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CEREBRAL TUMOUR:

2.

HISTORY AND DIAGNOSIS.

By PROF. T. MCCALL ANDERSON, M.D.

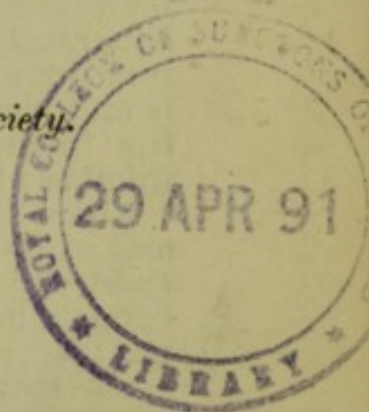
OPERATION FOR ITS REMOVAL.

By PROF. GEORGE BUCHANAN, M.A., M.D., LL.D.

PATHOLOGY.

By DR. JOSEPH COATS.

Read before the Glasgow Medico-Chirurgical Society.



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I.—DIAGNOSIS AND LOCALISATION FROM THE NERVE SYMPTOMS.

By T. McCALL ANDERSON, M.D.,

Professor of Clinical Medicine in the University of Glasgow.

GENTLEMEN,—I have to request your careful attention to the details of the history of this case, because it is mainly from them that the diagnosis of the seat and nature of the disease was made.

A. K.,¹ aged 16, engineer's apprentice, was admitted to Ward 2 of the Western Infirmary on August 14th, 1890, complaining of fits and of paresis of the left arm and leg. No definite neurotic tendency can be traced in the family beyond the fact that his mother suffers frequently from headache, and that for a number of years he himself has been similarly affected, apparently as part of "bilious attacks." There is no history nor are there evidences of syphilis or tuberculosis. There is an indefinite history of slight discharge from the ears during infancy, but all traces of this have been absent for a number of years.

About four years and a half ago, without previous warning, and while in the act of lacing his boots, his left forearm was suddenly flexed, and, uttering a cry, he fell down in a semi-insensible condition, conscious, to a certain extent, of what was going on around him, but unable to speak or move. Ever since this fit he has complained at times of slight pain, numbness and weakness in the left hand, and within the last year or so this had been more frequent and severe. The pain and its accompanying numbness are usually experienced in the left thumb and forefinger, and, only when severe, extend to the rest of the hand and forearm.

No recurrence of fits took place till a year and a half ago, when, on May 10th, 1889, a second occurred. This was preceded by lateral oscillation of the head for about two hours. Pain and numbness were then complained of in the left thumb and forefinger, which gradually extended upwards through the left hand and forearm to the arm, finally affecting

¹ Reported by the resident medical officer, Mr. L. R. Sutherland, M.B., C.M.

the left side of the face, including the left half of the tongue. He remembers uttering a cry and falling, and a quarter of an hour later he woke up, unconscious of what had happened, and complaining of headache and nausea. A third fit occurred on the following day, and fourteen days later a fourth. These all began in much the same manner, and had much the same character and duration.

Alarmed about this state of matters, he sought admission to hospital on June 11th, 1889, and was under treatment by mixed bromides, gr. v, increased to gr. xv t.i.d. till August 3rd, 1889, when he was dismissed much improved. While under observation on this first occasion he had only two fits. These were ushered in by pain in the left thumb and forefinger, extending up the arm towards the head. The actual fit was apparently a generalised convulsion, said to have been attended by sobbing and profuse perspiration.

A fortnight after leaving hospital the fits returned, and have since continued to recur. At times intervals of from eight to sixteen weeks elapse, at others they occur daily, even though he may be under the influence of bromides. The fits, since he left hospital, have differed from the previous ones in so far as there has been no loss of consciousness. The aura has continued as before.

For a month before his readmission the numbness and pain in the left hand and forearm have been becoming rapidly worse, and partial paralysis of the left arm, gradually extending to the leg, has developed.

During the ten weeks he was under observation in hospital for the second time eighty-nine fits occurred. From August 21st to September 17th there were no fewer than eighty-seven, on an average three daily. Under the influence of treatment they gradually became less frequent, and finally ceased. For three weeks no fits occurred. On October 10th, and again on the 26th, a slight recurrence took place, all treatment having been suspended on the 21st.

Examination.—The limbs of the affected side are somewhat flabby and cold. There is very decided paresis of the left arm and hand, the dynamometer registering on the right 50 kilos, on the left *nil*. Quite distinct, but less decided, paresis can be made out in the left leg on resisting movement. There is exaggeration of the left knee and wrist jerks, slight left ankle clonus, and the superficial reflexes are active. Tactile sensation is perfect. A feeling of numbness is experienced all over the left side, particularly in the arm and leg, and to a less extent in the left side of face and left half of the tongue, but this is not constant. There is slight facial paralysis as estimated by the usual tests. There is slight deviation of the uvula to the left, and the tongue on protrusion is slightly deflected to the affected side. Pain, at times very acute, is complained of behind and above the right ear and in the right frontal region, and, at a point 2 inches above and behind the ear, an area of distinct tenderness is discovered on percussion.

The following are the results of the examination of the eyes, ears, and urine:—

DR. HINSELWOOD'S REPORT ON THE CONDITION OF THE EYES (September 11th, 1890).—"Well-marked optic neuritis present in both eyes, but all the changes are most marked in the right. The papillæ are swollen, and the normal cupping of the discs entirely obliterated. The edges of both discs are obscured, so that it is impossible to make out where the retina begins and the disc ends. The papillæ are of a deep greyish-red colour, but towards the outer part are surrounded by a palish halo. The veins are dilated, and the arteries are smaller than normal. The retinae, for a considerable distance round the optic discs, have lost their transparency, and have an opaque greyish appearance, which gives a very dull fundus reflex on ophthalmoscopic examination."

DR. BARR'S REPORT ON THE CONDITION OF THE EARS (October 29th, 1890).—"Right ear. Hearing power slightly under the normal; tympanic membrane fairly normal; no perforation, cicatrix, or any evidence of present or past purulent disease. Bone conduction good. The tinnitus is probably connected with some form of irritation at the auditory centre in the brain. Left ear: Pear-shaped cicatrix in tympanic membrane; rest of membrane opaque. There are indications of a past purulent disease of the middle ear. Hearing power more impaired than on the right side."

DR. W. F. SOMERVILLE'S REPORT ON THE URINE (October 30th, 1890).—"A. K.; amount of urine examined, 1.2 lite in 24 hours; colour, palish amber; odour, urinous; reaction, neutral; specific gravity, 1022.

	In per Mille.	Gramms. in 24 hours.	
Water	948.8	1148.5	
Dry residue	51.2	61.4	
Organic material	33.5	40.2	rel. abs.
Ash	17.7	20.2	+ n.
Extractive material	7.3	8.7	sl. + sl. +
Urea	25.2	30.2	— —
Chlorides	11.1	13.3	+ +
Sulphates	3.0	3.6	— —
Phosphates	3.67	4.4	n. sl. —
Uric Acid	—		
Pigments	n.		
Albumen	none		
Sugar	"		
Ammon. carb.	+		
Alkali phosphates	2.46	2.95	sl. — sl. —
Alkaline earth phosphates	1.21	1.44	+ +

NOTE. + = increased; — = decreased; rel. = relatively to dry residue; abs. = absolutely in twenty-four hours; sl. = slightly; n. = normal.

"Result.—I have neither seen the patient, nor do I know any clinical particulars of the case. From the examination of

the urine according to the method recommended by Mr. A. E. Haswell, pathological chemist, Vienna, I find evidences of brain irritation, as shown by the increased excretion, relatively and absolutely, of the earthy phosphates, caused, perhaps, by the presence of a tumour, or by the pressure of bone on the brain-substance; or possibly, though not likely, by a very old encapsuled abscess. From the light colour of the urine, the specific gravity, the amount of urine voided in twenty-four hours, the relatively decreased urea, and the increased chlorides, the possibility of any suppurative process, as one would find in a case of abscess or of meningitis, can be quite excluded."

The following is the substance of my remarks to my clinical class prior to the operation: In reference to diagnosis, the points which we have specially to consider are two; first, the seat; and secondly, the nature of the lesion.

1. *The Seat of the Lesion.*—The disease is manifestly cerebral, and implicates the right side of the brain, as the resulting manifestations are almost exclusively on the left side of the body, while the paralytic phenomena indicate implication of the motor tract. But what part of the motor tract is the seat of the mischief? The symptoms point, I think, very positively to the cortex cerebri. For it must be borne in mind that in cortical lesions convulsions are very common, are frequently limited, at least at their onset, to the part whose centre is irritated, and consciousness is often retained, factors which are all present in our patient. In such cases, too, a sensory aura often precedes the epileptiform seizures, and in this instance the fits set in with numbness and pain in the left thumb and forefinger.

This last circumstance, coupled with the fact that the paralysis began in the left arm, points to a lesion having its centre about the junction of the middle with the lower third of the ascending parietal convolution. This conclusion is somewhat supported by the pain which was complained of, and by the tenderness on percussion above and behind the right ear, although it must be remembered that the seat of pain does not necessarily correspond with the seat of the disease.

2. *The Nature of the Lesion.*—The history of suppurative disease of the middle ear naturally leads to the suspicion that there might be a cerebral abscess; but this suppuration occurred on the *left* side, and in early life, a good many years before there were any symptoms of cerebral irritation; while Dr. Barr's report furnishes evidence of prolonged absence of active disease of the middle ear. So that we may almost certainly exclude the hypothesis of abscess of the brain, more especially as Dr. Somerville's report on the urine is decidedly against such a view.

That being so, we can come to no other conclusion than that we have to deal with a tumour of some kind. The most common forms of cerebral growth are tuberculous or syphilitic in their nature, and which might possibly be influenced by

the inoculation of Koch's fluid on the one hand, and anti-syphilitic treatment on the other. But there is no history of a hereditary tendency to tuberculous disease, nor is there any indication of a delicacy of constitution in the patient himself. And, as regards syphilis, there is no history or symptom of hereditary transmission of the taint, nor is there any suspicion of the disease having been acquired, not to speak of the age of the patient which, of itself, almost excludes it. A cancerous growth is out of the question, as the patient presents none of the characteristics of malignant disease, nor does there appear to be a family predisposition thereto.

If, then, we are right in our view that the tumour is neither tuberculous, syphilitic, nor cancerous, all that we can say further is that the intracranial growths which are most commonly met with are glioma or sarcoma; and the only way of getting rid of them is by operative interference.

II.—OPERATION FOR ITS REMOVAL: RECOVERY.

By GEORGE BUCHANAN, M.A., M.D., LL.D.,
Professor of Clinical Surgery in the University of Glasgow.

CEREBRAL surgery at the present day is in much the same position as abdominal surgery was thirty years ago. In April, 1864, I performed the first successful operation of ovariectomy in Glasgow or the West of Scotland. Not very many years before that, the leading surgeon in Scotland had openly declared his opinion that ovariectomy was unjustifiable, and that a surgeon who undertook that operation with a fatal result, laid himself open to a charge of culpable homicide. At the present time, owing to improved methods of operating and after-treatment, abdominal section is performed with impunity almost daily.

Cranial or cerebral surgery is now on its trial. Horsley, Macewen, Park, Bergmann, and others have clearly established that operations on the cranium for the relief of abscess and removal of morbid deposits and new growths, evidenced by certain well-ascertained nerve symptoms, can be undertaken with success. But as yet the opportunities for performing these operations have fallen into very few hands, so that it is the duty of every surgeon who can add to the limited experience to do so.

Trephining has frequently been performed in cases where there are scars on the scalp or depressions of bone indicating former injury, to which nerve symptoms, such as paralysis, convulsions, or neuralgia, etc., might be traced. A very striking example of this I published in the *BRITISH MEDICAL JOURNAL*, December 14th, 1889, p. 1318.

But the interest in the cerebral surgery of the present day is centred in those cases where the abnormal condition of the

brain is diagnosed and localised by the nature and situation of the nervous affection, as first pointed out by Ferrier.

I have not for myself collected the published cases for the last two years, but the results of operations up to 1888 have been summarised in a paper by Dr. Park in the *Transactions* of the Congress of American Physicians and Surgeons at Washington, published in 1889. The table includes those only in which the operation was performed according to the principles of cerebral localisation, without reference to scars or surface markings. The table contains 63 cases; the deaths were 17; 15 of the cases were abscesses, subdural or sub-cortical; in 11 the lesion was a tumour, exclusive of tuberculous nodules; there were 12 cysts; the other 25 were of a miscellaneous nature, such as the fibrination of a clot, gumma, tubercle, and pressure from confined and altered serous or other fluid.

These statistics, like most others, are probably defective. Additional cases may have been recorded and escaped the notice of the compiler; others may have been done and not published. No doubt every successful case has been recorded; not so with some the result of which has been negative or fatal. Still, the table is valuable, as the compilation, so far as could be achieved, of cases of the operation referred to, during the early years of its introduction.

The following remarkable case comes under the category of those included in Dr. Park's table:—

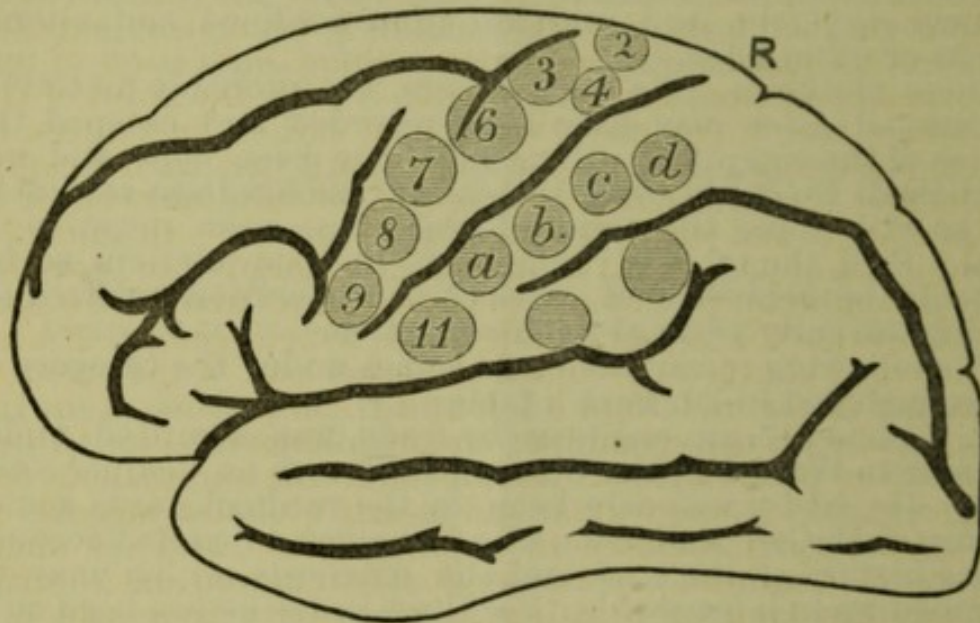
A. K., aged 17, an engineer by trade, was admitted under my care to Ward 3 of the Western Infirmary on October 30th, 1890. He had previously been in the medical wards under Professor McCall Anderson, who has given a detailed account of the history of the case and the diagnosis, which may be summed up in a few words: For three years he has been subject to epileptic attacks, which have gradually increased in frequency and severity. They always begin and sometimes are limited to the thumb and forefinger of the left hand, but frequently involve the whole limb, and sometimes the leg of the same side. Of late, the left arm has become partially paralysed, and to a slighter degree the left leg.

These symptoms seemed to a point to a gradually developing lesion, probably a tumour, in the cerebral centres presiding over the movements of the thumb, fingers, and wrist, which are very distinctly marked out in Ferrier's map of the cerebral convolutions, at the junction of the middle and lower third of the post-Rolando convolution.

Accordingly, after careful consideration, Dr. Anderson and I decided that an exploratory operation should be performed on the region referred to. In the preparation of the patient, the steps of the operation, and the after-treatment, I followed rigidly the plan described by Victor Horsley, and had every reason to be satisfied with the result.

Three days before the operation the head was shaved, to allow me to study the topography of the cranium. The point at which I proposed to open the cranium was fixed on

by the following measurements: the distance between the root of the nose and occipital protuberance was divided into two equal parts; half an inch behind the centre point, indicating the upper end of the fissure of Rolando, was marked. From this point a line was drawn downwards and forwards at an angle of 65° ; this indicates the direction of Rolando's fissure. Three inches down, just behind this line, are situated the convolutions indicated in Dr. Ferrier's plan as those presiding over the movements of the thumb and finger. These spots and lines were marked with a blue pencil. The scalp was then thoroughly cleansed, and a wet compress of carbolic solution kept on continuously.



2, 3, 4, centres for the movements of arms and legs; 6, centre for supination of hand and flexion of forearm; a, b, c, d, centres for hand and wrist; 11, a, b, c, d, are on the ascending parietal convolution behind the fissure of Rolando R. The tumour was situated under a.

On October 30th, the day preceding the operation, the bowels were cleared out with castor oil, the head was again shaved, cleansed, and kept moistened with carbolic acid solution.

The operation was performed on October 31st, at 9.30 A.M. Immediately before this he had a quarter of a grain of morphine subcutaneously, which is believed to have some effect in controlling hæmorrhage from small vessels of the brain.

The patient having been put under chloroform, I made a semilunar flap of the scalp, including the aponeurosis, the upper part of which was near the vertex, the base about 3 inches wide, across the lower part of the fissure of Rolando, that is, just on a level with the top of the pinna. One or two small arteries were ligatured. The pericranium was turned aside from part of the skull, where a trephine was applied, just at the spot previously determined by the surface mark-

ing. The trephine was rather larger than a shilling. The button of skull which was removed was placed between folds of lint moistened with carbolic solution, and kept warm. The dura mater exposed by the trephine and the convolutions beneath seemed to be perfectly normal, and presented no evidence of any tumour or lesion. Thinking that the diseased area might be further up, behind the fissure, on the centre indicated for the arm, I applied the trephine 2 inches above and behind the former situation, and removed a similar disc of bone. I then applied a Hey's saw on each side in a line touching the outside of both circles, and with a lever removed the intervening bridge of bone. All the pieces were kept moist in warm carbolic solution. I now clipped the dura mater for four-fifths of the circumference of the oval aperture, about a sixth of an inch from the edge of the bone, and so exposed the cerebral surface. At no part was there indication of any abnormal condition, nor on pressing it with the point of the forefinger was there any evidence of either fluctuation or undue resistance. But at the lower part, just in the centre of the first trephine hole, the cerebral convolution seemed to bulge a little, and while feeling it with the smooth end of a director it suddenly burst asunder, and a dark red or brownish body resembling an Orleans plum emerged from below, and pushing aside the cerebral substance, which seemed to have been extended over it, occupied the lower part of the opening. With my finger and thumb I found I could move it in the brain, and with the spoon-like end of a large director I lifted it out of its place, without tearing anything and without any hæmorrhage. It was regular and nearly globular, smooth on the surface as if enclosed in a thin capsule, and was about the size of a walnut. It was evidently removed entire without any breaking or bruising, as the cavity from which it came contained no *débris*, and it closed at once by resiliency of the surrounding substance.

After washing the wound with a stream of antiseptic fluid, I sewed the dura mater into its place with stitches of fine silk. It came together edge to edge, except at a small part where it had been torn. I now replaced the discs of bone in their situation, and filled up the space between them with pieces of the intervening bridge of bone, which I had cut into four or five portions. The semilunar flap was then put into position, and retained with fine silver wire stitches, a little opening, into which I put a drainage tube, being left at the posterior angle. A dressing of alembroth gauze and Gamgee cotton was applied with a very slight pressure. The patient stood the operation well, and his progress to recovery was almost uninterrupted.

It is unnecessary to give daily reports, but the after-treatment and course of the case have been summarised by Mr. Munro Kerr, M.B., C.M., my house-surgeon.

Urine was drawn off only on two occasions, once on the afternoon of the operation, and once again on November 5th.

Opiates.—One-sixth of a grain of morphine was given hypo-

dermically on two occasions for headache—at 1 A.M. on November 3rd and 5th.

Delirium.—Only on one occasion did the patient seem somewhat confused, and that only to a slight extent on the evening of November 3rd.

Headache.—A good deal of frontal headache till November 7th, which was relieved by a small dose of antipyrin.

Bowels inclined to be constipated, which was obviated first by soap and water enemata, and subsequently by gentle laxatives.

Food.—Only a little milk and soda water was allowed till November 5th, then a little toast, afterwards milk and biscuits, of which he was very fond, and gradually to more generous diet.

Dressings changed for the first time on the fourth day. Edges of the wound for the most part united, except where the drainage tube emerged, and one or two points where there were a few granulations. Tube removed.

November 13th. Dressing changed a second time; a little discharge on the dressing. Some projection of the flap, which made an elastic swelling. No pulsation.

November 18th. The bulging of the flap distinctly less; a little discharge and granulation at site of exit of tube. After this the progress of the wound to recovery was uninterrupted.

The tumour was a spindle-celled sarcoma, as reported by Dr. Coats, pathologist.

Nervous Symptoms and Fits.—On November 10th, at 11 A.M., he became unconscious for about two minutes, the arm and mouth twitched, and the head was thrown to one side.

On November 18th, in the evening, he had an attack similar to the above.

On November 19th, during most of this day he felt uncomfortable, with occasional twitchings in the limbs.

On November 25th he had a very slight attack.

After this he was very well in every way till December 22nd, when he lost consciousness for a minute and had some twitchings on the arm, but not head or leg.

Since that date he has had no return of any of these symptoms, and is very much better in every way; cheerful, taking his food well and sleeping without any disturbance.

On January 13th, 1891, he got up out of bed for the first time and daily since.

Present Condition, February 18th, 1891.—The flap of scalp, which had been dissected off to expose the bone, is now completely adherent. It is raised above the level of the surrounding scalp about half an inch. Underneath this can be felt the pieces of skull, which had been replaced and are now firmly united to each other and to the adjoining edges of the aperture, so that there is now a complete closure of the opening, except over a small space of about three-quarters of an inch in diameter, where I had left the dura mater uncovered with pieces of bone, to allow of some little discharge. Here, however, the scalp is so thick and firm that the gap is

practically closed. So far as the operation is concerned the result is perfect. The patient's general health and condition are most satisfactory. He has not had any epileptic attack, nor even a partial twitching, since December 22nd, a period of eight weeks, so that that part of the nerve ailment may be considered as cured.

The left arm, which before the operation was paralysed to the extent that it lay powerless by his side, at least could not be raised or moved without the assistance of his other hand, can now be raised and moved about voluntarily. There is, however, when he moves to any great extent, a spastic contraction of the muscles of the fingers, wrist, and elbow, which tends to keep the limb more or less rigid; so that the cerebral convolutions over the region from which the tumour was removed have not regained entirely their normal functions. This, however, is daily improving.

POSTSCRIPT.

March 10th, 1891.—The foregoing paper was read at a meeting of the Glasgow Medico-Chirurgical Society on February 20th. That evening the patient was sitting by the fire, waiting for the cab in which he was to be taken to be shown at the meeting. Without warning, he was seized with an epileptiform fit, affecting, as formerly, only the left hand and arm, and slightly the leg. It lasted about two minutes and a half, and there was no loss of consciousness. He remembers all about it. It came on suddenly without any premonitory sensation or aura, and passed off leaving him very much as he was before. He told me all about it next day, and he said he believed it had been brought on by the partial excitement he had been in all day, at the prospect of being taken to the Society and shown to so many medical men. I think that probably he was right and that it was a transient attack, and might be explained by the long time the cerebral substance had been pressed upon and altered by the growth of the tumour, so that it had acquired a habit which had not yet passed off, though it had manifested itself at very long intervals. I suppose we may still expect some slight attacks to recur before the brain tissue is restored to its normal functions.

III.—REPORT ON ITS PATHOLOGY.

By JOSEPH COATS, M.D.,

Lecturer on Pathology in the University of Glasgow.

THE following note was made when the tissue was fresh, immediately after the operation:—

The specimen is a soft, fleshy piece of tissue of a reddish colour; its surface is irregular, having a granular appearance, which on closer inspection looks almost papillary; at least there are a number of regular flat elevations of very small

size. The tumour is a flat mass of a generally triangular shape, having somewhat the outline as well as the size of the suprarenal body. Its longest diameter is $1\frac{1}{2}$ inch; its other diameter 1 inch, and its thickness $\frac{1}{2}$ inch. The tissue is very friable, and there is no defining capsule.

A portion removed by scissors from the surface shows the tissue to be very vascular, numerous capillary vessels forming a reticulated network. At the surface the vessels show what looks like papillary projections. Between the vessels, and to some extent clothing them, are large quantities of cells which are of considerable size, and contain large oval nuclei.

A portion of the tumour was hardened in absolute alcohol imbedded in celloidin, and sections made with the microtome. The sections stained readily with logwood, alum carmine, Bismarck brown, etc.

The tissue contains numerous vessels, and each vessel is surrounded by a mantle of translucent tissue sparsely provided with cells. This tissue in specimens mounted in Canada balsam is homogeneous and structureless in appearance, but in glycerine it is seen to have a finely fibrillated character. The thickness of this mantle varies considerably, in some places equalling the diameter of the vessel, in other places much less.

The tissue generally consists of cells mostly oval or spindle-shaped. Between the cells there is the merest trace of intercellular substance consisting of reticulated fibres. The papilliform appearance noted in the fresh state is not borne out in hardened specimens; and it was due, doubtless, to the fact that at the torn edge of the tissue, the vessels with their mantle presented themselves individually.

From the character of the tumour, it may be regarded as a spindle-celled sarcoma, but taking into consideration the mantle around the vessels, it belongs to the group Plexiform Sarcoma.