

FOREIGN BODY APPENDICITIS.

WITH ESPECIAL REFERENCE TO THE DOMESTIC PIN; AN ANALYSIS OF
SIXTY-THREE CASES.

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THE origin of appendicitis a few years ago was frequently attributed in the lay mind to the influence of foreign bodies. Grape seeds, strawberry seeds, orange pips, and other bodies figured conspicuously. Now, however, we know that true foreign bodies are rarely found, and that concretions play a subsidiary rôle in the production of the disease. Records show that seeds are rarely found in the appendix; heavy objects drop in with the greatest ease. Since the demonstration of the nature of fecal concretions and the recognition of the fact that they are not true foreign bodies, but the result of inflammation rather than the cause, little attention has been paid to the subject of foreign bodies. If careful chemical and physical tests are made, analysis will show that certain bodies which have been considered seeds are nothing more than fecal concretions. A justifiable scepticism has arisen concerning the accuracy of observation in such cases. If the foreign body is completely surrounded by fecal matter its presence may be easily overlooked. True foreign bodies have been found free and unencrusted in the appendix or in an abscess cavity into which they had escaped. In the majority of cases foreign bodies have been found either partially or completely surrounded by fecal matter. In a limited number of cases shot have been found in the appendix without surrounding fecal matter and without, it is stated, evidence of inflammation in the organ. Fragments of egg-shell, enamel from saucepans, etc., have been found in appendices in which it was stated the organs were apparently normal. Without microscopic examination the detection of foreign body inflammation is not possible. A foreign body may set up very little irritation and may not be active in causing an acute inflammation until it is surrounded by fecal

concretion. According to some authorities a foreign body cannot enter a normal appendix. It is reasonable to suppose that a foreign body may cause irritation and an increased production of mucus, which is deposited upon the body, producing a concretion. The presence of a foreign body in the appendix seems more apt to cause a chronic than an acute inflammation, and indirectly an acute exacerbation.

Statistics showing foreign bodies in general as predisposing causes of appendicitis present considerable variation. Up to 1906, foreign bodies had been found by the late George Ryerson Fowler¹ in $\frac{1}{5}$ of 1 per cent. of 2000 cases. Murphy² found foreign bodies in 2 per cent. of 2000 cases, and Mitchell³ in his study of 1400 cases found them to be present in 7 per cent. Other observers, Fitz⁴ and Matterstock,⁵ found

TABLE SHOWING PER CENT. OF FOREIGN BODIES,
EXCLUSIVE OF ENTEROLITHS.

No. of Cases.	Foreign Body.	Per cent. of Foreign Body.	Reported by	Year.
1400	98	7	Mitchell ³	1899
152	18	12*	Fitz ⁴	1886
169	20	12*	Matterstock ⁵	1880
429	14	3.5	Renvers ⁶	1895
106	3	3*	Kraft
67	0	0	Hawkins ⁷	1895
2000	40	2	Murphy ²	1904
200	1	0.5	Galland
460	23	0.5	Kelly, A. O. J., Deaver ⁸	1905
1000	4	0.4	Kelly and Hurdon ⁹	1905
200	15	7.5	Ferguson ¹⁰	1891
2000	1	0.2	Fowler, G. R. ¹	1906
459	16	3*	Ranvier
1000	5	0.5	Bell
250	1	0.4	Robb
103	2	1*	Ochsner ¹¹	1899
100	2	2	Morris, R. T. ¹²	1895

* About.

¹ Fowler, George Ryerson: Treatise on Surgery, Saunders, 1906.

² Murphy, John B.: Journal American Medical Association, Sept., 1904.

³ Mitchell, J. F.: Johns Hopkins Hospital Bulletin, 1899, vol. x, p. 35.

⁴ Fitz: Trans. of Association of American Physicians, 1886, vol.

i, p. 110.

⁵ Matterstock: Gerhardt's Handbuch der Kinder Krankheiten, Bd. 80, vol. i, 1880, vol. v, p. 893.

them in about 12 per cent., the former studying 152 cases and the latter 169.

In the post-mortem examination of 3750 subjects at the Cook County Hospital, the appendix was found by Heineck¹³ to contain foreign bodies in but two instances. Two cases came under William Osler's¹⁴ personal observation in the course of ten years of pathological work in Montreal. In general terms it may be said that appendicitis due to irritation and trauma from foreign bodies does not represent more than 2 or 3 per cent. of all cases. We are justified in looking upon the swallowing of certain kinds of foreign bodies with grave solicitude until they are located and removed.

Sharp, pointed metallic foreign bodies represent a class by themselves. They have rarely been found even in large surgical experience, and their occurrence represents a surgical curiosity. The common domestic pin is the most frequently encountered body of this nature found in the appendix. It is the most dangerous. McBurney and Park have seen but two cases. Abbe, Dawbarn, Deaver, Kammerer, Keen, Mayo, Ochsner, and Syms, each have seen but one case. A. O. J. Kelly found but one instance in a study of 460 cases, Kelly and Hurdon but one in 1000 cases and Bell two in 1000 cases. Ewing, Schultze, and Wood¹⁵ in exceptionally large pathologic experience have observed no cases in which pins were found in the appendix. Barnes,¹⁶ in a study of 94 cases of true foreign bodies found in the appendix, estimated that more than 52 per cent. were pins. The writer observed one instance in his first series of 50 cases of appendicitis. The

⁶ Renvers: Festschrift der Frederick Wilhelm Institut., Berlin, 1895.

⁷ Hawkins: Diseases of the Vermiform Appendix, London, 1895.

⁸ Kelly, A. O. J.: Deaver's Appendicitis, 1905.

⁹ Kelly and Hurdon: The Vermiform Appendix and its Diseases.

¹⁰ Ferguson, A. H.: American Journal Med. Sciences, vol. cxvi, p. 61, 1891.

¹¹ Ochsner, Albert: Journal American Med. Assn., July, 1899.

¹² Morris, Robt. T.: Lectures on Appendicitis, 1895.

¹³ Heineck, A. P.: Mobile Med. and Surg. Journal, 1907, x, p. 312.

¹⁴ Osler, Wm.: Principles and Practice of Medicine, 1898, p. 520.

¹⁵ Ewing, James, Schultze, Otto, Wood, F. C., personal communications.

¹⁶ Barnes, F. S.: Foreign Bodies as an Etiologic Factor in Appendicitis. Kentucky State Journal of Medicine, February, 1908.

case which stimulated interest in this subject is herewith reported.

Mrs. X., aged sixty-six, was referred to the German Hospital on August 28, 1911. Temperature 102.8°, pulse 128, respiration 28, with the following history: The chief complaint was diffuse abdominal pain. Present attack commenced three days prior to admission, with acute pain in the umbilical region which gradually increased in severity and a few hours after the onset was followed by vomiting of greenish fluid. The following day pain was felt in the right iliac fossa, and gradually spread until the entire abdomen was sore to the touch. Patient again vomited. Bowels moved following catharsis at the onset. Last movement on the morning before the day of admission. Her past history revealed the fact that three years before she had an attack of abdominal pain with vomiting and without jaundice, which was diagnosed as gall-stone colic. Following the subsidence of this attack she was well until the present. My examination showed a universally tender and rigid abdomen, somewhat distended. The face was drawn and expression anxious, a typical picture of diffuse septic peritonitis. The preparatory enema was expelled clear, without flatus or fecal matter. A right rectus incision was made. Pus under tension spurted upon incising the peritoneum. The appendix was isolated and excised. A diffuse peritonitis was present. Pus was mopped up and sponged away. Large rubber tube drains were inserted into the pelvis and down to the stump of the appendix. Upon examination of the appendix it was found to be gangrenous at the middle, perforated, and contained a large enterolith. The appendix was split, enterolith crushed, and a pin discovered entirely encrusted by fecal matter (Fig. 1). The head of the pin was directed downward. It is interesting to note that it was not the pin which had perforated the organ. The fecal concretion was very hard, distinctly laminated. From the fact that it had completely surrounded the pin it is probable the foreign body had been present a long time. It is probable that the attack of abdominal pain of three years ago was due to appendicitis. I was unable to obtain a history of the woman having swallowed the pin. After-treatment consisted in the continuance of the elevated head and trunk position. To this was added the Murphy drip. An effort was made to encourage peristaltic rest

by withholding all fluid by mouth. Repeated gastric lavage was necessary to overcome vomiting. Patient lived for 36 hours, and died from sepsis, complicated by intestinal paralysis, for the relief of which an enterostomy was performed.

J. F. Mitchell has collected 33 cases of pins in the appendix, Kelly and Hurdon have added to this list 13 cases. The writer in searching the literature has been able to find four cases which were overlooked by these observers, namely those of Amyand, Markoe, and Woolsey, and an additional case reported by Roswell Park. Patterson,¹⁷ writing upon the subject in 1906, contributed two additional cases (personal communications from J. C. Hearst and C. H. Frazier). Eleven other cases, including my own, have been reported during the last five years.

It is of historic interest to note that the first authentic case was reported by Claudius Amyand, Esq., F.R.S. This is also the first recorded case of appendectomy performed upon the human subject during life. He operated upon a boy of eleven years in 1735, for the cure of a discharging sinus in the right thigh, which evidently communicated with an irreducible scrotal hernia. Hernia had existed from infancy and for one month there had discharged from this fistula "a great quantity of unkind matter." As it was evident that the cure of the sinus depended upon that of the hernia, "which latter could be obtained by no other operation than that for Bubonocele," this was agreed to and the operation accordingly performed on the sixth of December. "This operation proved the most complicated and perplexing Mr. Amyand ever met with, many unsuspected oddities and events occurring to make it as intricate as it proved laborious and difficult." The hernia was found to be chiefly omental, "the size of a small pippin." In its interior lay the appendix cæci which had been perforated by the point of a pin. The head, covered with much encrusted stone, remained within the appendix, acting as a ball-valve and allowing at the most un-

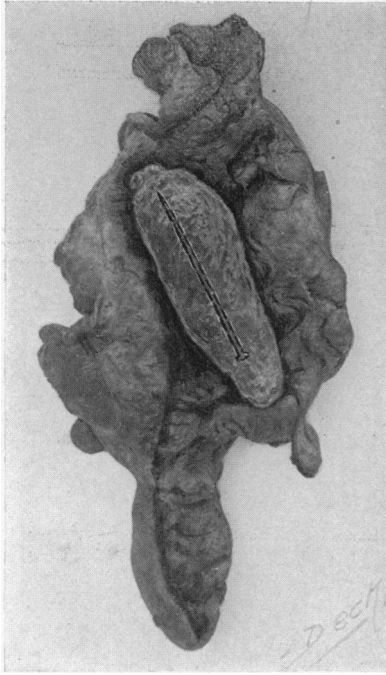
¹⁷ Patterson, F. D.: American Journal Med. Sciences, 1906, p. 859.

expected and inopportune moments a copious discharge of fecal matter over the field of operation.

Twenty-three cases have occurred in children under eleven years of age. We are justified in charging about one-third of "pin cases" to the habit of infancy and childhood of placing everything in the mouth. We would suppose that certain occupations in adults, that of seamstress, tailor, nursemaid, etc., would predispose to this condition. In point of fact such predisposing occupations were mentioned in three instances in this series. A history of the patient having swallowed the pin has appeared in five records. Twenty-four cases occurred in females and 28 in males.

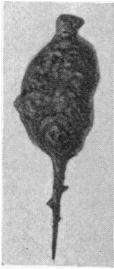
The pin may be found free from deposit, rusty, or corroded and brittle. It may form the nucleus of a fecal concretion and be either partially or entirely surrounded. In cases in which the pin has not been entirely surrounded, it is the head which is most frequently covered with soft or hard fecal matter (Figs. 2 and 3). In this series of cases 22 were encrusted, 7 completely, 15 partially. The appendix was perforated in 48 cases. One would naturally suppose that a pin would lead to rapid perforation. This is not always true. In the majority of cases there is no reason to ascribe the perforation directly to the presence of the pin in the appendix. In a few cases in which the head has been surrounded by a concretion and remained in the appendix, the point and shaft have perforated the appendix and the head has formed a ball-valve (Fig. 4). The head caused ulceration in four cases (Fig. 5). The point was the direct cause of the perforation, and had transfixed the organ in 21 cases (Fig. 6). The pin usually enters the appendix head-first; is generally found straight, but occasionally has been bent upon itself (McPhedron and Caven). In most instances it has been found to lie parallel to the long axis of the appendix. In a number of instances it has been found to lie transversely across the lumen (four cases). The head may ulcerate through one wall and the point perforate the opposite wall. McBurney found two pins in this way lying parallel

FIG. 1.



Gangrenous appendix, perforated. Diffuse septic peritonitis. Pin had not caused perforation, was completely surrounded by enterolith, and not discovered until crushed. Abdominal symptoms, 3 years; acute attack, 3 days. (Case of R. H. Fowler.)

FIG. 2.



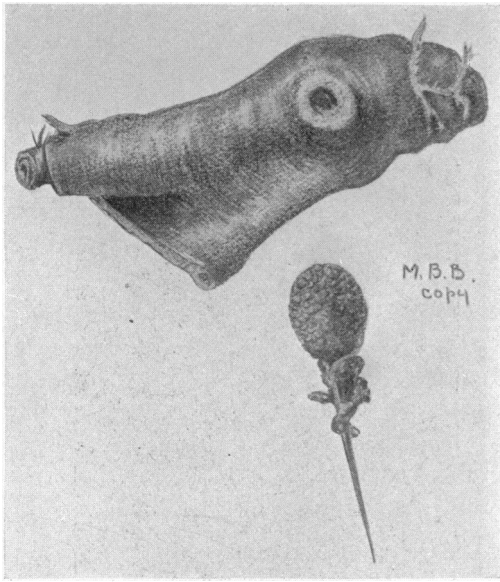
Fecal concretion surrounding head and part of shaft. Appendicular abscess sinus. Symptoms for one month. (Case of F. H. Markoe.)

FIG. 3.



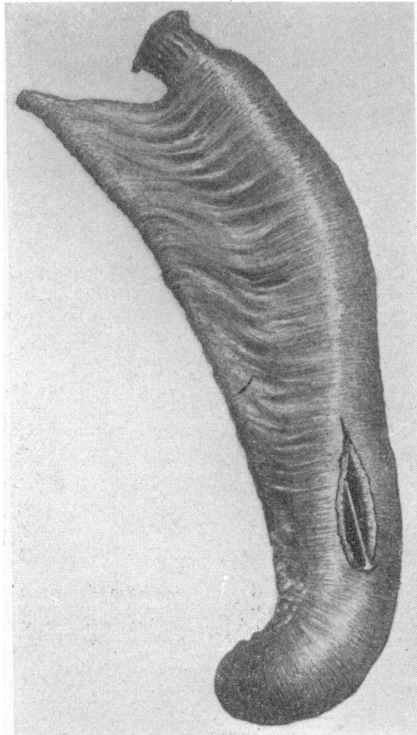
Appendicular abscess; persistent sinus. Pin when removed from appendix was completely encrusted. (Case of J. M. Spellissy.)

FIG. 4.



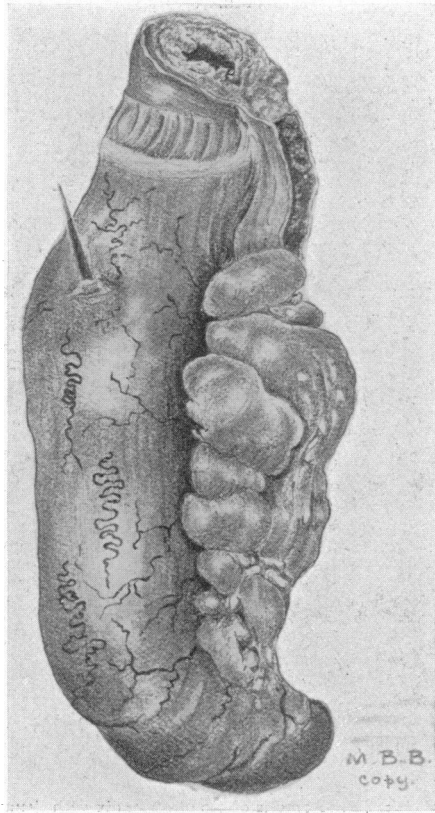
Appendix excised. Head of pin surrounded by an enterolith. (Case II, J. F. Mitchell.)

FIG. 5.



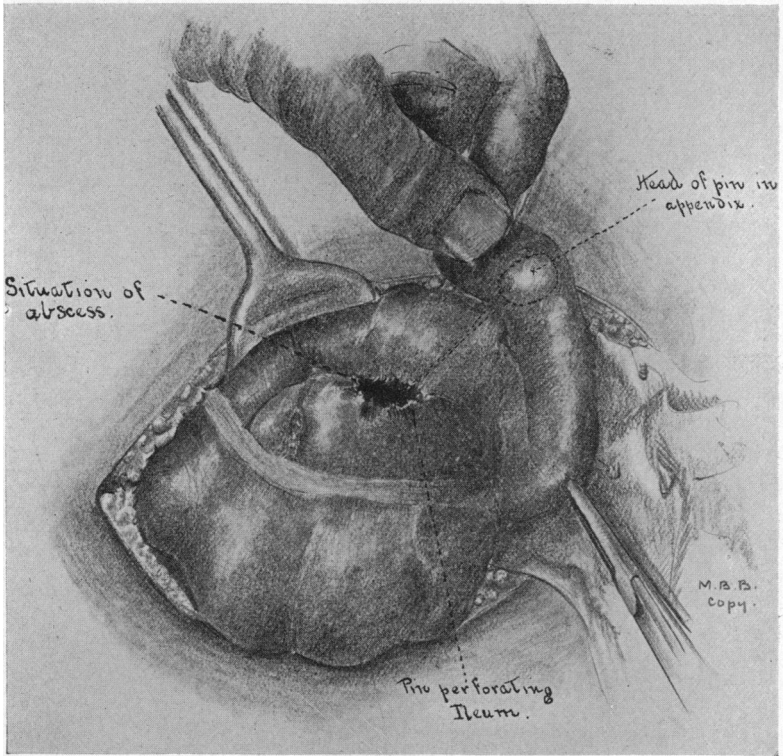
Pin in vermiform appendix, which perforated it by ulceration and caused a fatal peritonitis. (Specimen in Guy's Hospital Museum.)

FIG. 6.



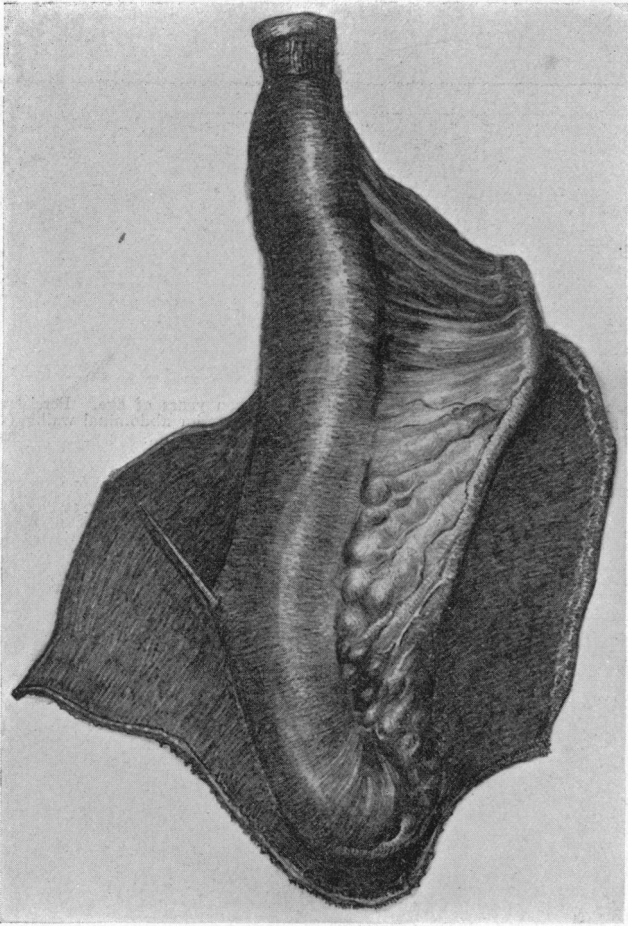
A black pin had perforated the appendix by the point. Appendix rolled up in omentum no pus. Acute attack, 10 days. (Case of John B. Deaver.)

FIG. 7.



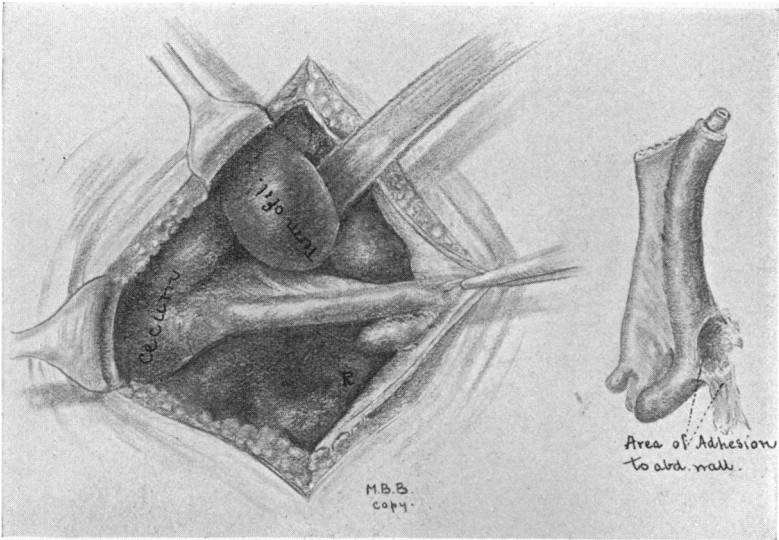
Recurrent appendicitis. Anastomosis of tip of appendix with ileum, through which pin had passed, producing perforation in opposite wall of ileum. Point surrounded by a small abscess, between caecum and ileum. (Case II of J. F. Mitchell.)

FIG. 9.



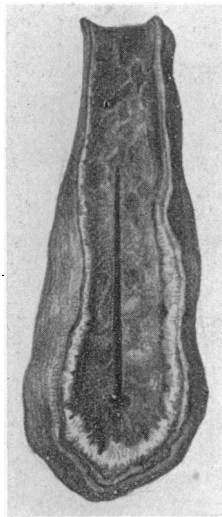
Appendix contained in hernial sac transfixed by pin. Right inguinal.
(Case of J. A. C. MacEwen.)

FIG. 10.



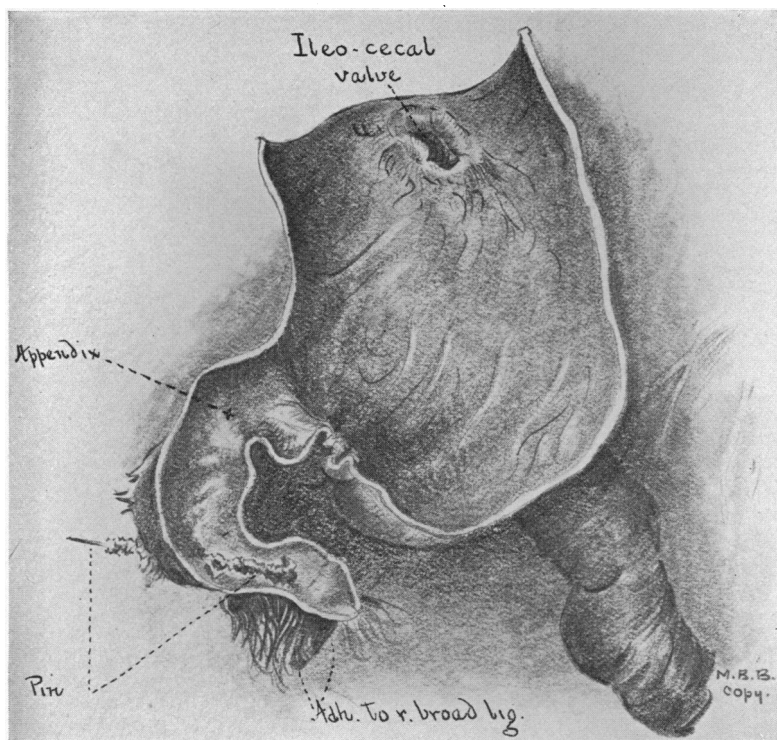
Appendix abscess opened and drained when seven years of age. Persistent sinus. Pin found in the discharge. Appendix adherent to anterior abdominal wall. (Case I of J. F. Mitchell.)

FIG. 11.



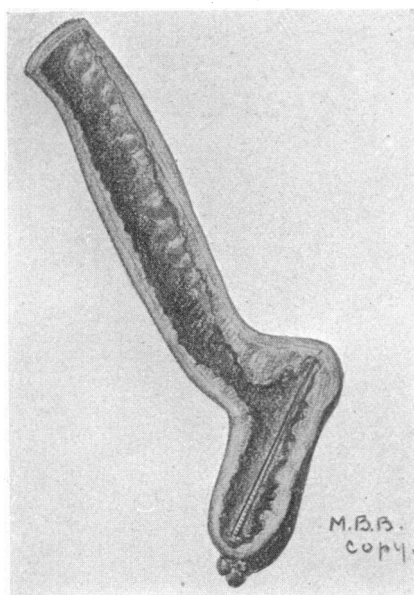
Limitation of inflamed area to portion containing pin. Appendix perforated, but not by pin. Diffuse peritonitis. Acute symptoms for a few hours. (Case of Arthur Edmunds.)

FIG. 12.



Abscess of the liver. Complained for a year or two of stitch in the side. Diagnosis, pleurisy. Operated upon for abscess of liver. At autopsy the appendix was found adherent to right broad ligament; recent peritonitis; at this point pin had perforated appendix; head remained inside; shaft and point surrounded by adhesions; pin irregularly encrusted. (Case of H. D. Rolleston.)

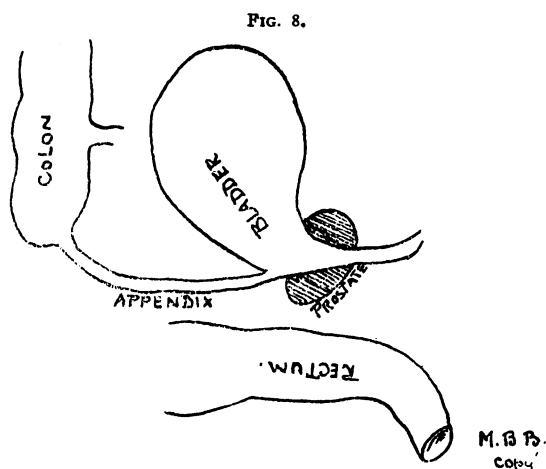
FIG. 13.



Pin, head down, encrusted. Point lay in a small pocket, which projected from the side. Appendix red, thickened, oedematous. Diffuse peritonitis. Acute attack, 5 days. (Case of F. B. Lund.)

to each other. Hirst also found two pins in an appendix which he removed. In three cases the point of the pin had engaged and become embedded in the wall of the appendix without causing perforation (Joffroy, McPhedron and Caven, and Morriata).

The lesion caused by this foreign body is variable. The appendix has been found practically normal from the outside without perforation and with but slight thickening of the walls of the organ. In other cases perforation has been found to be the result of transfixation or of ulceration by



Tip of appendix solidly incorporated in the bladder. Patient when seven years of age had dysuria, at which time pin, which he believed he had swallowed, was removed from urethra. (Case of W. W. Keen.)

the pin. In the majority of cases perforation occurred independently of the pin. Perforation by the pin directly has taken place usually near the base or middle. In one instance the point and shaft had perforated the tip of the appendix, and passing through the ileum had produced a small abscess between the ileum and the cæcum (Mitchell, Fig. 7). In a very interesting case reported by Keen, a pin had been removed from the urethra. The appendix was found at operation adherent to the bladder with which it had established a pathological anastomosis (Fig. 8). A pin encrusted by a

calculus has been found in the urinary bladder, to which organ the appendix had become adherent, having formed a communication and through which the pin had become discharged. The pathological report does not state whether the calculus was formed of desiccated fecal matter or represented a true bladder stone. It was probably a combination of urinary salts and fecal material, inasmuch as the contents of the colon was discharged into the bladder. This patient also discharged worms from the urethra in addition to fæces (Kingdon). In four cases pins have been found in appendices contained in hernial sacs (Fig. 9). In one of these, a strangulated hernia, the pin had perforated and protruded into the dartos of the scrotum (Roberts). Pins have been discovered in the remnants of the appendix in eight cases, causing a persistent sinus. A pin has been observed in the discharge from an appendicular abscess (Mitchell, Fig. 10). In another instance a pin was detected by the probe in a tract, which operation subsequently revealed led to remnants of an appendix (Parrot). Inflammation has been found limited to the portion of the appendix which contained the pin, the proximal portion being practically normal (Edmunds, Fig. 11). In eleven cases an abscess of the liver has existed. Abscess of the liver has developed most frequently in the chronic or subacute cases and in those cases which had not been recognized early. Peritonitis or abscess has not followed all cases in which the pin has perforated the appendix. Adhesions have formed about the point and shaft. Peritonitis was present in 13 cases, appendicular abscess in 30 cases. In eight cases the pin was found in the abscess cavity.

In but few instances have foreign bodies been suspected before operation. The duration of abdominal symptoms has been variable. In two cases it was stated no symptoms had existed referable to the appendix. They have been found to exist for from a few hours to 15 years. Symptoms have been chronic in the majority of cases, most showing an acute exacerbation (32 cases). Acute symptoms of less than 10 days' duration without previous attacks have existed in 13

cases. Mild symptoms with recurrent attacks or long-continued pain may be present or but a slight uneasiness in the right iliac region. Signs of rapid perforation at the onset without a history of previous disturbances are rare (Edmunds and Galzebrook). In a few instances pins have apparently remained dormant in the appendix for years, until lighted up by a blow upon the abdomen (Bell, Morriata).

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