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ABSTRACT OF A PAPER "A RESUME OF THE
SUBJECT OF ACTINOMYCOSIS—WITH REPORT
OF A CASE OF ACTINOMYCOSIS ABDOMINALIS."*

By A. VANDERVEER, M.D., and ARTHUR W. ELTING, M.D.,
of Albany, New York.

Mr. President:—I desire to express my appreciation of Dr. Elting's contribution in the careful study of this subject, and in the reference he has made to various authors, French and German in especial.

The polymorphous fungus belonging to the genus of oospores was first recognized by von Langenbeck in 1845. In 1857 Lebert described a case of thoracic actinomycosis, observed by Louis in 1848, and published cuts of the actinomyces in his atlas, believing, however, that these fungi were the débris of cysticerci.

From 1868 to 1875 Rivolti and Perroncito demonstrated the so-called sarcomata of the jaws of cattle to be due to actinomyces, Bollinger, at the same time, recognizing the characteristic fungus in "Lump Jaw" in cattle, and referred it to the botanist Harz, who classified and gave to it the name of actinomycosis.

Actinomycosis in human pathology dates from the works of Israel in 1878, this author and Ponfick recognizing the identity of bovine and human actinomyces, even before the transmissibility of the disease had been proven by inoculation experiments, the latter, however, not being successful until 1880, when Johne produced the disease in a cow inoculated with some of the actinomycotic granules obtained from an animal of the same species. In 1883 Israel successfully inoculated the human actinomyces into a rabbit.

* Read at the Semi-Annual Meeting of the Medical Society of the State of New York, New York City, October 16th, 1901.

During the decade from 1880 to 1890 there were published two important articles, i. e., the classical monograph of Israel, in 1885, with a report of 37 cases of human actinomycosis, comparatively little having been added since; the second article was published by Böstrom, in which he paid special attention to human actinomycosis, and the transmissibility of the disease through vegetable life.

During the past decade much interest has been aroused in France, and among the best of the numerous publications is the exhaustive monograph of Poncet and Berard.

To-day the literature upon the subject in America is quite extensive, the disease no longer being regarded as of infrequent occurrence.

A great variety of names has been proposed for the fungus, the true distinction, however, between Madura foot and the group of pseudo actinomycoses being clearly established by Blanchard in 1895.

In the infected tissue, contents of abscess cavities, or discharge from fistulous passages, the actinomyces are usually present, in the form of small, yellowish, more or less opaque granules, in size from .15 to .75 mm, although larger granules often occur, are usually grayish-white, transparent, easily broken up, and of a consistency of soft jelly. Becoming older the granule grows more opaque and yellow, finally becoming impregnated with calcium salts, which gives rise to a structureless concretion.

The actinomyces stain readily with ordinary basic aniline dyes, not being decolorized by Gram's method, are a facultative anaerobe and grow upon most of the common bacteriological media. The best temperature is from 33° to 37°c and even under these conditions culture development is slow, requiring from 5 to 15 days. Very often actinomyces are mixed with other micro-organisms, the latter having a more vigorous growth, and tending to obscure the former. The most common of these micro-

organisms are the staphylococci, the streptococci, colon bacillus and leptothrix bucalis.

Actinomyces possess a surprising ability to develop upon cereals and vegetable media in general. At 45°c the growth of the fungus is arrested, and rapidly destroyed at 60°c.

The spores are more resistant to injurious agencies than the mycelium, although less so than the spores of bacteria. Greater resistance to noxious agencies is possessed by the spores grown upon cereals, experiments by Berard and Nicolas showing that some spores have lived as long as 4 years upon certain cereals and under unfavorable conditions.

There are a few cases on record where it seemed probable man had contracted the disease from animals, but it would appear that prolonged, intimate and close contact is necessary, which seems to indicate that the virulence and infectiousness of the actinomyces are diminished in animal organisms.

The concensus of opinion is that the great carriers of actinomycotic contagion are the different forms of cereals, especially barley, through their agency both man and domestic animals becoming infected. Pieces of cereal grains have been found in the focus of infection, the history of the case pointing almost definitely to their being the source of the disease.

Vegetables, especially those grown above ground, may also convey the contagion to man and animals.

Men are much more frequently infected than women, probably as a result of their being more exposed to infection.

Of 357 cases of human actinomycosis, collected by Hutyra, one-third occurred in the third decade of recognition of the disease.

Five chief avenues of infection have been distinguished—

1. Through the mouth and pharynx.
2. Through the respiratory tract.
3. Through the gastro-intestinal tract.

4. Through the skin, wounds, etc., and
5. A group of cases in which no definite portal of entry is discoverable.

Microscopically a focus of actinomycotic infection is characterized by a central zone, containing the fungus either free or attached to the foreign body by means of which it gained access to the part, this zone containing more or less cellular detritus and products of degeneration.

The blood vessels in the immediate vicinity of the focus are but rarely obliterated.

All the actinomycotic lesions can be divided into two great classes:—

1. The neoplastic type, which is usually found in horses and cattle.
2. The inflammatory type usually found in man and hogs.

The neoplastic type is the form in which spontaneous recovery not infrequently occurs.

In the inflammatory type the process of destruction exceeds in rapidity and intensity that of defense, tends to the production of sinuses but not of large abscess cavities, the latter usually being the result of a secondary infection.

The muscles and bones afford a very unfavorable medium for development or extension of actinomycotic foci.

The tendency to the formation of fistulous passages is quite characteristic, the discharge presenting marked differences. In some instances it is serous, in others sero-purulent and in others distinctly purulent. Secondary infection practically always exists in fistulous cases.

Another characteristic feature of actinomycotic lesions is the tendency to extend by continuity rather than by metastasis.

Poncet and Berard propose a division of actinomycotic infections into the following groups:—

1. Cervico-facial. 2. Thoracic. 3. Abdominal.
4. Cutaneous. Foci in bone, the spinal column,

the genito-urinary organs, the brain, special organs of sense, etc., being regarded as complications.

Statistics prove that about 55% of the cases were of the cervico-facial type; 20% thoracic and pulmonary; about 20% the abdominal type, and about 5% of a variety of types.

There has never been a definitely authenticated case of primary abdominal actinomycosis reported which did not originate from the gastro-intestinal tract, adhesions and abscesses being the characteristic feature, and abscesses always resulting from a secondary infection.

The actinomyces gain access to the stomach along with either animal or vegetable food, most commonly the latter. Neither the gastric juice nor the bile appear to have any very decidedly harmful effect upon the fungus.

The different portions of the alimentary tract seem to be affected in direct proportion to the length of time which the intestinal contents remain in the different parts.

Intestinal actinomycosis appears first as a small nodule in the submucosa, which undergoes degeneration at its centre, and presently gives rise to a small ulcer with undermined edges, which may extend either by progression or by confluence of several small ulcers, which, in certain instances, heal and leave irregular pigmented scars.

As the process extends, there is a decided tendency for the involved portion of the intestine to become adherent to other portions of the intestine, the abdominal viscera or the abdominal wall, preventing, in most instances, a perforation into the general peritoneal cavity. When the process originates from the colon, i. e., a portion of intestine not provided with a mesentery, retroperitoneal abscess is not an uncommon complication.

In some instances the intestine adherent to the abdominal wall has perforated externally, forming a fecal fistula.

Perforation into the bladder is of rare occurrence,

although cases have been reported by Böstrom, Hesse, Billroth and others.

The prostate has, in a few instances, been involved by extension of the disease from the rectum.

In women the pelvic viscera have sometimes been extensively involved by extension of the process from the primary intestinal focus.

In all the literature Grill was unable to find a single authentic case where abdominal actinomycosis had extended through the lymph channels.

Metastasis, in the great majority of cases, takes place through the veins rather than the arteries.

Among the secondary lesions of abdominal actinomycosis those of the liver are the most frequent, involvement occurring either by continuity, contiguity or metastasis. In 20 of the 30 cases of hepatic actinomycosis collected by Aribaud the primary focus was intestinal.

In from 50 to 60% of abdominal actinomycosis the primary focus is the cecum, appendix, or contiguous portions of the ileum and colon, i. e., in the right iliac fossa; from 10 to 15% of the cases in the rectum. In comparatively few cases has the primary focus occurred in the small intestine. There thus remain a certain number of cases in which the primary focus is undetermined, even though careful post-mortem examinations have been made.

Grill has distinguished three typical periods in the course of abdominal actinomycosis:—

1. The initial period.
2. The period of tumor formation.
3. The period of fistula.

To these three periods Hinglais has added a fourth—a period of repair.

Although in certain cases this or that period may predominate or be entirely absent, nevertheless, the periods mentioned are usually characteristic of the disease, when localized in the abdomen.

Pain, while usually present, is rarely severe, being rather a sensation of tension and discomfort.

In rectal actinomycosis the fistulae usually open

about the anus and occasionally in the loin or above the pubis. Spontaneous recovery is possible, even though there be extensive infiltration of the abdominal wall, with numerous fistulae.

The duration of the disease is quite variable—from a few weeks to several years.

The prognosis in abdominal actinomycosis, even though the process be extensive, is not necessarily hopeless, for there are on record a considerable number of cases that have recovered.

In general one can say that those cases offer the best prognosis which are most amenable to surgical treatment. i. e., the abdominal form rather than the thoracic. The oldest cases are most unfavorable because of the possibilities offered for extension or metastasis.

In 77 cases of abdominal actinomycosis treated surgically, Grill found 22 recoveries 10 improvements and 45 deaths.

It is practically impossible to recognize abdominal actinomycosis in its earliest stage, although examination of fecal matter has, in a few instances, led to a comparatively early diagnosis. In the later stages, when tumefaction is extensive, with foci of suppuration and numerous fistulae, and the discharge contains characteristic granules, diagnosis is comparatively easy.

Sarcoma, carcinoma and tuberculosis of the cecal region must also be considered in differential diagnosis.

Greater care in the selection and preparation of cereals and vegetables would certainly diminish the number of infections by this avenue. Since thorough cooking destroys the spores of actinomyces in flesh, prevention of the infection from this source would appear to be comparatively easy.

Therapeutically a so-called specific for actinomycosis has never been discovered, although iodide of potassium possesses certain qualities which produce a favorable result. In general iodide of potassium appears to act more satisfactorily and effectually, the earlier in the course of the disease it is adminis-

tered, and in large and gradually increasing doses. Experiments have shown that it has little or no effect upon the growth of the actinomyces on artificial media.

Billroth, Kahler and others have tried the effect of tuberculin, improvement seeming to have followed its employment in a few instances. An interesting fact brought out by Kahler, Illich and Wolff, and confirmed by Arloing, is that men and animals infected with actinomycosis react to Koch's tuberculin the same as in cases of tuberculosis.

Ziegler has reported a favorable result following the injection of protein obtained from cultures of the staphylococcus pyogenes aureus.

Gautier has seen favorable results follow the use of electrolysis and Braum recommends the use of Fowler's solution.

In general, however, combined medical and surgical treatment would appear to have produced the best results, especially in the forms of actinomycosis more superficially placed.

It is frequently difficult to determine the extent of the process and consequently the extent of surgical intervention required.

Careful exploration of the fistulae and foci should be practiced, so far as possible, with the removal of as much diseased tissue as consistent. If apparent recovery occurs, the case should, nevertheless, be watched for several years because of the great possibility of recurrence.

Mr. A. S., Castleton, N. Y., aet 45; native of United States; carpenter by occupation; married. Admitted to Albany Hospital February 22d, 1901. Provisional diagnosis sarcoma of cecum or mesentery; corrected diagnosis actinomycosis abdominalis. Treatment: Operation and medical. Family history good. Previous history: patient had usual diseases of childhood; typhoid fever at the age of 15; was quite ill, but made a good recovery. Denies venereal disease of any kind. Patient has partaken sparingly of stimulants; smokes and chews tobacco rather excessively; has associated much with animals; never worked in grain. General health always good; no serious injuries. Present illness began November 27th, 1900. While at work had pain in stomach; however, finished day's work, and

then tried various remedies without relief. Had sharp cramps in lower portion of abdomen; very severe for 3 or 5 minutes, recurring at first every half hour or so. Did not obtain relief for a week, although under the care of a physician. Pain gradually diminished, but did not disappear for eight weeks from onset. No chills, fever or vomiting, but slightly nauseated. Pain not localized or radiating, but seemed, to patient, to be in abdomen. No jaundice; no distension of abdomen that patient ever noticed. Bowels and kidneys normal in functions.

January 1, 1901, patient was able to be up, around and improved quite rapidly. Middle of January, superintended an ice gang.

February 1, as well as usual, and had regained normal weight.

February 20th, still feeling as well as ever, but noticed a small tumor in region of umbilicus, for which he came to the Albany Hospital February 22, under my care.

Physical diagnosis: distinct tumor, size of fist, in right iliac region; smaller tumor, inflammatory in character, evidently containing pus, at umbilicus; smaller masses to be felt through and in abdominal wall, giving an impression of sarcoma of the mesentery. Heart, lungs, spleen and stomach normal. Liver dulness extended about one finger's breadth below the costal margin. Skin over tumor red, with yellow spot in centre. Urine amber, 1030, acid, no albumin or sugar, sediment slight, and a very large number of calcium oxalate crystals present. Blood examination revealed leukocytes 18,500, reds 4,710,000.

Operation, February 28, 1901. Abdominal incision 6 cm. long in median line. Peritoneum found adherent to coils of small intestines in various places, with a flattened tumor, size of half a hand, springing from right iliac crest. While supposed to be a case of multiple sarcoma of the mesentery, yet it differed from any similar case I had ever seen. There was a distinct hardening of this portion of the peritoneum extending to umbilicus, along the course of the urachus and round ligament of liver, with an abscess presenting just under the skin. The latter was not opened for fear of infecting the peritoneum. Incision in peritoneum closed with fine silk, continuous sutures; wound closed with interrupted silkworm gut sutures and iodoform gauze introduced in lower end of incision, then standard dressing. Gauze removed on 4th day, and drainage encouraged thereafter, the abscess of umbilicus having opened and discharged a creamy, flaky-like substance. Specimens of discharge and tumor were saved, but lost later, and did not reach the Bender Laboratory for examination.

Patient put upon syrup of hydriodic acid, strychnia and elixir of calisaya, with as good nourishment as possible. Not feeling at all certain of my diagnosis, and the possi-

bility of actinomycosis, about April 1st I asked Dr. Elting to look the case over carefully, and make a thorough examination of the discharge. This was done and the case found to be one of typical actinomycosis. Cover slips stained by Gram's method showed the characteristic fungi. Cul-

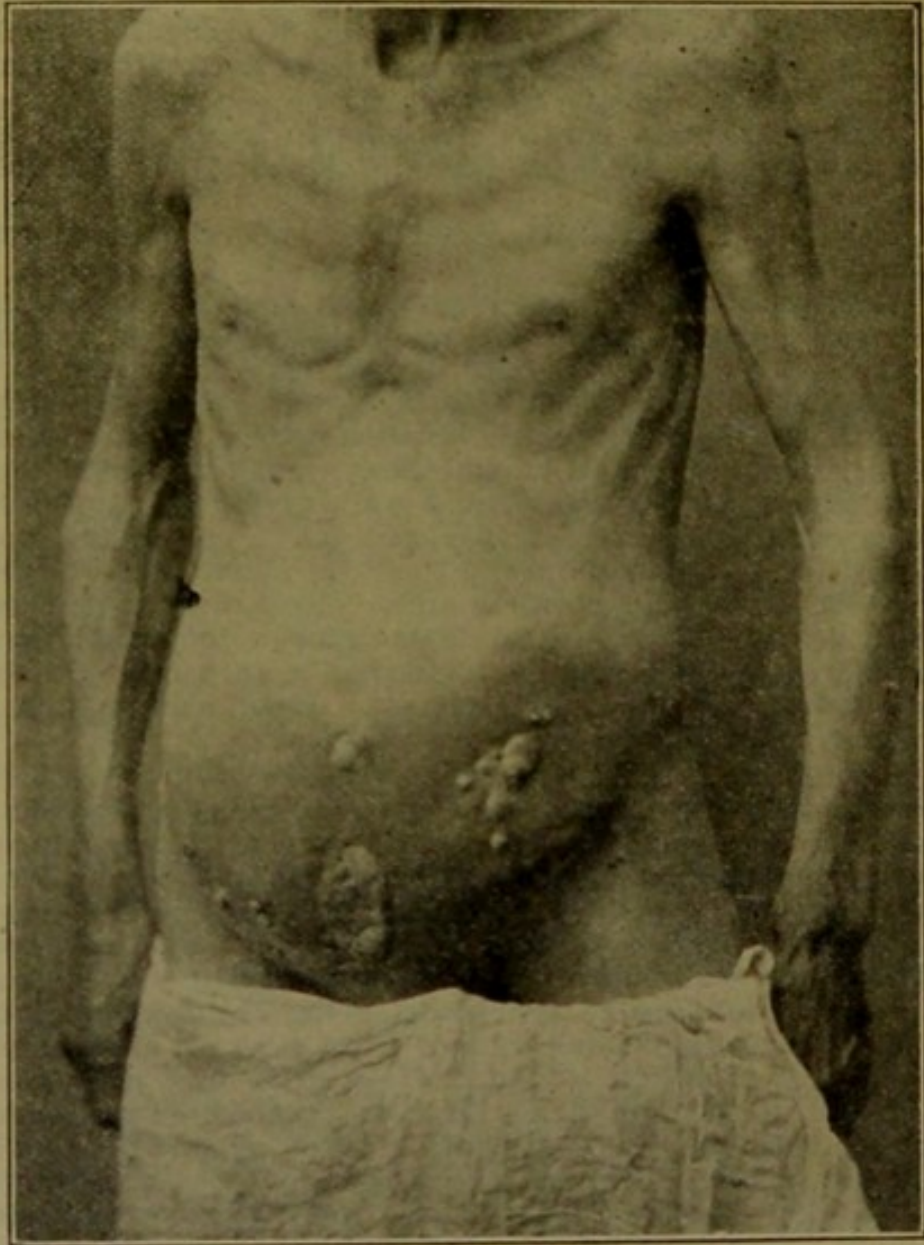


FIG. 1.

tures from several of the abscesses showed so vigorous a growth of the bacillus coli communis that the growth of the actinomyces was obscured. Patient was now administered iodide of potassium in increasing doses, i. e., a saturated solution, commencing with 3 drops in a wineglassful of water

before each meal, increasing 3 drops each day until 60 drops were reached and this dose continued.

May 1, 1901: Condition improved somewhat, although necessary on two occasions to open abscesses in the abdominal wall. Less numerous actinomycotic granules in discharge

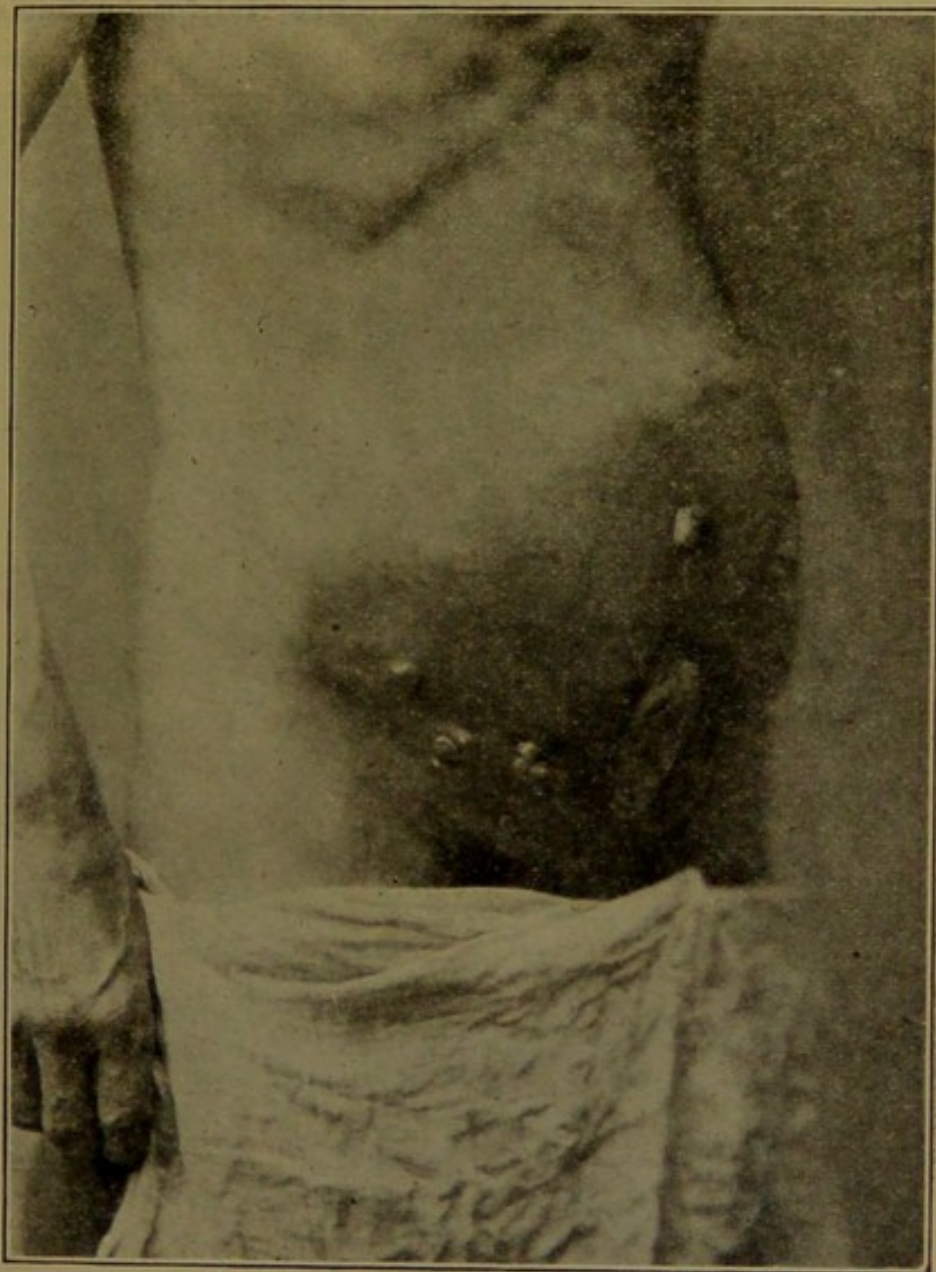


FIG 2

than before the administration of iodide of potassium was begun. Large tumor still in right lower quadrant of abdomen, extensive induration and infiltration of abdominal wall, and four fistulous openings.

June 15th: Patient's general condition not quite as satis-

factory as at previous note. Three discharging sinuses in abdominal wall, the discharge sero-purulent, and containing a moderate amount of actinomycotic granules. Appetite good, no gastro-intestinal symptoms. At patient's request he was discharged from the hospital and advised to continue the large doses of iodide of potassium.

June 29th: Patient readmitted to hospital for further ob-

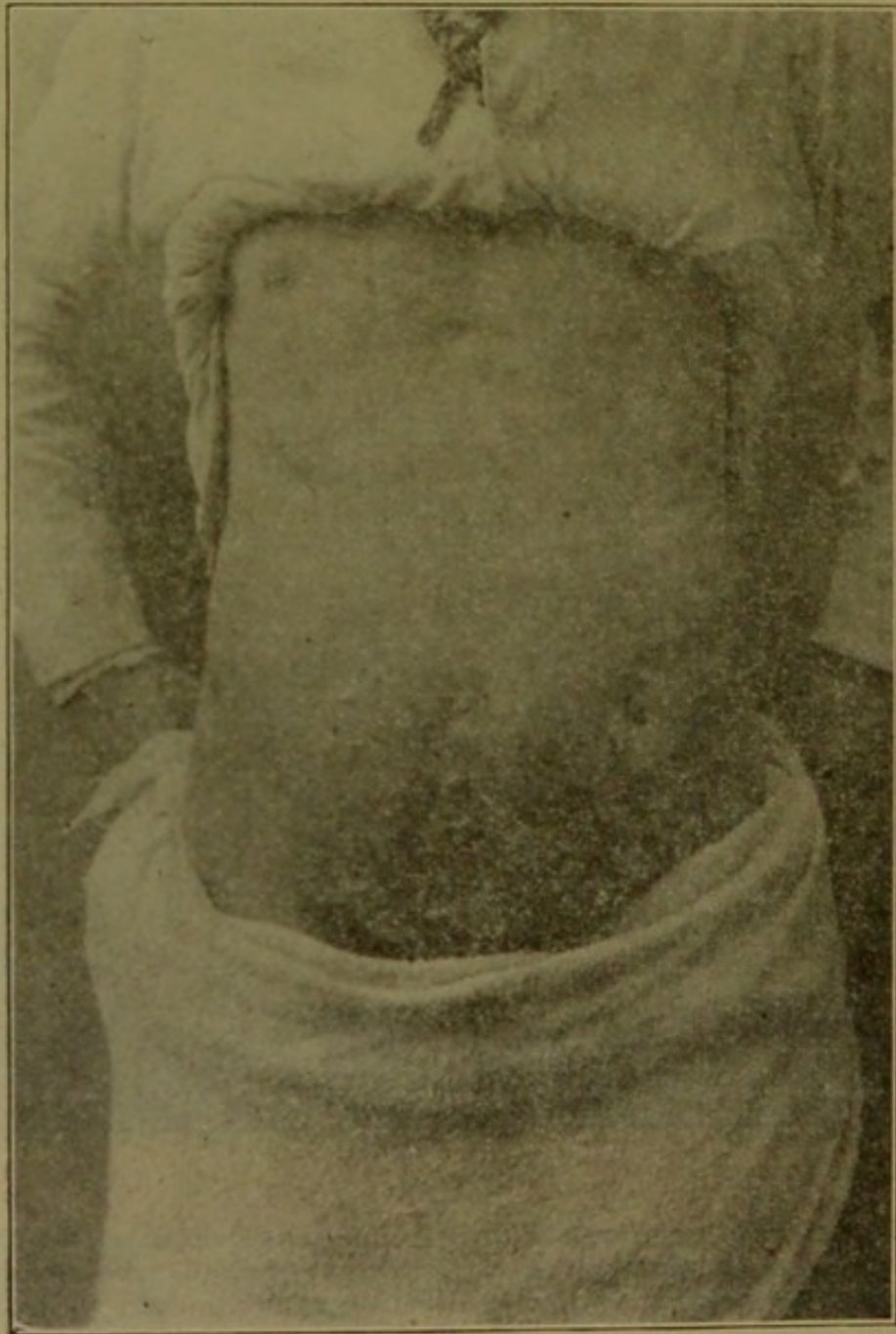


FIG. 3.

servation. General condition somewhat improved but there are more discharging sinuses than at last note. Condition at this time indicated by accompanying photographs. Figs. 1 and 2.

August 20th: Patient returns feeling much better than when seen about 3 weeks ago. Condition of abdomen distinctly improved. Some of the sinuses closed, and discharge from remaining ones decidedly less.

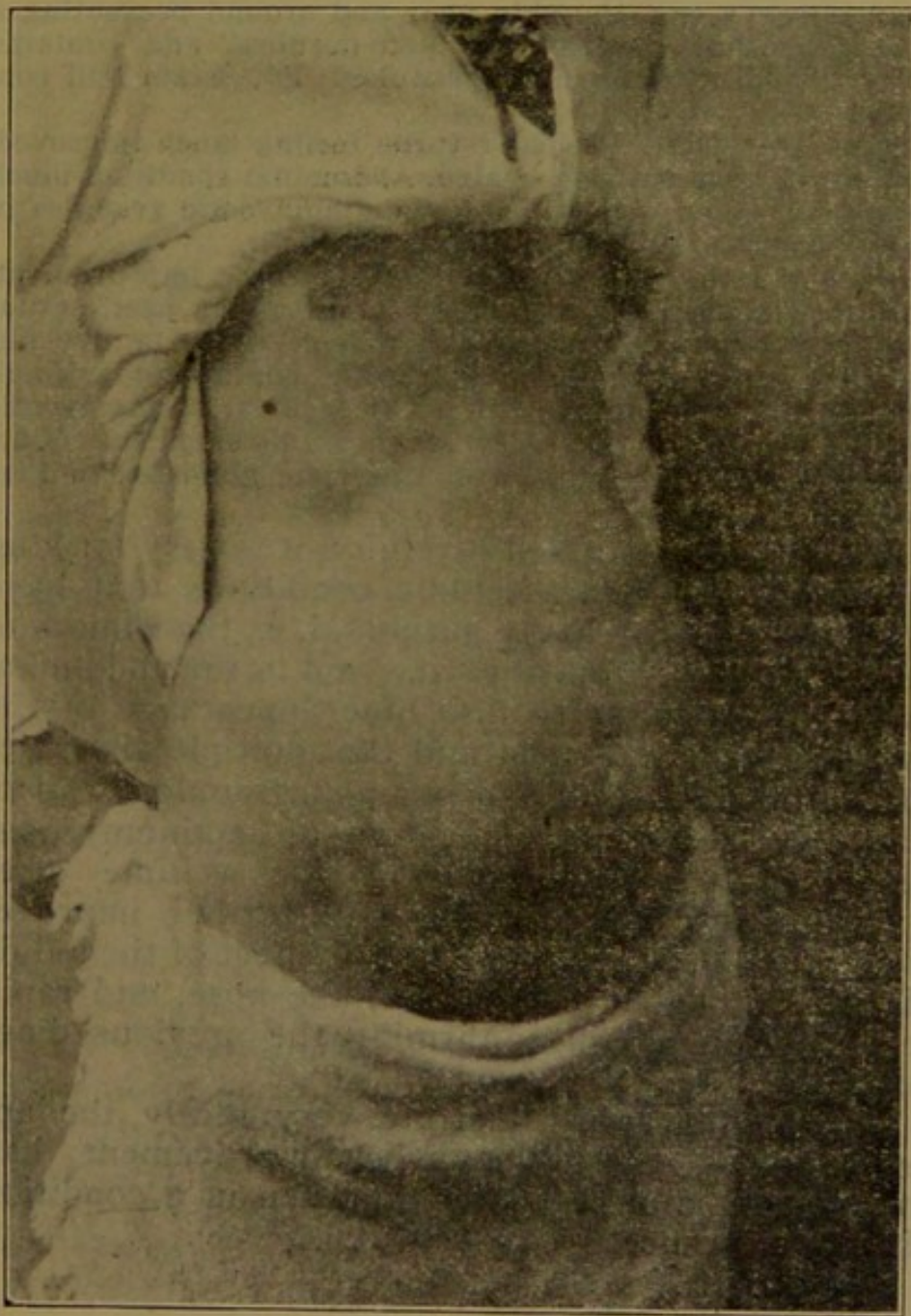


FIG. 4.

Patient says two weeks ago a small pimple or blackhead developed on right side of the nose, near inner angle of eye. This was squeezed by his wife, who had attended to the abdominal wounds. 48 hours later patient noticed some pain and swelling about nose, which gradually increased, and a tumor, the size of a hen's egg, developed, which almost closed right eye. Hot applications employed and about a week from onset tumor broke and discharged considerable pus. There still remains a tumor the size of a large pigeon's egg, the skin near and around presenting a livid appearance. Discharge sero-purulent and contains a few typical actinomycotic granules. Potassium still continued.

September 20th. Patient returns feeling much improved. Abscess of nose entirely healed. Abdominal condition much improved. There are still a few actinomycotic granules in discharge from sinuses in abdominal wall.

October 12th: Patient shows still further improvement. Has been doing light work for several weeks past. Color good and general appearance excellent. Four or five discharging sinuses in abdominal wall, containing a small amount of discharge, with an occasional actinomycotic granule, mostly in an early stage of development. Condition of patient's abdomen at this time indicated in Figs 3 and 4.

If this case is studied carefully, it is very striking to observe the characteristic conditions that have been described by many authors, i. e., the tumors to be felt in the peritoneal cavity, and in the abdominal walls, the peculiar reddish-blue appearance of the surface of the abdomen and the multiple abscesses containing yellowish-like pus and granules. All of these conditions are indicative of actinomycosis, also the patient's improvement for a time after operative intervention, and still further improvement when getting under the full effect of the iodide of potassium; the infection of the nose, and rapid recovery, all aid in confirming the previous diagnosis.

The photographs illustrate very nicely the appearance of the patient when improvement had commenced, and still later on when in a condition of convalescence.

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