immobility occurs precipitously and is the result of a very aggressive neoplasm, such as an anaplastic thyroid tumor or submucosal tumor extension. Viral illness is speculated to cause a large percentage of idiopathic vocal fold paresis. There are many case reports of laryngeal paresis associated with reactivated herpes simplex virus (HSV) and more rarely cytomegalovirus, Epstein-Barr virus, and post polio patients [8].

Two rare causes of laryngeal paralysis are familial disease and vincristine chemotherapy. The hereditary forms cause bilateral paralysis and include patterns suggesting both an X-linked and autosomal dominant inheritance. Vincristine's peripheral neurotoxicity has been reported to cause both bilateral and unilateral laryngeal paralysis in children and adults [9-10].

Given the fact that there aren't sufficient epidemiological data about this pathology in Romania, although it could have in some cases legal implications, we decided to inventory the cases admitted to our department during 2008 and 2011.

OBJECTIVES, MATERIALS AND METHODS

We conducted a retrospective descriptive study comprising the patients diagnosed with vocal cords paralysis in the ENT Clinic from Coltea Clinical Hospital

Bucharest during 2008-2011. The study group contains 188 cases.

Our study's objectives are:

1. Descriptive analysis of our study group (gender distribution, age groups distribution, types of lesions);
2. Analysis of the etiologies for vocal cord paralysis presented by the patients addressing our unit (surgery, neoplasm, CNS lesions, intubation, viral infections, chemotherapy, idiopathic);
3. Descriptive analysis of iatrogenic cases;

Inclusion criteria for our study group:

1. Were included only those patients with traceable complete examination charts;
2. The patient should have had at least one follow-up after the initial diagnosis;
3. If the etiology was neoplasm we took into account only those with histopathology diagnosis of certainty.

Exclusion criteria for the cases in our study group:

1. We have excluded all the cases without traceable or with incomplete examination charts;
2. We did not analyze the patients without at least one follow-up after the initial diagnosis;
3. We did not take into our study group those patients without histopathology diagnosis of certainty if the etiology was neoplasm.

Therefore we have identified 212 cases of vocal cord paralysis admitted to our hospital but 24 cases were excluded, 15 didn't meet the inclusion criteria and 9 were subsequent admissions of the same patients to different departments in our hospital.

For classifying the types of lesions we used the ICD10 system. There are 4 categories.

- Unspecified paralysis of the vocal cords and larynx - where the actual etiology could not be identified and we have only a suspicion, regardless of unilateral or bilateral lesions.
- Partial unilateral paralysis of the vocal cords and larynx – the patient did not associate respiratory insufficiency.
- Complex unilateral paralysis of the vocal cords and larynx - where the patient had some degree of respiratory insufficiency.
- Partial bilateral paralysis of the vocal cords and larynx.

For statistical analysis we have used Microsoft Excel and SPSS. We would like to thank InfoWorld our statistics department for their help in the initial inventory of the cases admitted to our hospital.

RESULTS AND DISCUSSIONS

From the point of view of case distribution per sexes inside our study group we observed a male predominance with 117 (62%) cases which is not in agreement with literature data that put thyroid pathology

on the first place with a female predominance, Table 1.

Our patients came from rural and urban areas in almost equal percents, Table 1.

Table 1. Descriptive statistics

| | Number of cases |
|--------|-----------------|
| MALE | 117 (62%) |
| FEMALE | 71 (38%) |
| URBAN | 92 (49%) |
| RURAL | 96 (51%) |

Age groups distribution presents a maximum number of cases inside the age groups 55-64 years and 65-74 years, Figure 1.A.

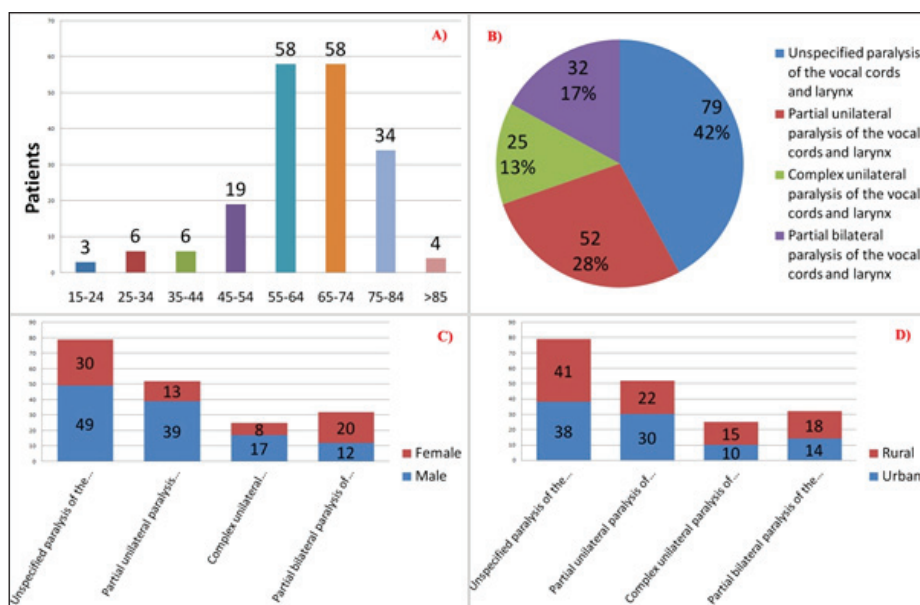


Figure 1. A) Age groups distribution inside our study group; B) Distribution of ICD10 types of lesion inside the study group; C) Distribution of ICD10 types of lesion per sex inside the study group; D) Distribution of ICD10 types of lesion per environment inside the study group.

The number of cases recorded in our unit has a linear growing evolution suggesting that the etiologic factors are not diminished. Regarding the evolution of case numbers per age groups we are glad to observe a linear decreasing number of patients with ages between 15 and 44 years.

Using this classification there is a majority of cases with unspecified paralysis of the vocal cords and larynx, Figure 1.B. This type of lesion has a growing number of cases during our study period while the other 3 types decrease.

We engaged our fellow colleagues in a series of discussions on this matter. It has been singled out the fact that our staff associates this ICD10 code with idiopathic lesions. On the contrary the lesions classified as bilateral partial paralysis of the vocal cords and larynx is almost exclusively associated with total thyroidectomy.

There is a female predominance among the patients with partial bilateral paralysis of the vocal cords

and larynx which brings further evidence to sustain the connection between this type of lesion and thyroid surgery given the endemic female thyroid pathology present in Romania, Figure 1.C.

Characteristic to Romania, despite the pathology taken into discussion, is a rural predominance of the cases with severe lesions due to the fact that these patients have a poor access to the healthcare system till advanced stages of their disease, Figure 1.D.

The etiologies were grouped in the following categories: lymphoma, idiopathic, post thyroidectomy, aortic dilatation, esophageal cancer, trauma, endotracheal intubation, laryngeal cancer, phonatory overexertion, mediastinal nodules, and CNS lesions. The category mediastinal nodules comprise both malignancies that present with compressing mediastinal masses and other mediastinal pathologies such as sarcoidosis.

Laryngeal cancer ranks first given our expertise in this area of treatment followed by thyroidectomy as Romania is an endemic country for thyroid diseases. It seems that we do not have all the diagnostic means necessary as idiopathic cases rank third, Figure 2.A.

Obviously there is a majority of lesions on the left side but we discovered an almost equal proportion of bilateral impairment because our unit receives all the difficult cases sent from the territory, Figure 2.B. Alarming is the growing linear number of cases with bilateral lesions in conjunction with a constant evolution of right sided cases.

Various carcinomas have an increasing influence on the etiology of vocal cord paralysis whereas other possible factors have a constant or declining proportion. Among the cases with bilateral vocal cord paralysis and acute respiratory insufficiency thyroidectomy ranks first followed by laryngeal cancer and mediastinal nodules. These were severe cases, some of them being brought in straight from the operating room of other departments.

In order to ascertain the iatrogenic cases we have eliminated the cases with unspecified paralysis of the vocal cords and larynx because the actual etiology could not be identified and we have only a suspicion. Also we included only those cases which suffered a previous medical procedure related to the current pathology.

These cases were classified according to the following possible etiologies: thyroidectomy, esophageal cancer, endotracheal intubation and mediastinal nodules. Thus we discovered a total number of 44 iatrogenic situations, Table 2.

Table 2. Impact of iatrogenic lesions

| | TOTAL | IATROGENIC |
|-------------------------|-------|-------------|
| Number of cases | 188 | 44 (23,40%) |
| Thyroidectomy | 36 | 19 (52,77%) |
| Esophageal cancer | 14 | 8 (57,14%) |
| Endotracheal intubation | 8 | 6 (75%) |
| Mediastinal nodules | 25 | 11(44%) |
| Right side lesions | 40 | 8 (20%) |
| Left side lesions | 70 | 17 (24,28%) |
| Bilateral lesions | 78 | 19 (24,35%) |

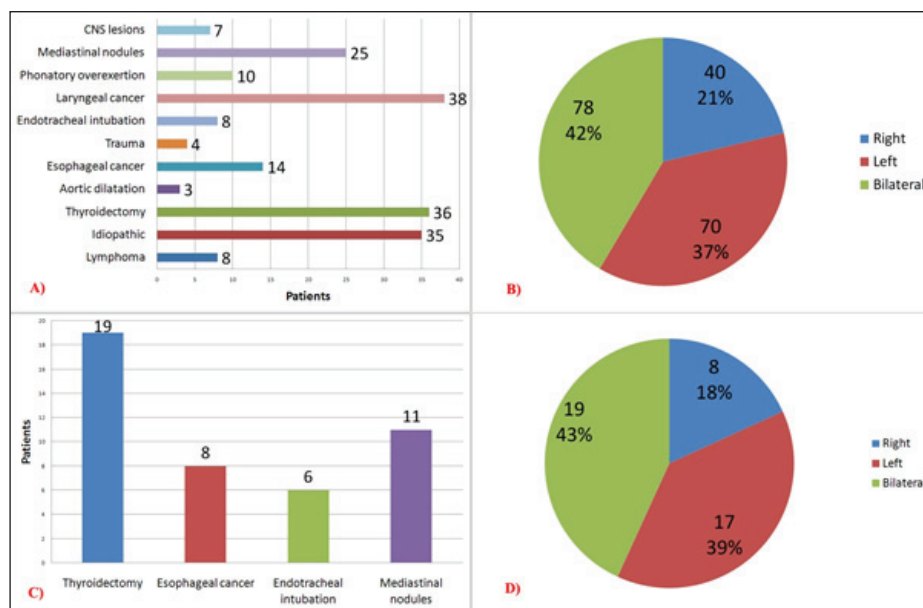


Figure 2. A) Etiologies of vocal cord paralysis; B) Anatomical site of lesion; C) Etiologies of iatrogenic lesions in our study group; D) Anatomical site of lesion for iatrogenic cases.

As supposed the major etiology associated with iatrogeny was thyroidectomy, Figure 2.C. Thyroidectomy was a cause of iatrogeny in 52, 77% of the patients with vocal fold paralysis due to thyroid pathology.

Moreover the majority of lesions associated with iatrogeny were bilateral, Figure 2.D. Needless to mention that bilateral iatrogenic lesions are associated with acute respiratory insufficiency and unless the patient is treated rapidly it would have possibly meant exitus of the patient.

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CONCLUSIONS

Our study confirms general epidemiological data regarding predominance of left sided lesions, female predominance among bilateral vocal cord paralysis and growing number of cases during the study period, etc. However there are various specific aspects for our study group: 1) an almost equal distribution per rural/ urban lifestyle; 2) decline of number of cases in younger patients; 3) a great number of idiopathic cases due to the fact that we are a tertiary unit treating severe cases; 4) there are a great

number of bilateral and unilateral iatrogenic lesions associated with surgical procedures because Romania is endemic for thyroid pathology; 5) bilateral lesions are associated with female gender and etiologies such as thyroidectomy, laryngeal cancer and mediastinal nodules.

The alarming number of iatrogenic cases that we have discovered only in 4 years shows that given the socio economical environment in our country the experienced medical personnel has left to work in foreign countries and their duties were taken by young inexperienced doctors prone to involvement in future malpraxis law suits.

The means for surgical treatment are limited due to the general economic environment in our country and the majority of cases benefit only from conservative measures.

This study contains reference data that could be used for designing a future prospective study in partnership with fellow surgeons in order to experiment with novel techniques in phonosurgery and nerve reconstruction for laryngeal nerve lesions.