ON THE STATE OF THE LUNG IN IMPERFECT OR PROTRACTED RESOLUTION OF ACUTE PNEUMONIA.

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THE condition of lung which I am about to describe has often been a subject of speculation amongst physicians and pathologists, for its diagnosis is at first always difficult and sometimes impossible, while the opportunities afforded of seeing it *post mortem* are of excessive rarity. I allude to cases of pneumonia in which resolution has been imperfect or much protracted, but usually in the end complete. Dulness, bronchial breathing, and *râles* persist more or less for weeks or months, yet the lung ultimately resumes its normal functions. The questions are: What is the morbid anatomy of the damaged lung, and are there any indications afforded of a pre-existent local condition which has thwarted the occurrence of normal resolution?

This lesion is apt to be confounded with an unabsorbed pleurisy, with induration of the lung succeeding to pneumonia (fibroid pneumonia), and with tuberculous infiltration. Clinically, it may be impossible to tell for some time which of these conditions is present or in what combination they may exist; but it can no longer be denied, as some have ventured to do, that either of them may be the sequel of an acute pneumonia. The special features of induration succeeding to pneumonia have been demonstrated by myself¹ and others, and an opportunity has now been afforded of examining the lung in a state of imperfect resolution. Cases have been recorded by Leyden² in which recovery was delayed until the fifth month, and Trousseau³ refers to cases completely resolving only after two and three months. Charcot⁴ gives a case wherein death occurred thirty-five days after the onset of the disease, to which more particular allusion will shortly be made. E. Wagner⁵ gives a detailed account of eight cases in which dulness persisted for from four to ten weeks, with ultimate complete recovery. Traube⁶ describes a case proving fatal from pericarditis thirty-eight days after the onset of the pneumonia, in which the lung seemed to be still in a state of grey hepatisation. Cornil and Ranvier⁷ allude to cases of prolonged resolution in which intercurrent affections caused death fifteen to twenty days after the cessation of all acute symptoms. Sturges and Coupland⁸ give a table showing the condition of lungs as regards physical signs at stated periods after the crisis, up to the fifty-sixth day. Of all these observers, only Charcot and Cornil and Ranvier seem to have had the opportunity of investigating this condition *post mortem*. They agree in describing the air cells as containing numbers of fatty corpuscles, generally of a large size, mucous masses and free fat globules, all embedded in a granular albuminous exudation. In M. Charcot's case there was slight thickening of the alveolar walls, and he termed the lesion (unfortunately, as I think) "red induration." Cornil and Ranvier, however, maintained the thickness of the alveolar walls to be due to an abnormal growth of spindle-celled epithelium disposed in several layers.

The case which I have here illustrated bears out the descriptions of these authors so far as they have gone, but there were also certain other features of importance which seem to throw light on the etiology and prognosis of the lesion, at least in certain cases. The patient, a man aged 48, had suffered for seven years from bronchitis. He came under the care of Dr. G. Tennent, suffering from pneumonia in the right lung. The temperature became normal on the fifteenth day, but the physical signs persisted with a considerable amount of muco-purulent expectoration, occasionally blood-tinged. He remained in this condition until the supervention of acute meningitis in the sixth week, death occurring just seven weeks after the pneumonia declared itself. The necropsy was made by my friend Dr. R. M. Buchanan, whom I have to thank for supplying me with pieces of the lung suitable for examination. It was found that the right lung was more or less generally adherent, and its upper lobe was in a state of condensation, except at the extreme apex. There was no bronchiectasis. The left lung was, however, the seat

of a bronchiectatic cavity in the apex of the lower lobe, but was otherwise not remarkable. Liver and kidneys were pale. There was an exudation of opaque yellow lymph over the surface of the brain, chiefly in the sulci, in which were discovered large numbers of capsule cocci.

a, Walls of alveoli showing distended and tortuous capillaries and lined throughout with layers of round and spindle cells; b, thickened and cellular interlobular septum; c, crowd of lymph corpuscles pushing their way into lymphatics of septum; d, minute bronchus in a state of chronic inflammation; e, interior of alveoli, showing (1) large fatty corpuscles, some of which contain pigment granules and red blood cells, (2) corpuscles consisting of large fat droplets, (3) free fatty globules and granules, (4) nucleated and binucleated lymph cells, (5) coherent masses of small polygonal cells, (6) large fatty epithelial scales. (x150).

The consolidated portion of lung was of a reddish colour. Some pieces of it floated in water, while other portions sank. It lacked the friability of ordinary hepatisation, being somewhat elastic and yielding on pressure a turbid grey and blood-stained juice. The microscopical appearances were in several respects remarkable. The bronchi were in a state of chronic catarrh, and the interlobular septa were, as a result of this, more or less thickened from fibrocellular growth. The alveoli adjoining these septa frequently contained large numbers of lymph cells, which seemed to be forcing their way into the septa and travelling along their sides. In other places (not shown in drawing) groups of six, eight, ten or more alveoli were crammed with lymph cells. The vast majority of the air cells, however, contained elements in a state of active regression, chiefly large fatty corpuscles, fatty globules, free fat granules, and granular debris. The alveolar walls were enlarged and thickened from distension of their capillaries and by the presence of numerous round and spindle cells, the latter apparently of epithelial origin.

The larger sized granular corpuscles frequently contained pigment granules and likewise red blood oises in their interior. These elements were much larger than leucocytes, and could not possibly have accommodated themselves in the normal capillaries. It therefore must be concluded that they are derived from the epithelium lining the walls, and, if so, it is clear that they can assume the rôle of phagocytes. This is not surprising as, according to Metchnikoff, the endothelial cells of the body do duty as phagocytes, and it is notorious that the pulmonary epithelium resembles the endothelium both in its character and in its behaviour under stimulation.

Another cell occasionally observed in the exudation impressed me strongly as a leucocyte in process of division. One or two such are represented in the illustration considerably above their relative size.

Outside the microscopical appearances there are one or two points of importance calling for comment in this case. The fresh and fatal outburst of the disease in the membranes of the brain four weeks after the temperature had fallen to the normal is noteworthy, and may be advantageously considered alongside the experimental research of the Messrs. Klemperer,⁹ in which it is alleged that the injection of any nutrient medium in which the pneumococcus has been cultivated renders animals immune against pneumonic septicæmia, and that the injection of the serum of pneumonic patients after the crisis cures pneumonia in rabbits. Regarding the local condition, it is to be concluded that the chronic bronchial catarrh had led to injury and choking of the lymphatics which travel along the septa, causing tardy absorption of the products of the pneumonia; also, it is not improbable that the alveolar walls themselves had in places sustained some damage. The existence, therefore, of a previous bronchial affection should be kept in view in estimating the prognosis of a pneumonia. When no bronchial affection has existed, impaired resolution must be attributed to a sluggish state of the lymphatics induced by cachexia. I think this case also teaches that there is a possibility of the condition terminating in abscess, the groups of lymph cells depicted acting as foci for such. However, a favourable prognosis is the rule, and, judging from the condition of the lung generally in the present instance, there is, I think, little doubt that recovery would ultimately be brought about had the pneumonic virus not attacked the meninges of the unfortunate subject.

REFERENCES.

- ¹ *The Pathology of Bronchial Affections and Pneumonia*, London, 1891.
² *Berl. klin. Woch.*, 1879, p. 304. ³ *Clin. Med.*, 1, p. 574. ⁴ *De la Pneumonie Chronique*, Thèse, 1860. ⁵ *Deut. Arch. f. klin. Med.*, vol. xxxiii. ⁶ *Gas. Beltrige*, II, p. 716. ⁷ *Manual path. Hist.*, Art. Pneumonie. ⁸ *Pneumonia*, p. 125. ⁹ *Berlin. klin. Woch.*, August 24th and 31st, 1891.

CLINICAL OBSERVATIONS ON TROPACOCAINE
IN OPHTHALMIC PRACTICE.

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AFTER reading Dr. Chadbourne's valuable and concise paper¹ on the synthetical hydrochlorate of tropacocaine, I obtained, with some difficulty, a small sample. The following brief clinical observations were noted by me during a period of six months. Solutions of various strengths were used, thus—1, 2, 3, 5, and 10 per cent. The installation of one drop of a 2 or 3 per cent. solution (there being not much difference between the two) caused complete anæsthesia of the cornea in two minutes. But, for the removal of small foreign bodies, the cornea was always sufficiently insensible in about thirty seconds. Hardly any smarting or discomfort was felt, and that only momentarily. There was no hyperæmia. The conjunctiva, especially the palpebral portion, was slower in becoming anæsthetised, but it appeared to retain its insensibility for a longer period. Sensation gradually returned in from ten to fifteen minutes. This depended, no doubt, on the size of the drop instilled into the eye and the amount that escaped from it. A 1 per cent. solution within a few minutes gave sufficient anæsthesia to remove foreign bodies, but sensation returned early; and although repeated instillations completely anæsthetised the cornea and conjunctiva, the solution was discarded as unsuitable. A single instillation of the 5 per cent. solution rendered the cornea and conjunctiva completely insensible in a minute and a-half, but superficial anæsthesia of the cornea was produced so rapidly that in five seconds it was insensible to the touch of a camel's hair brush. The anæsthesia lasted from fifteen to twenty minutes. A drop of the 10 per cent. solution caused insensibility of the cornea within a few seconds, but it also gave rise to considerable injection, which remained for a few hours. At the end of the half-hour during which the patient was under observation, the anæsthesia still remained complete; unfortunately its full duration could not be recorded. Next day the patient stated

that an hour after he left a pain set up in the eye, which kept him awake the whole night. He described it as acute and extending to the back of the head, and frequently darting up to the brow. These statements made me chary of using the strong solution any further. Besides, there was no need for so concentrated a solution, as the 5 per cent. gave every satisfaction whenever rapid anæsthesia of the deep-seated parts was desired. The 3 per cent. solution was most frequently employed. Below are a few instances in which tropacocaine was used.

Eye-lids and Conjunctiva.—Meibomian cysts were painlessly incised and scraped. In cases of muco-purulent ophthalmia requiring the application of a strong solution of nitrate of silver a drop of tropacocaine prevented the after-smarting which usually follows that operation. Cocaine, as a rule, is less effective when the conjunctiva is inflamed. But tropacocaine does not appear to fail in this respect, neither did its continual use produce that sodden appearance of the conjunctiva which is frequently the case with cocaine. In entropion of the lower lid requiring the removal of a piece of skin, and in other operations about the lids, three drops of a 3 per cent. solution injected subcutaneously at the spot made the operations painless.

Cornea.—Ulcers were painlessly cauterised. Needlings were also satisfactorily accomplished without pain. In cataract operations, with and without iridectomy, no pain was felt, three instillations of a 3 per cent. solution being used. A single drop of a 5 per cent. solution rendered the excision of a portion of prolapsed iris painless. The same solution gave satisfaction in an iridectomy for glaucoma.

Nasal Duct.—Canaliculi were slit up without pain, and the injection of a few drops of a 3 per cent. solution down the duct rendered otherwise painful probing tolerable.

Strabismus.—A single drop of a 5 per cent. solution produced sufficient anæsthesia of the muscle. Some minutes were usually allowed to elapse between the instillation and the operation. The 3 per cent. solution required several instillations.

CONCLUSIONS.

1. Tropacocaine is more reliable and deeper in its action than cocaine, and the anæsthesia it produces lasts a little longer. Unlike cocaine, it anæsthetises inflamed tissue—at least, more deeply than does that salt. There is complete absence of the haze over the cornea which is so characteristic of cocaine anæsthesia. This was specially appreciated when needling. The strength of the solution depends on the requirement. For general use 2 or 3 per cent. is sufficient and a 5 per cent. solution may be used with safety when anæsthesia of the deep-seated parts is required.

2. Solutions of tropacocaine made with distilled water keep well and retain their strength for months. One solution (3 per cent.), prepared in January last, although now a little cloudy, has not lost its activity. So far no fungus has been noticed growing in the solutions.

3. With the exception of the one case mentioned in which the 10 per cent. solution was used, tropacocaine gave rise to no disagreeable symptoms. It practically has no mydriatic action; neither is it hæmostatic. But it certainly did not give rise to "intense hæmorrhage," as was the experience of Seifert.²

I am inclined to think that cocaine will eventually be replaced by tropacocaine when its advantages are fully understood. Even if it were only for its antiseptic properties, the new anæsthetic should be given the preference. The price is not prohibitive, and increased demand will place it within the reach of all.

THE PHYSIOLOGICAL EFFECTS OF ELECTRICAL
CURRENTS OF HIGH FREQUENCY.

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THE application to medicine of electrical currents of great rapidity of alternation, or high frequency currents, as they are commonly called, has occupied the minds of medical men to a great extent during the past twelve months. In France

¹ BRITISH MEDICAL JOURNAL, August 20th, 1892, p. 402.

² *Internat. klin. Rundschau*, No. 8, 1893.