

## XII.

# LARYNGEAL DISTURBANCES IN THE DISEASES OF THE CENTRAL NERVOUS SYSTEM WITH SPECIAL CONSIDERATION OF LARYN- GEAL DISTURBANCES IN TABES DORSALIS.

BY DR. JOHANN SENDZIAK,

WARSAU.

TRANSLATED

BY PHILIP VON PHUL, M. D.,

ST. LOUIS.

In order to better understand the laryngeal disturbances which are met with in diseases of the central nervous system, I will give a short resumé of the present status of our knowledge regarding the anatomy and physiology of the innervation of the larynx.\* Fifteen years ago it was thought that the only center of origin of the innervation of the larynx was the medulla oblongata, where the nuclei of both the vagus and spinal accessory are found.

It was not until 1884 that H. Krause,<sup>3</sup> for the first time, proved experimentally, that in dogs the phonetic center of the larynx is located in the cortical portion of the brain. This exceedingly important discovery, among others, was moreover confirmed by Horsley and Semon, in monkeys. In all probability this center is also to be found in man. In dogs it is symmetrically placed in each hemisphere in the outer portion of the gyrus prefrontalis (prae-crucialis, Owen) and at the base of the gyrus frontalis ascendens in monkeys. An irritation in this region produces a bilateral approximation of the vocal cords (adduction).

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\*In preparing this general resumé I have consulted principally the excellent works of Semon,<sup>1</sup> Luc<sup>19</sup> and Lermoyez.<sup>2</sup>

In addition to this, Masini<sup>4</sup> suspects the presence of centers beneath the cortex. Onodi<sup>5</sup> places his center for the production of voice behind the corpora quadrigmina. This is, however, not as yet proved, and in fact the latest control experiments of Klemperer<sup>6</sup>, as also the latest of Grabower<sup>7</sup> deny the existence of Onodi's center.

Besides the center of phonation in the cortex of the brain in dogs\* there is found, as was proved experimentally in the year 1895 by Risien Russell<sup>9</sup>, and before him (in cats) by Horsley and Semon, in each hemisphere a symmetrically placed respiratory center. It lies anterior to, and below the center of phonation. An irritation in this region calls forth a double sided separation of the vocal cords.

As regards the center for the larynx in the medulla oblongata we are indebted for our knowledge of its existence to the untiring labors of the writers, Horsley and Semon, in this field. By experiments upon animals they have proved that in the medulla oblongata as well as in the cerebral cortex symmetrically placed centers for the larynx, and moreover separate centers for phonation and respiration, are to be found. The latter, of much more importance, are found in the upper portion of the floor of the fourth ventricle in the ala cinerea.

The phonetic center lies immediately under the respiratory in the lower portion of the floor of the fourth ventricle (*calamus scriptorius et corpus restiforme*).

Irritation of each produces likewise a double sided ab- or adduction of the vocal cords.

Finally, the same writers demonstrated that fibers proceeded from the laryngeal center in the cerebral cortex to the medulla oblongata. They pass principally through the internal capsule where they occupy a position indicating their phonetic and respiratory function.

In general, the cortex is, above all others, the seat of the voluntary functions of the larynx; namely, that of phonation; the medulla oblongata on the other hand is the seat of automatic function, that is, of respiration. As I have already mentioned, irritation of the centers of the cortex always causes a bilateral adduction of the vocal cords, and

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\*Uchermann of Christiania<sup>8</sup> has just published a case, as is claimed "in vivo," which proves the presence of such a center in man.

not a one-sided and opposed abduction as shown by Masini, but with whom Semon and Horsley, and also Onodi and Klemperer, are not agreed.

At best the question of paralysis of the larynx, as regards its primary origin in the cortex of the brain is not as yet solved. The possibility of this latter is accepted by the representatives of the French school (Garel and Dor<sup>10</sup> Déjérine, Raugé<sup>11</sup> and also by Dreyfuss<sup>12</sup>). Klemperer, however, is an opponent of this theory.

The innervation of the larynx is accomplished by means of two nerves, the laryngeus superior, and inferior. The latter is commonly called the recurrent. Besides these some authors, (Exner<sup>13</sup> in men; Horsley and Semon, in dogs) maintain the existence of a third nerve of the larynx; viz., the laryngeus medius. Finally, Onodi claims that the nervus sympathicus (sympathetic nerve) plays a part in the innervation of the larynx.

The superior laryngeal nerve arises from the vagus, and is "par excellence" the nerve of sensation, with the exception of its terminal branches which supply the cricothyroid muscle. The recurrent nerve is, on the other hand, the motor nerve of the larynx,\* supplying all of its muscles, the adductors as well as the abductors.

In general it has not as yet been agreed which of the nerves, vagus or accessorius, is the voluntary motor nerve of the larynx. The majority of writers (Schech<sup>14</sup>, and lately Darkschewitsch,<sup>15</sup> Uchermann, etc.), hold the old view (Claude, Bernard, Longet), that the nervus accessorius Willisii is the principal motor nerve of the larynx; others, however, as Navratil, and lately Grabower,<sup>16</sup> Grossmann, Onodi,<sup>17</sup> Stoerk,<sup>18</sup> etc., hold that the nervus accessorius plays absolutely no part in the innervation of the larynx, inasmuch as they recognize only the vagus as the motor nerve of the larynx "par excellence."

As mentioned above, this question is not as yet finally settled (Semon). At all events all the nerve fibers that are destined for the larynx, motor as well as sensory, after the joining of the nervus vagus and accessorius Willisii, on exit from the jugular foramen pass out of the trunk of

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\*According to Burkhardt, and Krause, as also Masini, the recurrent nerve also contains fibers of sensation, with which view, however, Semon, Burger and Hooper are not agreed.

the vagus. It is therefore very important, and regarding this, Semon called attention, that the fibers for opening the glottis pursue their course separately on the inner side, while those for closing the same pass along the outer side (Russell, Onodi).

In closing this rather general subdivision, in order to understand the fundamental differences which arise in explaining the laryngeal disturbances present in functional and organic diseases of the central nervous system, I must here call attention to that extremely important law of Rosenbach-Semon, or rather of Semon, which is, that in every progressive organic disease of the nervous system of central (Semon), or peripheral (Rosenbach) origin, those fibers are originally or entirely responsible for the paralysis which supply the posterior cricoarytenoid muscle; afterward the other muscles (adductors) may be affected as a result of their paralytic contracture, consequent upon which the muscles of the vocal cords undergo a secondary paralysis (thyro-arytenoid) (Burger<sup>20</sup>, Semon). In this manner we explain the median, that is, the position of phonation of the vocal cords, which forms the first stage of paralysis of the recurrent nerve (the second, last stage, is that of cadaveric position).

The view of Krause on the other hand, that we have not in this instance to do with a primary paralysis of the cricoarytenoid muscles but with a primary contraction of all the muscles of the larynx which are supplied by branches of the recurrent nerve especially, namely, the crico-arytenoidei laterales according to Krause, or the crico-thyroid muscles according to Grossmann and Wagner, finds continually fewer supporters.

After these short general remarks upon the anatomy and physiology of the innervation of the larynx, remarks which I regard as indispensable for a clear understanding of laryngeal disturbances, which are met with in the course of diseases of the central nervous system, I proceed to a study of the latter. In this I shall rely upon my own findings in the examinations of the larynx in 154 cases of various diseases, principally in organic diseases, but to some extent in functional diseases, of the central nervous system. I have carried out these examinations in nearly all of the hospitals in Warsaw (Infant Jesus, Holy Ghost,

the Jewish, the Evangelical), also in Prague, and finally in the asylum for the aged of the Warsaw Charitable Association.

In as much as it is an impossibility for me to mention all the physicians and directors of the divisions, as also their assistants, to the kindness of whom I am indebted for the opportunity of carrying on my examinations, I here take occasion to express to one and all my heartfelt gratitude.

As is known we divide all diseases of the central nervous system into two principal groups, the functional and the organic. The latter are more important and therefore I shall begin with them and in this I shall consider the diseases of the brain, of the medulla oblongata, and of the spinal cord, although this division will not be a strict one, since many affections, for example, sclerosis disseminata, belong equally to different groups.

## A. ORGANIC DISEASES OF THE CENTRAL NERVOUS SYSTEM.

### I. THE BRAIN AND ITS COVERINGS.

#### 1. *Meningitis (simplex, purulenta, tuberculosa, syphilitica, etc).*

In meningitis simplex the mucous membrane of the larynx (and pharynx) is probably unusually sensitive; examinations, however, with this end in view, simply on the grounds of technique are exceedingly difficult (Löri<sup>21</sup>). This same author saw, in a child, in the beginning of an inflammation of the meninges, a spasm of the glottis. An ataxia of the vocal cords has been observed by Schroetter. As regards the paralyzes of the larynx, they appear usually in the latter stages of the inflammation of the meninges, and among other manifestations permit of the entering (aspiration) of fluid into the respiratory tract (Schluck-pneumonie). On the other hand, in purulent basilar meningitis, or meningitis tuberculosa, involvement of the vagus and accessorius is exceedingly rare. In syphilitic pachymeningitis, Remak<sup>22</sup> has observed in the beginning a right sided paralysis, and later a left sided paralysis of the recurrent nerve.

In epidemic cerebro-spinal-meningitis Oppenheim observed a form of nystagmus of the vocal cords (30-80

oscillations per minute); Major<sup>23</sup> on the other hand a complete bilateral paralysis of the crico-arytenoid muscles. Bamberger<sup>24</sup> and Wallenberg<sup>25</sup> each published a case of encephalitis and meningitis with paralysis of the larynx.

In chronic hydrocephalus, a spasm of the glottis, laryngismus stridulus, is described. Löri regards the "cri hydrocéphalique" as a symptom of irritation of the larynx. In the single case of chronic hydrocephalus which I had the opportunity of observing (in Dr. Chelmonski's division in the hospital of the Infant Jesus) affecting a patient 44 years old, I found an impairment of the mobility of the right vocal cord—similar to the position of phonation (paresis postici dextra).

## 2. *Hyperaemia et anaemia cerebri.*

In this affection is described a spasm of the glottis (laryngismus stridulus), as well as ictus (vertigo) laryngis, an affection which begins with an unpleasant sensation in the neighborhood of the larynx, followed by vertigo and finally a temporary unconsciousness. Such cases have been published by Gerhardt, Schmidt and Kurtz.

## 3. *Hemorrhagia et encephalomalacia cerebri.*

Kattwinkel<sup>26</sup> has interested himself especially in the question of reflexes of the larynx in hemiplegias, and has arrived at the following conclusion: In left sided hemiplegias there is more frequently a weakening, in fact an absence of this reflex (58 per cent.) than in right sided hemiplegias (only six per cent.).

As a result of my own investigation in 31 cases of hemiplegia I can not confirm the above statement.

In general, anesthesia of the mucous membrane of the larynx appears much more infrequently in these affections than that of the pharynx (Löri). Scheinmann has observed a tremor of the vocal cords in cerebral hemorrhage.

Regarding the paralysis in these affections, I have already observed that we possess as yet no absolutely positive proofs that such exist. There indeed exist in literature observations of partial or complete paralysis of the larynx following hemorrhages or brain softenings, but

in the majority of cases they will not bear a very close scrutiny, in so far as they (1) either have not been confirmed at the autopsy which would probably have shown changes in the medulla, as that, for example, found in the case of Bryson Delavan, (2) or they are found on post-mortem, but without having been examined laryngoscopically during life.

The cases of one-sided paralysis of the larynx elicit special attention, since they contradict the general law that by irritation of the cortical centers in one hemisphere a double sided paralysis of the vocal cords is produced.

In general, Semon and Lermoyez (both very experienced authorities in this field) believe that they were not able in a single instance to discover a motor disturbance (paralysis) of the larynx.

Löri on the other hand has observed, in hemorrhages of the brain, directly following the attack, a unilateral paralysis of the recurrent. These cases usually ended fatally, but in the cases where recovery took place this symptom also disappeared, which Gottstein regards as a result of the reflex caused by the hemorrhage.

In one of the four cases of Krause (hemiplegia dextra aphasia) paresis and anesthesia of the right side of the larynx were observed.

Among the cases upon which autopsy was made and which speak for the possibility of paralysis of the larynx emanating from the cortex, should be mentioned the case of Rebillard, also of Garel, of Garel and Dor, and finally the most convincing according to Dreyfuss are the two cases of Déjérine<sup>27</sup>. In all of these cases the paralysis was one-sided.

I have observed in 31 cases of hemiplegia, paresis postici four times, and that always one-sided; namely three times on the opposite side (twice in hemiplegia sinistra—right-sided paresis, and once in hemiplegia dextra—paresis posticus sinistra), once only in right-sided paralysis following hemorrhage of the brain, and in paralysis of the right facial nerve and right-half of the tongue, a partial paralysis (paresis) of the right posticus was present.

Still these cases, inasmuch as they were not confirmed by the autopsy, belong, in my opinion, in the first cate-

gory, and are as such, as is also the last one described by Uchermann,<sup>28</sup> not conclusive.

4. *Syphilis of the brain.*

Disturbances of the larynx (anesthesia, paralysis), are among the frequent occurrences in syphilis of the brain. (Oppenheim<sup>29</sup> Löri). In this list belong the cases of Oppenheim (spasm of the glottis) of Ott (anesthesia of the right half of the larynx, right-sided paralysis of the recurrent), of Bull<sup>30</sup> (bilateral posticus paralysis). My observations include 16 cases of these neuroses; twice laryngeal disturbances were present, once complete paralysis of the left recurrent, that is cadaveric position of the left vocal cord, and once paralysis of the right posticus, that is median position of the right vocal cord.

5. *Tumors of the brain, particularly of the cerebellum.*

Oppenheim<sup>31</sup> holds that in tumors of the cortex permanent laryngeal disturbances are hardly ever present, but are only temporary. In Krause's<sup>32</sup> case (glio-sarcoma corporis striati et lobi sinistris, hemiplegia dextra, aphasia), a paralysis of the right half of the larynx was present (paralysis of the right recurrent nerve). Spencer<sup>33</sup> on the other hand observed a nystagmus of the vocal cords in a metastatic sarcoma of the dura-mater causing pressure on the left frontal gyrus. In tumors of the cerebellum, a tremor of the vocal cords is observed (Collet and Oppenheim).

I have twice seen in ten cases of tumor of the brain, that is, of the cerebellum, a partial paralysis of the left crico-arytenoideus posterior (paresis postici sinistra).

Before I proceed to a description of the disturbances of the larynx in organic diseases of the medulla oblongata I will consider another affection, namely:

6. *Pathological processes at the base of the skull (gummata, tumors, fractures, etc.).*

On account of the pressure at the exit of the accessory nerves these processes more frequently cause disturbances of the larynx. Löri has observed anesthesia and Garrod<sup>34</sup> a double sided paralysis of the postici in gummata of the base; McBride<sup>35</sup> paralysis of the left posticus in cases of carcinoma of the base; Scheek has observed a paralysis of the vocal cords; Moeser<sup>38</sup> a paralysis of

the right recurrent in fractures of the base; Haug<sup>141</sup> lately described an endothelial carcinoma of the temporal bone with extension into the base of the skull, in which likewise a recurrent paralysis constituted *intra vitam*, the most pronounced symptom. In general it is to be observed that pathologic processes, especially tumors of the base (posterior fossa) usually present the picture of a half-sided bulbar paralysis, with involvement as a rule, of many nerves.

As regards my personal observation, I have observed in my hospital practice a case of *commotio cerebri*, with an absence however of laryngeal disturbance, as also one of probable syphilitic process of the base. In the last case, which occurred in a patient 46 years of age, with a bilateral paralysis of the oculomotor nerves, I diagnosed a paresis of the right posterior crico-arytenoid muscles (*paresis postici dextra*).

## II. MEDULLA OBLONGATA.

### 1. *Hemorrhagia et ramollitio.*

These processes in the medulla oblongata present a picture which is similar to that of progressive bulbar paralysis, and is known as *paralysis bulbaris apoplectiformis*. Laryngeal disturbances in these cases are rarely observed as the majority of them are rapidly fatal. In this class belongs the case of Remak, in which according to Gottstein, the examination of the larynx led to a proper diagnosis; and especially three cases of Eisenlohr<sup>36</sup> in which the examination of the larynx, *intra vitam*, was confirmed by the autopsy.

### 2. *Tumors, as well as syphilitic processes of the medulla oblongata.*

In this class belong the cases of Nothnagel, Lőri (*anesthesia and paralysis of the right half of the larynx in left-sided glioma*), as well as those of Ott (*unilateral paralysis of the larynx, as a result of arteritis syphilitica*).

In a case of supposed tumor in the fourth ventricle, in a patient 31 years of age, with paralysis of nearly all the cranial nerves (from the 3d to the 12th), I found a partial paralysis of the left posticus.

### 3. *Progressive bulbar paralysis (paralysis glosso-labiolaryngée, Duchenne).*

Anesthesia of the mucous membrane of the larynx,

ataxia of the vocal cords (Schroetter), finally paralysis of the vocal cords partial or complete, unilateral (Bosworth<sup>37</sup>), or bilateral (Semon<sup>39</sup>) have been found in this affection. Usually the abductors of the glottis were paralysed, only in the cases from Krause, Broadbent<sup>40</sup>, and Dreyfuss were the adductors affected.

As a rule the larynx symptoms in this affection appear later than the paralysis of the tongue and soft palate, which gives rise to characteristic speech (a weak monotone without modulation, the highest tones being impossible). In two of the four such cases observed by me, I found paralysis of the postici (once on the left side, and once on the right side). The third case, a patient 64 years old, who, one week previously, became suddenly ill, presented hoarseness, disturbed articulation, static ataxia (spastic ataxic gait), and slight paresis of the lower extremities. Acute bulbar paralysis was diagnosed. Examination of the larynx showed immobility of the left half, with swelling of left false vocal cord, and of the left arytenoid cartilages. After application of an energetic antiphlogistic the symptoms of swelling of the larynx disappeared; the left vocal cord, however, did not reach the median line in phonation as was seen in a case of Lör's. Finally in the fourth (last) case of progressive bulbar paralysis, I found no disturbance of the larynx whatever.

#### 4. *Pseudo-bulbar paralysis.*

This affection, as is known, is caused by localized changes in the brain, and runs its course similar to a real bulbar paralysis (for this reason I consider it here). Besides the paralysis of the lips and tongue, laryngeal disturbances are sometimes observed; paralyse, namely, not however of the abductors, which is explained by the inferiority of the respiratory centers in the brain cortex (Semon). Here belong the cases of Lannois, Cartaz,<sup>41</sup> and Krause. There are also cases of paralysis of the abductors (Müntzer), but Dreyfuss, with justice, states that their pure cerebral origin is doubtful.

#### 5. *Sclerosis disseminata (sclerose en plaques).*

This affection which is caused by areas scattered through the brain and spinal cord, I think best to consider in this connection.

Laryngeal disturbances are frequent in this affection according to some (Löri), seldom, according to others (Semon).

In this case a paralysis of the tensors of the vocal cords (crico-thyroid muscles) (in Erb's cases,<sup>42</sup> however, a double-sided posticus paralysis) is usually the underlying cause, whereby the tone, passing over to falsetto, and characteristic of this affection is explained. The equally characteristic "noisy inspiration" the same author explains by paralysis of the abductors, which probably is likewise dependent upon the involvement of the nucleus in the medulla oblongata. Krause observed as a primary symptom in this affection spastic aphonia, that is, a functional glottis spasm on phonation. As a frequent symptom of sclerosis disseminata is observed tremor, nystagmus of the vocal cords in the form of an intention tremor, that is, a tremor which appeared on efforts of phonation. Such cases have been observed by Gerhardt, Krause, Krzywicki,<sup>44</sup> Löri, Collet,<sup>43</sup> Batten and Horn,<sup>45</sup> etc.

According to my observation I have seen eight cases of this affection in one of which I found a paralysis of the adductors, principally the transversus muscle. In a second case (a 25-year-old patient) there was present a right-sided posticus paralysis, that is the position of phonation of the right vocal cord. Finally, in four cases I had the opportunity to observe a tremor of the vocal cords particularly well marked, in a patient 34 years old, with symptoms typical of "sclerose en plaques" (scanning speech, nystagmus bulborum oculorum, intention-tremor in the upper and lower extremities, and scattered anesthesias). In two cases of this affection I was unable to find the slightest disturbance in the larynx. Lately I have had the opportunity in my private practice to observe another such case, having all the symptoms of sclerosis disseminata, in a girl 20 years of age (nystagmus, intention-tremor of the lower extremities, etc.), in which I found a total paralysis of the left recurrent nerve (cadaveric position of the left vocal cord).

### III. THE SPINAL CORD AND ITS COVERINGS.

#### 1. *Pachymeningitis spinalis externa, leptomenigitis spinalis acuta.*

Regarding these diseases in which laryngeal disturb-

ances are present, we possess only the observations of Löri. In the latter of the two diseases above mentioned this writer usually noticed a double-sided paralysis of the recurrent.

2. *Myelitis (chronica transversa).*

In this affection, in which, as is well known, the principal symptoms are paraplegia with exaggerated patellar reflex, anesthesia and paralysis of the bladder and intestines, laryngeal disturbances are seldom met with; although in eight cases of chronic myelitis, I observed in each, right-sided paresis of the posticus, and in one case of acute transverse myelitis I found a right-sided paralysis of the recurrent (cadaveric position of the right vocal cord).

3. *Syphilis and tumor of the spinal cord.*

In reference to syphilis, a case of Krause's is well known. In three cases of syphilis of the spinal cord observed by myself, I found in two of them right-sided posticus paralysis. Finally in a single case (a patient 64 years of age) with a probable tumor of the spinal cord with right-sided paresis and spastic symptoms on the right half of the body, I found a right-sided paralysis of the posterior crico-arytenoid muscles.

4. *Spastic spinal paralysis, hereditary ataxia (Morbus Friedreich).*

The former affection, which is characterized by a primary sclerosis of the lateral columns of the cord, I once had an opportunity to observe in the division of my colleague Pulawski in the hospital of the Infant Jesus; in the larynx, however, I found not the least disturbance.

Regarding Friedreich's disease, we know that it appears in the majority of instances in several members of the same family, and at a youthful age (before the 16th year). Symptoms of ataxia first appear in the lower extremities, then in the entire body, even when the patient is quiet (static ataxia).

Griffith has in 143 cases of this affection, observed in 189 instances disturbances of speech, articulation being often interrupted through sudden pausing, sometimes scanning and drawling.

5. *Tabes dorsalis (ataxie locomotrice).*

The laryngeal disturbances in this affection will be

thoroughly considered in the second part of this work.

6. *Sclerosis lateralis amyotrophica* (Charcot).

As yet we possess few observation of laryngeal disturbances in this affection. In this class belong the cases of Löri (double-sided paralysis of the recurrent), Dorling (bilateral posticus paralysis), Cartaz, etc. I have observed two cases of this affection in one of which, in a patient 39 years old, with symptoms of paraparesis spastica inferior et atrophia superior, I found a right-sided posticus paralysis.

7. *Atrophia (dystrophia) musculorum progressiva* (Aran, Duchenne)

Laryngeal disturbances in this affection usually appear at an early period, therefore not as in the simple form of Duchenne (paralysie glosso-labio-laryngée).

They appear most frequently in the form of abductor-paralyses, commonly unilateral, seldom bilateral. [Case of Koschlakoff,<sup>55</sup> as also of Gevaert<sup>56</sup>.]

According to Löri, anesthesias of the pharynx are frequent in this affection. In one case of dystrophia musculorum progressiva occurring in a boy of 11 years of age I found no special changes in the larynx.

8. *Syringomyelia*.

This rare affection, to which only recently we have begun to pay attention, is characterized, as is well known, by the following principal symptoms: Progressive muscular atrophy of the upper extremities, partial paralysis, disturbances of sensation, motor and trophic disturbances of the skin, tendency to the formation of paronychia, etc. Laryngeal disturbances in this affection are of relative frequency. Cartaz<sup>57</sup> has observed them in one-half of 18 cases. They appear most frequently in the form of paralysis of the recurrent (Schlesinger<sup>68</sup>) more often unilateral, though it may be bilateral (Schmidt<sup>58</sup>) that is, the opposite of that which occurs in tabes dorsalis. Often in combination with paralysis or atrophy of the cucullaris (Weintraud). Tremor of the vocal cords has often been observed in this affection (Schroetter) as also rhythmic movements of the arytenoid cartilage on breathing, of chronic character. Finally Lack has observed in this affection "crises laryngées."

In all I have seen but two cases of syringomyelia. In both I found laryngeal disturbances, namely, in both, paralysis of the left posterior crico-arytenoid muscles. (paralysis postici sinistra). In one of these cases (19 years of age) I found on second examination, one month after disappearance of the symptoms of syringomyelia, that the larynx paralysis also disappeared.

9. *Neuritis multiplex, polyneuritis.*

Of the two cases which I had the opportunity to observe in my hospital practice, one (a patient 32 years of age) presented a partial paralysis (paresis) of the right posticus.

B. FUNCTIONAL DISEASES OF THE CENTRAL NERVOUS-SYSTEM.

FUNCTIONAL NEUROSES.

1. *Hysteria, neurasthenia, hypochondriasis.*

In these neuroses, hyperesthesia and neuralgia as well as paresthesias are often present. As regards anesthetics of the mucous membrane of the larynx in hysteria, opinion is divided. A few, for example Chairon, view these as constant symptoms of this affection; Schech and Semon also regard these as frequent, Löri on the other hand as very rare, and McKenzie in fact claims that he has never observed this symptom in his patients.

In these disturbances (hysteria, neurasthenia, and hypochondriasis), spastic aphonia is observed (Gerhardt, Schroetter, Onodi, etc.), that is, a spasm of the glottis on phonation, also a functional respiratory (Semon), co-ordination (Meyer<sup>62</sup>), spasm; finally Przedborski<sup>63</sup> describes a case of hysterical spasm of the abductors, which, however, Burger and Semon regard as very doubtful. Schroetter has described an ataxia of the vocal cords, also Schmidt. Tremor of the vocal cords of hysterical origin has been observed by Gerhardt, and Baginsky. In the latter's case 50-54 oscillations per minute were noticed.

As regards paralysis of the larynx, the adductors of the glottis, principally the thyro-arytenoids int. muscles, are the underlying cause.

There are indeed cases in which paralysis of the pos-

terior crico-arytenoid muscles have been described unilateral (Löri), as well as bilateral (Dufour<sup>64</sup> Scheppegrell); these, however, are with justice questioned by Burger and Semon.

My material embraces 33 cases of hysteria, neurasthenia and hypochondriasis, which I have observed in hospital practice; not once have I observed a paralysis of the abductors, frequently, however, paralysis of the adductors. Finally, I observed in an hysterical patient 23 years of age a phonetic spasm of the glottis.

### 2. *Neurosis traumatica.*

In recent times these neuroses have been demonstrated in hysteria as well as in neurasthenia and hypochondriasis. The paralysis of the abductors in this disease has according to Dreyfuss an important diagnostic significance, in so far as it speaks against simulation, as well as against a functional origin of the paralysis, and indicates a probability of an organic affection.

In this disease Scheier<sup>61</sup> has observed twice in ten cases, anesthesia of the mucous membrane of the larynx, Holz<sup>64</sup>, however, in one case, paresis of the ad- and abductors.

In one case in my clinical material (a patient 61 years old) I found no disturbance of the larynx.

### 3. *Epilepsy.*

According to Gottstein, anesthesia of the larynx during and after the epileptic seizure is an ever present symptom of this affection. Gerhardt observed in this disease a respiratory spasm as did also Löri. In two cases of epilepsy of my own no laryngeal disturbances were present, nor in one case of hystero-epilepsy.

### 4. *Paralysis agitans.*

Schroetter observed in this affection ataxia of the vocal cords, Gerhardt, tremor, Müller<sup>65</sup> the same (the vocal cords in going over from phonation to respiration made 3 to 5 pendulum adduction movements.) In the cases of Rosenberg<sup>66</sup> the tremor of the vocal cords appeared only during quiet respiration; that is, the opposite of what is at times observed in sclerosis disseminata (intention tremor) in going over from phonation to respiration. Besides this there also occurred in these cases a coincident

drawing in of the epiglottis with delayed adduction, and change of tension, thereby causing irregular speech, and often a change of high notes, being sometimes falsetto, sometimes bass. Moreover, a tremulous scanning speech may result on account of an involvement of the lips, cheeks, and tongue.

In two of the four cases of paralysis agitans which I had the opportunity of observing there was present, although not very pronounced, a tremor of the vocal cords.

#### 5. *Chorea*.

Spasm of the larynx is here observed on inspiration. (Schroetter ataxia of the vocal cords, Gerhardt tremor, finally Krause, tremor of the vocal cords with paresis of the adductors).

#### 6. *Tetany*.

Tetany is characterized by intermittent, at times painful, tonic tremor, symmetrically on both sides of groups of muscles (most frequently the interossei of the palm of the hand) whereby pressure on the brachial artery or plexus brachialis calls forth an attack (the so-called symptom of Trousseau). It is particularly a disease of youth; spasm of the glottis (laryngismus stridulus); has in this connection been observed by Loos<sup>67</sup>, Kramsztyk, Kassowitz, in combination with the tremor of the upper and lower extremities (carpo-pedal spasmus).

#### 7. *Dementia paralytica*.

Anesthesia of the larynx has been observed by Lennox Brown; Krause has observed principally paralysis of the adductors. In my two cases of this affection, I have observed no disturbances of any significance.

#### 8. *Paralysis periodica (Erb, Goldflam)*.

I had an opportunity to observe this rare affection in a teacher 54 years of age, without however any changes in the larynx.

### LARYNGEAL DISTURBANCES IN TABES DORSALIS (ATAXIE LOCOMOTRICE).\*

Laryngeal disturbances in tabes dorsalis are relatively frequent, and, what is of the greatest importance is that

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\*From an address delivered at the meeting of the medical society of Warsaw, Jan. 17, 1899.

they appear at times at a very early period of this affection. Therefore their recognition is, not only for the laryngologist, but also for the neurologist, of the utmost importance.

For this reason I shall devote myself particularly to this question, especially since in our literature (Polish) such a monograph does not exist.\*

It appears quite reasonable that before the days of the laryngoscope, that is, until the end of the first half of the last century, we knew nothing of laryngeal disturbances in *tabes dorsalis*. Indeed, in the first years of this epoch-making discovery, investigations regarding the above question were not made. There does exist a reference to laryngeal paralysis in *tabes dorsalis* in a case observed by the celebrated clinician Duchenne, in the year 1859, without, however, a laryngoscopic examination. In 1866, Schnitzler<sup>70</sup> in Vienna was the first who, with the help of the laryngoscope, diagnosed the presence of a paralysis of the larynx in two cases of *tabes dorsalis*.

Shortly thereafter Féréol, in the year 1868, for the first time, in a meeting of the French Medical Society, made mention of a very important disturbance of the larynx appearing in the first stage of *tabes dorsalis*, namely, a spasm of the glottis, called by him "crises laryngées," which designation it has held up to the present time. In the year 1875, Rosenthal<sup>72</sup> (2 cases of paralysis of the larynx) Semon<sup>73-74</sup> in 1878-'79 (a case of bilateral paralysis of the posterior crico-arytenoid muscles), Charcot,<sup>75</sup> 1879 (laryngoscopic examination made by Krishaber, which demonstrated laryngeal paralysis), have written regarding the above mentioned manifestation. Then Krishaber<sup>76</sup> in the year 1880 (two cases of laryngeal paralysis). Semon<sup>77</sup> in 1881 wrote, for the third time, upon this subject, as did Cherchewsky<sup>78</sup> in the same year. This writer collected for the first time in a most comprehensive monograph, all the known cases of laryngeal disturbances in *tabes dorsalis* that had appeared in the literature up to that date, to which he added two new cases from Charcot's clinic, in which laryngeal paralysis had been diagnosed by Krishaber, by a laryngoscopic examin-

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\*In the preparation of this part I used with preference the splendid monograph of Burger.<sup>52</sup>

ation. By this Krishaber rendered great service, as he entered into a minute study of *tabes dorsalis*, whereby he gave the impulse to a further systematic examination of the larynx in this affection. To the later observations belong those of Kahler<sup>79</sup>, and Morgan<sup>80</sup> both of the year 1881 (each a case of laryngeal paralysis in *tabes dorsalis*.) In the following year (1882) Lhoste<sup>81</sup> chose as the theme for his inaugural dissertation the laryngeal disturbances in *tabes dorsalis*, on the grounds that a case in which these disturbances were present awakened the suspicion of *tabes dorsalis* (dyspnea, as a result of bilateral adductor paralysis; Krishaber).

In the year 1883 there appeared, in reference to the question now under discussion, three new investigations of Pillat,<sup>82</sup> Landouzy and Déjérine<sup>83</sup> finally Eisenlohr<sup>84</sup> (bilateral paralysis of the postici muscles). In the following year Oppenheim<sup>85</sup> a splendid diagnostician of nervous diseases, in reference to the above question, addressed the Berlin psychiatric society regarding a case of bilateral larynx paralysis, in the discussion of which Remak<sup>86</sup> mentioned a case in which the laryngoscopic examination disclosed a unilateral paralysis of the posticus muscle as almost the first symptom of *tabes dorsalis*. Following this Krause<sup>87</sup> in the year 1885 laid before the medical society the results of the examinations of the larynx in patients afflicted with nervous diseases in the Charité hospital in Berlin. This year yielded a wealth of articles, having for their title laryngeal disturbances in *tabes dorsalis*. Here belong the investigations of Fournier,<sup>88</sup> Ord and Semon<sup>89</sup> (a very interesting case which demonstrated the importance of examining the larynx in *tabes dorsalis*) Ziegelmeyer,<sup>90</sup> Gerhardt,<sup>91</sup> McBride,<sup>92</sup> Bristowe,<sup>93</sup> Berbez,<sup>94</sup> and finally Huchard and le Gendre<sup>95</sup>. In the same year Munschina chose as a theme for his inaugural address laryngeal disturbances in *tabes dorsalis*. Finally Löri<sup>21</sup> in his well known work regarding the changes in the pharynx and larynx in various affections in the body, stated, that in six cases of *tabes dorsalis*, he found four laryngeal paralyses, presenting the symptoms of irritation, as well as of pain, in the region of the larynx, cough, spasm of the glottis, etc.

Since that time, casual, as well as exhaustive treatises

having to do with laryngeal disturbances in *tabes dorsalis* have steadily increased.

For instance, in 1896, the following articles were published: Krause,<sup>98</sup> who for a second time took up the work; Weil<sup>99</sup> a case of bilateral paralysis of the adductors as an initial symptom of *tabes dorsalis*, also Landgraf<sup>100</sup> (combination of the "crises laryngées" with bilateral abductor paralysis; Saundby<sup>101</sup> (bilateral posticus paralysis); Hirschmann<sup>102</sup>, paralysis of both postici with coexisting pulmonary tuberculosis; Ross,<sup>103</sup> Krause,<sup>104</sup> a case of laryngeal paralysis with deformities of the joints; finally, B. Fränkel<sup>105</sup> (bilateral posticus paralysis).

In the year 1887, the following authors wrote regarding this question: Martius<sup>106</sup> a case of Landgraf's with consequent paralysis of the trapezius muscles, that is, involvement of the accessory nerve, also Pel<sup>107</sup> unilateral atrophy of the tongue, left sided paralysis of the soft palate, atrophy of the left sterno-cleido-mastoid muscle and the trapezius, and finally left sided paralysis of the recurrent; Felici<sup>108</sup> (an interesting case of laryngeal disturbance; crisis and bilateral paralysis of the postici, occasioned the solicitation of medical aid, whereby *tabes dorsalis* was diagnosed); Luc<sup>109</sup> likewise a very interesting case which emphasized the importance of laryngeal examination (bilateral posticus paralysis where *tabes dorsalis* was diagnosed); Kuesner<sup>110</sup> (two cases of postici paralysis, one being complicated by struma). Wegener<sup>111</sup> chose this subject for his inaugural dissertation. In the same year Eulenberg<sup>102</sup> mentioned a case of *tabes dorsalis* with paralysis and atrophy of the tongue, paralysis of the ocular and laryngeal muscles (bilateral posticus paralysis, Baginski). This author mentioned in general, that he had often discovered paralysis of the vocal cords in *tabes dorsalis*. Oppenheim<sup>49</sup> mentioned a case in which in addition to "crises gastriques et laryngées", pharyngeal spasms, so called by himself, were present, that is, spasmodic movements on swallowing.

Finally Tissier<sup>113</sup> in the same year also reported a case of laryngeal paralysis in *tabes dorsalis*.

In the year 1888 there appeared a detailed investigation by Krause<sup>32</sup> entitled: "On the disturbances of the functions of the larynx in diseases of the central nervous system."

This work showed that the disturbances of the larynx in *tabes dorsalis*, which up to the present time were thought to occur but seldom, were by no means so infrequent, since this author in 38 cases of *tabes* found laryngeal disturbances in 30. These disturbances were principally partial or complete paralysis of the muscles of the larynx, especially the posterior crico-arytenoid, which this writer evidently by mistake, claimed to be a result of adductor spasms, and not as is generally accepted, a primary paralysis of the abductors (Semon).

In the same year Aronsohn<sup>114</sup> referred to a case of left-sided posticus paralysis, an atrophy of the left cucullaris muscle, sternocleido-mastoid, and soft palate; Kroenig<sup>115</sup> (2 cases of bilateral posticus paralysis, Baginsky). Lucas Championnière<sup>116</sup> wrote in reference to crises laryngées. Masucci<sup>139</sup> proposed instead of "crises," the term *neurosis* or *spasmus laryngis*. In the year 1889 again appeared that already oft quoted writer, Oppenheim<sup>117</sup>, referring to this question in an ably written article in which he described, in addition to his previously published case of pharynx crises, a paralysis of the abductors.

In the year 1890, Marina<sup>47</sup> published in Trieste a detailed work upon *tabes* with special attention to the disturbances of the ears, pharynx and larynx, based upon a study of 40 cases of this affection. In nearly all cases disturbances of the larynx more or less marked were found (examination by Fano); namely, in five cases the epiglottis was curved posteriorly making the examination of the larynx impossible, in 14 cases disturbance of sensation in the pharynx, nine times in the larynx, paralysis of the adductors in ten cases, in eight cases, however, the abductors, irregularity of the vocal cords four times, and in nine cases ataxia. The results of the examination of the larynx in tabetic patients instituted by Dreyfuss in Mendel's clinic are most decidedly at variance with the above. This writer in 22 cases of this affection only twice diagnosed a laryngeal disturbance (bilateral paralysis of the postici). Finally Geison in the same year published a paper in reference to the question "*Crises laryngées in tabes dorsalis*;" Symonds<sup>140</sup>, a case (doubted, however, by Semon) of laryngeal paralysis, as one of the first symptoms of *tabes*.

The year 1891 produced but a single work, but this comprehended all former ones,—the splendid monograph of Burger, of Amsterdam, entitled, “The disturbances of the larynx in tabes dorsalis,” which has proved most useful to me in the present article. After a very careful presentation of the works that had appeared up to date, relative to the question of laryngeal disturbances in tabes, this author added the results of his own observations in 20 cases; of this number six showed laryngeal involvement (twice ataxia of the vocal cords and four times paralysis of the muscles of the larynx). He also mentioned two cases observed in his private practice of the physicians Kooy and Klinkert. In closing his learned article the writer draws, among others, the conclusion that the so-called posticus paralysis is a symptom of tabes “par excellence.” This view is entirely correct, as we shall soon convince ourselves.

Ruault<sup>919</sup> in the year 1891 mentioned in the Laryngological Society of Paris a case of tabes with “crises laryngées.”

In the following year appeared successively the articles, in reference to laryngeal disturbances in tabes, by Lasnière<sup>120</sup> and Grabower<sup>64</sup> (paralysis postici). In the year 1893 at a meeting of the London Laryngological society, Semon<sup>121, 122</sup> presented a tabetic patient, who in addition to “crises laryngées” and paralysis of the soft palate, showed bilateral paralysis of the abductors. The same author presented in the same year another tabetic patient in whom paralysis of the larynx (bilateral posticus paralysis) had lasted more than 12 years.

In same year Grabower<sup>123</sup> also wrote in reference to this subject, and mentioned an interesting case which presented paralysis of the right posticus muscle 15 months before the appearance of tabetic symptoms. This author advises, and with justice, that the larynx be examined in every case of nervous disease. Ilberg<sup>124</sup> does the same.

The year 1894 produced a small number of articles in reference to laryngeal disturbances in tabes dorsalis. Kronenberg<sup>125</sup> presented a case to the Laryngological Society of Berlin in which the examination of the larynx (posticus paralysis) made possible the diagnosis of tabes dorsalis. In the discussion Rosenberg<sup>125a</sup> mentioned two cases of

tabes dorsalis, in which for a long time the only symptom was a disturbance of the larynx (unilateral paralysis of the recurrent nerve in one case, and double posticus paralysis in the other), and only later the symptoms of tabes dorsalis were presented.

In the same year there appeared a large work, presented under the authorship of Schlesinger from Schroetter's clinic, in which, among others, a rare case of tabes dorsalis is mentioned, complicated with spasmodic attacks of coughing and unconsciousness (ictus laryngis). Besides this in the same year (1894) Lepine<sup>126</sup> wrote (paralysis of the tongue and larynx in tabes), as did also Moritz<sup>127</sup>.

Pel<sup>128</sup> presented a case of tabes dorsalis before the Laryngological Society of Amsterdam, in which long before the appearance of symptoms typical of tabes, the laryngeal paralysis was present.

In the year 1895 appeared the following articles relative to the question under discussion: Hawkins<sup>129</sup> tabes dorsalis, bilateral paralysis of the postici, tracheotomy; as also Herms<sup>130</sup> (inaugural dissertation).

In the year 1896, Parker<sup>131</sup> demonstrated to the Laryngological Society of London, a case of tabes dorsalis in which the "crises laryngées" formed the first symptoms of this affection. In the discussion Semon called attention to the importance of laryngoscopic examination in cases of tabes dorsalis, and the advisability of examining the patellar reflex in every obscure case of paralysis of the larynx.

In the same year Gougutenheim and Plicque<sup>132</sup> published a case of tabes dorsalis, in which after the internal use of potassium iodid, symptoms of spasm of the larynx appeared (paralysis of the abductors).

Likewise in the year 1896 there appeared in Nothnagel's Special Pathology and Therapy a very good article by Gerhardt<sup>51</sup> entitled: "Disturbance of movements of the vocal cords," in which the writer reported among others, 122 cases of tabes dorsalis, in which he diagnosed, by the aid of the laryngoscope, 17 cases of paralysis of the larynx.

In the year 1897 Dundas Grant<sup>133</sup> presented, at a meeting of the London Laryngological Society, a patient with tabes dorsalis in whom bilateral paralysis of the posterior

crico-arytenoid muscles produced symptoms of suffocation, necessitating tracheotomy. Petren<sup>134</sup> in Stockholm, also published two cases of *tabes dorsalis*; in both death occurred from suffocation due to paralysis of the adductors on both sides. As a result of a microscopic examination in both the above cases the author arrives at the conclusion that laryngeal paralyses are in the majority of cases dependent upon a peripheral neuritis.

In the same year de Havilland Hall<sup>50</sup>, in his well-known work regarding the relationship of the diseases of the respiratory passages to the general disturbances of the organism, likewise interested himself in reference to the disturbances of the larynx in *tabes dorsalis*. Again in this year Heymann's handbook of Laryngology and Rhinology (a splendid reference work) contained a very good monograph by Semon regarding the nervous affections of the larynx in which likewise the above theme is considered. Finally, Schulz<sup>130</sup> in the beginning of the year 1898 published a case of *tabes dorsalis* in a syphilitic patient. This case is important because it confirms the law of Semon-Rosenbach, viz., that in progressive organic diseases of the nervous system, of either central or peripheral origin. The abductors at first, or alone, are the underlying cause of the paralysis and later the adductors.

In the above cases there arose under the very eyes of the author, a beginning paralysis of the posterior, crico-arytenoid muscles followed by a complete paralysis of the recurrent nerve. After specific treatment an improvement set in in the same manner, that is, recurrent paralysis ended with posticus paralysis. This is all I was able to gather regarding the question of laryngeal disturbances in *tabes dorsalis*. From this resumé we may conclude that:

1. This inquiry dates from very recent times, being only a few years old.

2. Although we are indebted for the original investigation of these disturbances to the French authors (Féréol, discoverer of the "crises laryngées," in general, however, to the school of Charcot, Cherehewsky, Krishaber, etc.\*), nevertheless, as regards its further development, the work was carried on in Germany (that which now constitutes

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\* More than a fourth of all treatises upon laryngeal disturbances in *tabes dorsalis* come from the pen of French writers.

almost one half of all investigations, the present number of which amounts to 83, as may be seen upon the last pages of this work, and as shown by the most reliable catalogue), as, for instance by Oppenheim and Krause, and above all by Burger, in Amsterdam, whose monograph of the year 1891 forms up to the present time the most important source of our knowledge of disturbances of the larynx. Finally, we have the work of Semon, the best known diagnostician of nervous manifestations of the larynx, and author of a most comprehensive chapter on this subject in the latest work of reference by Heymann (*Handbuch der Laryngologie und Rhinologie*), as a further contribution to the subject under consideration.

As yet we possess in our own literature (Polish), as previously mentioned, no work on this subject.

After this, perhaps too lengthy introduction, which I however have considered necessary, since this question is touched upon for the first time by ourselves in Poland, I shall, before I proceed to a detailed description of the different laryngeal disturbances in *tabes dorsalis*, give a short resumé of my own observations, which I have made in the hospitals of Warsaw, thanks to the chiefs of the divisions and clinics to whom I here express my heartfelt gratitude.

I have made notes upon 22 cases of *tabes dorsalis* in which I have made an examination of the larynx.

Case 1. K., 50 years of age, laborer, in the clinic of Prof. Szczerbakow in the Hospital of the Infant Jesus, Chief, Dr. Kopczyński. Diagnosis, *tabes dorsalis*. (Absence of patellar reflex, ataxia of the lower extremities.)\*

Aneurysm of the ascending aorta, the latter confirmed by the aid of the Röntgen rays (Dr. Bychowski); hoarseness. The laryngoscopic examination, which I personally made, showed paralysis of the right recurrent nerve, the right vocal cord in cadaveric position, i. e., between the position of phonation and that of respiration, is somewhat shorter than the left, being concave at its free border, the latter being due to secondary paralysis of the vocal cords (internal thyro-arytenoid muscle). As re-

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\*To avoid repetition in the following cases, I shall not mention those symptoms which are characteristic of *tabes dorsalis*, but only those more rare ones.

gards the double affection in the above case in which the paralysis of the larynx could have been caused by the tabes dorsalis as well as by the aortic aneurysm, the former being of central, the latter of peripheral origin, I was not in a position to decide at once to which this laryngeal paralysis was due; however, I was more inclined to believe that in this case the aneurysm of the aorta, that is, of its ascending portion, pressing upon the right recurrent nerve probably produced the paralysis. And for this reason I have, among others mentioned in my article, presented this case, which was published in the year 1898 in *Gaz. Lek* and in the *Arch f. Lar.* 1899<sup>97</sup>. The further course of the disease deserves to be mentioned. After about a month, upon making another examination of the larynx of this patient, it presented a rather marked change; the right vocal cord which was previously found in cadaveric position, now occupied the position of phonation; in other words, instead of the former paralysis of the right recurrent nerve we have here to do with the so-called posticus paralysis, that is, a paralysis of the crico-arytenoid muscles. It has been more than once observed that improvements of this nature confirm the correctness of Semon's view in reference to the superiority of the abductors in tabes dorsalis (Schulz, Semon, etc.) more rarely, however, in aneurysm of the aorta (among others, the first case in my above mentioned investigation).

Case 2. W., 32 years old, painter, in Prof. Szczerbarkow's clinic, in the Hospital of the Infant Jesus. Chief, Dr. Piotrowski.

Diagnosis: Tabes dorsalis. The examination of the larynx made by myself showed no marked disturbance either subjective or objective, the movements of the vocal cords on phonation and during respiration being perfectly free.

Case 3. B., 42 years old, tinner, in Prof. Zieniec's clinic in the Hospital of the Infant Jesus, Chief Dr. Bronowski. Diagnosis: Tabes dorsalis. Besides the symptoms of this disease, which had already existed seven years (absence of the patellar reflex, ataxic walk), crises gastriques were present. The examination of the larynx showed an incomplete paralysis of the left crico-arytenoid

muscles (paresis postici sin), that is, the left vocal cord immovable, and almost in the median position. No subjective symptoms (hoarseness).

Case 4. 37 years of age, farmer, in Dr. Chelchowski's division in the Hospital of the Infant Jesus.

Diagnosis: Tabes dorsalis. On examination of the larynx I observed a slight ataxia of the vocal cords, which showed itself as an irregular retraction movement, that is they moved, on efforts of phonation, as also, and particularly, on deep inspiration, quickly toward the median line (in phonation), as is usual in inspiration, halting, however, half way, and later, as if pulled upon, equally rapidly assumed the proper position.

Case 5. O., 32 years of age, agent, in Dr. Dunin's division in the Hospital of the Infant Jesus.

Diagnosis: Tabes dorsalis. Among the rarer symptoms the "crises gastriques," which had persisted five years, deserve mention. The examination of the larynx showed an incomplete paralysis of the right crico-arytenoid muscles (paresis postici dex), the right vocal cord being in the position of phonation. The voice was clear.

Case 6. M., 39 years old, carpenter in Dr. K. Zielinski's division of the hospital in Prague.

Diagnosis: Tabes dorsalis lasting 1 1/2 years; "crises gastriques," hoarseness. The examination of the larynx revealed a paralysis of the right recurrent nerve (paralysis nervi recurrentis dex.); the right vocal cord a little shorter than the left, immovable on phonation, as well as during respiration; it occupies that position which we observe on the cadaver (the so called-cadaveric position), its free border being concave (secondary paralysis of the internal thyro-arytenoid muscles.)

Case 7. M., 29 years old, hat maker, in Dr. Gajkiewicz's division in the Jewish Hospital.

Diagnosis: Tabes dorsalis, having lasted one year, slight hoarseness. The examination of the larynx revealed paralysis postici dex., the right vocal cord being in a position of phonation.

Case 8. S., 47 years old, in Prof. Zieniec's clinic in the Hospital of the Infant Jesus; Chief, Dr. Nartowski.

Diagnosis: Tabes dorsalis, pulmonary tuberculosis. I could discover no special change in the larynx.

Case 9. B., 45 years old, official, in Dr. Brunner's division of the Evangelical Hospital.

Diagnosis: *Tabes dorsalis*. The examination of the larynx revealed no disturbances in the excursion of the vocal cord.

Case 10. K., 78 years old; servant, in the "out-patient" department of the Evangelical Hospital. (Dr. Kucharzewski.)

Diagnosis: *Tabes dorsalis*; the examination of the larynx gave a negative result.

Case 11. G., 37 years of age, a woman, unmarried, living with her family, from Prof. Szczerbakow's clinic in the Hospital of the Holy Ghost. Chief, Dr. Bregman.

Diagnosis: *Tabes dorsalis superior*. The disease began seven months previously. The symptoms claiming attention were amaurosis, *atrophia nervorum optictorum*, falling out of the teeth, and "crises gastriques". The examination of the larynx revealed an unchanged condition.

Case 12. D., 23 years old, factory girl, also from Prof. Szczerbakow's clinic.

Diagnosis: *Tabes dorsalis* of two years standing. Among other symptoms, *atrophia nervorum optictorum*.

The examination of the larynx gave a negative result.

Case 13. K., 50 years, brewer, in the above mentioned clinic.

Diagnosis: *Tabes dorsalis*. The disease began ten years previously. Examination of the larynx revealed no special changes (perhaps the right vocal cord a trifle hindered in its movements).

Case 14. B., 31 years of age, policeman, from the same clinic as above mentioned.

Diagnosis: *Tabes dorsalis*. For the last five years, "crises laryngées," the voice somewhat hoarse. The laryngoscopic examination disclosed the following picture: both vocal cords immovable on phonation, as well as during respiration; they occupy almost a median position, so that on deepest respiration the distance between the vocal cords measures two to three mm. thereby, particularly at night, producing difficulty in breathing, and there arises a condition similar to "crises laryngées."

In other words, we have to do in the above case with a

bilateral paralysis of the posterior crico-arytenoid muscles.

Case 15. O., 40 years old, servant, from the same clinic.

Diagnosis: *Tabes dorsalis*; examination of the larynx reveals no changes.

Case 16. K., 37 years old, conductor, in Prof. Szczerbakow's clinic, in the Hospital of the Infant Jesus. Chief, Dr. Kopeczynski.

Diagnosis: *Tabes dorsalis* for past four years, "crises gastriques," Romberg's and Argyll Robertson symptoms. Laryngeal examination showed complete paralysis of the right abductor muscles (*paresis postici dex.*), the right vocal cord occupying almost the median position; voice pure.

Case 17. Z., 53 years of age, farmer, in Prof. Szczerbakow's clinic in the Hospital of the Holy Ghost.

Diagnosis: *Tabes dorsalis*. Examination of the larynx revealed no changes.

Case 18. R., 52 years, widow, in Dr. Pulawski's division in the Hospital of the Infant Jesus.

Diagnosis: Incipient *tabes dorsalis* (without ataxia of the lower extremities). The laryngoscopic examination showed, though not entirely clearly, a certain form of ataxia of the vocal cords, affecting the return movement: namely, instead of nearing the median line in phonation, they showed a tendency to separate from one another, and vice versa on respiration they made movements as though they would meet in the median line (the so-called perverse action of the vocal cords).

Case 19. G., 41 years old, goldworker, in Prof. Szczerbakow's clinic in the Hospital of the Holy Ghost. Chief Dr. Bregman.

Diagnosis: *Tabes dorsalis*. Laryngoscopic examination, negative.

Case 20. M., 40 years of age, mechanic, in Dr. Gajkiewicz's division in the Israelite Hospital.

Diagnosis: *Tabes dorsalis*. Examination of the larynx revealed no appreciable changes.

Case 21. A., 42 years old, official, from my private practice.

Diagnosis: (Dr. Ed. Zielinski) *Tabes dorsalis* (absence

of patellar reflex, ataxic walk, etc.). The voice somewhat hoarse, tuberculosis of lungs (old infiltration of the apices). Laryngoscopic examination disclosed a right-sided paralysis of the posterior crico-arytenoid muscles (paralysis postici dex).

Case 22. K., 32 years of age, physician, from my private practice.

Diagnosis: *Tabes dorsalis*, of several years standing; "crises gastriques et laryngées," absence of the patellar reflex, bilateral postici paralysis.

In this manner I found in 22 cases of *tabes dorsalis* in which I made a laryngoscopic examination, 11, that is one-half, presenting more or less disturbance, namely, nine times paralysis, and twice ataxia of the vocal cords. As regards the paralysis, two were paralysis of the recurrent (one case complicated with aortic aneurysm), two bilateral posticus paralysis, two right-sided posticus paralysis, finally three incomplete paralysis (paresis) of the posterior crico-arytenoid muscles (twice right-sided paralysis, and once left-sided).

I now come to an analysis of the particular laryngeal disturbances seen in the course of *tabes dorsalis*.

They are: 1. Those of sensation (hyperesthesia, anesthesia and paresthesia) 2. Those of motility (laryngeal crises, ataxia of the vocal cords, and finally laryngeal paralyzes).

Regarding the former, they belong generally speaking, to the rarer forms. Upon this point the observations of nearly all authors agree (Krause, Dreyfuss, Burger). I also have observed these disturbances (hyperesthesia and anesthesia) principally in the pharynx, only exceptionally in the larynx. Marina, however, gives the percentage of anesthetics of the laryngeal mucous membrane at 25. I must add that the same writer has observed hyperesthesia and anesthesia of the soft palate in 85 per cent., and of the pharynx in 39 per cent., and finally an increased pharyngeal reflex in 11 per cent. of cases.

These figures are in very evident contradiction with the results of examinations by other writers, in these affections. In general I will state, that the determining of the degree of sensitiveness of the larynx or pharynx in *tabes dorsalis* as in general in other pathological processes, is

attended with great difficulty, in as much as in perfectly healthy individuals it is uniform. This is true of the pharynx as well as of the larynx. Unusual sensitiveness of the pharynx (reflex) during the laryngoscopic examination is often met with in perfectly healthy individuals, especially on first examination.

Of greater importance are the disturbances in the motor-sphere of the larynx, to which, particularly, belong the so-called "crises laryngées." They are simply spasms of the abductors, a kind of reflex neuroses, which ordinarily, are the result of irritation present in the sensitive sphere of the larynx, or may be produced by slight pressure on the thyroid cartilage; also upon the crico-thyroid ligament at the point of exit of the superior laryngeal nerve (Krause). More rarely does it take its origin from the sinus pyriformis, trachea, pharynx, nose, or external auditory canal. These "crises" are observed on pressure over Oppenheim's point (the inner border of the sternocleido-mastoid muscle in the region of the larynx) and finally during psychical or physical excitement (Semon).

They were described for the first time by Feréol in the years 1868-69, also by Krishaber, Cherchevsky, Lhoste, Fournier and Lucas Championnière (in general by the French school). In Germany, Oppenheim, Burger and Semon interested themselves especially in this subject. The designation "crises laryngées" holds to-day though it means nothing, and simple spasm of the larynx, proposed among others by Westphal, Krause (laryngospastic attacks), and Masucci (neurosis of the larynx or laryngospasm), are much more appropriate. Cherchevsky observed them quite often (9 times in 16 cases); other writers, however, were not so fortunate, as, for example, Krause, 3 times in 38 cases; Gerhardt, 4 times in 122 cases. Burger, the author of the excellent monograph on laryngeal disturbances in *tabes dorsalis*, so often quoted by me, mentions them but once.

I also noted "crises laryngées" but twice in the histories of 22 cases of this disease.

As a rule they belong to the earlier symptoms of *tabes dorsalis*.

The symptoms of "crises laryngées" are varied, depend-

ing on their intensity.\* In the mildest cases sudden attacks of spasmodic coughing are observed; in cases of medium severity such attacks commence with a sudden sensation of tickling, sticking, burning, simulating the sensation of a foreign body in the neighborhood of the larynx, or a sensation of pressure, or of suffocation, which causes the patient to be seized with terror; the respiration is rendered difficult, and then comes the attack of coughing with prolonged loud inspiration and short, sudden expiration. At the same time disturbances of circulation are observed, such as cyanosis.

Simon observed a case in which "crises laryngées" developed with crises gastriques.

Such a terrifying attack usually ends after a few seconds, or at most minutes, with long, loud inspiration, which gradually becomes easier, at the same time the cough ceases. Sometimes such an attack ends with expectoration of a small amount of slimy or blood-colored sputum or perhaps vomiting.

Finally, in the severest cases, vertigo (*vertige laryngée*, Charcot), incontinence of urine and feces, epileptic attacks and apnea are observed; in spite of all the attack usually ceases without untoward consequences, although not always. Sometimes tracheotomy is necessary to save the patient on account of the dangerous dyspnea (cases of Krishaber, Semon, etc.). At times, however, death results (cases of Lizé<sup>136</sup>, Cherchewsky, Oppenheim, Fournier, etc.).

In my statistics of laryngeal disturbance in *tabes dorsalis* (see table 1) crises laryngées existed 17 times in 125 cases. In both cases of crises laryngées in *tabes dorsalis* observed by me (Nos. 14, 22) there was a bilateral paralysis of the abductors, similar to all three cases of Krause. Such crises laryngées may exist alone, or they may be complicated with paralysis of the abductors (one or both).

Oppenheim, as also Jean, describes combinations of laryngeal spasms with spasms of the pharynx (the so-called pharynx spasm, Oppenheim). The author describes

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\*In describing these symptoms I will confine myself to the splendid monograph of Semon (Heymann's *Handbuch der Laryng. u. Rhin.*).

them in the following manner: "Pharynx spasms present special symptoms, and it seems to me some not as yet described. From time to time spasms of deglutition are observed, the movements of swallowing follow one another rapidly (about 24 in a minute, whereby a clicking sound and a stenotic murmur is heard)."

Such an attack lasts 10 minutes; it can, however, last longer, but is then much weaker. The attacks may come spontaneously, or during the act of swallowing; they can also be produced every time by pressure upon the side of the larynx, or where upon pressure a painful point is found.

How can the combination of paralysis of the larynx with crises laryngées be explained? Semon gives the following theory, which according to my idea is certainly the most plausible. As is known the cerebral nuclei of the abductors suffer principally in tabes dorsalis, complicated with paralysis of the larynx. (According to Petren, however, the paralyses are dependent upon peripheral inflammation of the laryngeal nerves). At the same time, however, the gyrus cells of the abductors are in a condition of increased excitability and react more quickly and to a greater degree, to reflex and peripheral irritation. Under these conditions an irritation, which ordinarily would produce a single cough or a mild attack of coughing, in tabetics with increased sensibility, and a higher grade of spastic approximation of the abnormal vocal cords than that which for coughing is usually necessary, would produce a true laryngeal spasm. To this explanation Burger adds, in as much as he is essentially of the same opinion, another condition similar to that of Semon's, "that an irritation must be present at the same time."

The diagnosis of crises laryngées, is on account of the above symptoms, not difficult. One might confound them with attack, of whooping cough in adult, or with ictus (vertigo) of the larynx. The negative findings on examination of the thorax in the former, and the positive data on examination "quo ad tabem" (absence of patellar reflex, ataxia of the lower extremities), as well as unconsciousness in the latter, prevent a wrong diagnosis. The prognosis of the spastic attacks of the larynx in tabes

dorsalis is, as a rule, not bad, although a fatal termination is possible.

The treatment consists in the local application of cocaine, (painting the larynx with a 20 per cent. solution) which blunts the sensibility of the larynx, whereby the number and intensity of the attacks diminish (cases of Krause, Landgraf, Oppenheim, etc.). Kussner advises the internal use of sodium bromide. During the attack inhalations of chloroform or ether are to be tried. As has already been mentioned, we are sometimes compelled to resort to tracheotomy.

II. *Ataxia of the vocal cords: that is, defective coördination of the muscles of the larynx.*

According to a few writers (Bourdon<sup>137</sup> Lhoste), the first accounts of these disturbances in *tabes dorsalis* were already given in the first half of the last century, 1825, by the renowned Cruveilhier,<sup>138</sup> obviously without laryngoscopic examination which was at that time unknown.

Moreover Féréol, the discoverer of the crises laryngées, in the same article in 1869, also described in a case laryngeal ataxia. Unfortunately in this case no laryngoscopic examination was made. Only in the year 1878 Semon described for the first time the disturbances shown by a laryngoscopic examination; the vocal cords showed irregular retraction movements.

Fournier, in the year 1885, described in his lectures on *tabes dorsalis* of syphilitic origin, likewise as a symptom of *tabes*, failure of coördination of the vocal cords, he did not however call it ataxia of the vocal cords, but phonetic spasm (spasm aphonique, aphonia spastica).

In the years 1895-98, Krause, in his article on laryngeal disturbances in diseases of the central nervous system, also described a laryngeal picture, present in the laryngoscope, in ataxia of the vocal cords. It is similar to the one previously described by Semon; the vocal cords show a tendency to retract, in that they halt half way between the positions of phonation and inspiration; similar to the backward twitching of the eyeball, to which Friedrich gave the name of "atactic nystagmus."

Characteristic of the symptoms is the fact that atactic movements appear only on deep inspiration and phonation, never however during quiet breathing. Disturbances of

this kind of coördination of the vocal cords, I observed once in 21 cases of *tabes dorsalis*. (Case No. 4.)

Marina, however, observed it nine times in 36 cases; Gerhardt also observed ataxia of the vocal cords in this affection (twice in 122 cases) as also Semon and de Haviland Hall. The latter observed it as one of the earliest symptoms of *tabes dorsalis*.

In the same class (disturbances of coördination) belong, according to Burger, trembling (tremor, nystagmus, tremulous movements, Gerhardt) of the vocal cords.

It differs from that observed in *sclerosis disseminata*, as in this latter neurosis it appears only on efforts of phonation (intention tremor), whereas in *tabes*, and similarly in *paralysis agitans*, it is observed principally during respiration. Burger describes very exactly in his monograph (p. 128) disturbances of this kind, which he had the opportunity to observe in two cases, as follows: The position of the vocal cords in phonation, as also during normal respiration, is normal. In regular, deep breathing however, is observed, in abduction as well as in adduction, irregular movements of the vocal cords. It appears as though the vocal cords were suddenly arrested in their movement; they make a slight motion in the first direction, and then move quickly backward, in order to carry out the originally intended movement. In general the vocal cords on deep breathing or on equally deep respiration, instead of one, make two or three ab- and adduction movements. As a rule the abduction is more pronounced on inspiration, although the opposite may take place. As I have already mentioned, this writer (Burger) refers these disturbances of coördination also to ataxia.

Finally, the so-called perverse action of the vocal cords (B. Frankel, Semon) belongs to the disturbances of coördination, and is based on the fact that on inspiration the vocal cords approach one another, on phonation and expiration separate from one another. This is the underlying principle of the so-called inspiratory functional spasm of the vocal cords. This symptom, which is observed principally in hysteria, I had an opportunity to observe in one case of *tabes dorsalis* (case No. 18).

Although all of the above mentioned laryngeal disturbances, principally "crises laryngées," finally ataxia and

tremor (nystagmus) of the vocal cords, have a very real significance, for the reason, namely, that they so often appear in the very early stages of this affection, nevertheless, as regards importance, they are far beneath laryngeal paralyses, which are "par excellence" tabetic disturbances. I now come to these.

### III. *Laryngeal paralyses in tabes dorsalis.*

These belong, as I have already mentioned to the most important disturbances, not only as regards their frequency, but also, at times, their earliest manifestations. Regarding the frequency of their appearance in tabes dorsalis the figures of different writers are at variance.

Whereas Dreyfuss only twice observed this above-mentioned laryngeal disturbance in 22 cases of this affection, others give a very marked per cent.; as for example Gerhardt, 17 times in 122 cases, that is, about 14 per cent.; Semon more or less the same, (14 times in 100 cases).; Berger gives still higher figures; 30 per cent. (6 times in twenty cases); Krause 34.2 per cent. (13 times in 38 cases); finally, Morina 38.8 per cent. (14 times in 36 cases). These differences which we see in the above figures may be explained by mere accident. That this is so, is proved by the fact mentioned by Semon; in 100 cases of tabes dorsalis, in the first series of examination of twelve cases of this affection, he observed seven pharyngeal paralyses; in the following 50 or 60, however, not even once, and again in the remainder (about 33 cases) seven times. According to my own observation I have seen paralysis eight times in 22 cases, more than  $\frac{1}{3}$  (36.3 per cent.). As I have already mentioned, I do not count in this enumeration case No. 1, since, besides tabes dorsalis, an aortic aneurysm existed at the same time, and upon this the paralysis of the right recurrent nerve was probably dependent. In the eight cases I observed right-sided recurrent paralysis once; bilateral posticus paralysis, twice; right-sided paralysis of these muscles (paralysis post. dex), twice; and finally incomplete posticus paralysis (paresis postici) three times, twice on the right and once on the left side.

In two cases, the tabes dorsalis was complicated by tuberculosis of the lungs. Hirschmann and Berger pub-

lished similar cases. In these few cases one can also explain the existence of laryngeal paralysis through pressure upon the recurrent nerve by the infiltration of the apex of the lung.

Burger gives, in his oft-quoted excellent monograph on laryngeal disturbances in *tabes dorsalis*, a table of the laryngeal paralyses, which includes all the known cases in the literature to-day, beginning with the year 1866, that is with Schnitzler's cases, and ending with the year 1891, that is during 25 years. The number of these observations is 71, including Burger's six cases. On the grounds of these statistics the writer is convinced that the so-called posticus paralysis is a tabetic symptom of *tabes* "par excellence."

My table embraces cases of laryngeal paralysis in *tabes dorsalis* since the year 1892 to 1898, that is, during the last six years. Including my eight, the number of these cases amounts to 53.

In this way the statistics of both Burger and myself include 124 cases now known in the literature of laryngeal paralysis in *tabes dorsalis*. From these statistics one may convince himself that the paralyses in *tabes dorsalis* almost exclusively affect the abductors. Only in two cases of Marina is paralysis of the internal muscles mentioned.

TABLE I. LARYNGEAL PARALYSIS IN TABES DORSALIS.

No.	Author.	Yr.	Kind of Paralysis.	Publication.	Remarks.
1	Grabower (Berlin)	1892	Paralysis postici sin.	D. med. Woch. 1892, No. 27	
2	" "	1893	" " "	Berl. Klin. Woch. 1893, No. 21	
3	Semon (London)	1893	Paralysis postici bilateralis	I. C. f. Lar. '93-94 p. 63	
4	" "	1893	Par. postici bilateral	I. C. f. Lar. '93-94 p. 161	
5	Kronenberg (Solingen)	1894	" " "	Berl. Klin. Woch. 1894, No. 48	
6	Pel (Amsterdam)	1894	" " "	I. C. f. Lar. 1877, p. 88	
7	Hawkins (London)	1895	" " "	Lancet, 1895, June 1	
8	Mader (Germany?)	1896	Par. postici sin.	I. C. f. Lar. 1877, p. 88	
9	Grabower (Berlin)	1896	" " "	" " p. 319	
10	Gougenheim and Plique (Paris)	1896	Par. postici bilateral.	" " p. 431	
11	Gerhardt (Berlin)	1896	" " "	Nothnagel's spec. Pa. & Th. '96 p. 55	
12	" "	1896	" " "	" " "	
13	" "	1896	" " "	" " "	
14	" "	1896	" " "	" " "	
15	" "	1896	" " "	" " "	
16	" "	1896	Par. postici dex.	" " "	
17	" "	1896	" " "	" " "	
18	" "	1896	" " "	" " "	
19	" "	1896	" " "	" " "	
20	" "	1896	Par. postici sin.	" " "	
21	" "	1896	" " "	" " "	
22	" "	1896	Par. recurrentis dex.	" " "	
23	" "	1896	" " "	" " "	
24	" "	1896	Par. rec. bilateralis.	" " "	
25	" "	1896	" postici et crico-arytenoid.	" " "	
26	" "	1896	Par. postici et recurrentis	" " "	
27	Dundas Grant (London)	1897	Par. postici bilateral.	I. C. f. Lar. '97, p. 530	
28	Semon (London)	1897	" postici.	Heymann's Handbuch der Laryng. 1. Bd. p. 811.	
29	" "	1897	" " "	" " "	
30	" "	1897	" " "	" " "	
31	" "	1897	" " "	" " "	
32	" "	1897	" " "	" " "	
33	" "	1897	Par. postici bilateral	" " "	
34	" "	1897	" " "	" " "	
35	" "	1897	" " "	" " "	
36	" "	1897	" " "	" " "	
37	" "	1897	" " "	" " "	
38	" "	1897	" " "	" " "	
39	" "	1897	Par. recurrentis	" " "	
40	" "	1897	" " "	" " "	
41	" "	1897	" " "	" " "	
42	Petren (Stockholm)	1897	Par. post. bilateralis	I. C. f. Lar. '98 p. 10	
43	Petren (Stockholm)	1897	" " "	" " "	
44	Chiari (Wien)	1898	" " "	" " p. 3	
45	Schulz (Berlin)	1898	Par. postici dex. later. par. recurrent. finally par. postici-bilater.	Berl. Klin. Woch. 1898, No. 12.	Improvement aft. specific treatment (syphilis)
46	Sendziak (Warsaw)	1898	Par. recurrentis dex.	Not published	Crisis gastriques
47	" "	1897	Par. post. bilateralis	" "	Crises laryng.
48	" "	1897	" " "	" "	Crises laryng. et gastriques
49	" "	1897	Par. postici dex.	" "	
50	" "	1897	" " "	" "	
51	" "	1897	Paresis postici dex.	" "	
52	" "	1897	" " "	" "	
53	" "	1897	" " sin.	" "	

Semon observed temporary (functional) abductor paralysis. Besides the abductors, paralysis of the adductors, also present, was diagnosed, principally the thyro-arytenoid muscles (Oppenheim, Gerhardt, Burger, Marina, Kroenig, Eulenberg, Hirschmann), seldom the cricothyroid (Eisenlohr).

Complete paralysis of the recurrent, that is, paralysis of the ab- and adductors was not often diagnosed; namely, 16 times in 124 cases (eight times on the right, twice on the left, and twice on both sides; these are the cases of Marina, which, however, are questioned by Burger and Gerhardt); in the four latter cases it was not stated which recurrent nerve was paralysed. In a few cases (Gerhardt Kahler) there existed, besides recurrent paralysis, posticus paralysis of the other side. Finally partial recurrent paralysis, that is paralysis of the crico-arytenoid muscles (paralysis postici) was observed in 87 cases; namely, bilateral 53, unilateral 34 times, right 11, left 14 times, and in the remaining nine cases, nothing was said in reference to the side on which the posterior-crico-arytenoid was paralysed.

In 19 cases, only paralysis of the vocal cords in general was noted, without further comment upon the more exact nature of this paralysis (paralysis recurrentis s. postici).

From this analysis one is compelled to regard the posticus paralysis, principally bilateral\* as a special symptom of tabes concerning which Burger for the first time called attention, and with whom Semon and I agree. They can for years remain as such without going over into complete recurrent paralysis (in one case of Semon's eight years, in another 12 years).

Worthy of special notice is the fact that laryngeal paralysis may for a long time precede the other objective symptoms which are characteristic of tabes dorsalis (absence of patellar reflex, ataxic gait, etc.), as the cases of Semon (2 years) Grabower (1  $\frac{1}{4}$  years) and others (Löri, Lhoste, Fournier, Aronsohn, Burger, Rosenberg, Weil, Felici, Luc, Pel, Kronenberg, etc.) show. This plainly

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\*According to my own observations, I noted bilateral posticus paralysis much more infrequently than unilateral; namely, but twice in eight cases; two cases of unilateral recurrent paralysis, however, were undoubtedly accidental.

demonstrates the importance of laryngeal examination in every case of nervous disease, even though they be merely suspected, to which Burger and Semon long ago called attention.

As regards the symptoms characterizing paralysis of the larynx in tabes dorsalis, I must, a priori, remark that they are in the majority of cases absent; namely, in unilateral paralysis of the postici, neither hoarseness or disturbances of breathing (stenosis) are present.

Hoarseness is observed only in bilateral paralysis and principally in the extremely rare bilateral paralysis of the recurrent nerves; in the bilateral posticus paralysis, however, we have to do with symptoms of stenosis, which sometimes necessitate tracheotomy.

The diagnosis of laryngeal paralysis is, thanks to the laryngoscope, not difficult. The posticus paralysis is characterized by the position of phonation of the vocal cords, the paralysis of the recurrent nerves by the cadaveric position.

The prognosis of this form of laryngeal disturbance in the course of tabes dorsalis is with the single exception of bilateral posticus paralysis which brings with it the danger of suffocation, not so bad in so far as the underlying disease (tabes dorsalis) can afford a good prognosis. (?)

Treatment of laryngeal paralysis in tabes dorsalis is in the majority of cases useless, especially in the absence of pronounced subjective symptoms (hoarseness, dyspnea). On the other hand we resort to tracheotomy as an "indicatio vitalis," in cases where the dyspnea endangers life (intubation finds no supporters, as also the attempt at laryngeal fissure, or resection of the paralyzed vocal cords (Semon), electricity, also massage to benefit the voice in paralysis which give rise to hoarseness. Such maneuvers are, as is self-evident in these progressive organic affections, almost hopeless.

I need not add, that as always, so here, the general treatment is of the greatest importance. Unfortunately we are able to accomplish, as we know from experience, but little in these severe affections.

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