inner surface of the wound in the abdominal wall formed the focus of infection, as shown by the distribution of the tubercles on the peritoneum.

The similarity in point of histological appearances between scrofulous and tuberculous lesions has formed the subject of several excellent memoirs. I have examined sections from most of the animals experimented on, and find no essential differences between them and the same lesions produced by the inoculation of miliary tuberculosis, only slight alterations in accordance with the acuteness or duration of the disease.

Like other observers, I have found tubercle bacilli, although in very small numbers, in strumous glands; but in abundance in those organs which I have examined from the rabbits and guinea-pigs inoculated experimentally. The bacilli in the visceral tuberculosis were generally uniformly stained with even outlines; but in the strumous abscess in a rabbit which had existed for eight months they were nearly all "beaded" or uniformly stained, and often collected in groups not unlike clumps of micrococci. These changes in the form of the bacilli in acute and chronic cases of tuberculosis have been noted by MM. Raymond and Arthaud.⁵

In investigating the relation of strumous disease to other forms of tuberculosis, it was necessary to consider the possibility of its belonging to the form of tuberculosis described as *tuberculose zoogloïque* by Malassez and Vignal,⁶ and which has also been observed by Eberth. This disease in its coarse anatomical characters cannot be distinguished from tuberculosis; but, on investigating the lesions microscopically with appropriate reagents, the bacilli of Koch are not to be found, while at the periphery of the caseous centres of the nodules are dense masses of micrococci, usually distributed in zoogloea, but in part in chaplets. The precise relation of this disease to bacillary tuberculosis has not yet been determined. Malassez and Vignal discovered it in guinea-pigs which had been inoculated with a tuberculosis of the skin; and recently Chantemesse⁷ obtained the same disease by inoculating guinea-pigs with portions of sterilised cotton-wool, through which the air of waiting rooms used by phthisical patients had been passed. Malassez and Vignal incline to the opinion that zoogloëtic tuberculosis may coexist with the ordinary bacillary form. In their experiments bacilli appeared in animals inoculated with a third series of cultures of micrococci, of which each generation had been passed through a guinea-pig. It is even possible that the micrococci may be simply contaminations of bacillary tuberculosis. The subject, therefore, requires further investigation, especially in tuberculous products from man. With the reagents employed by the authors above mentioned I have carefully searched two specimens of strumous gland, and many diseased organs both from rabbits and guinea-pigs inoculated with strumous glands, but have found nothing like zoogloea, except in one gland. Here were some darkly stained granular masses, but the granules were not well defined, and disappeared when the field was fully illuminated by removing the diaphragm. They were probably nothing more than masses of granular caseous material.

In passing I may here state that I have much pleasure in confirming, as regards strumous glands, the observation of Mr. Treves,⁸ which has been combated by high authority, that many of the "giant cells" are clearly formed by lymph coagula lying in lymph sinuses. I may also call attention to a curious condition of the lungs of some guinea-pigs which had been inoculated with tubercle. They are studded with rounded cavities, some larger than a pea, and many of these projected beneath the pleura, looking like bullæ. On microscopic examination they appeared to be formed by the softening of the caseous centres of tuberculous nodules, and by dilatation of the minute bronchi. The occurrence of cavities in the tuberculous lungs of animals has been denied by Chantemesse.

To conclude, while I have shown that the virus of strumous gland disease produced visceral tuberculosis in rabbits as well as in guinea-pigs, yet I admit that the disease in rabbits is not so acute and rapidly fatal as that following inoculation with, for example, acute miliary tubercle. The difference is one only of degree, not of a kind permitting us to infer, with Arloing, that struma is a specialised form of the tuberculous virus. We must, therefore, fall back on another explanation of the clinically innocent course of strumous gland disease; and we find it probably in the locality or soil in which the virus is implanted. Taking cervical gland

disease, if the virus is not inherited from a consumptive or strumous parent, it may be surmised that the common bacillus of phthisis is implanted in the lymph follicles of the pharynx or tonsil, in one of the adjoining mucous membranes on the skin, and is carried direct to the glands. These, acting as filters, arrest its progress permanently, except in some cases in which suppuration and ulceration take place, when the surrounding textures may become implicated, and general dissemination ensue. The malignancy of the virus may be somewhat attenuated under the local influence of the lymph cells and leucocytes in the gland, but to admit that the virus producing the disease is *ab initio* specialised, would be to infer that the strumous disease could only be produced by the virus of struma, and no other.⁹

In conclusion, I would emphasise the objections to the use of the terms "scrofula" and "struma" for lesions resembling tuberculosis.

Teachers must often be asked by students as I have been, What is the difference between a strumous and a tuberculous testicle?

Further, any evidence tending to connect more closely strumous gland disease with general tuberculous affections encourages us to persevere in the practice of early operation (where possible), with the view of completely eradicating the disease.

PERICHONDRITIS OF THE LARYNX.

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A VERY instructive case has recently occurred in my clinic, of which I append the notes. The patient, C. T., aged 43, a big, strong-looking man, by occupation a policeman, applied at the Throat Hospital on September 20th, 1887. He gave the following history. He had been a policeman for sixteen years, had never had any illness that he remembered, except an injury to the knee, which kept him in hospital for fifteen weeks. The father is alive and well, the mother dead fifteen years before from "cancer of the breast;" all other relatives were healthy. The patient himself, though frequently pressed, could give no history of syphilis. At Christmas, 1885, he had caught a severe cold, suffered sore throat, and loss of voice and dyspnoea on lying down in bed. Under treatment he got somewhat better, partly regaining his voice, which, however, never became so clear as formerly. From time to time he caught cold, and suffered extinction of the voice, but was not ill enough to relinquish his work. He attended the Victoria Park Chest Hospital at Christmas, 1886. In July, 1887, he went to Yarmouth, and on returning home continued his work until coming to this hospital in September, 1887.

I saw him first on October 25th, 1887, and then found upon laryngoscopic examination that, situated under the right vocal cord, projecting beyond its edge, and occupying the anterior third of its subglottic portion, was a swelling, smooth and red, having all the appearance of a neoplasm (Fig. 1). The vocal cord of that

Fig. 1.

side was nearly motionless upon deep inspiration, and its surface was congested. The left cord was well abducted, and presented no abnormal appearance. The ventricular bands of both sides were a little thickened, just as in chronic laryngitis. The voice was hoarse but not extinct. No history of pain in any part could be obtained. Breathing was easy, and the patient's general condition satisfactory.

Bearing in mind the age of the patient, the history of the case, and the resemblance of the subglottic swelling to a new growth, I thought the case might possibly be one of malignant disease of the larynx. I therefore proposed to the patient that on my next

⁵ *Prophylaxie de la Tuberculose*, p. 38.

⁶ *Arch. de Physiologie*, February 15th, 1883, February 16th, 1884.

⁷ *Annales de L'Institut Pasteur*, March, 1887.

⁸ *Holmes's System of Surgery*, vol. i.

⁹ For two cases in which the inoculation of circumcision wounds by tuberculous virus was followed only by caseous abscesses, see *Lancet*, January 28th, 1888.

visit, three days afterwards, I should remove a portion of the supposed neoplasm, and submit it to microscopic diagnosis. The patient did not come to the hospital until eight days afterwards, when his symptoms had suddenly become urgent. For some days before he had suffered fresh dyspnoea, and was now at the point of suffocation. There was great inspiratory stridor, and extinction of voice; the whole skin was bathed in sweat; the pulse was rapid and feeble; breathing was most difficult, and the patient's expression was most anxious. The imminence of asphyxia rendered tracheotomy necessary on November 1st, 1887. The man was therefore put under anæsthetics, and the operation was performed with skill and dexterity by Mr. Procter S. Hutchinson, the resident medical officer.

Just before the operation I was enabled to make a laryngoscopic examination. Though this was difficult, I was able to make out that all the soft parts of the laryngeal tissues were greatly swollen—the ary-epiglottic folds, the ventricular bands, and the cushion of the epiglottis. The vocal cords were completely hidden, except a small part of their posterior extremities, of which the edges could be seen, quite white, but motionless and fixed. Externally the thyroid cartilage was swollen and enlarged, slightly tender to pressure, and giving some sense of fluctuation. There was very little bleeding during the operation of tracheotomy, and immediate relief was experienced; it was followed, however, by an attack of bronchitis.

The development of the case became now extremely interesting. Two days after the performance of tracheotomy, I obtained a laryngoscopic examination, but could see but little beyond that the whole larynx was occupied by red swellings; no vocal cords could be seen, nor any orifice to serve for respiration. The swelling was covered with frothy mucus, and brushing it off with alkaline lotion exposed a surface, upon which no ulceration could be detected. The odour of the breath was offensive, the secretion smelt also. A good deal of muco-purulent matter escaped through the tracheotomy wound, outside the outer tube. Expectoration was copious, depending of course upon the bronchitis. The secretion through the laryngeal wound continually soaked the dressings and the wound, which was dressed at first with iodoform gauze, looked irritated and inflammatory. Iodol dressings were substituted for iodoform, with great benefit. The temperature chart suggested the presence of pus, and for some days was up and down (Fig. 2).

Fig. 2.

On November 10th, a little piece of cartilage was expectorated, and the discharge was lessening in offensiveness and in quantity. On the 14th the thyroid cartilage was enlarged in its whole extent, and especially the left wing, which was fluctuating to touch. An aching pain was complained of, and referred to a spot over the left wing of the thyroid cartilage. The interior of the larynx still appeared almost completely occluded by red oedematous swellings, and only just the posterior ends of the vocal cords could be seen. These swellings were well scarified with the laryngeal lancet with some relief to the patient, who had also been prescribed the vapor pini sylvestris, since the tracheotomy. A slight degree of dysphagia existed at this time. A week afterwards (November 21st) the patient reported that for some days all discharge from the larynx had ceased, and he felt comfortable. The swelling of the thyroid cartilage (externally) had gone down, but he still experienced a constant aching pain at a spot on the lower part of the left wing of this cartilage. An attempt to

obtain a subglottic view, by introduction of a mirror through the tracheal wound, was not successful. At this date (November 21st) the patient was up apparently well, and eating heartily. Cough and expectoration still continued, but the former was relieved by cocaine lozenges, and linctus papaveris. On November 22nd the swelling in the larynx was found to be diminished; but the ventricular bands formed two red tumours, meeting in the mid-line, and the swelling first observed under the right vocal cord could still be seen (Fig. 3). The posterior extremities of both vocal cords

Fig. 3.

could be seen, immobile, but of normal colour.

Nothing noticeable occurred for some time. The patient was greatly improved in every respect, but there was slight discharge by the side of the tracheotomy tube, of muco-purulent character. Insufflations of iodol were daily applied to the subglottic region, through the tracheotomy tube, and had the effect of diminishing the secretion. On December 10th, 1887, the patient was discharged much relieved, and he became an out-patient. On December 14th he visited me again, and stated that there had been some discharge from the tube ever since he went out. With the laryngoscope I saw that there was increased swelling in the larynx, and, though there was a fair respiratory opening, the vocal cords were again hidden by swellings above them. He came again on December 20th, and stated that the day before he had coughed up a piece of bone. The piece was handed to me, and was of the exact size of this drawing. (Fig. 4.)

Fig. 4.

There was bluish-red swelling of both ventricular bands and over both arytenoids, but the laryngeal opening was larger than before. On December 27th I scarified the larynx freely. There had been a good deal of discharge through the tube, and a little dysphagia.

On January 3rd, 1888, he reported himself not so well. Sleep was entirely prevented by a tickling cough, and he then felt "something scratching or pricking" over the thyroid cartilage. The cartilage was much thickened externally, the whole laryngeal cavity was again blocked with red oedematous swellings, and there was a good deal of discharge of offensive pus through the tracheal wound. I was anxious for him to re-enter the hospital. As there was then no vacancy, I directed him to lie down continuously at his own home, and keep an ice-bag continuously applied over the larynx. Ten days after he was much better, and the necessity seemed to have passed away. On January 20th the larynx was not quite so occluded, and the voice was better and the patient stronger. On the 27th the oedematous swellings had still further diminished, and the voice was much stronger.

On February 3rd he was going on well, but some external redness over the thyroid cartilage made me continue the external application of ice. On February 10th all external inflammation had gone down, the voice was fairly strong, but rough, and he could breathe for two minutes at a time with the tube corked up.

On February 17th he was still better, and could breathe for ten minutes now with the cork in the tube. On February 24th he came again, stating that he had had a good deal of inflammation over the thyroid cartilage, with pain, and sharp pains over the clavicle. There was pain on pressure over both ake of the thyroid cartilage, with redness, and a boggy feel. But inside the larynx there was much less swelling, and I could now see into the trachea. There was no dis-

charge now from the tube, and he could breathe for twenty minutes at a time easily with the tube corked up. (I expect he could have breathed for longer, but was nervous.) Ice was again ordered for external application, and four days after (February 28th) the external inflammation had subsided. Internally there was still swelling of the ventricular bands and the cushion of the epiglottis and ary-epiglottic folds, but no ulceration anywhere; the extremity of the vocal cords was quite normal in appearance.

On March 9th, the laryngeal opening was larger, and breathing tolerably easy. He walked about now for several hours with the tube corked up. At this visit I commenced to dilate the laryngeal opening, and passed a No. 7 œsophageal bougie (bent to shape) through it.

On March 13th, 16th, 20th, and 23rd I again dilated it with Mackenzie's three-pronged dilator, and on each occasion passed œsophageal bougies of increased size through the constriction with ease. After each operation he was able to breathe better and for longer with the tube corked up, and now (March 28th) he is able to dispense with the tracheotomy tube altogether. The general condition is excellent, and he has gained in weight. He may now be considered as cured. The tube is entirely removed, and the tracheal opening closed up within twenty-four hours. At the last visit he pointed out to me the cicatrix of an old scrofulous ulcer in the neck, which had been hidden by the beard, and which I had not seen before.

As to treatment, iodide of potassium was, of course, given, at first in doses of 5 grains, afterwards reaching 15 grains, three times a day. This was given without any reference to syphilis. The tracheotomy wound was always dressed with iodol gauze (except just at first, when iodoform was used), and washed with perchloride of mercury (1 in 1,000). Iodol was insufflated into the subglottic region through the tracheotomy tube, and headache was relieved with antipyrin.

A drawing of the condition of the larynx at the present time is here appended (Fig. 5); it was executed by Mr. P. S. Hutchinson

Fig. 5.

who also made the drawings of the larynx reproduced in Figs. 1 and 3. It is seen that the laryngeal aperture is now large enough to permit of easy respiration. All active inflammation has subsided. I quite expect that occasional dilatation will still have to be performed; but the patient may be said to have made a very successful recovery.

Perichondritis of the larynx may arise, as is well known, in the course of typhoid fever, tuberculosis, syphilis, and cancer; it has also been known to occur as a result of chronic laryngitis; to these must be added traumatism, both external and internal. Charles H. Knight, of New York, recently recorded a very interesting case of this kind, the cause of which was injury to the larynx by strangling during a quarrel. He also, in the same paper, recorded a case in which perichondritis followed from swallowing a plate of false teeth during an epileptic fit in a woman. The lodging of the teeth in the pharynx was succeeded by abscess of the posterior wall of the larynx. Perichondritis from decubitus, the pressure of an ossified cricoid cartilage against the vertebral column, has also been described by Gerhardt and Dittrich, and Mackenzie has seen it after cut throat.

The injudicious use of œsophageal bougies in the aged is referred to by Knight as an etiological factor, and there is no doubt that careless or prolonged use of the galvano-cautery to the larynx may give rise to it.

It seems desirable to correct the general opinion that perichondritis must necessarily be caused by syphilis or cancer. The case I have here recorded shows how it may arise out of chronic laryngitis, and the same catarrhal condition which leads to production of innocent neoplasms may also lead to perichondritis of the laryngeal cartilages.

A second case of extensive perichondritis of the larynx has occurred in my practice recently, arising out of chronic laryngitis, and in which there was no question of syphilis. In this case the cricoid cartilage was extensively affected, and formed a large abscess externally, on opening which a large quantity of sero-sanguineous fluid was poured out. The stenosis of the larynx was extreme, and tracheotomy had been performed many months before I saw the case by a surgeon at the Cape of Good Hope. As to prognosis, every case of perichondritis of the larynx, even when extensive, is not necessarily followed by fatal termination. Those due to syphilis, or of traumatic origin, frequently recover, and the case I have here first recorded in detail shows how perichondritis, arising out of chronic laryngitis, may also recover. What influences prognosis most is probably the extent of cartilage involved as well as the patient's general condition; and it is probably true, as all writers on the subject are agreed, that perichondritis of the cricoid cartilage progresses slowly but surely towards a fatal termination. Sufficiently accurate descriptions of the symptoms and laryngoscopic appearances of this disease are contained in many textbooks. I will merely remark that, in cases where there is a possibility of the presence of malignant disease, very little importance can be attached to the examination of the secretions.

A MODE OF OBTAINING VACCINE LYMPH WITHOUT PUNCTURING THE VESICLES.

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THE present method of taking lymph for vaccination purposes is coupled with so many inconveniences, not to say dangers, that I feel sure medical men will gladly welcome any suggestion which will dispense with the necessity for puncturing the vesicles at the risk of obtaining a lymph contaminated with blood, or of favouring the occurrence of subsequent inflammation.

The method which I have adopted for some time past for the extraction of lymph from the pock has, so far as my present experience goes, a double advantage, namely, that the supply of lymph obtainable from each vesicle is greater and its efficiency is increased. Out of upwards of 200 infants vaccinated by me during the past few months, I have not as yet had one ill-developed pock nor a single failure of a punctured spot, although many of the cases were from vaccine obtained from very young infants. As a general rule, I only vaccinate in four places, principally on account of the young age of the infants I am called upon to vaccinate. Down to December 31st, 1886, I had vaccinated altogether 2,685 infants, of whom, with one exception, all were successful either at the first attempt or at the second. The unsuccessful case resisted four successive attempts to vaccinate, for which no explanation can be given. The mother had never had small-pox.

A complete failure in all four spots on a first vaccination was comparatively rare, and could, as a rule, be traced to a deficiency in the lymph, for it seldom or never occurred when the lymph was obtained from children of three months old and upwards. It generally happened when the lymph was drawn from an infant less than a fortnight old, at which age the quantity of lymph is very scanty and its efficacy below the normal. It is seldom possible to vaccinate successfully more than a dozen children from one such infant; and failure in one, two, or three spots is not uncommon.

I may remark incidentally that where one or more punctures had failed to take, revaccination of the infant with lymph obtained from its own successful pock generally ensured a satisfactory result, the primary pock or pocks remaining quiescent until the pocks which followed the second vaccination arrived at maturity, that is, at about the eighth day, when they all faded away together. In these cases it was impossible to say from appearances, by the eighth day, which were the primary and which the secondary pocks. In only one case did this method of re-auto-vaccination fail, and no better results were obtained when lymph from other sources was substituted for its own. I had therefore to be satisfied with the two successful primary pocks.

My system of obtaining lymph is as follows: I drop a small bead of pure glycerine upon the centre of each pock, and then gently rub the top of the vesicle with a smooth, blunt instrument (the round glass head of a shawl pin does excellently). After the lapse of two or three minutes the bead of glycerine will have