

had all the conditions present for the propulsion of a very feeble stream of blood into the aorta. Under such circumstances there would be a very feeble aortic recoil, and notably in the first case, but also in some of the others, the coats of this vessel were stiffened and weakened by atheroma.

In short, my explanation is that the amount of regurgitation in these cases is so slight, and the stream of regurgitant blood passes the valves under such low pressure, that it is unable to determine an audible aortic murmur.

In the consideration of the facts disclosed in this paper the means employed for detecting sounds is of importance, I therefore mention that I use a binaural stethoscope and an ordinary wooden one, and that I am accustomed to listen to the heart sounds with both.

III.—CLINICAL AND PATHOLOGICAL MEMORANDA.

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XI.—*Glioma and Cyst of the Left Frontal Lobe, with extreme Hyaloid Degeneration of some of the Bloodvessels of the Tumour.* ✓

(Continued from page 623.)

The *post-mortem examination* was made on March 20th; the head only was examined.

The scalp, skull-cap, and outer surface of the dura were natural; the internal surface of the dura was adherent over the left frontal lobe, which was markedly swollen and considerably larger than the right. There was no appearance of any general increase of the intracranial pressure—no flattening of the convolutions, no effacement of the sulci; in fact, the convolutions of the brain generally were rather atrophied than flattened, the sulci wide, and the sub-arachnoid fluid in some excess.

On cutting up the brain the greater portion of the left frontal lobe, or to speak more precisely, the anterior two-thirds of the first and second, and the anterior half of the third left frontal convolutions, with the associated portions of the subjacent white matter, were completely destroyed by a new growth; while the posterior third of the first and second, and the greater part of the posterior half of the third left frontal convolutions, were softened, cedematous, and, to some extent, infiltrated by the lesion (see Fig. 41). The greater portion of the tumour consisted of a soft glioma, but embedded in its posterior end, and projecting for some distance behind it, there was a cyst as large as an average size hen's egg.

This cyst, which contained a colourless but slightly turbid fluid, was bounded above and in front by the gliomatous tissue of the tumour, below and behind by the anterior cornu of the lateral ventricle, and behind by the white matter of the centrum ovale.

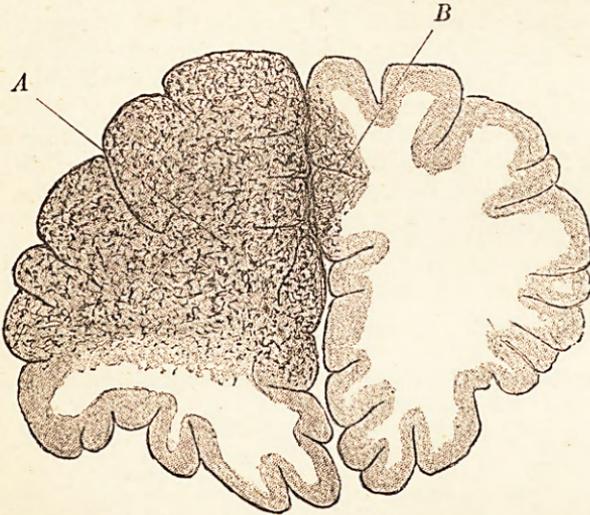


FIG. 41.—*Transverse Vertical Section through the Frontal Lobes in the case of Miss A., showing the position of the lesion. Drawn from memory.*

A points to the lesion in the left frontal lobe, and *B* to a portion of the right frontal lobe affected by the direct extension of the tumour.

The posterior end of the cyst was in close contact with the lenticular nucleus and head of the corpus striatum, and must have been in a position to have exerted pressure upon those fibres of the centrum ovale which pass downwards under the name of the motor portion of the internal capsule. The wall of the cyst was formed by a tough but transparent membrane, which was the only structure which divided the cavity of the cyst from the cavity of the lateral ventricle; in this semi-transparent partition a most beautiful network of bloodvessels was seen.

Several recent hæmorrhages, the largest about the size of a large walnut, were present in different parts of the tumour; and the pigmented remains of other hæmorrhages of old date were visible, both to the naked eye and on subsequent microscopical examination, in other parts of the new growth.

The enlarged and diseased left frontal lobe bulged across the middle line, and at one spot where it impinged upon the right frontal lobe (see *B*, Fig. 41), the tissue of that (the right) lobe was diseased, the result without doubt of a process of direct extension or auto-inoculation.

The other portions of the brain were free from disease. The optic nerves were to the naked eye perfectly normal.

On *microscopical examination*, the tumour was found to be a glioma, or perhaps more correctly a glio-sarcoma.

The cells were for the most part round or oval, and arranged in dense masses (see Figs. 47, 51, 54). In some parts, more especially in half-cleared-up carmine or picro-carmine preparations, and in sections stained with picro-carmine, teased out, and mounted in Farrant's solution, the glial threads or fibres were well shown (see Fig. 42). In those portions of the tumour into which recent hæmorrhages had occurred, large round cells, which appeared to be distended with clear colourless contents, which did not stain pink with picro-carmine, were found. Some of these large swollen cells contained a single small round nucleus, others contained red blood corpuscles which they had apparently digested

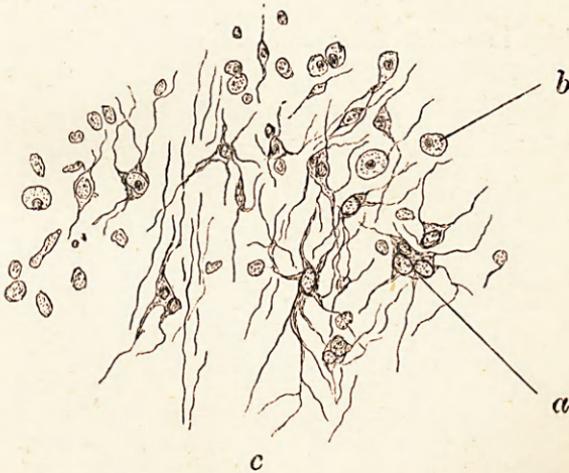


FIG. 42.—Camera Lucida Drawing of a Microscopical Section of a portion of the Cerebral Tumour in the case of Miss A., showing Gliomatous and Sarcomatous Cells and Fine Fibres. Stained with Picro-carmine, half-cleared with Methylated Spirit and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc, 3, obj. 8.)

a, Glial cell containing three nuclei; b, round sarcomatous cell containing nucleus; c, fine glial fibres.

(see Fig. 43). The impression left upon my mind was that the large swollen cells with colourless non-staining contents had previously contained red blood corpuscles, which had become fused into a single uniform mass.

The tumour tissue was most vascular—indeed, in some places the tumour appeared to consist of a dense network of minute vessels, in the meshes of which the glial cells were situated. Aneurismal dilatations were, in many places, seen on the minute vessels (see Fig. 44). In places, therefore, the structure of the tumour corresponded to the condition which has been termed a telangiectatic glioma.

In the midst of some of the large masses of extravasated red

blood corpuscles, which were situated in different parts of the tumour, enormous crystals were situated (see Fig. 45). These crystals were of a pale yellow colour; they were seen both in preparations mounted in Farrant's solution, and in sections which had been treated with absolute alcohol and oil of cloves, and mounted in balsam. I am unable to pronounce an opinion as to their exact nature, for I have never seen anything resembling them before. I feel convinced that they were not artificial (post-mortem) productions, the result of the reagents employed in hardening and mounting the sections. Possibly they were derivatives of the red blood globules in the midst of which they lay; but whether they existed during life, or were produced during the death agony, or even after death, I feel unable to decide.

Surrounding the masses of extravasated blood in which the crystals were embedded, and in the midst of some of the other extravasations in which there were no crystals, large irregularly

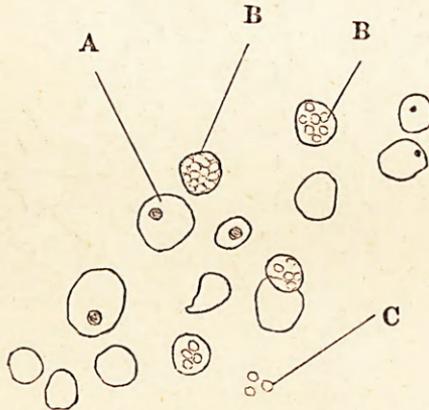


FIG. 43.—Camera Lucida Drawing of a Microscopical Section of a portion of the Cerebral Tumour in the case of Miss A., showing large round Transparent Cells, some of which contain a single small Nucleus (? Nucleolus), others Red Blood Globules. These Cells lay in the midst of Extravasated Red Blood Corpuscles, which have been omitted from the Drawing. Stained with Ficro-carminé, half-cleared with Methylated Spirit and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8.)

A, Large cell containing a single nucleus; B, B, cells containing red blood corpuscles; C, red blood globules.

shaped masses, composed of a highly refractive, transparent, and structureless material, were situated. These masses were for the most part of the same pale yellow colour as the large crystals, but some of them stained pink with picro-carminé. These irregular, structureless, colloid-like masses were probably like the crystals, derivatives of the extravasated red blood corpuscles. Further, I am disposed to think, after careful examination of many different preparations, that they represented a material in an intermediate stage between the extravasated red blood corpuscles and the hyaline material which was present in the walls of many of the

bloodvessels of the tumour, and to which I will presently refer. The crystals, the irregularly shaped, transparent, yellow masses,

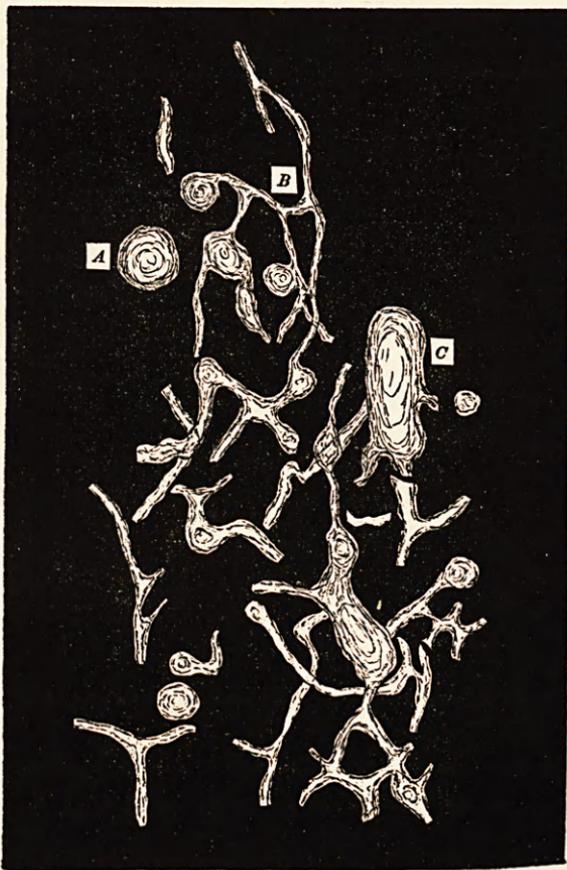


FIG. 44.—Camera Lucida Drawing of a Microscopic Section of a portion of the Cerebral Tumour in the case of Miss A., showing Aneurismal Dilatation of the Minute Vessels. Stained with Picro-carminé, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from 8 to 4 inches.)

A, Transversely divided vessel; B, vessel with numerous aneurismal dilatations; C, large aneurismal dilatation. The tissue of the tumour in the midst of which the vessels lie, and many of the vessels themselves, have been omitted from the drawing.

and the hyaline material in the walls of the vessels, were present in such quantities that it is hardly possible, I think, to suppose that they were derivatives of the extravasated *white* blood corpuscles. Possibly, however, the hyaline material which was present in such abundance in the walls of the bloodvessels, both in this case and in Dr Leslie's case of glio-sarcomatous tumour (see page 591), may have been a derivative—a product so to speak—of the glial cells. But be that as it may, it is important to note that

in these two cases in which the hyaline degeneration of the vessels was so extensive, the structure of the two tumours was identically the same; both were glio-sarcomatous tumours; in both there was a large cyst connected with the tumour; in both the tumour tissue contained an enormous number of minute vessels; and in both there was evidence of extensive blood extravasations.



FIG. 45.—Camera Lucida Drawing of a Microscopical Section of a portion of the Cerebral Tumour in the case of Miss A., showing the Large Crystals described in the Text. The Blood Corpuscles, in the midst of which the Crystals lie, are not shown in the drawing, and could hardly be individually distinguished with this Magnifying Power—Hartnack, oc. 3, obj. 3, and drawing reduced from 4 to $3\frac{1}{2}$ inches. The Preparation was stained with Picro-carminé and mounted in Farrant's Solution.

In many parts of the tumour highly refractive, homogenous masses, composed of hyaline material, were seen. These hyaline masses were in some places most numerous; many of them were small, others very large; the large masses were almost invariably stained pink when treated with picro-carminé. Some of the small masses did not take on the pink stain, but remained unstained, or were stained of a pale yellow or greenish-yellow colour; in fact, they closely resembled little drops or beads of yellowish-green glass. The large hyaline masses were much more highly stained in sections which were treated with alcohol and oil of cloves and mounted in balsam than in sections mounted in Farrant's solution.

In completely cleared-up carminé and picro-carminé preparations (*i.e.*, sections which had been treated with absolute alcohol), the large hyaline masses were concentrically lined; in sections half-cleared-up (*i.e.*, treated with methylated spirit), and still better in preparations mounted in Farrant's solution, one or more minute

vessels, which were, as a rule, transversely divided, could be seen in the midst of the hyaline material. The concentric appearance seen in completely cleared-up preparations was evidently the result of the shrinking produced in the hyaline material by the absolute alcohol, for the concentric markings were less marked in half-cleared-up preparations, and not seen in sections mounted in Farrant's solution.

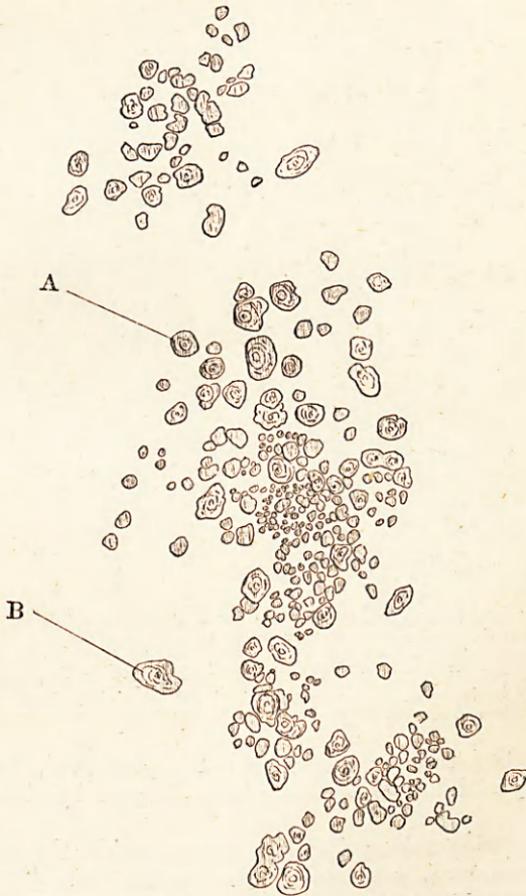


FIG. 46.—Camera Lucida Drawing of a Microscopical Section through a portion of the Cerebral Tumour in the Case of Miss A., showing numerous Hyaline Lumps. The Tumour Tissue, in the midst of which the Hyaline Masses lie, has not been represented, for, under this magnifying power the Individual Cells of the Tumour could not be distinguished. Stained with Picro-carmin, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 2, obj. 3, and drawing reduced from $6\frac{1}{2}$ to $4\frac{1}{2}$ inches.)

A, B, point to two of the hyaloid lumps, which are seen to be concentrically lined, and are in reality hyaline masses surrounding bloodvessels.

The small hyaline masses were in some cases connected with vessels, but in many places this connexion was not apparent, and the little hyaline masses then appeared to be simply scattered here

and there in the midst of the tissue of the tumour. The appearances just described are well seen in Figs. 46, 47, and 48. In

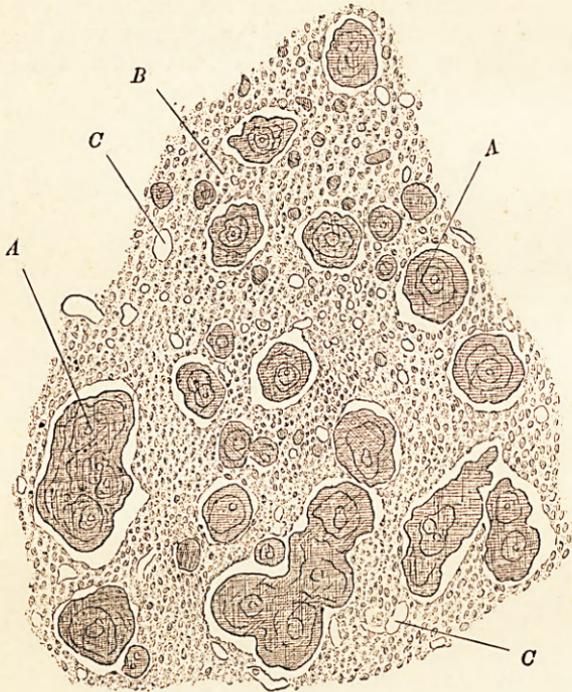


FIG. 47.—*Camera Lucida Drawing of a Microscopical Section of a portion of the Cerebral Tumour in the Case of Miss A., showing large Hyaline Masses lying in the midst of Sarcomatous Tissue. Stained with Picro-carmin, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 7, and drawing reduced from $5\frac{1}{2}$ to $3\frac{1}{2}$ inches.)*

A, A, Large hyaline masses, concentrically lined, and containing minute bloodvessels; B, sarcomatous tissue; C, C, small vessels in the tumour, the walls of which are healthy.

46 and 48 the tumour tissue is not represented, but in Fig. 47 the comparative size of the glial cells and hyaline lumps is seen.

In other sections long hyaline masses evidently surrounding minute vessels were seen (see Figs. 49 and 50). One of these hyaline masses was so cut that the minute vessel in its interior could be clearly seen; in this instance the hyaline mass seemed to form a sheath around the vessel; between the vessel and the hyaline cylinder some delicate spindle cells and connective tissue fibres were situated.

Adhering to the outer surface of these long hyaline sheaths were numerous small round or oval hyaline masses, which looked as if they had exuded in the form of drops from the main mass of hyaline substance. The same droplike appearance was also seen

in transverse sections of vessels affected with the hyaline change (see Figs. 52 and 53).

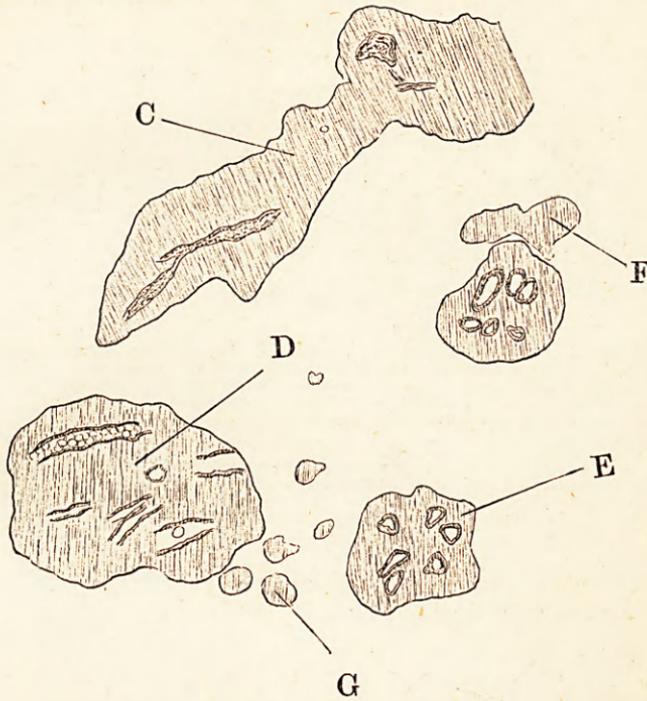


FIG. 48.—Camera Lucida Drawing of Hyaline Masses from the Cerebral Tumour in the Case of Miss A., showing numerous small Vessels in their Interior. Stained with Picro-carmin, and mounted in Farrant's Solution. (Magnified—Hartnack, oc. 3, obj. 8.)

C, D, Hyaline lumps, containing minute vessels longitudinally and transversely divided; E, hyaloid lump, containing six minute vessels transversely divided; F and G, large and small hyaline lumps, in which there are no vessels.

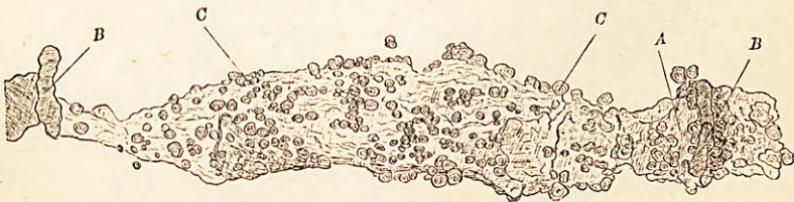


FIG. 49.—Camera Lucida Drawing of a Bloodvessel from the Cerebral Tumour in the Case of Miss A., showing Enormous Thickening, due to Hyaline Infiltration of its Wall, and numerous small Hyaline Globules, which appear to have exuded from the Outer Surface of the Hyaline Sheath. Stained with Picro-carmin, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from 8 to 3 inches.)

A, Hyaline sheath; B, B, large, and C, C, small masses of hyaline material adhering to the outer surface of the hyaline sheath. The small hyaline masses are concentrically lined.

The walls of many of the large vessels contained in the tumour were also infiltrated with hyaline material (see Figs. 51, 52, and

53). In some instances (as in Fig. 51), the hyaline infiltration was limited to one side of the vascular wall, and in many cases the hyaline material in the vascular wall appeared to be con-

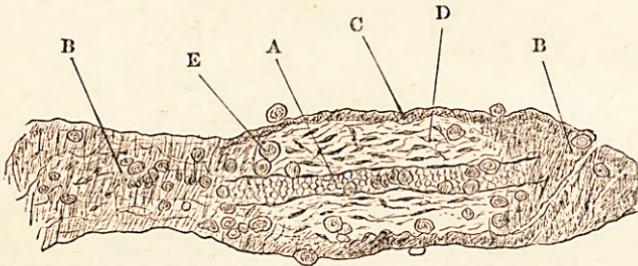


FIG. 50.—Camera Lucida Drawing of a Minute Vessel and the Hyaline Sheath which surrounds it, from the Cerebral Tumour in the Case of Miss A. The Hyaline Sheath is so cut that the Minute Vessel in its Interior is distinctly seen. Between the Vessel and the Hyaline Sheath some delicate Spindle Cells and Fibres are situated. Stained with Picro-carmin, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from $4\frac{1}{2}$ to $3\frac{1}{4}$ inches.)

A, Vessel containing red blood corpuscles and some small round hyaline lumps; B, hyaline sheath surrounding the vessel; at B' the hyaline sheath is cracked across; C, cut edge of hyaline sheath; D, spindle cells between the sheath and its contained vessel; E, hyaline globules which are adhering to, and in places appear to have exuded from, the hyaline sheath.

tinuous with masses of hyaline material in the tissue of the tumour surrounding the affected vessel.

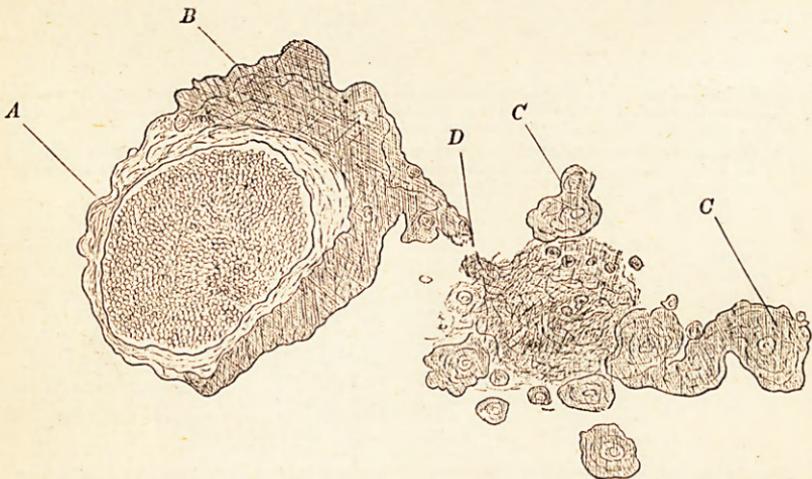


FIG. 51.—Camera Lucida Drawing of a Section through a portion of the Cerebral Tumour in the Case of Miss A., showing a Bloodvessel, the Wall of which is partly infiltrated with Hyaline Material, which is apparently continuous with Hyaline Masses in the Tissue of the Tumour surrounding it. Stained with Picro-carmin, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from 6 to 4 inches.)

A, Healthy portion of vessel wall; B, Hyaline mass in vessel wall; C, C, hyaline lumps in surrounding tissue; D, the junction of the hyaline mass in wall of vessel and in surrounding tissue; the continuity has apparently been broken in the process of preparation. The sarcomatous tissue in which the vessel lies has been omitted from the drawing.

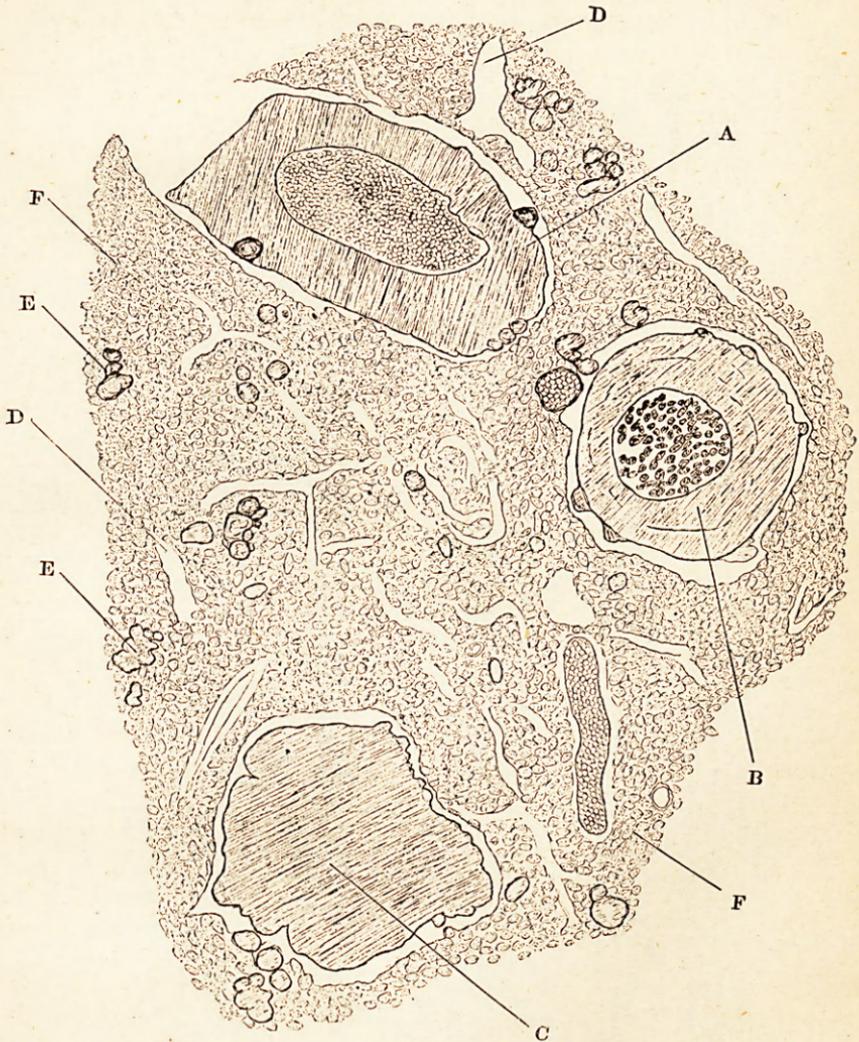


FIG. 52.—Camera Lucida Drawing of a Microscopical Section of a portion of the Tumour in the Case of Miss A., showing three Vessels, the Walls of which are enormously thickened and infiltrated with Hyaline Material. Stained with Picro-carminé, mounted in Farrant's Solution. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from 7 to 4½ inches.)

A, Vessel containing blood corpuscles—its walls are enormously thickened and infiltrated with hyaline material; B, vessel with walls affected in the same manner as A, but filled with sarcomatous cells, forming, as it were, a sarcomatous infarction; C, large mass of hyaline material, which seems to represent a former bloodvessel; D, D, small vessels in the midst of the sarcomatous tissue; E, E, small hyaline lumps in the midst of the sarcomatous tissue; F, F, point to the sarcomatous tissue, which is composed at this part of round and oval cells.

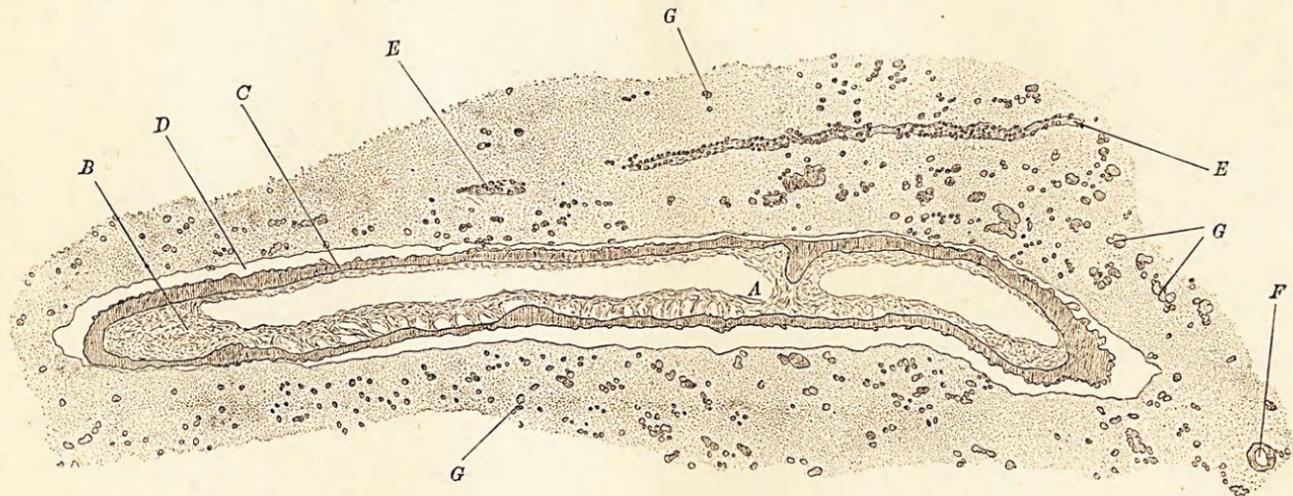


FIG. 53.—Camera Lucida Drawing of a Microscopical Section through a portion of the Cerebral Tumour in the Case of Miss A., showing a large Vessel in Longitudinal Section; the Coats of the Vessel are infiltrated with Hyaline Material, and its Canal is partly obstructed by an organizing Thrombus; numerous small Hyaline Lumps are seen in the surrounding Tissue—some of them appear to be free, others adhering to Minute Vessels. Stained with Picro-carminé, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 3, and drawing reduced from 11 to 6½ inches.)

The letter A is placed in the interior of the vessel, near a point where its canal is bridged across by a mass of hyaline material and by a portion of the organized thrombus (B); C, hyaline material in walls of vessel; D, space (? lymphatic space) surrounding the bloodvessel; E, E, minute vessel, seen longitudinally, surrounded by numerous small hyaline masses; F, small vessel, transversely divided, the coats of which are infiltrated with hyaline material; G, G, G, small hyaline lumps in the tissue of the tumour, the minute structure of which cannot be seen under this low magnifying power.

Some of the large vessels affected with the hyaline change were filled with blood corpuscles (see A, Fig. 52); in one instance (B, Fig. 52) the vessel contained glial cells—an infarction or throm-

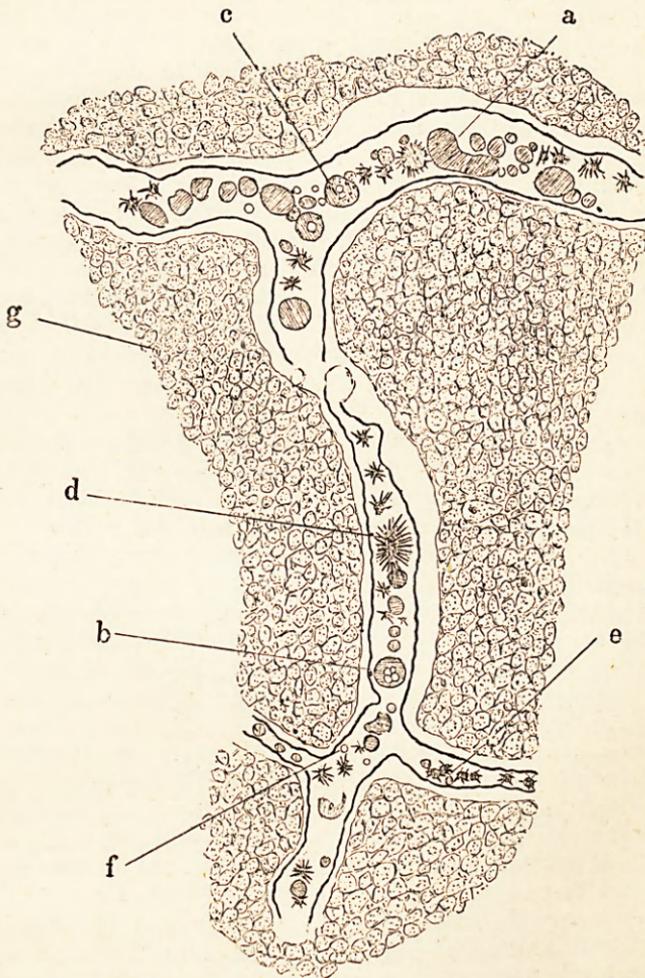


FIG. 54.—*Camera Lucida Drawing of a Section through the Cerebral Tumour in the Case of Miss A., showing a Bloodvessel surrounded by Sarcomatous Tissue; in the interior of the Vessel there are numerous masses of Hyaline Material, some of them contain small round Bodies (Vacuoles, or Red Blood Corpuscles), others are bristled with Acicular Crystals. Stained with Picro-carminé, cleared with absolute Alcohol and Oil of Cloves, and mounted in Zylol Balsam. (Magnified—Hartnack, oc. 3, obj. 8, and drawing reduced from $5\frac{1}{2}$ to 5 inches.)*

a, Large irregularly shaped hyaline mass, b and c, round hyaline masses containing small, clear, round bodies (? vacuoles or red blood corpuscles); d, large oval hyaline mass, bristled with acicular crystals; e, small round hyaline masses, studded with acicular crystals; f, red blood corpuscle; g, sarcomatous tissue, composed of round and oval cells. There were numerous minute bloodvessels amongst the sarcomatous cells; they are not shown in the drawing.

basis composed of cells identical in structure, though not quite so large in size, as the cells forming the adjacent portion of the tumour. In several instances, vessels, the walls of which were infiltrated with hyaline material, were partly filled up by an organizing thrombus (see Fig. 53).

In many different sections hyaline lumps, for the most part round or oval, and many times larger than red blood corpuscles, were seen in the interior of vessels, the walls of which were healthy. Some of these masses contained round, clear, colourless globules in their interior—probably vacuoles, but possibly red blood globules. The surface of the hyaline masses within the bloodvessels was in many instances bristled with fine acicular crystals; these crystals, which were stained in picro-carminic preparations of the same pink colour as the hyaline material, had probably been formed after death or during the death agony. In Fig. 54 a remarkable illustration of these intra-vascular, hyaline masses and crystals is faithfully represented; and it is to be observed that in the portion of the tumour surrounding this vessel no hyaline masses are to be seen.

Remarks.—This case presents several points of great clinical and pathological interest.

Diagnosis.—It could hardly, I think, be doubted, that the condition of the patient when I first saw her, and the whole previous history of the case, were indicative of an organic cerebral lesion; while the history of headache and vomiting, the pseudo-apoplectic attacks, the one-sided paralysis and tremor which varied so remarkably from time to time, and the temporary and unilateral optic neuritis observed by Dr Barlow, together with the absence of any of the ordinary causes of cerebral softening, were strongly suggestive of an intracranial tumour.

The reason which induced me, when I first saw the patient, to think that the tumour was pressing upon the pons Varolii have already been detailed. The appearances found at the autopsy showed no cause for the left-sided facial paralysis, nor of the extreme difficulty of swallowing which was such a marked symptom at the time of my first visit.

On reviewing the whole history and progress of the case, I am disposed to think that the character of the intellectual deterioration (the marked loss of the power of attention and of mental concentration), the falling of the head to the right, and the defects in speech (use of wrong words, etc.), which might be called a minor degree of aphasia, should have enabled us to localize the lesion in the left frontal lobe. It must, however, be remembered that many of the symptoms to which I have just referred were by no means prominently marked, that almost all of them were temporary and evanescent (present at times, absent at others), and that it seemed difficult to explain the unilateral paralysis and voluntary tremor, and to account for the remarkable variability of these

symptoms (paralysis and tremor) by a tumour in the frontal lobe.¹

Further, a careful review of the symptoms in the light of the conditions found at the post-mortem leads me to think that the exact pathological nature of the tumour might perhaps have been correctly surmised.

The coarse tremor, absent while the limbs were at rest, but present on voluntary movement (granting that it was due to organic and not to functional—hysterical—disease), was indicative either of cerebro-spinal sclerosis or of pressure on the motor conducting fibres.

The facts that the paralysis and tremor varied greatly in degree from time to time, and had on more than one occasion completely disappeared, excluded cerebro-spinal sclerosis (indeed that condition was never suspected, for the symptoms, taken as a whole, were in no way indicative of its presence), and ought, perhaps, to have suggested the presence of a cyst, or at all events of fluid pressure.²

Granting, then, as might perhaps have been conjectured, that the intermittent character of the paralysis and tremor could only have resulted from the pressure of fluid, the tension of which varied in degree from time to time, it might, I think, further have been supposed that the cause of the pressure was the presence of a cyst. The variations in the degree of pressure, as evidenced by the paralysis and tremor, were so rapid and extensive that an aneurism—another possible cause of intermittent pressure—might, I think, have been definitely excluded.

¹ In the *British Medical Journal*, 3rd March 1876, and in the *Edinburgh Medical Journal*, December 1878, I have reported cases in which tumours with cysts were found in the frontal lobes. In both cases the mental symptoms were very prominent, and in both there were sudden but temporary attacks of hemiplegia without loss of consciousness, and without convulsions. In one case there was also some loss of power on the same side (arm and leg) as the lesion. These two cases have several points in common with the one which I am at present describing.

² The pressure of a cerebellar tumour on the pons or medulla is a common cause of this form of voluntary tremor. For the past ten years I have been familiar with cases of this kind, and have explained the tremor by the pressure of the tumour upon the motor conducting fibres in the pons Varolii or medulla. I have also seen two cases in which a lesion, presumably in the neighbourhood of the lenticular nucleus (for the diagnosis was not confirmed by post-mortem examination), has been attended with the same form of voluntary tremor, the result, I suppose, of pressure on the motor strands of the internal capsule. But in these cases there were marked sensory disturbances, the result no doubt of pressure on the sensory fibres of the internal capsule. I have met with no case in which a tumour of the frontal lobe by pressing upon the motor fibres of the internal capsule has caused tremor of this kind—unless such was the position of the lesion in a case which I saw some two years ago with Dr Struthers of Leith. In many respects that case bore such a close resemblance to the one (case of Miss A.) which I am now describing, that although there was no post-mortem, I will on some future occasion record its chief details.

Now, if we exclude parasitic cysts (hydatids and cysticercus cellulose), which, in such a case as this, might probably be excluded—*firstly*, because of their extreme rarity; and, *secondly*, because there was no evidence of similar disease in any other part of the body—a cyst of sufficient size to produce the symptoms which have been described must in all probability have been the result of an ordinary hæmorrhagic apoplexy or of a new growth (glioma with hæmorrhage and cyst formation).

Further, ordinary cerebral hæmorrhage (hæmorrhagic apoplexy *par excellence*) might, I think, have been definitely excluded as the cause of the supposed cyst—*firstly*, because there was no evidence of any of the conditions which are usually associated with ordinary cerebral hæmorrhage (cardiac, vascular, or kidney disease); *secondly*, because the symptoms, both individually (headache, vomiting, pseudo-apoplectic attacks) and as a whole, and the whole progress and course of the case, were strongly in favour of a tumour rather than of softening, the result of hæmorrhagic apoplexy. In particular, the numerous pseudo-apoplectic attacks are easily explained by repeated small hæmorrhages in the substance of a tumour, and the disturbance of the intracranial pressure produced thereby, but would have been difficult or impossible to explain on the supposition that the supposed cyst had resulted from ordinary hæmorrhagic apoplexy. It is hardly possible to imagine so many separate hæmorrhagic extravasations, all of small size, all recovered from within a few hours, all outside the ordinary lenticulo-striate region, for none of the hæmorrhages were followed by motor or sensory paralysis.

The fact that sudden attacks of hemiplegia, rapidly passing off, were observed in two other cases of cyst in the frontal lobes, has already been referred to.

Reviewing, then, the symptoms which were observed during life in the light of the appearances found at the post-mortem, and taking into account the other two cases of tumour with cyst in the frontal lobe which I have reported, I am disposed to think that the position and exact pathological nature of the lesion might perhaps have been correctly surmised.

The effect of free purgation on the pseudo-apoplectic attacks is another point of great clinical interest, and is, I think, satisfactorily explained by supposing that the drain of water from the bowel by reducing the general blood pressure, produced absorption of fluid, which had been effused into the tissues of the tumour, while it, perhaps, at the same time reduced the tension of the fluid in the cyst; and that in one or other or both of these ways the increased tension within the cranium was reduced, and relief afforded.

The condition of the deep reflexes is a point of considerable interest. At the time of my first visit there was marked paralysis of the right arm and leg, but the knee-jerk was diminished instead of

increased, as it usually is in cases of cerebral hemiplegia. When I next saw the patient the hemiplegia had almost completely disappeared, and the knee-jerk had reappeared, and was, in fact, equal to that on the left (non-paralyzed) side.

This fact would seem to show that where paralysis results from *simple* pressure upon motor conducting fibres (*i.e.*, where there are no irritative changes in the conducting fibres as the result of that pressure) the knee-jerk is diminished rather than exaggerated—an important clinical indication of the cause of the paralysis, if it should be verified by future observations.

Further, if the effect of simple pressure is to produce diminution of the deep reflex movements, the exaggeration of the deep reflexes, which is present in ordinary hemiplegia, must evidently depend upon a process of irritation passing down the pyramidal tract to the multipolar nerve cells of the spinal cord, and not upon the simple arrest or shutting off of the cerebral control—the other theory which has been advanced to account for the exaggeration in that condition.

The character of the mental deterioration which was present in this case, and the *marked way in which the head tended to fall to the right side* (the side opposite the lesion), confirm Ferrier's observations on lesions of the frontal lobes.

The exact duration of the lesion must be a matter of speculation. It can hardly be imagined that the cerebral attack which was said to be due to "water on the head," whatever that term may mean, and which occurred at the age of twelve (thirty-five years before the patient's death), had anything to do with the condition.

Whether the well-marked cerebral attack (coma, rigidity, and speechlessness, lasting for five days) which occurred at the age of thirty-five was due to the lesion which was found at the autopsy it is impossible to say. It must, however, be observed that after this attack a distinct and permanent change was observed in the patient's mental condition; presumably, therefore, there had been some lesion which had resulted in permanent damage. It is not unreasonable to suppose that the cause of this attack was a hæmorrhage into the left frontal lobe, and that the cyst resulted from that hæmorrhage.

The condition of the optic nerve and retina.—The fact, that in this case, in which (*a*), the lesion was distinctly irritative in character (evidenced by its microscopical characters, by the adhesion of the dura mater over the tumour, and by the direct extension—auto-inoculation—of the new growth from the surface of one to that of the other frontal lobe), and in which (*b*) there was no evidence of increased intracranial pressure at the autopsy, there was only a passing neuritis in one fundus, supports, I think, the view which I have always held, that increased intracranial pressure is a most important factor in the production of the double optic neuritis which is so frequently observed in connexion with intracranial

tumours. It must, however, be remembered that Dr Hughlings Jackson has advanced the fact that, in those rare cases in which the neuritis is unilateral, it is present, as it was in this case, on the opposite side to the cerebral lesion, as an argument against the increased intracranial pressure theory.

Points of pathological interest.—The extreme vascularity of the tumour, the evidence of many separate small hæmorrhages in the tissue of the tumour, the frequent relationship of cysts with gliomatous tumours, the direct extension of the tumour by a process of auto-inoculation from the surface of the left to that of the right frontal lobe, the glio-sarcomatous infarction which was present in one of the vessels of the tumour (see Fig. 51), and the peculiar character of the large crystalline masses (see Fig. 45) which were found in some of the hæmorrhages, are points of pathological interest, which the limits of this communication do not allow me further to consider. I must, however, briefly refer to the hyaline degeneration which was such a remarkable feature both in this tumour and in Dr Leslie's case reported on page 591.

Hyaline degeneration is met with in a great variety of different conditions. Recklinghausen, as the result of a long series of observations, concludes that the hyaline metamorphosis plays a considerable part in a great variety of different conditions, both normal and abnormal. It consists of a transformation (or infiltration) of the tissues, more especially the walls of the minute arteries, into a translucent, highly refractive material, which bears a close resemblance to the translucent material which is met with in cases of amyloid or waxy degeneration. It differs, however, in this important particular from the amyloid material, that it does not give the characteristic reactions with iodine and methy-violet.

Hyaline degeneration of the minute arteries has been observed in diphtheria, typhoid, scarlet fever, and other febrile affections; it is comparatively common in lymphatic glands; is frequently seen in the brain, more especially in the neighbourhood of caseous or hæmorrhagic foci. P. Meyer has shown that it plays an important part in the production of the minute aneurisms which are seen on the terminal branches of the pulmonary artery in cases of phthisis. The same observer has shown that true obliterative thrombi composed of hyaline material may frequently be observed in infarctions of the spleen and kidney in cases of phthisis. In a case of chronic meningitis with caseous deposits in the pia mater, P. Meyer found at certain points, where the cerebral substance was in a state of hæmorrhagic softening, an infiltration of the walls of the vessels, and often a complete obliteration of their canals by the hyaline substance. He has also seen the afferent arterioles in the kidneys of scarlet fever completely obliterated by hyaline masses; and he records a very remarkable case, in which cerebral symptoms with high temperature developed in

the course of an attack of acute rheumatism, and in which a most extensive hæmorrhagic softening of the greater part of the left occipital lobe was found after death, the cerebral lesion being apparently due to the plugging of the minute arteries with refractive hyaline masses.

The exact chemical composition of the hyaline material is unknown.

In some cases the hyaline deposits are, according to Recklinghausen, only products of the death agony, but in others, and amongst these there can be no doubt that the two cases of cerebral tumour to which I am now more especially referring must be included, the hyaline material had evidently been formed during life, and is of distinct pathological importance.

Various opinions have been expressed as to the source of this hyaline material. Almost all observers who have studied the subject seem to think that it is not simple fibrine. According to Recklinghausen, it is a derivative of cellular protoplasm. Most writers seem to think that the white corpuscles of the blood are the source from which it is usually derived, but P. Meyer and others admit that the endothelial cells of the bloodvessels, and in some cases, perhaps, all the elements of the tissues, may be transformed or fused, as it were, into hyaline material. Pitres believes that the hyaline material may be derived from the red blood corpuscles. P. Meyer does not think the evidence on this point conclusive; but I am disposed to think, for the reasons previously stated (see pages 692 and 693), that in the case related above (case of Miss A.) the large crystals, the irregular, transparent masses, and the hyaline material were probably derivatives of the red rather than the white blood-cells.

Hyaline degeneration is seen where the conditions for satisfactory nutrition are interfered with; anything, whether a chemical or mechanical cause, or a dyscrasia, which interferes with the vitality of cell life, seems to predispose to its production. It is especially liable to occur in the neighbourhood of caseous foci, and in the cerebral arteries in cases of hæmorrhagic extravasation and red softening. Further, the two cases which we are now reporting show that an advanced degree of hyaline degeneration may be met with in cases of glio-sarcomatous tumours of the brain, and suggest the possibility of the hyaline change being a product, not merely of the extravasated blood corpuscles, but possibly of the glial cells themselves.¹

I regret that a microscopical examination of the blood was not made during life; and that the great viscera of the thorax and abdomen was not examined at the autopsy.

¹ For further information as regards hyaline degeneration the reader is referred to Dr P. Meyer's paper, "De la formation et du rôle de l'hyaline dans les anévrisms et dans les vaisseaux" (*Archives de Physiologie normale et pathologique*, 1880, page 598 et seq.), to which I am indebted for many of the foregoing particulars.