

REPORT OF PATHOLOGIST

Gross Appearance of Specimen.—A right hand from an adult; amputated 6 or 7 cm. above the carpus. There is a linear trophic ulcer on the palmar surface of the distal phalanx of the little finger, 1.2 by 0.2 cm. The hand is in a rigid posture, which cannot be overcome by any reasonable force, with all the fingers flexed at all joints, but most at the metacarpophalangeal joint.

Dissection.—The radial and ulnar nerves cannot be found. The radial artery is found without difficulty. It appears to be slightly smaller than normal, but the walls are not thickened. The tendons and synovia at the wrist are apparently normal. They can be moved freely over the joint by alternate traction above and below the joint. Obstruction to motion does not lie in either the superficial or the deep tendons crossing the wrist. When the palmar fascia is divided the contracture persists. All the superficial muscles of the hand are apparently markedly degenerated. The color is pale, translucent, brownish-yellow, the consistency soft, pasty. Dissection of these muscles is begun at the little finger. A piece of muscle tissue is removed from the hypothenar eminence and ulnar edge of the hand for examination. In this muscle fibers cannot be distinguished with the naked eye. The long flexor tendons of the little finger are then liberated in their entire length, but without releasing the contracture. Disarticulation of the finger at the carpometacarpal joint equally fails to release the contracture. Further dissection of the soft parts on the anterior surface of the fingers uncovers tissue which is redder and firmer than the other muscles. A portion removed for examination appears to consist of muscle tissue mixed with dense, resistant fibrous tissue. Division of this tissue partly, but not completely, releases the contracture. Division of all the soft tissues on the anterior surface of the finger, down to the bone, results in complete relaxation. The red tissue is probably not muscle, no muscle being normally found at this point.

Division of the long tendons and palmar fascia of the ring finger also fails to release the contracture. The knife is then inserted under the skin on the anterior aspect of the proximal phalanx and the soft tissue divided to the bone. The contracture then freely relaxes.

The superficial muscles of the thenar eminence form a pale, pulpy, translucent mass about the size of a lead-pencil, but smaller at the center than near the bony attachments. There is hardly a trace of color. A portion is removed for examination. Division of this muscle does not affect the posture of the thumb. Beneath is found, as in the little finger, a small mass of redder firmer tissue, the flexor brevis pollicis, tense and apparently firmly contracted. When this is divided the contracture relaxes. Finally, the knife blade, turned on the flat, is inserted close to the bone on the anterior aspect of the proximal phalanx of the middle finger. The soft tissues are then slit away from the bone. The contracture relaxes easily and completely.

Microscopic Examination.—The vessels are everywhere normal. No nerves are found at the wrist or elsewhere which can be clearly recognized as such. In a number of sections (stained with hematoxylin and eosin) are found bundles of connective tissue surrounded by a sheath, suggesting a nerve in cross-section, but no axis cylinders or myelin can be made out. The red tissue from the deep tissue of the thumb and little finger consists of dense fibrous connective tissue, with fully developed collagen fibrils and considerable fat, but the vessels are still rather large and thin walled. The muscle removed from various areas, as already indicated, shows a varying amount of connective-tissue increase. In certain areas the connective tissue is fully developed, with few vessels, in every respect identical with fully developed scar tissue. In other areas the process of connective tissue proliferation is still in active progress. In these areas the nuclei are of fibroblast type, lying in a delicate stroma devoid of collagen, and with abundant large thin-walled capillaries which branch and anastomose in every direction, and frequently show "vessel tents." In certain areas the connective tissue seems to be made up almost exclusively of these capillaries. The muscle fibers themselves are everywhere degenerated, but most markedly so where the

connective-tissue increase is most marked. The fibers are shrunken, usually present a wavy outline, and for the most part are devoid of cross-striations. Longitudinal striation, when present at all, seems to be exaggerated. The fibers are frequently broken up into rather coarse granules. In the areas where the connective tissue is least advanced, the muscle fibers are similarly more normal in structure, the cross-striation being at times intact, or at times extending across the fiber, but with a break in the line, recalling a geologic "fault." This appearance is particularly striking in sections stained with Mallory's phosphotungstic acid hematoxylin. When the striæ disappear they do so first at the periphery of the fiber. The tissues from the ulnar side of the hand show in general a more advanced degeneration of the muscle fibers, which are here scanty and separated by broad areas of connective tissue. Even here, however, a very few cells show traces of cross-striation. Their outline is wavy, and the fibrils run in a variety of directions, sometimes even crossing one another at right angles.

Dr. Whitman further says:

From the histologic study of this amputated limb it would seem probable that in this particular instance the changes were due to the combined effect of the anemia on the muscles and nerves. Whether this is so in the average case of the so-called Volkmann's ischemic paralysis and contracture can only be determined by the study of a considerable number of cases.

I do not know whether it is my unenviable fortune to be the only one who has amputated for this condition. I do not seem to find record of other amputations, although surgeons who have contributed to the literature of this subject say that in given instances amputation may become necessary. Of this I do feel certain: that in this particular case I know of no way in which the condition of the patient could have been improved. I believe that the original injury irreparably damaged the muscles, and, perhaps, the nerves. I may be mistaken in this, but on careful review of the course of this patient for nearly seven years this is my belief. I am conversant with the orthopedic, non-operative measures which have been thoughtfully and carefully set forth by Robert Jones, Reginald Sayre and others. In general I believe that such orthopedic management is the best which we at this time possess, but I venture the thought that this would have been without avail in the particular instance which forms the subject of this communication.

Fourteenth and Stout Streets.

MENINGEAL CARCINOMATOSIS

W. F. BEERMAN, M.D.
SAN FRANCISCO

During the lifetime of the patient the presence of carcinoma was not suspected, either in the meninges or in other organs, and after death the unaided eye could not discern it. It was revealed only by microscopic examination.

REPORT OF CASE

History.—Mrs. G., aged 62, widow, had been ailing on and off for several years with gout. For ten years she suffered with flatulency, but had never been seriously ill. Six weeks previous to Dr. W. W. Kerr's first visit, the patient began to suffer from headaches; these were at first slight, then gradually increased in severity and constancy until on October 31 her sufferings became so intense that she was unable to leave her bed. For seven or ten days previous to taking to bed, she complained of intense pain in both lumbar regions, which was greatly relieved by the use of a hot iron. The headaches during these six weeks were described as general and were unassociated with vomiting or disturbances of vision. At no time during her illness had she any stiffness of the muscles of

the neck or back. Oct. 31, 1910, when she was first seen by Dr. W. W. Kerr, she had several paroxysms of severe pain on the upper left side of the head; the pain was felt in the scalp. The mere brushing of her hair was sufficient to provoke a paroxysm of severe pain. This peculiarity of her headaches—their superficial location—remained constant. The pain was so severe that morphin was often given with but slight, if any, relief. November 14 it was first noted that the patient could not walk straight, and that her headaches were most severe behind the right eye and in the left occipital region. Her daughter now noted that the patient's mind was confused. November 17 she complained of severe pain in the lower-spine after sneezing. The patient became irrational and her speech incoherent. At times she did not recognize her daughters. November 21 she began to have hallucinations of sight; she saw cats and babies in her bed and about her.

Examination.—November 21 by Dr. Leo Newmark. The patient was well developed. She answered all questions promptly and correctly. The symptoms of mental aberration as described by her daughter were never noted at this or at the several other examinations. On the contrary, the patient took quite an interest in the various tests made. The whole scalp was tender, but the right parietal region was most sensitive to pressure. The pupils, disks, reflexes, visual fields,

became actively delirious, continually trying to get out of bed. With this was associated muscular twitchings of the right shoulder, while with the right hand she constantly beat the bed-clothes. December 6 the patient passed into a semicomatose state from which she could be aroused. This state alternated with active delirium until December 9, when she sank into a deep coma. The temperature, which had been normal during the whole course of her illness, now rose to 100 and 102 F. Death occurred on December 12.

Post-Mortem Examination.—Dr. M. B. Lennon found on removing the brain that the left hemisphere was larger than the right. Otherwise the brain and its membranes appeared normal. The arteries were not thickened. The several transverse and longitudinal incisions made revealed no abnormalities of the cerebral substance. Everywhere the gray and white matter appeared normal. After the brain had been hardened in formaldehyd solution it was seen that the pia mater was slightly thickened and opaque. A piece of the left frontal lobe was first examined, and it became at once evident that we were dealing with a malignant process involving the pia-arachnoid. These membranes were everywhere thickened and infiltrated with numerous large round, irregular and oval cells. The nuclei stained darkly; in isolated instances they

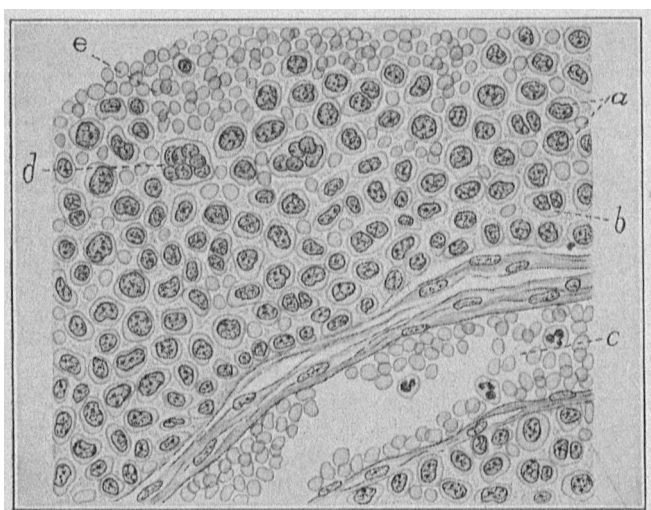


Fig. 1.—Here and there in the preparations a diffuse arrangement of the neoplastic cells is found with no tendency to assume the gland-like structures which are so common in most of the areas invaded by the new growth. Where this condition exists most of the cells have a pale protoplasmic element with single, large, round or oval nuclei rich in chromatin. Such cells are shown in the illustration at *a*. Aside from these numerous cells are found in various stages of mitosis—one variety with double nuclei is seen at *b*, while another containing several nuclei is shown at *d*. A blood-vessel is indicated at *c* and a diffuse hemorrhage at *e*.

stereognostic sense and every other function of the nervous system were carefully, minutely and frequently tested, and at no time was any abnormal condition detected. There was no suggestion of aphasia of any kind, nor was there at any time any evidence of a meningeal affection. Percussion of the skull over the right parietal region elicited a tympanitic note. Examination of the chest and abdomen was negative. The breasts were normal. The urine was normal. The Wassermann reaction in the blood-serum was negative. From this date on the hallucinations of sight became more frequent, and at one time the patient forced her son to crawl under the bed and dispose of a group of monkeys.

Course.—The patient was sleepless, with the exception of some sleep obtained by chloral, bromids, etc. She was in a constant state of restlessness. December 4 her daughter on approaching her from the left side with a feeding-cup would be pushed away, as patient remarked that she could feed herself. If, however, she approached the patient from the right, her approach was not recognized. Tests with the finger, however, failed to elicit hemianopsia or hemianublyopia. The severe headaches continued up to this date. December 5 the patient



Fig. 2.—The typical glandular arrangement of the neoplastic cells is shown in this illustration at *b* and their position corresponds to the perivascular lymph-spaces of the blood-vessel *a*.

were pale and vesicular. Most of the cells were rich in protoplasm. Their distribution was perivascular. These abnormal cells dipped down into the pia of the sulci, and here they were in many places arranged in long rows. Large cells were occasionally seen with several nuclei—three to five or more. Diffuse hemorrhages were seen throughout the membranes. The cells infiltrating the pia-arachnoid covering the frontal and parietal lobes, the cerebellum, pons and the pia from the neighborhood of the great transverse fissure were gathered together in a diffuse manner, and in these areas mitotic figures were most commonly seen. In the pia covering the occipital and temporal lobes, and the upper and lower medulla, the cells were arranged in gland-like structures. Here the cells were placed in a single layer and were of the low columnar variety. Again, proliferation occurred and the cells occupied much of the cavity. Nowhere was there any evidence of an infiltration of the cerebral substance. Some sections from the anterior horns of the lateral ventricles were examined and the ependyma was found normal. The sections were submitted to Dr. Ophüls for examination, who reported "carcinomatosis of the pia-arachnoid."

The various factors which render this case important and possibly unique, are as follows:

1. The absence of opisthotonos, Kernig's sign and other signs and symptoms commonly associated with

meningitis. Lumbar puncture was not performed. It is possible that cells such as were found in the pia-arachnoid might have been observed during life in the cerebrospinal fluid.

2. Despite an illness of three months or over, there had not been any loss of weight. Emaciation is quite constant in this condition.

We had so little suspicion that we were dealing with a cancerous affection that no investigation for the purpose of finding a primary growth was made during life, and the same state of ignorance made us omit the search even after death. And furthermore, the brain itself after its removal seemed to promise so little result that its microscopic examination was deferred for several months.

3. The degree of involvement of the pia-arachnoid, which was everywhere infiltrated with cancer cells, so

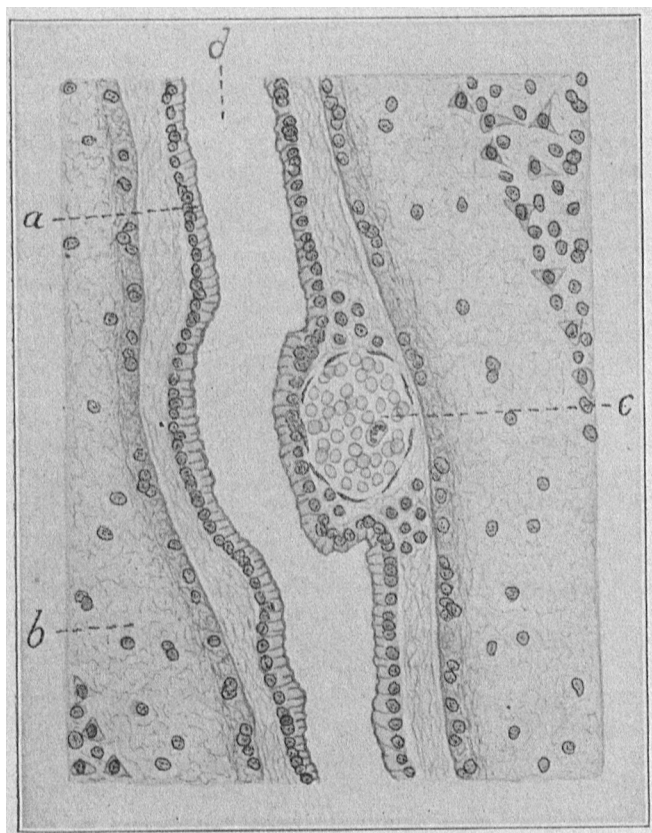


Fig. 3.—This illustration serves to point out the fact that the neoplasm confined itself to an intimate relation with the pia-arachnoid of the brain and did not in any place invade the parenchyma of that viscus. *a*, neoplastic cells; *b*, cerebral tissue; *c*, blood-vessel; *d*, sulcus.

that it may be said that the entire brain was ensheathed in cancer.

4. The marked gland-like arrangement of the cells. In but few of the cases reported was this formation present.

Diffuse microscopic meningeal carcinomatosis of this kind is rare. I have been able to find in the literature records of only eleven cases similar to the one here reported. Of these eleven cases, nine were secondary to cancer of the stomach, two to cancer of the lung.

The clinical diagnosis of this condition is most difficult. When meningeal symptoms occur in cases in which the presence of the primary growth is known, our suspicions would readily be aroused; but the diagnosis is often impossible because the primary lesion is not

detected. If cancer cells be found in the spinal fluid, the diagnosis would be certain. In three cases reported, in which, however, definite signs of a meningitis were present, a clinical diagnosis was made by finding in the spinal fluid large round cells which resembled those found later on microscopic examination of the pia. In the cases of Eberth, Lilienfeld and Benda and Nonne, hysteria was diagnosed, and not until within a few days of the death of the patients, when signs of a focal lesion appeared, was an organic lesion assumed. Marchand and Saenger have reported cases in which a clinical diagnosis of brain tumor had been made. Symptoms of cerebral derangement are common in cancer. Oppenheim first drew attention to various symptoms of cerebral derangement in patients suffering from cancer of various organs, in which, macroscopically, no disease of the brain was observed. These symptoms he regarded as toxic. Some authors dispute as to whether the rather bizarre nervous symptoms which may occur in the course of carcinoma are of toxic origin. Saenger and Spiller believe that definite organic changes cause the so-called toxic symptoms, while others believe that gastric intoxications are the cause. The literature contains the histories of numerous cases in which a metastatic growth seemed the probable diagnosis, but at autopsy no macroscopic lesion was present.

The symptoms of carcinomatous meningitis may be as protean as the symptoms found in hysteria and syphilis. It is well known that in cancers, variously situated, cerebral symptoms, focal or general, are often present without macroscopic changes to account for them; but it may be possible that microscopic lesions may have been the cause of the hemiplegias, with or without aphasia, aphasia alone, convulsions, either general or jacksonian, cranial nerve palsies, bulbar phenomena, apathy, delirium, coma, psychoses, etc., which have been observed.

My case shows that a marked hallucinatory and agitative state in an apparently well-nourished patient with excruciating headaches and marked tenderness of the scalp, with no suspicion of malignancy, may be due to an almost generalized, microscopic cancerous involvement of the pia-arachnoid.

It should be emphasized that in the majority of instances of the so-called toxic symptoms of cancer, where macroscopically no demonstrable lesions are present, careful and extensive histologic studies of the brain and its membranes will in nearly all cases show structural changes marked enough to account for all symptoms.

I wish to thank Dr. W. W. Kerr and Dr. Leo Newmark for permitting me to report this case.

800 Butler Building.

Ophthalmia Neonatorum.—Laws for the prevention of the blindness of new-born infants are making progress slowly. Many of the states have recognized the need of measures to prevent the disease. Some states have issued instructions regarding the proper methods of prophylaxis and some also furnish packets containing preparations of silver salts for use in the eyes of the new-born. The records for institutions for the blind show that from 23 to 35 per cent. of the inmates have become blind as a result of ophthalmia neonatorum. Among the states in which the disease is notifiable are Connecticut, Massachusetts, Minnesota, Nebraska, New York, Oregon, South Carolina, Utah, Vermont and Wisconsin. In some states a nurse, midwife or parent is required to report the disease. In most cases, at least, the disease can be prevented and where it exists proper treatment will, in many instances, prevent loss of vision.—*Pub. Health Rep.*