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ON "AERIAL GOITRE" AND  
"TRACHEOCELE."

Galenus<sup>1</sup> and Paul d'Egine<sup>2</sup> seem to have been acquainted with aerial tumours of the upper air-passages, the latter referring to bronchocele or tracheocele.

Larrey<sup>3</sup> described, under the name of *Aerial Goitre*, a form of aerial tumour which is now generally thought to have been emphysema of the neck. It consisted of one or many aerial tumours situated in the front of the neck, and principally at the side of the larynx. These tumours, "which may acquire a considerable size, arise from more or less violent efforts, necessitated by cries and shouting. The air which has served for inspiration being then expelled outward by expiratory effort, with all the modifications required to give the voice or cries the desired intonation, insensibly produces these tumours. The air is, however, arrested in the tortuous cavities at the summit of the trachea, larynx, or parts behind the mouth, gradually distending the muco-cellular tissue of the air-channels, and determining the formation externally of small herniæ of these membranes, either between the great cornua of the hyoid bone and the thyroid cartilage, or across the interstices of the cricoid and first ring of the trachea. The vesicles thus produced grow rapidly and rise externally to the edge of the jaw, but present this feature, that gradual and uniform pressure causes them to disappear wholly or in part. This phenomenon, together with the absence of pulsations or arterial thrill, serves to distinguish this kind of pneumo-bronchocele from aneurysmal goitre." It was seen in Egypt amongst the blind, who are employed to chant verses of the Koran from the minarets at all hours of the day and night, for the purpose of marking the time and calling the attention of the faithful to their duties. The pouches produced are described by Larrey as like those found in certain apes. They appear only at the time these "religieuses" commence to chant their exercises, and the sufferers are compelled to compress them. But when the internal openings are much dilated, so that aerial tumours of the size of a fist are instantly produced by the expiratory effort, these persons are permitted to retreat into the privacy of the "piscines" of the temples. Larrey had seen this condition in two officers who used the voice much for instructing troops. One had a

<sup>1</sup> *De Compos. Medic. per Genera.* Lib. VI., cap. xiv.

<sup>2</sup> Lib. VI., cap. xiv.

<sup>3</sup> "Du Goitre aérien ou Ventriculaire. *Clin. Chir.* t. II., 1829.

tumour on each side of the larynx of the size of an apple, crepitant to pressure, thin, and knobby and indolent. Both subjects were aphonic, and could be heard only when compressing the goître with both hands, and this pressure caused the goître to disappear. The latter two cases certainly bear a very strong resemblance to tracheocele, and as Jacquoud<sup>1</sup> remarks, might well be produced by a rupture of the tracheal membrane and outward escape of air, which, however, is of course different to simple hernia.

"Congenital bronchocele" was described by Gohl,<sup>2</sup> the record being, however, very incomplete. The case was diagnosed from the fact that the tumour had increased on inspiration and crying, and was unaffected by expiration. There was, moreover, in this case a complication with struma. A case quoted by Riegel,<sup>3</sup> under the head of "Congenital Fistula of the Neck," is accepted by Eldridge<sup>4</sup> as tracheocele, but there do not seem any grounds for reversing the original diagnosis of Riegel. Lizé<sup>5</sup> described, in 1861, a case (under the title of emphysematous goître) of a girl seventeen years old, in whom a gaseous tumour developed suddenly from violent shrieking during labour. It occupied the right side of the neck, and disappeared in two days. Leriche's<sup>6</sup> case of "aerial goître," occurring in a child eight months old, from coughing; and Behr's<sup>7</sup> case of gaseous thyroid tumour in a girl of fourteen, as the result of coughing, are all, undoubtedly, cases of emphysema (very similar to Larrey's cases), and are wrongly included under the term tracheocele.

Emphysematous tumours of the thyroid gland have frequently been recognized, and have been variously designated "struma aera ventosa et pneumatophyma," "bronchocèle," "aérocèle," and by Larrey, as before mentioned, "goître aérien," or "pneumo-guttural." Such cases have been recorded by P. Franck, Richter, Schmalz, and Heidenreich, and they result, as Houel<sup>8</sup> properly remarks, not from any primary alteration of the thyroid gland, but from a lesion of the air-tract, such as rupture, which permits the passage of air outwards: such rupture has been known to occur during parturition, at the end of violent efforts during vomiting, after bursts of laughter, singing, and playing wind instruments. (Franck, &c.)

While aerial goître used to be much written about, it is no doubt true, as H. Rendu remarks, that there has been no veritable observation of a gaseous tumour, developed in the interior of the thyroid gland, without a communication existing either with the exterior or with the respiratory tract. Heidenreich, indeed, said he saw a gaseous tumour surrounded by a thick wall situated in the substance of the thyroid gland, but it cannot be imagined that a gaseous tumour could develop in the substance of such a gland without some external communication. It is far more probable,

<sup>1</sup> *Dic. de Méd. et de Chir.*, p. 36. Tracheocele.

<sup>2</sup> *Annou. Die angeborenen chir. Krankheiten des Menschen.* Berlin, 1842.

<sup>3</sup> *Ziemssen's Encyclopadia*, vol. IV.

<sup>4</sup> "On so-called Hernia of the Trachea." *Am. Journ. Med. Sci.*, July, 1879.

<sup>5</sup> *Soc. de Chir.*, 1861.

<sup>6</sup> *Soc. des Sci. Méd. de Lyon*, 1868.

<sup>7</sup> *Wochens. f. d. ges. Heilkunde*, Berlin, 1836.

<sup>8</sup> "Tumeurs des Corps Thyroïdes." *Thèse de Conc. Agrég.* Paris, 1860.

as Rendu remarks, that such a communication had previously existed, and the emphysematous enlargement had subsequently become encysted. One explanation of these aerial goîtres may be found in the observation of Duplay, who found two bursæ nearly constantly interposed between the lobes of the thyroid gland and the trachea. If a rupture of the trachea should admit air into these sacs, they naturally would expand. Heidenreich believed in dilatations of the tracheal rings themselves. All these cases in which the trachea would undergo a rupture by a sudden effort leading to extravasation of air into surrounding tissues would lead to sudden development of a crepitant, emphysematous tumour, which would be diffused, speedily absorbed (as in the cases of Lizé, Leriche, &c.), or, in very rare cases, such as Heidenreich's, might become encysted and localized. But most of the older observations are untrustworthy. Some of the older writers admitted hernia of the trachea, but no case was described with accuracy until Gayet<sup>1</sup> recorded an undoubted example of hernia of the trachea in 1867.

Virchow<sup>2</sup> has described what he has called "cystic trachectasies," which have their seat in that part of the aerial channel which is a little above and behind the sternal fourchette. They are dilatations of the posterior wall of the trachea, commencing in a series of flat depressions or excavations of the inner wall, which, little by little, coalescing, form a collective tumour, which steadily increases. Being unable to develop backwards by reason of the œsophagus and vertebral column, they extend laterally, and, under certain conditions, appear as veritable tumours above the clavicle, below and behind the thyroid gland, and at the sides of the trachea, and may then simulate a deep-seated goître or cyst. While originating at first as a hernia ("bronchocele"), they may later on become pedunculated. The orifice of communication may then become closed, and there results a pouch by the side of the trachea, filled with thick and clear mucus. Virchow<sup>3</sup> also describes, besides the dilatations of the trachea just mentioned, which might easily be confounded with cystic goître, and which, in place of air, habitually enclose only mucus, a dilatation of the ventricles of Morgagni, which may be called "ventricular laryngocele." In these cases there are seen small lengthened sacs, with thin walls, proceeding from the upper part of the ventricles by a narrow orifice, and sometimes extending to the upper border of the thyroid cartilage, and even to the hyoid bone, where they terminate in a club-shaped extremity, generally unilateral, but he once met with them on both sides. Their walls are smooth, the inside is lined with ciliated epithelium, and they contain air. It is impossible to confound them with goître, as they are placed within the thyroid cartilage. Once he met with a small cyst near the epiglottis and hyoid bone, which resulted from strangulation of the neighbouring sac.

We may dismiss the "aerial goître," so much written of by the older authors, as an impossible condition; the only case worth consideration, viz., that of Heidenreich, being explicable on other grounds, as already

<sup>1</sup> *Mémoires de la Soc. des Sci. Méd. de Lyon.* 1865-6, tome V.

<sup>2</sup> *Pathologie des Tumeurs.* Translation by Aronsohn. Tome I., p. 263. 1867.

<sup>3</sup> *Op. cit.*, tome III.

shown. Virchow's "trachectasies" and "ventricular laryngocele" appear to be curiosities. In connection with the former it may be mentioned that Rokitsansky<sup>1</sup> has described sacciform diverticula of the trachea, originating in hypertrophy and dilatation of the muciparous glands, and either of these conditions might reasonably play some part in the development of "tracheoceles." I scarcely think that anyone would confuse these aerial tracheal tumours with pulmonary hernia (or pneumatocele), which was ably described by Dr. John Cockle<sup>2</sup> in 1873.

"Tracheocele," or "tracheal hernia," escapes the attention of most writers of text-books, but is important enough to deserve recognition at their hands. Eldridge,<sup>3</sup> who wrote a careful essay on the subject in 1879, Cohen<sup>4</sup> and Morell Mackenzie<sup>5</sup> are the only English writers who have dealt with the subject in detail. Careful essays have also been contributed by Jacquoud<sup>6</sup> and Rendu.<sup>7</sup> I scarcely need to apologize for again directing attention to a condition which has received so little notice, more especially as I believe many cases must occur in practice, some of which escape detection, others of which are unrecorded. This is unfortunate, for the subject is interesting from many points of view. Three cases have occurred in my practice during the last eighteen months, and I herewith relate them :—

I.—The patient, a well-developed and intelligent German, aged twenty, an hotel waiter, noticed first in December, 1886, a fulness of the front of the neck above the sternal notch, forming a tumour on each side of the trachea, which was treated by a local practitioner for a goitre, which it fully resembled. Under treatment with iodine, it seemed to diminish for a time, but not completely, and subsequently increased again. At the first inspection at the Throat Hospital, where he came for treatment, I found a soft enlargement of both lobes of the thyroid gland, and noticed that on coughing the tumour became a little more prominent. He complained of a certain degree of dyspnoea on exertion, and an uncomfortable feeling of oppression in breathing. The voice was hoarse, the vocal cords congested, and their movements sluggish. At first I took the case to be one of simple goitre, and treated this by the insertion of electrolytic needles and Faradism. The goitre was soon dispersed under daily applications, and it then became evident that there was an aerial tumour communicating with the trachea, to which my attention was first directed by the patient saying to me, "I can blow it up." While the patient was at rest there appeared to be scarcely any more than fulness, chiefly located over the right side of the neck in the region of the lower part of the thyroid. When the tumour was fully distended by expiratory effort with the mouth and nares closed it appeared to be rounded and well defined, rising above the cricoid cartilage, extending on the right side under the edge of the sterno-mastoid muscle, and obliterating the sternal notch in its upper part. On the left was a similar but smaller tumour, not extending quite to the cricoid cartilage, or to the edge of the sterno-mastoid. The two tumours appeared to be connected by a swelling in front of the trachea, which inflated at the same time as the other portions. I and others thought these two tumours to be distinct, since

<sup>1</sup> *Path. Anatomy*, vol. III., p. 4.

<sup>2</sup> *Med. Times and Gaz.*, Jan. 4 and 11, 1873.

<sup>3</sup> *Am. Journal of the Med. Sciences*. New Series, vol. LXXVIII. July, 1879.

<sup>4</sup> *Ashurst's Encyclopædia*, vol. V. <sup>5</sup> *Dis. of Throat and Nose*, vol. I., p. 537.

<sup>6</sup> *Dic. de Méd. et de Chir.*, I., 35.

<sup>7</sup> *Dict. Encyclopédique des Sci. Méd.* 4<sup>me</sup> sec., tome IX.

la Chirurgie, IX, 1889, p. 132, ~~publié~~

10] Traité de l'Empyème, Album II, Marché  
12] examen anatomique articulaire &  
laine à l'œuf, Album de Diabète & Jaunisse

prevention of distension of the main tumour on the right side by pressure did not prevent the inflation of the tumour on the left side during forced expiration. The circumference of the neck when at rest was 13 $\frac{3}{4}$  inches, when inflated 15 inches. Coughing caused some distension of the tumours; external pressure would prevent the distension, but while pressure applied to a spot just below the cricoid cartilage on the right side would prevent inflation of this side, the tumour on the left side would be fully expanded, and *vice versa*. The tracheal sounds were heard on auscultation intense in character; the tumour was not tympanitic, probably owing to its possessing a thick wall, and no crepitation could be elicited. As in other cases described, the larynx was somewhat congested, and the muscular movements sluggish; voice was husky and weak. The only treatment adopted was the application of a pad to obtain compression, which the patient was directed to wear continuously. No history of violent expiratory effort, coughing, or vomiting could be obtained. I append a drawing of this case, which was interesting, because a goitre complicated the tracheocele, the former masking the condition for a time.

II.—E. B., aged thirty, an unmarried woman occupied in needlework, attended my clinic at the Throat Hospital, complaining of a “swelling on the left side of the neck.” She stated that she had frequently suffered from enlarged glands in previous years, and had noticed this tumour fifteen months previously for the first time. A doctor whom she consulted informed her that she had “Derbyshire neck,” and painted it with iodine. “When the patient is quiet and not speaking, “a rounded swelling is seen beneath the tendon of the left sterno-mastoid muscle, “commencing half an inch above the clavicle, and extending for one inch upward. “On forcible expiration with the mouth and nose closed, the swelling increases in “size, extending up to the middle line of the neck, and outwards to the supra- “clavicular fossa. The expansion of the tumour can be prevented by pressing on “a spot on the left side of the trachea. Coughing causes distension of the tumour. “Blowing breath sounds are heard on auscultation, and the tumour is tympanitic “to percussion. There is a slight amount of dyspnoea on exertion, and the voice “is weak but not hoarse. There is nothing abnormal in the larynx. The patient “is a pale, weakly-looking woman, who has suffered much from vomiting, with “violent retching, and thinks that this may have caused the tumour to appear in “the first instance.”<sup>1</sup>

III.—The third case occurred in a weak, debilitated man of forty-five. On removing the beard two months before coming to me, he had noticed for the first time a tumour on the right side of the neck by the side of the trachea, and a little below the cricoid cartilage, of the size of a Tangerine orange, hard but compressible (the sac wall was probably very thick). It could be almost completely emptied by external pressure. It enlarged considerably on expiration, cough, and distending it at will: it was not tympanitic to percussion, but blowing breath sounds were heard over it. The vocal cords were congested, and their movements sluggish.

But few cases of tracheal hernia have been put on record. Eldridge, in 1879, could only find recorded nine cases, of which three, however, were evidently not tracheocele. Cases must frequently have occurred, the true nature of which has been overlooked, and the practitioner may be excused for calling such cases goitre. He is not likely to recognize the true state of affairs unless he has caused the patient to voluntarily distend

<sup>1</sup> For the notes of these two cases I am indebted to my able clinical assistants, Dr. Stephen Breckenridge, of U.S.A., and Dr. Hugh Montgomery, of Penzance.

the tumour. In all cases of supposed goîtres he should, therefore, bear in mind the possibility of tracheal hernia.

Such cases as I am able to find recorded I will now refer to before discussing the general subject of tracheocele.

GAYET<sup>1</sup> described a case in 1867 which possessed the following points of interest. A joiner presented a tumour at the lower part of the median portion of the neck, which had existed for nine months, and had gradually increased in size. It passed under the inner edges of the sterno-inastoid muscles, becoming prominent, hard and elongated from below upwards when the muscles were thrown into action; becoming soft and diminished in size when the muscles were relaxed. It was also swollen and distended during forced expiration, disappearing during inspiration. It was soft to the touch and reducible by manipulation, but evidently presented a sac with thick walls. The tumour was independent of the thyroid gland, and communicated with the trachea probably below the cricoid cartilage.

DEVALZ,<sup>2</sup> in 1873, recorded a case in which the tracheal hernia had occurred ten years previously, consequent upon an attack of bronchitis attended with violent cough. It varied with respiratory movements, and formed a pyriform swelling on each side of the trachea, like hypertrophy of the lateral lobes of the thyroid on coughing. The appearance of the swelling could be prevented by pressure upon the trachea. The tumour was soft and readily compressible.

FAUCON,<sup>3</sup> in 1874, saw in a man of fifty-four a swelling of the size of a hen's egg to the right of the trachea, resembling a bronchocele, but differing from the latter in being soft, elastic, and increased in size by coughing, hawking, and blowing the nose. The tumour had first appeared after vomiting, but he had suffered for many years from bronchial catarrh. The tumour was tympanitic and voice weak. A second case of Faucon's<sup>4</sup> was that of a child of eighteen months old, and the tracheocele arose through exertion, receded spontaneously, and could be reduced.

ELDRIDGE'S<sup>5</sup> case occurred in a man of twenty-six, and the tumour had first appeared about seven months previously, being little more than a swelling on each side of the trachea, associated with occasional noisy and difficult breathing. It had gradually increased along with the severity of the symptoms, which, previously paroxysmal, now became constant, and there was suffocative dyspnœa. The size of the tumours could be increased by coughing and on forced expiration. The swellings were independent of each other, and looked like thyroid hypertrophies. With severe dyspnœa the tumours were much dilated, and when tensely distended the introduction of a hypodermic needle gave exit to a stream of air sufficient to extinguish a lighted match. Tracheotomy was proposed and refused.

DÉTIS,<sup>6</sup> in 1883, described the case of a merchant, aged twenty-nine, of previous good health, who, after severe coughing in the course of an acute

<sup>1</sup> *Mémoire de la Soc. des Sci. Med. de Lyon.* Loc. cit.

<sup>2</sup> *Gaz. des Hôp.*, 1873, 129.

<sup>3</sup> *Archives Méd. Belges*, Jan., 1874.

<sup>4</sup> *Ibid.*

<sup>5</sup> *American Jour. of the Med. Sci.*, July, 1879.

<sup>6</sup> *Cent. für Chir.*, July 7, 1883.

bronchitis, noticed a tumour the size of a hazel nut just above the sternum, which in three days had increased to the size of a pigeon's egg. Remaining stationary for three weeks, it suddenly opened, discharged pus and blood, and became reduced in size. It then grew again slowly for a time, remaining, however, softer and smaller than before. It increased in size during expiration, and diminished during inspiration. Compression caused it to disappear, and fine crepitus was elicited. Permanent compression with a truss cured it in six weeks. (This was probably a case of tracheocele, resulting from closure of a fistula.)

INGALS,<sup>1</sup> in 1885, related the case of a labouring man, aged fifty-four, suffering from chronic bronchitis with emphysema, in whom an irregularly hemispherical tumour, of the size of half a hen's egg, was detected. The tumour lay in front of the trachea, in the position of the thyroid isthmus, was firm but elastic to the touch, moved upwards and downwards with deglutition, but less so than a bronchocele. It was not materially altered in size by pressure, but enlarged to the size of a small orange on sudden expiratory effort, the left side of the neck and supra-clavicular region bulging out half to three-quarters of an inch on expiratory effort or coughing.

R. W. PARKER<sup>2</sup> described a case of congenital, soft, thin-walled tumour, noticed in a female child, two months old. It occupied the centre of the posterior triangle of the neck, was resonant on percussion, rose and fell with respiratory movements; during respiration was quite tense, hemispherical, and as large as a Tangerine orange. It sprang from beneath the sterno-mastoid muscle, and its connections with the trachea and thyroid could not definitely be made out. Its contents were air, and it rose and fell with respiration. Though Parker thought it corresponded with Virchow's ventricular laryngocele, there seems no doubt that it was a tracheocele.

The curious case described by HUTCHINSON<sup>3</sup> is instructive. A pale, phthisical-looking man, twenty-three years of age, presented an evenly-rounded swelling, of the size of a pigeon's egg, over the lower part of the larynx and front part of the trachea, which could be emptied with ease on pressure, and which refilled on coughing. It was tympanitic to percussion, and the base was indurated. The swelling had developed within three weeks, being at first small, then increasing. The voice was hoarse until compression of the tumour with compresses was applied, when it amended. The man was far advanced in phthisis, and Hutchinson inclined to the opinion that the origin of the condition was in laryngeal ulceration.

DAREMBERG and VERNEUIL<sup>4</sup> described an interesting case of a man of good constitution, aged 73, having for many years had a dry cough, and on two occasions suffocative crises. A small tumour was discovered on the left side of the neck, compressing and slightly deviating the trachea, and the tumour appeared to be prolonged behind the clavicle, and was localized in the corresponding lobe of the thyroid gland. The vocal cords moved perfectly, and were healthy. Tincture of iodine

<sup>1</sup> *N. York Med. Record*, April 4, 1885.

<sup>2</sup> *Clin. Soc. Trans.*, vol. XIX.

<sup>3</sup> *Med. Times and Gazette*, March, 1861.

<sup>4</sup> *Revue de Chirurgie*, May 10, 1886.



diminished the tumour. A year after, the small tumour of the size and form of a finger increased during coughing, and diminished afterwards. The right vocal cord was now motionless. There was also some difficulty of deglutition, and hot drinks brought on spasms of coughing, ending in their rejection by the nasal fossæ. The tumour was of the size of a citron, and disappeared suddenly. A smaller tumour appeared on the right side, apparently a dependence of the former. The authors regarded it as arising from sacciform protrusion of the membranous portion of the posterior tracheal wall, leading to hernia between the trachea and œsophagus. At first, the orifice being narrow prevented it from emptying completely and easily, thus giving rise to the formidable attacks of suffocation noticed at first. There was tracheal stricture in this case, and the case finally ended fatally, oppressed breathing passing into aphonia and asphyxia.

GIRAUD'S<sup>1</sup> case of "traumatic tracheocele" is also singular. A woman of forty-one came to the hospital with a transverse wound of the neck, penetrating the skin, sterno-mastoid and scalene muscles, and the external jugular vein. In ten days all had healed, but, at the end of a violent fit of coughing originated by a bronchitis, a soft, extensile, and easily reducible tumour was observed at the left side of the neck, of the size of an orange, appearing during coughing and disappearing while at rest. There was no sonority or crepitation. The symptoms lasted fifteen days, the cough amended, and the tumour had much diminished when the woman left the hospital. Giraud believed it to be caused by the rupture of a cicatrix formed in the trachea as a consequence of the coughing.

HEYMANN<sup>2</sup> demonstrated a case of tracheocele occurring in a child four years old. The author had noticed an intumescence of the neck during speaking and coughing, and every forced expiration brought into view a rounded tumour, which was tympanitic to percussion. Heymann thought that, as the tumour was very slow in filling, the communication between the trachea and the hernia must be small. Chronic catarrh accompanied the condition, and led to hoarseness.

I have only been able to find eleven cases of tracheocele recorded, which, with three cases of my own, will make fourteen in all. Of these, Giraud's and Dété's cases should, perhaps, not be called "tracheocele," if we restrict that term to hernial protrusions of the tracheal membranes.

The etiology of this curious condition is not very definite. So far as sex is concerned, it is three times as common in the male as in the female sex. As to age, it has occurred in a child eighteen months old, in a child eight months old, and in another of four years old, and seems to have been congenital in Parker's case, and, perhaps, also in Heymann's, and one of Faucon's cases. All the other cases have been adults. The causes leading to the appearance of the tumour have been violent expiratory effort, such as coughing, "straining with a closed glottis" (Cohen), or vomiting. In several cases there has been a history of chronic bron-

<sup>1</sup> *Revue de Chir.*, Jan. 10, 1887.

<sup>2</sup> Fifty-ninth Meeting of German Naturalists and Physicians, Laryngological Sub-section. Berlin, September, 1886. See also *Journal of Laryngology*, edited by Mackenzie and Wolfenden. Vol. I., No. 2, 1887.

chitis and tracheitis, attended with more or less coughing, and it may not be unintelligible that such a chronic condition may so weaken the tracheal walls as to lead easily to hernia. In Giraud's<sup>1</sup> case the hernia occurred after coughing, in chronic bronchitis, in a woman who had suffered an incised wound of the neck, in which the trachea had been involved, had subsequently cicatrized, and later on, this cicatrix had been broken by the coughing efforts. Giraud calls this "Traumatic Tracheocele."

The diagnosis of the condition is easily made. A well-defined tumour, situated above the sternum, in front or at the side of the trachea, not as a rule reaching above the cricoid cartilage, soft, elastic, and generally compressible, varying in size from a walnut to a small orange, enlarging during expiratory effort with mouth and nares closed, or with coughing, and diminishing with deep inspiration, should leave no doubt as to its nature. Its inflation can generally be completely or partially prevented by pressure applied to its external surface, and a spot may sometimes be found on the tracheal wall, pressure applied to which completely prevents expiratory inflation of the tumour. The tumour is sometimes tympanitic, though not always; if the wall be thick, respiratory sounds are heard in its interior, and the voice-sounds occasionally have a muffled resonance or "cooing" character. In Eldridge's case, the insertion of a hypodermic needle into the tumour was followed by the exit of a stream of air, forcible enough to extinguish a lighted match. The movements of the vocal cords and the laryngeal muscles have been described by most observers as sluggish, and the larynx as sometimes congested. One cord has also been described as lying motionless, probably from pressure upon the laryngeal nerves by the tumour. Slight dyspnoea generally exists, and severe suffocative attacks may occur, in which tracheotomy may be necessary. The voice is often weak, and most patients have signs of debilitated constitutions.

The most probable condition for which tracheocele would be confounded would be goitre. The inflation of the tumour would, however, prevent this error. From emphysema of the neck the condition is readily differentiated, and there can be no possibility of confusing the condition with pulmonary hernia. Very little can be done in the way of treatment. The application of a pad, to compress the tumour, is all that can be advised. Constant pressure, persistently applied, will certainly diminish the tumour. In a few cases the dyspnoea has been so intense as to suggest the propriety of tracheotomy. Heidenreich opened the pouch and endeavoured to promote cure by suppuration, but it is probably true, as Gayet remarked, that every attempt at radical cure will lead to results worse than the condition itself.

The pathology of this condition is most obscure, and several hypotheses have been emitted. I have referred to Virchow's views upon trachectasies and ventricular laryngocele, and to Duplay's idea of extravasation of air into tracheal bursæ. Rokitansky<sup>2</sup> ascribed certain sacciform diverticula of the trachea to hypertrophy and dilatation of the muciparous glands.

Eldridge<sup>3</sup> believed that all the cases of this character were most

<sup>1</sup> *Revue de Chirurgie*, 1887, No. 1.

<sup>2</sup> *Path. Anatomy*.

<sup>3</sup> *Loc. cit.*

easily explained on the supposition that blind or incomplete fistulæ of the neck exist, internal and congenital, due to persistence of the branchial clefts, or want of union of the branchial arches in the middle line, but congenital tracheal fistulæ have not yet been proved to exist, and M. Sarazin<sup>1</sup> has shown that the three reported cases of Luschka,<sup>2</sup> Riecke,<sup>3</sup> and Jenny,<sup>4</sup> were either branchial fistulæ or not congenital, and, as is properly remarked in Jacquoud's "Dictionnaire de Médecine" "the branchial origin of these fistulæ is less admissible still, since the branchial arches take no part in the development of the trachea," so that this view which has been adopted by Cohen<sup>5</sup> and Mackenzie<sup>6</sup> cannot any longer be maintained.

Rupture of the trachea has been advanced by some writers as the cause of these tumours, either of the membranous portion of the trachea in the posterior wall, or the membranes uniting it to the larynx, or from ulceration and pathological perforation of the trachea itself with extravasation of air into the peri-tracheal cellular tissue. This theory has latterly been maintained by Giraud,<sup>7</sup> who admits, however, that these cases of congenital tracheocele (Faucon, Devalz, and latterly Parker) must be explained on the ground of "arrest of development."

Rupture of the trachea, whether from ulceration or other cause, with sudden extravasation of air into the cellular tissue, would give rise to characteristic emphysema of the neck, indicated by ill-defined crepitant enlargements which subside in a few days, and Giraud's case must be regarded as having quite an exceptional origin. The very chronic and slow course of development of these tracheal tumours argues against any such lesion, and rupture into the tracheal bursæ of Duplay, with subsequent distension, must be regarded as still more problematical.

After all, the old and generally accepted idea of a hernial protrusion of the tracheal membranes originating at some weak spot of the tracheal wall, either acquired (as in cases of chronic tracheitis, such as has preceded most of the recorded cases) or congenital, is the most satisfactory.

Tillaux<sup>8</sup> remarked, "The fibrous membrane, very resistant, forms the frame-work of the trachea; it is composed of connective tissue fibres with a great number of elastic fibres, and this structure permits of the *bizarre* development of gaseous tumours at the sides of the trachea and communicating with its cavity, which are true hernias of the fibrous membrane, produced generally under the influence of violent expiratory effort." It has been objected that the solid adherence of the mucous membrane to the subjacent parts would prevent any hernial distension, but the interesting case recorded by Hutchinson would dispose of this difficulty. Again, Gerhardt<sup>9</sup> very pertinently remarks, "that not only is

<sup>1</sup> *Dict. de Méd. et de Chir. Pratique*, 1869, t. IX., p. 659.

<sup>2</sup> *Archiv. für Phys. Heilkunde*, 1848.

<sup>3</sup> Walthern-Ammon, *Journ. de Chirurgie*, Bd. XXXIV.

<sup>4</sup> *Schweizer Zeitsch.*, Bd. I.

<sup>5</sup> Ashurst's *Encyclopædia*, vol. V.

<sup>6</sup> *Dis. Throat and Nose*, vol. I., p. 537.

<sup>7</sup> *Revue de Chirurgie*, Jan. 10, 1887.

<sup>8</sup> *Traité d'Anatomie Topographique*, p. 402.

<sup>9</sup> *Handbuch der Kinderkrankh.*, vol. III., Heft 2, p. 564.

this thin, smooth, lax surface ('pars membranacea' of the trachea) prone to malformations, but is easily predisposed to diverticulum formation, by reason of the yieldingness of its slightly resistant muscular fibres and elastic and fibrous tissue." Meckel observed such a diverticulum of the trachea at the level of the fifth and sixth cartilaginous rings directed backwards, and being in communication directly with the trachea by a fine opening. While it must be admitted that the pathology of these conditions is obscure, owing to our want of post-mortem evidence, there is more reason to ascribe them to true hernia of the tracheal yielding membranes (rendered more yielding by pre-existent catarrhs of long standing) than to any other cause. Eldridge's theory of defect of the branchial clefts must be dismissed at once, as founded on erroneous developmental data, and the theory which ascribes them to ruptures of the tracheal wall, though applicable to Giraud's case (which, however, may well have been one of encysted emphysema), cannot be maintained for the majority of cases, such lesions giving rise to quite different conditions, viz., emphysema of the neck.

R. Norris Wolfenden.

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## NEW INSTRUMENTS AND THERAPEUTICS.

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**MAW, SON & THOMPSON** (London).—**Balin's Improved Fur-Respirator.** *British Medical Journal*, November 26, 1887.

THIS is a simple contrivance of a piece of natural fur, perforated with fine holes. It is backed with flannel, and makes an effective air filter.

Hunter Mackenzie.

**W. W. M.**—**Climate for Asthma.** *British Medical Journal*, December 3, 1887.

RECOMMENDATION of Bournemouth, which, though on the sea, is screened from all winds but the south, and is surrounded by pine forests. It consequently presents the principal desiderata for respiratory affections. (We have good reason to know that the east wind is not unknown at Bournemouth.)

Hunter Mackenzie.

**CLAY, JOHN** (Birmingham).—**On the Treatment of Cancer.** *Lancet*, November 19, 1887.

FOUR cases are recorded illustrative of the successful treatment of cancer by Chian turpentine. One is a case of epithelioma of the tongue, and another is a case of epithelioma of the nose and face.

Hunter Mackenzie.