

the slight traumatism to which they are of necessity exposed is not likely to affect them materially. The respiratory function can, on the other hand, hardly fail to be affected. The sternum is a very important element in the bony cage on whose movements respiration largely depends, but in neither of my cases has respiration been seriously interfered with. Ordinary respiration was perfectly well carried on by the diaphragm and it was only in spasmodic efforts such as coughing that any difficulty arose. So long as the lungs are unaffected the results of this operation on respiration need not be feared, but should pneumonia or severe bronchitis supervene the insufficiency of the expulsive efforts might gravely complicate the condition. An injury to the pleura at the time of operation is, of course, a possibility, but in my experience it has been very easily avoided, and did it occur it would at all events, if limited to one side, hardly produce any serious complication and the rent could be easily and at once repaired by sutures. To my mind the only real intrinsic danger of the operation is sepsis. The mediastinum is occupied by very thin loose fibrous tissue, with imperfect blood-supply and probably very little vitality, affording, as before stated, very little resistance to microbic invasion and great facility for absorption. Moreover, the cardiac plexuses are very likely to be affected by septic inflammation occurring around them, much more so than by the traumatism to which they have been exposed.

Sepsis is, here as elsewhere, the great danger; every precaution must be taken to avoid its production and where it already exists to prevent its extension. The experience gained from the peritoneal cavity can help us but little here. The peritoneum is capable of dealing with a very considerable amount of septic matter, and its power of rapidly secreting large quantities of fluids makes drainage an easy matter either by tube or by gauze. In many cases of mediastinal operation it will, of course, be possible to insure asepsis and in such cases complete immediate closure of the thorax will be indicated. Where sepsis is unavoidable drainage will be necessary, and to my mind the sole difficulty of mediastinal operation lies in the provision of efficient drainage. Drainage may be attempted in three directions—forwards through the sternum, upwards to the neck, or backwards through the middle and posterior mediastina. Drainage through the sternum can only be efficiently provided through holes made for this purpose. The manubrium sterni might be removed almost entirely, the periosteum being left, or trephine holes be made when required, care being taken not to injure the internal mammary artery, which is well outside the sternal limits. Drainage holes having been provided the two halves of the sternum should be firmly reunited. Drainage through these openings might be afforded by gauze plugs or specially designed glass tubes. Drainage upwards to the neck might be sufficient in some cases, would be much simpler in its application, and would have the advantage that the sternal and skin flaps might be completely united over the gauze plug, leaving only a skin opening in the neck. Drainage backwards through the middle and posterior mediastina is quite practicable and not so difficult as it seems at first sight. On the cadaver I have found it possible to insinuate my finger from the anterior to the posterior mediastinum and passing along the right side of the vertebrae to reach the third and fourth dorsal rib without injury to vein, nerve, or pleura, and by the resection of the rib from behind between its angle and tuberosity to create a practicable drainage route. There is, of course, considerable risk of tearing the pleura; a tear, however, in this position would be unlikely to produce any very serious effect. On the whole, I consider anterior drainage through special holes made in the sternum to be the best method, but experience only can decide the question, and undoubtedly the method employed must vary with the nature of the intervention.

The operation is not one to be performed without very evident indication or without due consideration being given to all other possible methods of relief. Until its technique is much more thoroughly worked out the operation is one that is only justifiable when life itself is in danger, when there is a good chance of being able to remove the *causa morbi*, and where no less dangerous route or method is available. Undoubtedly the splitting of the sternum affords the most perfect approach to the anterior and middle mediastina; it remains to be seen whether this approach is not all too dangerous to be admissible except in the most desperate cases.

Cairo.

## A SINGULAR CASE OF EXTENSIVE DEPOSIT OF PHOSPHATE OF LIME IN THE LUNGS.

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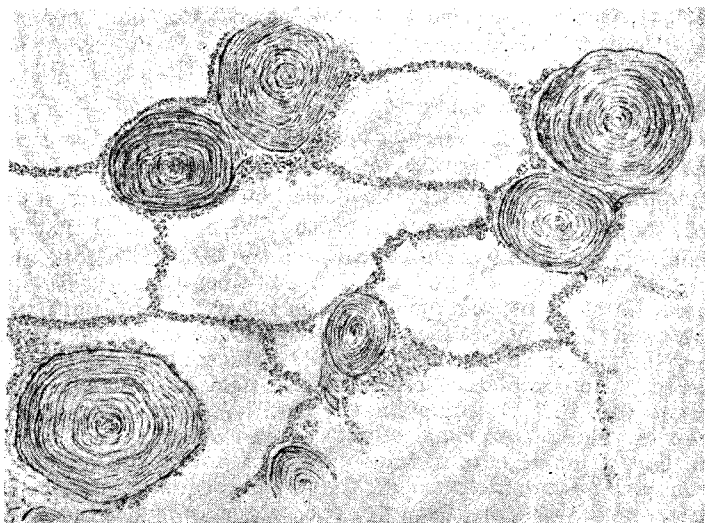
THE following case possesses some interest on account of its rarity. I have been unable to find any record of one that closely resembles it.

An unmarried woman, aged 32 years, was on June 10th, 1899, admitted into the Bristol Royal Infirmary under the care of Dr. Shingleton Smith for pneumonia and she died the same day. The following notes are abstracted from the report of the necropsy. The woman was well nourished and was of average height. Both lungs were universally adherent to the chest wall. The apices were pigmented and slightly scarred from the presence of local superficial tuberculous disease, but no fibroid or calcareous nodules were present in the thickened patches, and no old tuberculous nodules were present elsewhere over the pleura. The right lung was consolidated throughout. The left lung, though apparently free from recent consolidation, was abnormally resistant. Both lungs were cut with considerable difficulty and the cut surfaces presented a very unusual sensation to the touch. Everywhere they were extraordinarily gritty and small granules, in size and appearance like grains of sand, were left on the finger. Close inspection showed the substance of the lungs to be thickly studded from apex to base with these granules. In no part of either lung were they more numerous than in any other part. Both lungs were slightly pigmented and in some degree abnormally tough. The right lung was in a state of red hepatisation throughout and the lower lobe of the left lung showed some degree of commencing consolidation. The left lung may, however, be said to have been almost free from acute disease, and although almost free from consolidation the granules it contained caused it to readily sink in water. This lung weighed 45 ounces; the right lung weighed 57 ounces. In order to form a rough estimate of the amount of sand-like material in the lungs a cubic inch was cut out of one lung, and by tearing and repeated washing of this small portion most of the granules contained in it were removed. After being dried they weighed 98 grains. In drying they lost their sand-like appearance and became shrivelled and lustreless. The larynx, trachea, and bronchi were healthy. The mediastinal and bronchial glands were pigmented but presented nothing else noteworthy. The other organs showed nothing abnormal.

The following is a description of the granules and the result of analysis kindly made for me by a former pathological clerk, Dr. J. M. H. Munro: "The deposit consists of rounded transparent or translucent nodules which can be separated from the lung tissue by rasping it and washing the rasped material by elutriation or decantation with water. They are hard, fairly uniform in size, not affected by being kept in water for months, and only slightly affected by boiling-water. In a steam-oven they lose 8 per cent. of moisture but remain translucent. Under the microscope they appear to be built up of concentric laminae, and the surfaces of many of them show markings corresponding in size and shape with the outline of pulmonary alveoli. The specific gravity is 2.325. On prolonged ignition they leave about 76 per cent. of ash which consists almost entirely of phosphate of lime. On treatment with dilute hydrochloric acid they give off a few bubbles of gas, showing the presence of a little carbonate, the phosphate of lime is dissolved out, and the concentric laminae of organic matter become clearer in outline. The nodules answer the general tests for albuminoids and give 1.12 per cent. of nitrogen by Kjeldahl's process. Their general composition may be represented by moisture, 8 per cent.; albuminoid matter, 7 per cent.; phosphate of lime, 75.7 per cent.; non-nitrogenous organic matter, carbonates, and undetermined substances, 9.3 per cent."

Microscopical sections of decalcified portions of the left lung taken from areas apparently free from any of the lesions of acute pneumonia showed few abnormal changes. In places there was swelling with proliferation of the epithelium of the alveoli, but apart from the presence of the nodules there was

little evidence of chronic disease. The nodules generally lay in the walls of the alveoli which were of normal thickness, but here and there localised fibroid thickening was present in the immediate neighbourhood of a nodule. The outline of most of the nodules was a broad oval or slightly irregular circle. Lamination was very distinct and in most instances could be traced to the centre. Under as high a power as one-twelfth objective only in very few nodules could I trace any suggestion of a nucleus. In some a considerable portion



Calcareous granules in the lung.

in the centre appeared homogeneous, but comparison with other nodules showed gradations from this uniform appearance, through slightly marked lamination up to very definite lamination. The homogeneous aspect did not therefore appear to suggest a different origin for the central and peripheral portions of the nodules. In a few nodules small darkly-staining granules could be seen in the centre, but these were exceptional and in one or two instances at least appeared to be foreign bodies which had found their way into a central depression of the section of the nodule. The nodules stained blue with methyl aniline violet. There was no evidence that the nodules had arisen in the walls of the blood-vessels. The vessels were everywhere healthy and passed freely over the nodules without showing any connexion with them.

Inquiry into the patient's past history failed to throw any light upon the disease. She had for some years been a domestic servant and afterwards a shop assistant in a drapery establishment. Apparently her health had been moderately good. She had suffered from no serious illness, dyspnoea on exertion had not been marked, and apparently the exercise of the lungs occasioned by singing could not have caused discomfort since she was a member of a chapel choir. She had not been addicted to taking any medicine or medicinal food likely to contain phosphates.

Extensive calcification of other organs has occasionally been recorded. On mentioning this case to Dr. Rolleston he kindly drew my attention to the case of calcification of the liver recorded by Mr. Fargett.<sup>1</sup> Another case of calcification of the liver has comparatively recently been recorded by Dr. Brill and Dr. Libman.<sup>2</sup> Both of these cases are, however, of somewhat different character from the above. In one the calcification occurred in large masses and in the other it was considered to have begun in the arteries. Oohnheim's Lectures on Pathology<sup>3</sup> contain a reference to extensive calcification of the lungs. Virchow is there quoted as saying that he has seen the lungs so infiltrated with deposits of lime salts that they felt like pumice-stone. A brief abstract of another case, recorded in *Le Mouvement Médicale*, is published in the *London Medical Record* (1879, p. 139). In this case the lungs contained 14 per cent. of lime and magnesium salts, but these salts were deposited as needle-shaped crystals, not in granules.

In this case calcification had obviously taken place in so-called amyloid bodies, and the presence of large quantities of

phosphate of lime was secondary to the existence of amyloid bodies in the lungs in unusual numbers. The reason for the appearance of these bodies still seems to be in great measure a mystery. Dr. Ophüls in a recent article discusses their formation,<sup>4</sup> and considers them to be produced by the deposit of amyloid material around a nucleus of degenerating cells. Apparently bodies similar to amyloid bodies but of much larger size may arise by deposition of organic material around degenerating structures. I have met with a smooth-ovoid mass in the mesentery of the size of a large pigeon's egg composed of layer upon layer of organic matter partially infiltrated with lime salts. In the centre of these layers was a hard, somewhat irregular, calcareous mass, without doubt a calcified lymphatic gland. Yet in the nodules from the lungs I could not detect a nucleus. If a nucleus of degenerating cells once existed it must have been small and have rapidly become absorbed at the time the first layers of amyloid material were being deposited. Although I can detect no nuclei in the nodules, that they were started by numerous localised centres of irritation seems to be as reasonable an hypothesis as any. The resemblance to acute miliary tuberculosis of the lungs is only superficial but it is in some degree suggestive. It is more easy to imagine the disease to have originated in general invasion of the lungs by some microbe of low virulence than to believe that the circumscribed morbid changes were produced by a toxin uniformly distributed through the pulmonary tissues by the blood.

In conclusion, I have to thank Dr. Shingleton Smith for permitting me to use this case and Dr. Munro for his careful analysis of the granules.

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## NOTES ON A CASE OF POISONING BY COAL TAR NAPHTHA.

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CASES of fatal accident in which coal tar naphtha acts as the poisonous agent appear to be few and far between. The Registrar-General's report for England and Wales for 1886-95 in giving statistics regarding the relative frequency of the commoner poisons divides into the three groups—(1) poison used by suicides, (2) poison taken by accident and negligence, and (3) poisons used by murderers. Under none of these headings is there any record of naphtha poisoning. Then, again, the third edition (1896) of the "Nomenclature of Diseases drawn up by the Joint Committee appointed by the Royal College of Physicians of London" makes no mention whatever of this product. Neither is it referred to in such standard works as Brunton's "Pharmacology, Therapeutics, and Materia Medica," Hare's "Text-book of Practical Therapeutics" (1897), Taylor "On Poisons," Mann's "Forensic Medicine" (1898), &c. In the fifth and sixth editions of Guy and Ferrier's "Forensic Medicine," however, we have, in the chapter on "Inebriants," the following brief description given: "*Coal naphtha*.—This product of the distillation of coal-tar has proved fatal to a boy 12 years old. It was taken in the large dose of three ounces and death happened in less than three hours. The first symptoms were those of intoxication and furious delirium, soon followed by insensibility, stertorous breathing, and cold skin; then, after partial recovery following vomiting, fresh symptoms of collapse. Four days after death the body was pervaded by the odour of the poison."<sup>1</sup>

Considering, then, the comparative rarity of known cases of naphtha poisoning attended with fatal results, and acting upon the suggestion of the county coroner (Mr. J. Hyslop-Bell), I venture to bring the following details of such a case under the notice of the readers of THE LANCET.

On Dec. 21st, 1900, a little girl, aged five years, was taken to bed by her mother as usual at 6 P.M. The mother at the same time carried upstairs a pint bottle filled with coal naphtha and placed it on the bedroom floor inside the door,

<sup>1</sup> Transactions of the Pathological Society of London, vol. xl., p. 123.

<sup>2</sup> Journal of Experimental Medicine, September and November, 1899, p. 541.

<sup>3</sup> Vol. ii., p. 642.

<sup>4</sup> Journal of Experimental Medicine, vol. v., No. 2, p. 111.

<sup>1</sup> THE LANCET, August 23rd, 1856, p. 230.