

tacks. There was a marked degree of peridiverticulitis and the bowel wall was very edematous and there was a great deal of thickening and infiltration of the fatty tissue about the diverticulum.

The mass was excised and upon examination a large fecal mass about the size of a marble was found in the diverticulum. The wound was closed with three layers of sutures of chromicized gut and Pagenstecher. The patient had rather a stormy convalescence, developing a patch of pneumonia, and a fecal fistula delayed the healing of his wound.

Two factors in this case are of particular interest: first, the age, the patient being only 30; and, second, the fact that he had never been constipated.

My second case was an elderly gentleman about sixty-five years of age, with a previous history of good health. For about a year he had indefinite attacks of pain in the left side of the abdomen. When seen for the first time, in March, 1912, he had obstruction of the bowel, nothing having passed through it for two days, in spite of enemata and large doses of cathartics.

At operation a cancer of the sigmoid, secondary to diverticulitis, was found close to the rectum. In view of the short period of obstruction and the good condition of the patient, I decided to do a primary resection according to the method advocated by Dr. W. J. Mayo, using a large rubber tube to complete the anastomosis.

The patient recovered from his operation and was having a fairly comfortable convalescence in the third week, when pneumonia developed and proved fatal.

The third case which I wish to report was a man forty-eight years of age with a healthy out-door occupation, being foreman for the gas company.

I first saw this patient in February, 1912. He had been more or less constipated for years and had had three or four attacks of left-sided pain previous to this attack. When I saw him he was tender to the left of umbilicus and was troubled with nausea, but no vomiting. A large, tender movable mass the size of an egg was felt above and to the left of the umbilicus. The temperature was slightly elevated.

This tenderness slowly disappeared and at the end of a month no trace of the mass could be felt. He has had one slight attack since then and operation was advised, but the patient would not consent.

The fourth case was very similar to the second, and was seen in June, 1912.

My fifth case is a man sixty-three years old, extremely fleshy, weighing about 220 pounds. He gave a history of attacks of "bilious colic" extending over many years. His pain has always been above and to the left of umbilicus. I have seen him three times within three months with attacks of very severe left-sided pain, accompanied by pain and occasional vomiting. At about the end of the second day a tender mass can usually be found on the sigmoid. Tenderness and tumor usually disappear within a few days. In view of his age and excessive weight, I have been rather reluctant to advise operative interference.

In closing I wish to present the following conclusions:—

1. That this is not a rare disease.

2. Recurrent attacks of left-sided abdominal pain, with tenderness and tumor formation, in the absence of any active urinary disturbance, are usually due to inflamed diverticula.

3. As a focus of chronic irritation it may be a starting point of cancer of the sigmoid.

4. Surgical removal is the only perfect cure.

A CASE OF INFECTION WITH HYMEN-OLEPIS (TAENIA) NANA, THE DWARF TAPEWORM.

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THE following case is reported chiefly because of its rarity, but also on account of certain unusual clinical features. The patient entered the Boston City Hospital, on the service of Dr. Francis H. Williams, and it is through his kindness that the case is reported.

Stiles¹ in 1903 predicted that further investigations would show that *Taenia nana* is one of the commonest intestinal parasites in the United States. Yet, up to the present time, only 76 cases have been reported in America.² More than half of these have been in the past five years; which means that, as more attention is called to the importance of this parasite in causing obscure symptoms, more careful examinations are being made, and more cases recognized. The present case, however, is the first that has been reported from New England.

S. P., male. Age, 17. Single. Shoe-worker. Entered hospital Oct. 21, 1911. *Family history* and *past history* negative. Habits good.

Present History. For two weeks before entrance felt nauseated at times, with slight dizziness and dull general headache. For about one week had occasional, sharp, sudden pains in left axilla, lasting about 15 minutes. No other pains. No diarrhea. Has always been slightly constipated. No vomiting. Micturition normal. No cough. Appetite fair. Vision good. Has been eating pork in some form daily for several weeks. Day before entrance headache became worse, and dizziness increased. Patient had great difficulty in standing. General malaise and weakness. No epistaxis. Bowels as before. On day of entrance was wrestling with another boy. Latter threw him, and knelt on his right arm. Patient lost consciousness, and woke up to find himself in a police ambulance on the way to the hospital. He was said to have had a convulsion during transportation.

Physical Examination. Well developed and nourished young man. Conscious, but apparently dazed. Shortly after beginning the examination, patient had clonic convulsive movements of hands and fingers, with the characteristic position of tetany, i.e. contractures of thumb, wrist, and forearm. These movements subsided after about five minutes.

The patient's face was somewhat swollen and puffy, especially under the eyes. The skin was pasty-colored. The rest of the physical examination was absolutely negative. The knee-jerks were normal. There was no Kernig or any other abnormal

reflex. No tenderness of calf or thigh muscles, or along course of great nerves.

Temperature 100. Pulse 70. Respiration 23. Urine examination negative. Blood-pressure 130 mm. Blood examination: White blood corpuscles, 10,400; red blood corpuscles, 4,800,000. Hgb., 70%. Stained smear. Red cells normal. Differential count of leucocytes:—

Polynuclears	61%
Lymphocytes	22%
Mast cells	3%
Eosinophiles	14%

Oct. 25, temperature somewhat elevated the first twenty-four hours after entrance, then reached normal and has been normal since. No further convulsions. Puffiness of the face disappearing rapidly. Feels perfectly comfortable. No untoward symptoms of any sort. Passing a fair amount of urine, which is negative on examination. Blood smear shows some eosinophilia.

Blood smear repeated:—

Polynuclears	63.5%
Lymphocytes	23.5%
Transitionals	6%
Eosinophiles	7%

Examination of laked blood for *Trichina* embryos was negative. Examination of stool this morning showed many characteristic ova of *Hymenolepis nana*.

Oct. 27, patient was on a simple diet with free catharsis all day yesterday. This morning was given the following:—

R

Oleoresini Aspidii 3jss
Divided in 6 capsules.

One capsule was given every fifteen minutes for 6 doses, followed in three hours by epsom salts, 3i.

After treatment, patient moved his bowels very freely. Stools full of ova, and large numbers of complete dwarf tapeworms, varying in length from 5 to 10 mm.

Oct. 30, patient has had no untoward symptoms since treatment. Facial oedema now entirely gone. Feels perfectly well. Stools show no ova. General physical examination negative. Patient discharged well. Just before discharge a blood examination showed white blood corpuscles, 14,800. Stained smear:—

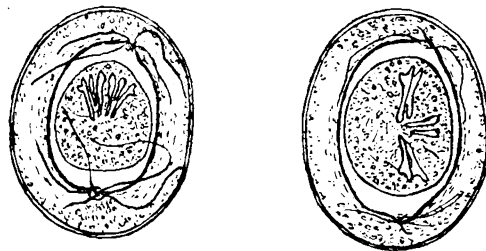
Polynuclear neutrophiles	60%
Basophiles	32%
Eosinophiles	8%

Patient was requested to present himself again in two months for re-examination of stool, but he failed to appear.

In this case, symptoms pointing towards the gastro-intestinal tract were practically absent, the only important one being nausea. On the other hand, the chief disturbances were those of the nervous system, severe headache, dizziness, and later convulsions and unconsciousness. This is in harmony with many of the reported cases.

The diagnosis is usually difficult to make, as there are ordinarily no symptoms pointing to an intestinal parasite. Sometimes there are gastro-intestinal symptoms:—diarrhoea alternating with constipation, colicky abdominal pains, vomiting, severe nausea.³ Often, as in this case,

symptoms from the side of the nervous system greatly outweigh the others. These are usually very severe, and may consist of headaches, disturbances of vision, dizziness, convulsions, spasms, fainting-fits, and pains in various regions. Often a very severe secondary anaemia results.⁴



Ova of *Taenia nana* found in feces. x 430.

The diagnosis can be made only by microscopical examination of the stool, and finding the characteristic ova, or more properly speaking, "oncospheres," as they contain an embryo. These ova have a thick double capsule, within which is found the embryo containing six hooklets. At either pole is a so-called "mamillate" tip, from which several filamentous appendages go off into the surrounding protoplasm. (See figure.) It is the possession of these filaments that distinguishes the *Hymenolepis nana*, or *Taenia nana* as it is more commonly called, from other members of the same genus.⁵ The dwarf tapeworms themselves are too small to be noticed in the stool with the naked eye, unless present in very large numbers, as after treatment. In the adult stage they measure only from 5 to 45 mm. in length, although they contain 100 to 200 segments. This is the smallest tapeworm known for man. It is usually a parasite of children, about 70% of the reported cases being in children under the age of 15. Most of the cases reported have been found either by routine stool examinations, for other purposes, or by examination of the stool on a mistaken diagnosis. Deaderick⁶ reports two cases where he supposed there was Uncinariasis, because of the grave anaemia and eosinophilia, but on examination only the ova of *Taenia nana* were found. In the present case the examination of the stool was made upon a mistaken diagnosis of probable Trichiniasis, because of the facial oedema, convulsions, and eosinophilia in the blood, together with the history of excessive pork-eating.

Facial oedema has been reported in four cases of infection with *Taenia nana*. These were all in children. Two were reported from New York by Schloss,⁷ and the other two by Deaderick.⁶ In the latter's cases the oedema involved not only the face and eyelids, but also the hands, feet, ankles, and legs up to the knees. This peculiar oedema, which in all the cases disappeared with evacuation of the parasites, furnishes some interesting evidence to apparently contradict the usual explanation for the appearance of the

primary facial oedema in Trichiniasis. This is said to be due chiefly to the obstruction and thrombosis of the smaller lymphatic vessels, caused by the circulating *Trichina* embryos.⁸ In infection with *Taenia nana* the parasites are restricted to the walls of the intestinal tract, yet a very similar facial oedema results. In the latter case, it must undoubtedly be of toxic or inflammatory origin.

The disturbances of the nervous system are due partly to the absorption of toxins liberated by the parasites, and partly to direct stimulation of the sympathetic nerves, as the animal's head is buried very deeply in the intestinal mucosa.⁹ It is enabled to do this by means of a retractable rostellum, crowned with 24 to 30 hooklets. Numerous cases have been reported from various parts of the world in which the parasite caused clonic spasms, and epileptiform and choreiform convulsions.¹⁰ In only one case, reported by Schloss,⁷ was there unconsciousness associated with such convulsions. The present case is the only one reported up to now in which the convulsions were of the peculiar character usually associated with tetany.

Eosinophilia has been found present in nearly all the cases in which blood examinations were made. The eosinophile count was always higher in children than in adults infected with this parasite. In this respect it follows the same rules shown by Grek and Reichenstern,¹¹ who made an extensive study of the eosinophilia associated with the ordinary tapeworms. They found that the eosinophiles constituted 5.7 to 6% in their cases over 13 years of age, whereas, in younger individuals the average count was 12.4%. In these children there was not merely a relative, but also an absolute increase of eosinophiles.

In most cases the origin of the infection can be traced to food contaminated by the excrement of rats or mice. The latter are hosts of a dwarf tapeworm, *Hymenolepis nana fraterna*, which is considered by many authorities to be identical with the species found in man.¹² The rat-stage, however, is not a necessary intermediate step in human infection, as infection from one person to another, and also auto-infection, are both highly probable. The onchospheres, when swallowed by rats, have their capsules dissolved in the intestinal juices. The liberated embryos bore into the intestinal villi, and there develop as the intermediate larva, the "cysticercus." Later these may reach the lumen of the intestine and develop into adult worms, discharging new onchospheres with the feces. This same process probably occurs in man, although this is not yet definitely established. The fact that some cases have lasted as long as three years,¹³ in spite of several apparently successful courses of treatment, seems to point to auto-infection from cysticerci which have been protected from the action of the drugs.

The only drug which has been found effective in the treatment of this worm is malefern, in any of its forms. The U. S. P. oleoresin aspidii

is as good as any. The other vermifuges, santonin, thymol, naphthol, etc., have all proved unsatisfactory as compared with malefern.

After an apparently successful single treatment, one should not feel that the patient is absolutely cured. The possibility of auto-infection from cysticerci, which may have been implanted in the intestinal wall, is always present. Therefore an examination of the stools should be made several months later to determine the presence or absence of the ova. If present, the treatment must be repeated.

It is worth again emphasizing the fact that the diagnosis of this tapeworm cannot be made usually from the clinical aspects of the case, or from the macroscopic examination of stools. It rests practically always upon finding the characteristic ova by microscopic examination.

There are undoubtedly many cases of infection with this tapeworm in this vicinity which have been unrecognized. They are probably often considered to be obscure, nervous diseases. The number of known cases will surely increase rapidly as soon as a routine microscopic stool examination is made of these obscure cases.

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PATHOLOGY OF TYPHOID SPINE.

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THIS paper is a study of the pathology of "Typhoid Spine," and is based on the reported cases, especially on those that give an x-ray report, and on the x-ray findings of two cases reported here. Of the ninety cases reported in the literature since this condition was first described by Gibney in 1889, there have been no deaths, so that we have no chance to study the pathology post-mortem. Therefore we are dependent for exact knowledge on the x-ray, and of these ninety cases there were eleven with x-ray reports.