perimental work, but it is not for him to carry out the actual work itself.

In the larger sense, however, the surgeon is engaged in the work of original research. In the clinical manifestations of disease he alone sees the connection between cause and effect. Suggestions as to treatment, symptomatology, prognosis and operative methods occur to him in the course of his daily work; and practical advance in the treatment of disease comes mainly from the results of his observations at the bedside and at the operating table.

How may it best be brought about that surgery shall be in the hands of those only who are by education and experience best equipped to practice it?

Is it better to limit surgery to those who are given courses of instruction and degrees designed especially for the education of the surgeon, or would it be preferable so to educate public opinion that only those could be called on to practice surgery who were known to be well fitted for it?

The trouble with the latter question is that the public is easily deceived in medical matters. Nevertheless there is, I think, a strong public opinion in favor of the practitioners who are known to be surgeons of skill and experience. It is on this power of discrimination between the evil results and the good, and on the dependence of these results on skill, that we must chiefly rely in creating a sound public and professional opinion in favor of special experience and skill in the advising and in the performance of surgical operations, and in the practice of surgery in general.

Original Articles

A CASE OF SYSTEMIC BLASTOMYCOSIS, WITH BLASTOMYCETES IN THE SPUTUM.

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AND

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Through the efforts of Drs. James Nevins Hyde and Frank Hugh Montgomery and other observers, cutaneous blastomycosis is now generally recognized as an entity. The number of reported cases of systemic blastomycosis being few, it seems justifiable to report more or less fully new cases as they occur, so that by a study of the entire group it will be possible definitely to place the disorder in its proper position in medicine. There are now on record four cases of systemic blastomycosis, in which the causative organism appears identical. These were recorded by Busse and Buschke,¹ Montgomery and Walker,² Ormsby and Miller³ and Cleary.⁴ Three of the cases were in Chicago, and two of these occurred in the practice of Drs. Hyde and Montgomery. Another case which closely conforms, and which by some observers is classed here, was that reported by Ophüls and Moffitt⁵ of Cali-

fornia. In these various cases, similar symptoms were presented before death and similar findings were made postmortem, yet marked differences also occurred. In the various cases, the larynx, trachea, lungs, pleura, myocardium, liver, spleen, pancreas, kidneys, adrenals, mesentery, lymph glands, bones, joints, subcutaneous and cutaneous tissues were the seat of the lesions, the organism being found in all these localities. The microscopic findings in all of these cases were similar, differing chiefly in extent of distribution or destruction. The process often resembled pyemia, multiple abscesses occurring in various organs and tissues of the body. In one case (that of Ormsby and Miller), the usual picture presented in the skin by the chronic, purely cutaneous cases was almost entirely absent, only one lesion possessing this resemblance. In another (that of Cleary), no cutaneous lesions were present. These cases resemble tuberculosis, both clinically and pathologically. This is evident from the findings in the past. The miliary tubercles found in the lungs, liver and elsewhere have a close resemblance to the miliary tubercles of tuberculosis in the same situations; and the chief responsibility of those recording cases in the future will be to eliminate the presence of tuberculosis.

We are indebted to Dr. M. L. Blatt for aid in procuring material for histologic study, and to Dr. H. L. Wolf, house surgeon at Cook County Hospital, for assistance in the work in this case.

Patient.—Polish laborer, aged 33, married and has two healthy children.

History.—His illness began in February, 1904. He was admitted to Cook County Hospital in February, 1905, and assigned to the service of Dr. Eisen drath. He speaks no English, so a satisfactory history through an interpreter was hard to obtain. It is probable that he has had the usual diseases of childhood. He denies venereal infection; he has been a moderate smoker of cigarettes, and drinks occasionally. His surroundings at home were most insanitary.

Present Illness.—The present disease began in February, 1904. He has given two versions of the beginning. The following was the last and seems most reliable: He states that the first noticeable departure from his usual good health consisted in a feeling of discomfort involving the chest on the right side, extending through from front to back. This lasted for a time, and, in fact, is still present, being better and worse at intervals. In June, four months from the beginning, his first cutaneous lesion appeared. This was located below the left ankle and extended down to the heel, and eventually became a little larger than a dollar. Shortly afterward the other lesions appeared, but it is impossible to tell their exact mode of development. In addition to this area on the left leg, the right leg had several large lesions, also the right and left forearm, and the face, chin and neck, especially on the right side (Fig. 1). About November, 1904, he suffered great muscular weakness, and marked swelling of the feet and ankles occurred. This gradually increased until he was wholly unable to work. He stopped work in December. He stated that with the onset of the original pain he employed a physician for two months and was benefited by the treatment. Something was applied to the skin by the physician which made the skin sore, but this soon healed, and was entirely different from the cutaneous lesions present on his admission to the hospital.

Examination.—On his admission to the hospital in February, 1905, he presented lesions on all the above-mentioned areas, and was very much emaciated, pale, anemic, exceedingly weak and had some elevation of temperature. Marked edema was present in the ankles, feet, face and arms. His nails were clubbed, and moderate inguinal adenopathy was noted.

Cutaneous Lesions: There was present on the left leg, below the ankle, a lesion about the size of a silver dollar. One on the right leg (Fig. 2.), on the lower third, occupying the outer and posterior surface, measured about four by two and one-

1. Busse-Buschke: Virchow's Arch., 1895, vol. cxl, p. 23; Verhandl. der Deutschen Dermatologischen Gesellschaft; Sechster Congress, 1899, p. 181.

2. Walker, James W., Montgomery, Frank Hugh: "Further Report of a Previously Recorded Case of Blastomycosis of the Skin; Systemic Infection with Blastomyces; Death; Autopsy." THE JOURNAL A. M. A., April 5, 1902.

3. Ormsby, Oliver S., Miller, H. M.: "Report of a Case of Systemic Blastomycosis, with Multiple Cutaneous and Subcutaneous Lesions." Jour. of Cut. Dis., March, 1903.

4. Cleary, J. H.: "A Case of Generalized Blastomycosis." Trans. Chicago Patho. Soc., vol. vi, No. 5, May 9, 1904, and Medicine, November, 1904.

5. Ophüls, W., Moffitt, H. C.: "A New Pathologic Mould." Philadelphia Med. Jour., 1900, v. 1471. Proc. of the Chicago Med. Soc., Illinois Med. Jour., vol. vii, May, 1905, p. 454.

half inches. This was oval in shape, and was joined below by a similar lesion, of about the same size, situated over the external malleolus. Two or three similar but smaller lesions were in the neighborhood. All these lesions were quite superficial, the larger part of each being an ulcer, crust covered in places, open in others. There was little induration, but considerable sanguinopurulent discharge. The edge of the ulcer was slightly elevated and presented a bluish-red halo, in which there were located a few miliary abscesses. In some parts of the area a papillomatous condition was present. The lesion on the arm was a subcutaneous nodule, which later softened and was incised, and from the sinus left after this procedure, and from both the lesions on the legs, the organism of blastomycosis was demonstrated by us in pus before the Chicago Medical Society,⁶ March 8, 1905. There was also present a large swelling on the left forearm, which apparently involved the whole circumference. It began about two and one-half inches below the elbow joint and extended down the forearm about four inches. It involved both sides of the forearm, and suggested the possibility of bone involvement. In a skiagraph of this lesion the bone appeared normal. This swelling was later incised and the same characteristic discharge released. Material from this swelling was inoculated into two guinea-pigs on April 26. There is still involvement in this area. The lesions on the face (Fig. 1), on account of the different anatomic site, presented a slightly different picture. Here they protruded more extensively above the level of the skin and were papillomatous; some were even verrucous. There was much discharge and marked crusting. The part chiefly involved was the right side of the face, the right side of the neck and the lower lip, extending to the vermillion border.

Bacteriologic Examination.—On March 22 pus was removed from a subcutaneous unruptured abscess situated on the left forearm and inoculated on various media and later in animals. Pure cultures of blastomycetes grew on all the tubes. This pus was stained for tubercle bacilli with negative results. Blood cultures have been negative, as has also examination of the urine relative to blastomycetes. Albumin and casts were present in the urine, however. On March 22 tuberculin was given with negative results. No tubercle bacilli have been demonstrated in sections or pus.

Course of the Disease.—Although the patient constantly denied having a cough or expectoration of any moment, and although his attendants at the hospital had not noticed these symptoms, on April 26 we were able to collect a large amount of blood-stained, mucopurulent sputum, in which the organism was plentifully found, as is well shown in Figure 3. On May 1 the following physical findings were recorded by the house physician, Dr. Morrell:

"Liver and spleen not palpable. Abdomen tympanitic. Lungs: Right apex and upper lobe on right side dull posteriorly. Bronchophony and bronchial breathing present. Lung expansion practically absent. A few râles present in the right lower lobe near the axillary line. The left lung hyper-resonant except at apex."

During his four months' sojourn at the hospital, his temperature ranged from 98.6 to 102.8; his pulse from 88 to 116; his respiration from 20 to 28. The latter half of the time the temperature was considerably lower. As a rule, there was an exacerbation each evening. Under large doses of potassium iodid internally, with radiotherapy, antiseptic dressings and surgical interference locally, marked improvement occurred.

On July 7, when the patient left the hospital, he was much improved in every way. The cutaneous lesions were nearly all healed, he had gained in weight, and had but little fever. On leaving the hospital he passed from our observation for a few weeks. He had stopped the treatment, and when seen by us at his home, five weeks later, he had suffered a relapse. He was suffering with marked pain in the right chest, several cutaneous lesions were active again, and the

sinuses leading from the deep lesions on the forearm had reopened.⁷

HISTOPATHOLOGY OF A CUTANEOUS LESION.

As this case presented the histologic picture common to this disease, a detailed description is not given here. Outside of the chief area of involvement there is vascular dilatation and perivascular cellular infiltration, scattered irregularly through the entire depth of the corium. Over this region the epidermis is unaltered, except for slight hyperpigmentation here and there. There is also slight edema of the collagen. Approaching the diseased area, the cellular infiltration increases until in the center there is a large, fairly well-defined area of intense infiltration. The epidermis over this region shows marked hypertrophy, which is very characteristic of this disorder. With low power (Fig. 4) one is struck with the marked resemblance this picture presents to lupus vulgaris—the marked epidermal hypertrophy; the intense cellular infiltration, containing groups of giant cells; the comparative absence of collagen and elastin, etc. Scattered all throughout, however, is the double-contoured organism of blastomycosis, occurring chiefly in budding forms, and practically every giant cell contains two or more of these organisms (Fig. 5). In addition to giant cells, there are some polynuclear cells, very many polymorphonuclear leucocytes, some mononuclear leucocytes, some plasma cells, and many connective tissue cells. No tubercle bacilli have been found.

CULTURES AND ANIMAL EXPERIMENTS.

The first cultures taken at Cook County Hospital on March 8 were made from open ulcers and a sinus on the forearm, and although the organism was fairly abundant in smears made from this pus, it failed to grow on the media. On March 22 pus was removed from a subcutaneous abscess on the left forearm, which was inoculated on various media. On March 28, six days after this inoculation, growth was plainly visible, and after this time the cultures grew rapidly. These proved to be pure cultures of blastomycetes. The organism both in the tissues and pus and on media differed in no essential particular from those described by Montgomery⁸ in his report of three years ago, so only a brief description is given here. In the pus they occurred as circular and budding forms, having a double contour and the usual refractile capsule. On media the growth varied. It presented a moist, pasty surface on glycerin-agar (Fig. 6), with at times a wormy appearance, or else presenting large folds and depressions. Microscopically, these cultures showed many oval and circular organisms, some budding ones and much mycelial formation, the latter being both coarse and fine and containing sporules (Figs. 7 and 8). Lateral conidia occurred. On glucose-agar (Fig. 9*) the growth was more dry, white, and presented aerial hyphæ; and microscopically, there were fewer circular and budding organisms and more fine mycelia. On both glucose and glycerin agar the media were penetrated to a considerable depth in a semicircular manner.

On blood serum the growth was also moist and pasty.

7. Sept. 15, 1905. The patient re-entered the hospital a few days ago with symptoms of a dorsal spondylitis which is undoubtedly another manifestation of the blastomycotic infection.

8. Hyde, James Nevins, Montgomery, Frank Hugh: "Cutaneous Blastomycosis: A Summary of the Observations of James Nevins Hyde, A.M., M.D., and Frank Hugh Montgomery, M.D." Rush Medical College, Chicago. THE JOURNAL A. M. A., June 7, 1902.

EDITOR'S NOTE.—By error on the plate of illustrations, Figure 9 is called a microphotograph instead of a photograph.

6. Chicago Med. Soc., Illinois Med. Jour., vol. viii, May, 1905, p. 454.

Fig. 1.—Cutaneous lesions on lower lip, chin and neck.

Fig. 2.—Cutaneous lesions on leg and ankle.

Fig. 4.—Microphotograph. Cutaneous section showing marked epidermal hypertrophy and giant-cells (low power).

Fig. 3.—Microphotograph. Smear from sputum mounted in 1 per cent. potassium hydrate solution, showing circular and budding organism ($\times 1200$).

Fig. 5.—Microphotograph. Higher magnification of Fig. 4, showing the organism in a giant-cell ($\times 600$).

Fig. 6.—Photograph. Growth of organism on glycerin-agar, five weeks old, obtained from pus from an unruptured subcutaneous abscess on forearm.

Fig. 7.—Microphotograph. Smear from growth on media five weeks old in 1 per cent. potassium hydrate solution (low power).

Fig. 8.—Microphotograph. Higher magnification of Fig. 7 ($\times 1200$).

Fig. 9.—Microphotograph. Same as Fig. 6, except growth here is on glucose-agar.

Fig. 10.—Subculture of organism on glycerin-agar, originally from sputum.

and presented a greater proportion of the circular and oval organisms. The cultures taken from the cutaneous lesions, the subcutaneous abscesses and the sputum (Fig. 10) all appeared similar. Subcultures had to be made to obtain pure cultures from the sputum. On April 26, two guinea-pigs were inoculated subcutaneously with an emulsion of pus and granulation tissue, removed from the forearm by incision into an unruptured, deep-seated abscess. Both these animals developed a local lesion of blastomycetic infection at the point of inoculation and surrounding it for half an inch in each direction. These lesions remained for a few weeks, then healed, leaving only a slight atrophic area. On August 12, one of these animals was chloroformed and a thorough postmortem examination made. The subcutaneous fat was intact, the glandular system negative and all the internal organs healthy. There was some local change where the inoculation was made, but no disease or organisms were present. As the other animal inoculated at the same time was healthy and fat, and as more than three months had elapsed since the inoculation, this work in these two animals was negative as to tuberculosis. On May 14, three guinea-pigs were inoculated, one with 15 mm. of the hemorrhagic mucopurulent sputum. This animal was accidentally killed three weeks later by a rat. The postmortem was made by Dr. Adolph Gehrman, who reported negative findings. Had tubercle bacilli been present in the sputum, some evidence of their development would have been evident in the three weeks. A second animal was inoculated subcutaneously with pus previously removed from a subcutaneous abscess in the left forearm. This animal, after three months, is perfectly healthy and is being kept. The third animal received 15 mm. of an emulsion of sterile water and a pure culture of the blastomycetes obtained March 22 from an unruptured abscess on the forearm. This animal was posted August 14, and apparently had overcome the attack, as it was perfectly healthy and no organisms were found in any of the tissues or organs. With negative results from four susceptible animals, such as guinea-pigs inoculated with such likely material as mucopurulent sputum, pus and granulation tissue from an abscess wall, it is probable that no tubercle bacilli were present in this case. The negative findings with the inoculation of the pure culture of the blastomycetic organism is not especially significant, as the guinea-pig is not very susceptible to general infection with this organism, though general infection has occurred several times.

A BRIEF REVIEW OF OTHER RECORDED CASES.

In the first case, that of Busse and Buschke,¹ cutaneous, subcutaneous, visceral and bone lesions were present. Early there formed an abscess on the tibia, from which situation the disease spread to the knee joint. There is uncertainty as to which appeared first, the tibial abscess or the cutaneous lesions. The patient succumbed in from thirteen to eighteen months from the beginning of the disease, having as general symptoms marasmus, irregular pulse and temperature. The organism, which was found abundantly in the pus and tissues, was round or oval and developed by budding. In the second case, that of Walker and Montgomery,² cutaneous blastomycosis of several years' duration was followed by systemic involvement. This patient was operated on, curettage and cauterization being employed. Nine days after the operation there occurred elevation of temperature, increased pulse rate and rapid respiration; the appetite failed, emaciation occurred, with dyspnea, the patient dying in forty-three days.

It is interesting to note that this case was under Dr. Montgomery's observation several years before cutaneous blastomycosis was recognized, and was classed by him as an unusual tuberculosis. At the postmortem, Dr. Walker considered the patient had died of acute miliary tuberculosis. Later, both gentlemen, having their attention called to the subject of blastomycosis, recalled this case and investigated their old slides, and independently recognized it as an example of cutaneous and visceral blastomycosis. The organism as seen in the sections was circular or oval and developed by budding. In the third case, that of Ormsby and Miller,³ the patient's history was suggestive of tuberculosis. It was briefly thus: The patient caught cold, which settled in his chest. He coughed and had some blood-streaked expectoration and became very weak. Two months later the first cutaneous lesion appeared. For a time, improvement in his general condition occurred, then he became pale, emaciated, anemic, had loss of appetite, coated tongue and a foul breath. The urine was negative. The temperature was elevated, pulse rapid and respiration increased. Large numbers of subcutaneous nodules and abscesses and cutaneous ulcers occurred. Physical examination of the lung showed bronchial breathing and other evidences of involvement. Laryngitis was present. This latter proved to be due to ulceration induced by the organism of blastomycosis. Repeated examinations of the sputum were negative as to tubercle bacilli. Tuberculin reaction repeated was negative. In this case, special effort was devoted to excluding tuberculosis. Thorough examination of smears made from pus from the various organs and tissues of the body all failed to reveal tubercle bacilli. Animal inoculation and culture experiments were all negative as to tuberculosis. In all situations large numbers of blastomycetes were always demonstrated. Cultures were readily obtained and animal experiments were successful with the blastomycetes. Drs. Otis and Evans⁴ did thorough pathologic and bacteriologic work on this case, and later reported in detail the biology of the organism. From their findings they ruled out tuberculosis. It is a point of scientific interest to note that one of the operators at the autopsy in this case was inoculated with and shortly afterward developed blastomycosis. This organism was found always in the budding form in the tissue and pus, but on media mycelia formed. In the fourth case, that of Cleary,⁴ it is interesting to note that special symptoms masked the general infection, so that the diagnosis of blastomycosis was made postmortem. The patient's general symptoms were a cold, cough, mucopurulent expectoration, loss of weight, anorexia, hoarseness and edema of the feet and legs. The urine contained albumin and granular and hyalin casts. The temperature was always subnormal and there were no cutaneous lesions. No tubercle bacilli were found in the sputum. At the autopsy, the usual budding organism was found in the lungs, kidneys, liver, spleen, adrenals and myocardium.

This group of cases resembles closely those cases reported in California and elsewhere under the title of protozoic dermatitis, both clinically and pathologically, one of the main differences being the fact that in the protozoic cases the organism does not reproduce by budding in pus and tissues, but develops by endogenous spore formation. In the case of Ophüls and Moffitt⁵ which is

9. Otis, F. J., Evans, Newton: "The Morphology and Biology of the Parasite from a Case of Systemic Blastomycosis." *THE JOURNAL A. M. A.*, vol. xii, No. 18, p. 1075.

classed by some as blastomycosis and by others as protozoic disease, the organism closely resembles in culture the blastomycetes, but in the tissue these develop only by spore formation and not by budding. The clinical and pathologic findings in this case are very similar to the blastomycosis cases.

INFECTION ATRIUM.

In two of the foregoing cases, the lungs seemed to have been the first point infected. In one other the skin was first attacked, general infection following. In the other the question is open as to which was first, the skin lesion or the tibial abscess. In our present case the lungs were apparently attacked first.

REVIEW OF PRESENT CASE.

First. This patient is suffering with a constitutional disease, as evidenced by the clinical symptoms, which show involvement of the lungs, kidneys, skin and subcutaneous tissues.

Second. It seems probable that the lungs were the first point of attack, and they are still markedly involved.

Third. Although tuberculosis in this case is simulated, no tubercle bacilli could be demonstrated, microscopically, culturally or experimentally, and tuberculin reaction proved negative.

Fourth. The organism of blastomycosis has been demonstrated abundantly in cutaneous lesions, subcutaneous unruptured abscesses (in pure culture), and in the sputum.

Fifth. Although the disease responded to, and greatly improved under, potassium iodid, the patient is far from well and future developments will be noted.

Sixth. With the organism from this patient, we have produced only local lesions of blastomycosis, our efforts being directed chiefly to the elimination of a possible tubercle bacillus infection.

PENETRATING WOUNDS OF THE ABDOMEN.*

RANDOLPH WINSLOW, M.D.

BALTIMORE.

Penetrating wounds of the abdomen occur with considerable frequency in civil as well as in military practice, and until recently have been the most uniformly fatal of all injuries. As much of our knowledge of this class of injuries has been derived from the experience of the civil war, in preantiseptic times, so we may expect to revise or to confirm our views on this subject by the experience of the surgeons now engaged with the armies in the far East, when they shall have the opportunity to collate their experiences. My experience in these cases is confined entirely to those injuries occurring in civil life, in which the wounds have been inflicted by pistol or rifle balls or with knives and scissors. The larger number of these injuries are inflicted by bullets, while a large minority are due to stabs. As a rule, the traumatism resulting from gunshot wounds are much greater than those dependent on cutting, and the mortality is higher. This is due to the fact that an incised wound heals more readily than a contused wound, and that the injuries are more localized when caused by a stab than when caused by bullets.

SYMPTOMS.

The symptoms of a penetrating wound are by no means always well defined, and there may be serious and even fatal lesions of the solid or hollow viscera,

with very slight external manifestations. The most obvious symptom is the location of the wound of entrance; when this is on the anterior abdominal wall, it is fair to presume that the peritoneal cavity has been entered, and the track of the missile or stab should be explored in such cases. The exploration should not be the old haphazard method of probing with an unclean finger or probe, but the abdomen should be thoroughly cleansed and the track incised carefully, and if it is found to lead into the peritoneal cavity laparotomy should be done at once and injuries of the viscera and vessels sought for. This procedure should not be undertaken until the patient has been conveyed to the place at which he is to remain, which should be a well-equipped hospital when possible; neither should it be performed by an inexperienced and ill-equipped surgeon if it is possible to obtain the services of one who has the requisite qualifications. Sometimes the omentum will protrude from the wound, but it is very seldom that fecal contents or gas will escape externally. There may be a wound of exit as well as of entrance, but the bullets are retained usually in civil practice, and even when there are multiple wounds they may not indicate that the missiles have passed through the body, but that the patient has been shot in opposite directions. No special significance can be placed on the symptom of shock; in many cases it is entirely absent, but when present generally indicates hemorrhage. It is somewhat difficult to determine whether gunshot or stab wounds of the posterior abdominal or lower thoracic walls have entered the peritoneal cavity, and they also should be explored by incising the track of the ball or knife or in doubtful cases by making an exploratory laparotomy.

Wounds of the thorax as high as the fifth and sixth ribs frequently penetrate the peritoneal cavity and inflict serious injuries to the abdominal viscera. Such wounds must always be regarded as possible penetrating traumatism of the belly. It is quite true in military practice that a person shot in the head, neck, thorax or extremities may have penetration of the peritoneum, but in civil life this is not generally the case. Vomiting of blood is a sign of injury to the stomach or upper intestine, and when associated with a wound suitably located makes the diagnosis reasonably sure. The bladder should be catheterized, and if it contains bloody urine a lesion of this viscus or of the kidneys or ureters is suggested. The escape of blood from the anus is not frequent, but when it does occur would indicate injury to the lower part of the intestinal tract.

The diagnosis of extent of injury done can only be determined by an operation or by postmortem examination.

PROGNOSIS.

The prognosis of penetrating wounds of the abdomen is exceedingly grave, and depends on the organs and structures injured, on the nature of the traumatism, on the degree of emptiness or fullness of the hollow viscera when injured, and on the presence or absence of serious hemorrhage. Wounds of the upper part of the abdomen are not so fatal as are those below the umbilicus, and small perforations of the stomach may not leak. Injuries of the liver, spleen and kidneys, if not extensive, are frequently recovered from. Gunshot wounds of the intestines in civil practice are usually fatal when unoperated on. In the civil war the mortality of gunshot wounds of both intestines was 80.3 per cent., while the same injuries to the small intestines

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.