

very rapidly if they are extirpated and there is even a small bit left behind. Similarly this class of tumors in the ovary, if ruptured within the peritoneal cavity, is liable to scatter the bits of tissue which will lead to a number of new growths on the peritoneum. In operation these tumors should be thoroughly and completely removed, if possible without incising the capsule surrounding the growth. Every precaution should be taken to prevent scattering in the wound bits of tissue which may become the germs of recurrence. Generally the operation is difficult, as the vessels and deep structures of the neck may be involved, and it may be impossible to remove all the new growth. In those cases in which the operation was incomplete, almost every time there has been recurrence. In many cases where a complete enucleation of the growth was supposed to have been done, there has been no recurrence.

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INTESTINAL PARASITES IN APPENDICITIS.<sup>1</sup>

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CASE I. C. V. C., entered the Boston City Hospital in the service of Dr. Bolles, who permits me to report the case, on Dec. 28, 1902. She was born in Boston and still lived there. She was nine years old. The family history and the previous history were both of no importance. The present illness began five days earlier with a chill, vomiting and abdominal pain, cramp-like in character, localized about the umbilicus. For the previous two days the pain had been less severe but has become localized in the right inguinal region. The physical examination in brief was as follows: Well developed and nourished. Pulse 124. Temperature normal. Apathetic. Facies slightly peritoneal. Heart and lungs normal. Abdomen symmetrical, slightly distended. An area of dullness near the right anterior spine and in the right flank. All the abdominal muscles in a state of spasm. Tenderness slight in the epigastrium and marked in the right lower quadrant but not general.

An immediate operation was decided on and under ether a muscle-splitting incision was made at McBurney's point. As soon as the peritoneal cavity was opened several ounces of creamy pus welled up. Pus wiped away and the pus cavity found not well walled off from the general abdominal cavity. The mesentery of the appendix, which was easily found, was tied off with chromicized gut. The appendix was tied off at its base and cut away. The stump was touched with carbolic acid. The peritoneal cavity was then washed out with many bottles of salt solution. The pus was found to come from the peritoneal cavity generally. Wicks were placed in various directions and the wound was partially closed. The appendix was red, swollen, gangrenous and perforated at one point. It contained two small worms identified by the pathologist as pin worms. The bacteriologist reported staphylococcus pyogenes aureus and bacillus subtilis in the pus.

At the close of the operation the patient was moribund, but rallied under stimulation and lived till the evening of the next day.

CASE II. C. H. B., entered the Boston City Hospital March 5, 1903. He entered the service of Dr. Bolles, but came under my care. He was sixteen years old, a painter by occupation. The family and previous histories were unimportant except that he had never been troubled by indigestion. March 1 had an attack of abdominal pain and took some medicine to cause vomiting. The next day he went to the Boston Dispensary complaining of constipation, colic pain and tenesmus. The examination was negative except for general tenderness over the abdomen. March 3 the condition was the same. Temperature 97 and pulse 120. March 4 about the house all the day till afternoon, when he went to bed feeling worse. Restless and delirious through the night. Abdominal pain more intense. March 5 seen by Dr. Colburn, to whom I am indebted for a large part of the history, and was sent to the hospital immediately. Pulse 130 and temperature 95. On his arrival at the hospital his condition was very critical. There was general cyanosis. The extremities were cold and the abdomen distended. There was general spasm of the abdominal muscles. He was suffering evidently from general peritonitis and although the boy was moribund it seemed best to give him even a forlorn chance, so under very light anesthesia incisions were made quickly through the abdominal wall in several places. As soon as the peritoneal cavity was opened a large amount of purulent material of the consistency of pea soup gushed out. Drainage tubes and gauze wicks were rapidly put in place and an intravenous injection of salt solution given. The patient lived several hours and then died in spite of stimulation. At a partial post-mortem examination a dead lumbricoid worm was found free in the general peritoneal cavity and another half way through a perforation in the appendix.

<sup>1</sup> Read before the Boston Obstetrical Society, Nov. 17, 1903.

While cases of appendicitis are occasionally reported where pin worms (*oxyuris vermicularis*) are found in the appendix, those with lumbricoid worms (*ascaris lumbricoides*) are less numerous. The interest in these cases centers about the etiological importance of the parasites, whether they have any direct influence on the inflammation of the appendix or whether their presence is simply a coincidence. They may have the same relationship to appendicitis as any foreign body. A foreign body lying in the appendix may cause appendicular colic due to the muscular contractions in the appendix in the attempts to expel it, or an actual inflammation may be brought about in the following manner: the foreign body irritates the mucous membrane which becoming swollen throws out an increased amount of secretion. As this cannot escape from the appendix, the lumen being blocked by the swelling of the mucous membrane about the foreign body, it distends the organ. The circulation is thus altered and an opportunity offered for the entrance into its walls of any bacteria, with a resulting inflammation. In such cases the inflammation is due to the presence in the appendix of something foreign to the normal contents, a fecal concretion, a worm, etc., and is in no way dependent on the characteristics of that particular form of foreign body. Does the inflammation of the appendix containing an intestinal parasite have any direct relation to that parasite because it is a worm and not a mass of hardened feces and because it has certain definite characteristics and manner of life? While the question is still open for some of the intestinal worms, for others it seems to have been fairly well settled both by the clinician and the pathologist.

Clinically the importance of intestinal worms has been shown by Metchnikoff,<sup>1</sup> who reports the histories of four cases of appendicitis. Most of the four had several recurring attacks of apparently typical appendicitis. Metchnikoff, finding in the stools of the patients either the eggs of intestinal worms or the worms themselves, gave to his cases vermifuge medicines. The cases all recovered, there were no more recurrences and when the series was reported the patients had been free from any suggestive symptoms for some length of time. He feels so strongly the importance of these worms as an etiological actor in appendicitis that he advises the examination of the stools in doubtful cases of appendicitis and as a routine practice in children, that the worms may be destroyed in time to prevent an attack.

The parasites most commonly found in cases of appendicitis and general peritonitis are *trichocephalus dispar*, *ascaris lumbricoides* and *oxyuris vermicularis*. While the first form of worm is not as common as the other two it was found in 23 soldiers out of 59 who were returned from the Philippines to the United States government hospital for the insane and examined for intestinal parasites.<sup>2</sup>

<sup>1</sup> Bull. Acad. d. Med., Paris, 1901, 3 s, xlv, 301.

<sup>2</sup> Med. Record, Aug. 8, 1903.

The proof of the definite relationship of cause and effect between *trichocephalus dispar* and appendicitis has been shown by the work of Askanazy.<sup>3</sup> He published in 1896 an article on the source of the food supply for this worm. Examining the worms microscopically, he found in them a substance which reacted to the test for iron and which originated he felt sure in the hemoglobin of the host. To get this food the worm must necessarily suck the blood of the host. He noticed that often at autopsy a worm was so firmly adherent to the mucous membrane that attempts to dislodge it resulted in either tearing the mucous membrane or breaking the worm. Hardened specimens showed that a greater or less part of the worm disappeared into the mucous membrane. Microscopic examination of sections showed that the worm had bored its way into the mucous membrane and had not simply entered a pre-existing opening. These wounds of the mucous membrane then may allow the entrance of bacteria. Girard<sup>4</sup> has demonstrated this very prettily. The case was that of a child of eight years who developed symptoms of peritonitis, the localizing signs being on the left side. The peritoneal cavity was opened, allowing the discharge of a sero-purulent fluid. The appendix appeared normal, but was removed as a precautionary measure. It was hardened and then cut into sections. By this two *trichocephali* were found. Girard describes the sections as follows: "The appendix is absolutely healthy in appearance. There is no trace of either old or recent inflammation anywhere except at the point where the extremity of the *trichocephalus* has penetrated into the mucosa. At this point there is a zone of inflammation. A large number of mono and polynuclear leucocytes are seen, some among them showing destruction of nuclei. In the midst of cellular detritus are bacteria, streptococci and colon bacilli. The inflammation around the *trichocephalus* is then due to the introduction of the intestinal microbes by means of the nematode." In this case an active inflammation was set up about the parasite due directly to it as a living worm leading its own individual life. It follows therefore that a *trichocephalus* may furnish the primary and direct cause for an attack of appendicitis.

The proof that *ascaris lumbricoides* ever causes an inflammation of the appendix as a result of its life struggle is less clear than in the case of *trichocephalus*. *Ascaris* is known to often force its way into narrow channels like the appendix and gall duct. When it clogs the lumen of the appendix it acts as I have already shown as a foreign body. I believe that it may do more than this, as it is not an inactive mass. It is very easy to conceive that by its struggles it may perforate a diseased appendix which if it contained a lifeless foreign body would have remained intact. This worm may thus change a comparatively simple case of appendicitis into a very complicated one. The question whether

<sup>3</sup> Deutsch. Arch. f. klin. Med., Bd. lvii, S. 104.

<sup>4</sup> Annals de l'Inst. Pasteur, 1901, xv, 440.

it can perforate a healthy intestine is still under discussion, though a case recently reported<sup>5</sup> seems to show that it may. Askanazy attempted to show the same relationship true between ascaris and appendicitis as between trichocephalus and appendicitis. He found in the intestinal epithelium of the ascaris a substance which reacted to the test for iron as did that in the trichocephalus. He felt, therefore, that this iron came from the blood of the host and that it was fair to assume that the ascaris obtained it by sucking. To suck the blood the mucous membrane must necessarily be wounded and entrance given to bacteria.

When we come to oxyuris vermicularis the proof of its etiological value as a cause of appendicitis other than through its presence as a foreign body is lacking. The pin worm is generally considered an inhabitant of the rectum and lower bowel. That this is not true is shown by the frequency of its occurrence in the appendix in a series of 200 autopsies done by Still<sup>6</sup> on children under twelve years of age. He found pin worms in the intestine in 38 cases, in 25 of which they were in the appendix. In 6 they were in the appendix and nowhere else in the large intestine or cecum. Sometimes they were in the extreme tip of the appendix, as in the case of a boy who died of pleurisy and pericarditis. Before death he complained of pain in the right iliac fossa. At the autopsy the appendix was found thickened and in a condition of catarrhal inflammation. In the distal 2½ inches 111 worms were found. No others were found anywhere in the intestine. Some have thought that oxyuris might wound the mucous membrane of the appendix by its wriggling and thus by furnishing a place of entrance to bacteria cause an attack of appendicitis. This theory as far as I know has not been substantiated by any definite proof and remains therefore simply as an attempt to carry the relation that exists between the other two parasites and appendicitis to oxyuris vermicularis.

**Conclusions.** — An intestinal parasite causes appendicitis through its presence as a foreign body; and by its struggles may bring about a perforation and peritonitis where otherwise none would have occurred.

*Trichocephalus dispar* has been proved to cause an inflammation of the appendix by injuring the mucous membrane while sucking the blood of the host.

*Ascaris lumbricoides* has been found with a material similar to that in trichocephalus in its intestinal epithelium and therefore is supposed to attach itself to the mucosa of the host and

thus start the processes which result in appendicitis.

*Oxyuris vermicularis*. No proof has been found that this worm causes an appendicitis except in its rôle of foreign body.

## Clinical Department.

### A CASE OF SARCOMA OF THE LOWER JAW.<sup>1</sup>

BY F. B. LUND, M.D., BOSTON.

THE accompanying case is reported in order to illustrate the slight amount of deformity which results from subperiosteal excision of the body of the lower jaw, from the lateral incisor tooth to the angle. The patient, a young girl of thirteen, was operated upon on the 16th of July, 1903, for a sarcoma of the lower jaw, which began in the medulla, had caused a fusiform swelling of the lower jaw, had forced its way upward through the alveolar process and grown up into the mouth

<sup>1</sup> Contributed to the fourteenth series of Medical and Surgical Reports of the Boston City Hospital.



Case of Sarcoma of the Lower Jaw.

<sup>5</sup> Aggr; J. Am. Med. Assoc. Feb. 28, 1903.

<sup>6</sup> Brit. Med. J. 1899, Vol. i, 898.