FOREIGN BODIES IN THE INTESTINE*

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Operation for an acute perforation of the sigmoid, produced by a pin accidentally swallowed six days previously, disclosed the fact that the head and not the point presented itself through the wall of the gut. The literature of foreign bodies in the intestine is replete with interesting and unusual cases such as this. Ingested foreign bodies, varying widely in number, size, and character, may travel through a distensible tube of comparatively small diameter, causing repeated mechanical insults to the intestinal wall without producing symptoms or permanent tissue damage. In addition, the phenomena mentioned above will be considered from the standpoint of the pathological physiology and the mechanical factors involved.

From 1915 to 1926, there have been at the Presbyterian Hospital forty-eight cases of proven foreign body in the intestine. All of them were swallowed and many different types were encountered. Most of those that could be followed were evacuated without untoward symptoms. For purposes of simplification the cases have been charted according to a definite scheme which is seen in the accompanying table.

An analysis of these cases (also seen in the graphs, Figs. 1 and 2) shows the following:

ANALYSIS OF 48 CASES †

Age:

Youngest patient ..... 5 months
Oldest patient ..... 64 years
Number of patients between:

1–5	31 = 64.7	per cent.
6–10	5 = 10.3	per cent.
11–20	4 = 8.3	per cent.
21–65	8 = 16.7	per cent.

Sex:

Female	26 = 54.2	per cent.
Male	22 = 45.8	per cent.

Type of Foreign Body:

Sharp	Pins	Straight pin	6	False molar with plate	2
		Bar pin	2	Tack	1
		Pin with large head	3	Nail	1
		Screws	4	Fishbone	1
		Needle	2	Chicken-bone	1

Total .. 23 = 47.92 per cent.

* Read before the Section on Surgery of the New York Academy of Medicine, December 3, 1926.

† The common factors for all these cases were age, sex, and type of foreign body. Thirty-one cases could be followed completely and these are analysed separately with additional constant factors.

Dull
- Coins: Penny ..... 5; Nickel 3
- Closed safety pins 4
- Toys: Whistle ..... 2; Metal horse 2
- Fruit stone, seeds 3
- Ring 2
- Pencil 1
- Piece of metal 1
- Stomach tube 1
- Tube with radium 1

Total ..... 25 = 52.08 per cent.

ANALYSIS OF 31 CASES (WITH FOLLOW-UP)

Number of sharp foreign bodies that passed without complications—10 out of 12 = 83.3 per cent.

Number of dull foreign bodies that passed without complications—15 out of 19 = 79 per cent.

Total number passed—25 out of 31 = 80 per cent.

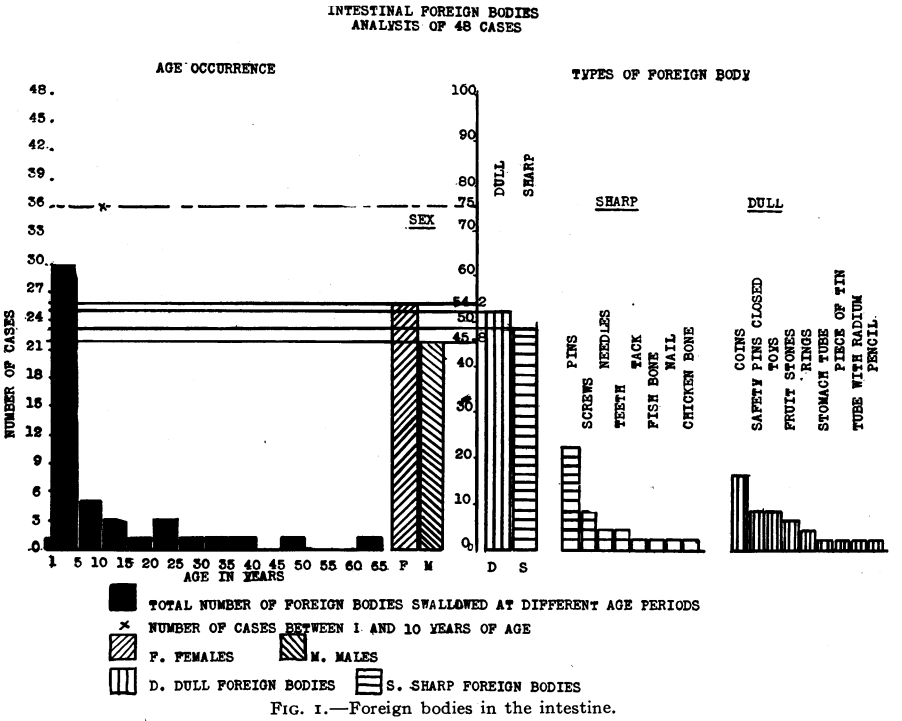

FIG. 1.—Foreign bodies in the intestine.

Symptoms referable to those foreign bodies that were passed—4 (16 per cent.) had symptoms divided between abdominal pain and vomiting.

Symptoms referable to complications:

1. Acute ileus—case died.
2. Chronic ileus—case died.
3. Perforation of sigmoid with peritonitis—case recovered.
4. Acute appendicitis—case recovered.
5. Pelvic peritoneal abscess—case recovered.

Longest time that foreign body stayed in any one part of intestine.

Nail in cæcum—3 weeks.

Shortest time in which foreign body was passed { dull—20 hours. / sharp—2 days.

Longest time in which foreign body was passed { dull—4 weeks. / sharp—3 weeks.

Average time for passage of sharp foreign bodies—7.33 days.
Average time for passage of dull foreign bodies—5 days.
Average time for passage of all foreign bodies—6.17 days.
35 per cent. of all the cases had catharsis. A little less than half of these had sharp foreign bodies. None developed complications.
To summarize, it appears from the foregoing analysis that:

1. The foreign bodies were swallowed accidentally or by those who knew no better.

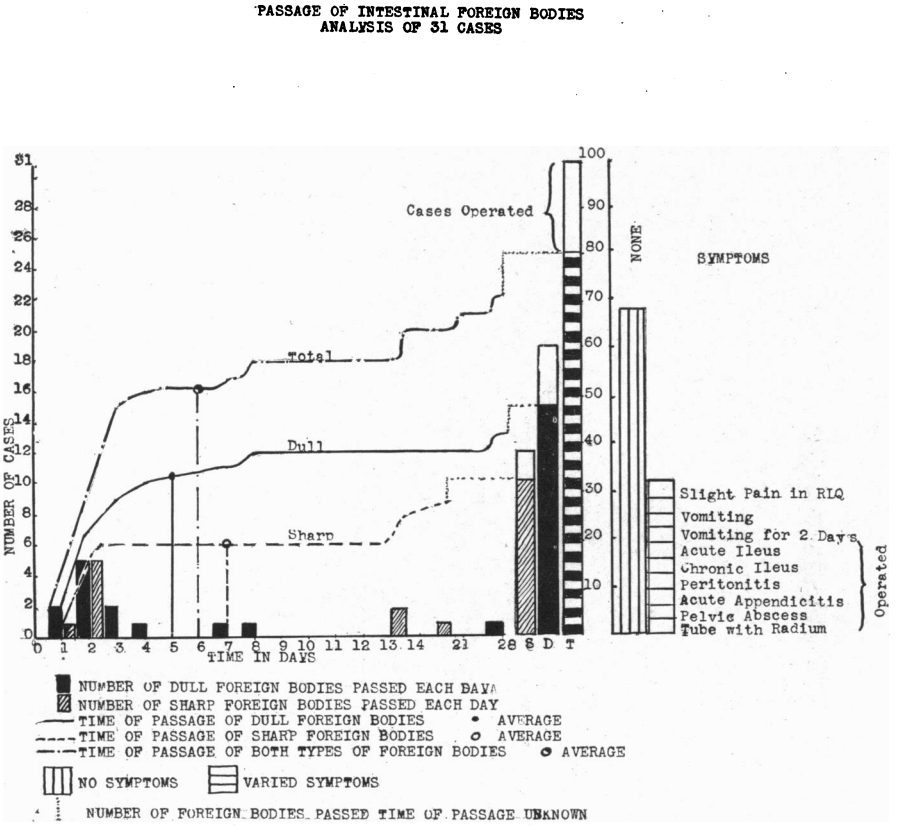

FIG. 2.—Foreign bodies in the intestine.

2. The largest number (75 per cent.) occurred among babies and children under ten years of age.
3. The cases were about equally divided between the sexes (not very significant in view of No. 2).
4. Dull objects were slightly preponderant.
5. Among sharp objects pins were preponderant.
6. Most of the foreign bodies (80 per cent.) were passed.
7. Of the sharp foreign bodies only two (15 per cent.) perforated the gut.
8. The minority of cases that pass foreign bodies have symptoms or signs.
9. It takes a sharp foreign body a little longer to pass than a dull foreign body.

Practical Anatomy and Movements of the Intestine.—The intestinal canal is a long, elastic, distensible, and motile tube, varying in diameter at different portions and characterized by natural folds in its wall, valvular formations, angulations, and mobility throughout its greater extent. Nor-

mally, it offers points of possible delay or obstruction to a foreign body as follows:

1. The junction of the second and third part of the duodenum, due to the flexure and the sphincter muscle described by Ochsner.

2. The ileocæcal region because of the angular insertion of the ileum.

3. The lumen of the appendix, which may harbor a foreign body due to incompetency of the ileocæcal valve.

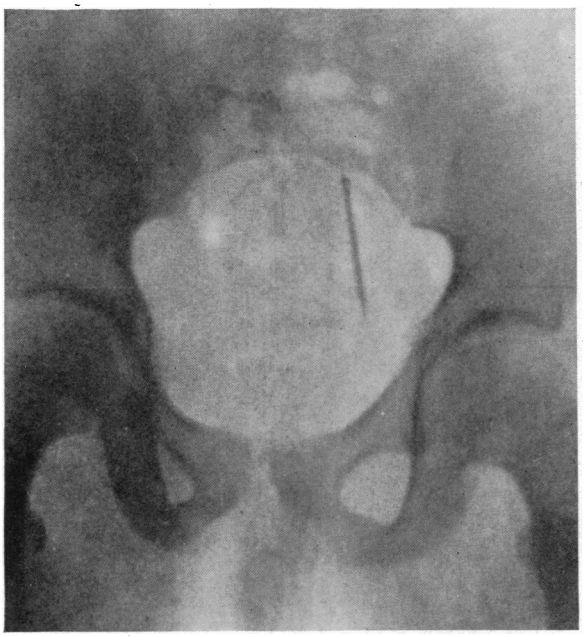

FIG. 3.—X-ray picture of pin in intestine of eleven-year-old girl the head of which perforated the sigmoid six days after it was accidentally swallowed.

4. The junction of cæcum and ascending colon, because of the presence of the "frenulum valvulæ coli."

5. Flexures and haustræ of the large intestine, including the rectal ampulla and crypts of Morgagni.

In order of frequency, the rectum, cæcum and sigmoid probably offer the best anatomical sites for the arrest of a foreign body. The movements of the intestine which normally are controlled centrally, through extrinsic nerves, and peripherally, by the neuromuscular mechanism in the wall of the intestine, may be grouped under the following heads:

1. Long tonic contractions (pendular movements).
2. True peristaltic contractions.
3. Rhythmic segmental contractions.
4. Antiperistaltic contractions, present mostly in the large intestine.

A foreign body might normally encounter a bar to further progress by one of the anatomical factors mentioned above. On the other hand, the tendency is for propulsion forward by intestinal movements, which in themselves might cause the foreign body to come in intimate contact with the intestinal wall. Nature's usual protection and reaction against this contact will be discussed later.

Reference to Poulet's [1] classic on foreign bodies in general and to Peter's [2] short monograph will give many amazing, unusual, and curious examples of foreign bodies in the intestine. Their presence may be due to migration from a neighboring organ, cavity or extremity, to accidental or deliberate ingestion or to introduction through the anus into the rectum. Deliberate

ingestion may result from an act of insanity, a dare, a habit or medicinal therapy. Accidental swallowing of foreign bodies is by far the most common. Fish bones, chicken bones, and fruit pits, normally present in food, are frequently swallowed in careless and rapid eating. On the other hand, individuals may unknowingly swallow foreign bodies such as slivers of wood in bread. A foreign body placed in the mouth temporarily may be swallowed through absentmindedness or a sudden inspiratory effort. I recall a patient who went to sleep with a toothpick in his mouth and swallowed it. In our series, St. John removed from the duodenum 50 mgs. of radium in a brass container. This had been placed in the nose for an ethmoidal condition and was accidentally swallowed.

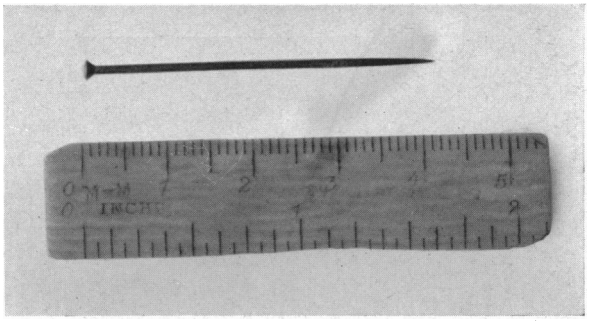

FIG. 4.—Pin shown in Fig. 1 after operation.

The ingestion of foreign bodies by the insane is a common occurrence. Ross[3] reports a case of an insane woman, who, after a six months' history of lower abdominal pain was found to contain twenty pieces of wire in a resected piece of ileum. Stough[4] cites a case of an adult insane male who swallowed a knife six and one-quarter inches long with a two and one-quarter inch blade. In several months a fecal fistula formed in which the knife was found. A female inmate of sixty-six was autopsied by Hill.[5] A palpable mass in the right iliac fossa, the size of a tangerine orange, was found to be a hair-ball in the ileum. Hosford[6] reports post-mortem findings on a lunatic, who, while alive, had been known to pass stones and pieces of wood and cloth. Autopsy showed innumerable articles, including wood, linens, neckties, and stones, in the jejunum, ileum and sigmoid, with a marked chronic pelvic peritonitis. It is remarkable that there was no ulceration or perforations of the gut wall. During a laparotomy on a neurotic woman, presumably for appendicitis, Gray[7] found the bowel perforated by a hairpin which had entered the abdominal wall. There were present also ten and one-half hairpins, seventy-eight ordinary pins, one nail, and one piece of steel three-quarters of an inch long. The patient finally admitted that she was in the habit of putting one or two pins in her mouth before going to bed in the event that she should awake and require them.

Pringle[8] records the case of a man of twenty who swallowed seven nails one inch long "on a dare." Eight days later he came to operation and the nails were found in the cæcum. He died of a post-operative ileus and autopsy showed early necrosis of cæcum and ascending colon. Another patient (Genglaire[9]) swallowed thirty frogs and had no symptoms until they reached the rectum. A large mass of tangled frog bones was extricated manually.

Material taken for therapeutic purposes such as bismuth or bran might accumulate in an already pathological colon and eventually create a foreign body. Vegetable fibres have been known to do the same. It is a well-known fact that the residuum of oatmeal, consumed in large quantities by many inhabitants of Ireland, may cause intestinal obstruction.

Women and babies occasionally make a habit of swallowing one particular

type of foreign body. As an illustration, we saw a colored child who was accustomed to pluck its own crimpy hair and swallow it. In 1914, Heazlit [10] reported 70 cases of hair-ball in the gastro-intestinal tract which he had collected from the literature. The habit of hair swallowing is practically confined to females, who are, as a rule, normal mentally. Operative therapy is usually necessary to relieve symptoms.

We will mention only in passing, the presence of gall-stones or scybalous masses in the intestine.

Although almost any type of foreign body may gain access to the intestine, those most frequently found are metal, bone, fruit pits, glass, hair, wood and cloth. Deliberate ingestion, usually accomplished with less choking and pain than accidental ingestion, accounts for the remarkable size of some of these bodies. A 6½-inch dinner fork with a 4-inch handle was swallowed by a female of twenty-five,[11] a 2½-inch scarf pin with a small glass ball at one end by a child of two,[12] a closed pocket knife 2½ inches long by a child of seven months,[13] a 2-inch iron nail by a two-year-old baby,[14] a 3¾-inch tooth-brush by an infant eight weeks old,[15] and in our series a 3-inch nail with a large head by a boy of six.

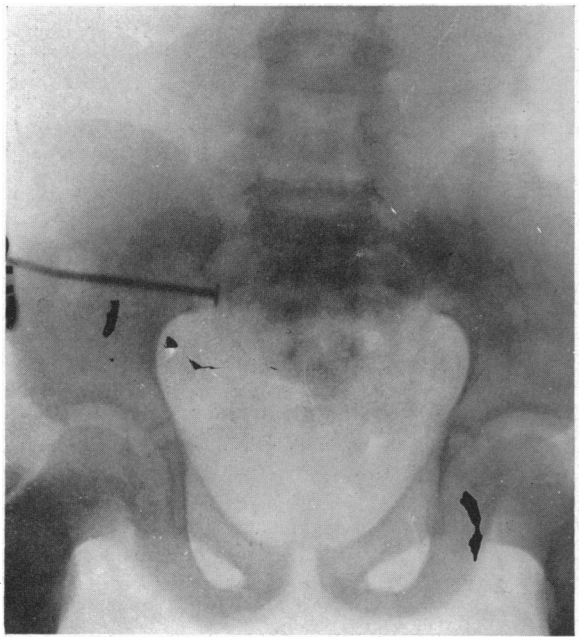

FIG. 5.—Nail which remained in cæcum of six-year-old boy for three weeks and was then suddenly passed after a barium enema.

What happens to the foreign body in the intestinal lumen and the reaction that may be produced in the intestinal wall constitute a most important aspect of this entire subject. Many are recovered in the same condition as before ingestion, but the intestinal juices may cause a metal object to break in two; or foreign bodies may be surrounded by some natural protective coat consisting of mucus, unabsorbed food or fæces. Glass is usually rounded off by the digestive juices, and Simmons and Von Glahn [16] found that the ingestion of ground glass has no toxic effect nor does it produce any permanent lesion on the gastro-intestinal tract of dogs. Faber [17] gave food with fishbones to adults, some of whom had a normal gastric acidity or hyperacidity and some of whom had a subnormal acid gastric content. In the former group the fæces showed no fishbones, while they were present in the latter. He infers that in the first instance normal decalcification could take place.

Although nature's protection facilitates the passage of most foreign bodies, symptoms frequently develop from obstruction, traumatism to or perforation of an organ. Thus we may find a peritonitis, peritoneal abscess, or fistulous communication between intestine and intestine, or between intestine and some other organ, such as the bladder. Other foreign bodies that are thin and sharp may perforate the gut, producing few or no symptoms, and travel through the peritoneal cavity or along muscle planes or into a large blood-vessel. Such a procedure usually takes a long time. David [18] cites

FIG. 6.—Unknown type of foreign body causing intestinal obstruction.

a case of an adult who, after swallowing a fishbone, had a cystitis for twenty-nine months. The bone was then passed per urethram, having migrated from the rectum into the bladder. Cordier [19] reports the case of a boy of sixteen, who had had an attack of pain in the right lower quadrant three years previously, in whom a diagnosis of typhoid fever was made. Subsequently he had urinary tenesmus with tenderness in the hypogastrium. Two stones were found in the bladder, one of which was incorporated with a veil-pin which had protruded into the bladder. A sane but neurotic male of thirty was operated on by Bell [20] for abdominal pain. He found a needle with one end in the stomach and the other in the liver, another needle free in the gastrocolic omentum, and a 4-inch hatpin piercing the duodenum. Nine years after a man had swallowed a darning needle, it was extracted from the posterior aspect of the hip-joint (Woodman,[21]). Mueller [22] had a case in which a pin was found lying across the ureter nine years after ingestion. In a woman who came to autopsy after having had an œdema of both lower

extremities, Thompson [23] found a needle with a surrounding thrombus in the inferior vena cava. Many cases have been operated presumably for appendicitis, in which a foreign body in or near the appendix was found to be the real etiological factor, Pike,[24] McCrae,[25] Speese,[26] Hertz.[27] In an analysis of 63 cases of foreign body appendicitis, Fowler [28] states that, of the larger foreign bodies, straight pins are found most frequently and that the symptoms are chronic in the majority of cases. Bidwell [29] found foreign bodies in about 20 per cent. of the appendices that he removed, and he believes that symptoms were produced not so much by the foreign bodies as by concretions formed around them.

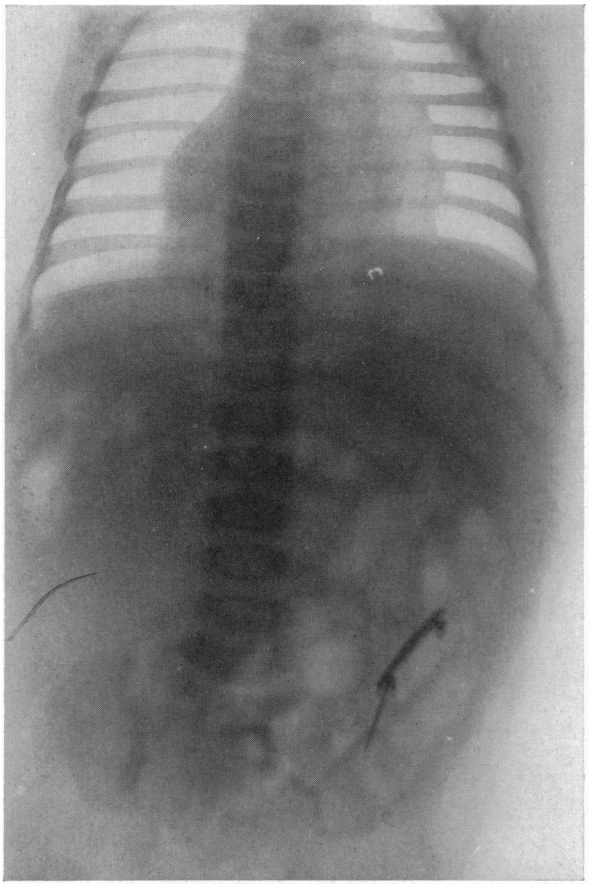

FIG. 7.—Röntgenogram of open bar-pin in intestine of five months old baby, passed in three days.

Two Italian observers, Zoja [30] and also Omboni,[31] were impressed with the usual favorable outcome of foreign bodies in the intestine in humans and experimentally in dogs. To ascertain the reaction of the intestinal wall to foreign bodies which permits their successful progress and evacuation with such remarkable frequency, Exner [32] conducted a series of beautiful and carefully controlled experiments on the intestine of dogs and cats. He found that if the mucosa of the small intestine is stroked or pricked, an anæmic area is formed after a period of time varying from several seconds to two minutes. In the centre of this area there is an inconstant concavity surrounded by a muscular and contractile wall. Reference to Fig. 10 will show the reactions noted in confirmatory experiments on the dog's intestine. The same results were noted when the experiment was performed with the sero-muscular layer removed. In both cases these phenomena disappeared in about one minute. In the second experiment the histological examination showed that the concavity was due to contractions

of the muscularis mucosa and of the fibres between the lymph follicles and the glands, and that the anæmic area was produced by compression of the blood-vessels caused by these contractions. An exsected piece of intestine showed the same reactions as above, proving that the ganglia in the intestine itself are the controlling factors in their production. These results seem to be less constant in the large intestine.

Continuing his experiments, Exner proceeded to feed long-pointed glass splinters to cats and found that the places where the glass touched the stomach wall were drier than the surrounding mucosa. There was no wound, but at the point of contact a concavity was formed in an area of anæmia. In the small gut the glass was also embedded in concavities, but in the large intestine they were found in the natural folds. The serosa presented nothing abnormal.

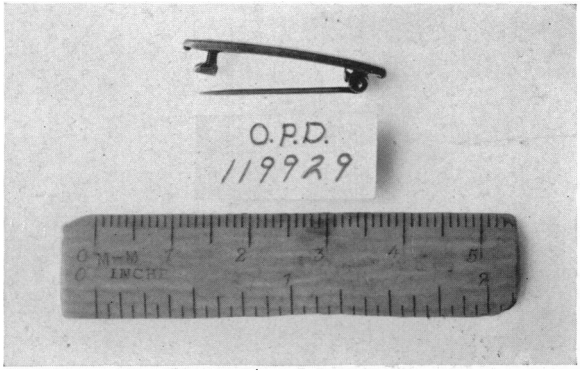

FIG. 8.—Pin seen in Fig. 7.

A dog on which he experimented was given food in which fifty needles were incorporated, one-half of which had their points isoperistaltic and the other half points antiperistaltic. After twenty-four hours, forty-eight needles had been passed with the heads isoperistaltic and the other two with the points isoperistaltic.

Summarizing other experiments, about 800 needles were introduced, points isoperistaltic, into the stomachs of dogs and cats. All the animals were well before they were killed, and autopsy showed no peritonitis, and no visible injury to the mucosa. Furthermore, the number of needles passed with heads isoperistaltic were found in a ratio of 7 to 3 that were passed with points isoperistaltic. This means that the intestine has a tendency to pass pointed foreign bodies with blunt end forward.

The significance of these observations brings us to the following consideration of the reasons why pointed foreign bodies in the majority of cases proceed through the intestinal tract with heads isoperistaltic and are passed through the anus in the same position:

1. If the contents of the intestine are entirely fluid, the centre of the column moves faster than the periphery. At the mucosa, where the point of a foreign body may impinge, the rate of movement of the fluid content is practically negligible, and therefore the head, which is in the faster current, is pushed forward.

2. If the contents of the intestine are firm, and if a pin, traveling with the point forward, touches the mucosa, a concavity forms between the mucosa

and column of fæces at the point of contact, and the fecal mass pushes the head of the pin in an isoperistaltic direction.

3. The muscular boundary of a concavity may stop the point of a pin and the adjacent fæces, causing part of the fecal mass to turn and force the head forward.

4. The point of a pin may get caught in the natural folds of the gut, and any of the three preceding factors may operate to push the head of the pin forward.

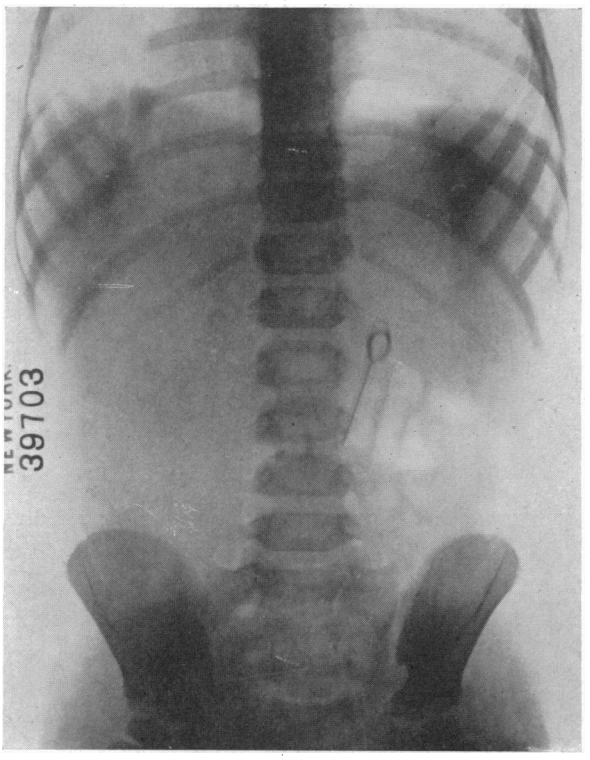

FIG. 9.—Pin in intestine of three-year-old child, passed in fourteen days.

With this knowledge of the mechanism of nature's protection against injury or perforation of the intestinal wall by foreign bodies, it is easy to understand how some foreign bodies may lodge in the distensible tube for a long time, especially when they have been completely enveloped by undigested food particles or fecal material. In a six-year-old boy in our series a 3-inch nail apparently stayed in the cæcum for three weeks and then was suddenly passed. Smith [33] reports a case of a woman who swallowed a darning needle 1 11/16 inches long and passed it twenty years later!

In about 90 per cent. of the cases of sharp foreign bodies analyzed in our series there was no perforation. When perforation does occur it probably is caused by pressure necrosis superinduced by a local inflammatory process, especially in the large intestine, where bacterial flora are profuse. Violent peristalsis or the act of defecation might drive the foreign body into the intestinal wall. Anatomical and pathological conditions, such as the narrow lumen of the appendix, the sacculations of the large gut, carcinoma, tuberculosis, diverticula, hernia, or any factor causing a chronic obstruction, will clearly predispose to perforation. Perforation in the large intestine is more frequent since the narrower lumen of the small intestine makes it difficult for the foreign body to turn around and its slow vermicular action makes lodgement or perforation here unlikely.

Most foreign bodies in passing through the intestine produce no symptoms. When symptoms occur the diagnosis must be made on a careful history and a physical examination followed by the various laboratory aids, especially the X-ray. Such symptoms may be summarized as follows:

1. A mild cramp when they pass through the intestine naturally.
2. A cramp or pain in one spot when they pass through slowly.
3. Diarrhœa and mucus or blood in the stool from irritation of the intestinal mucosa.
4. Intestinal obstruction.
5. Pain, tenderness and constitutional symptoms from inflammation and pressure necrosis.
6. Perforation.

Treatment.—The immediate course to be pursued following the ingestion

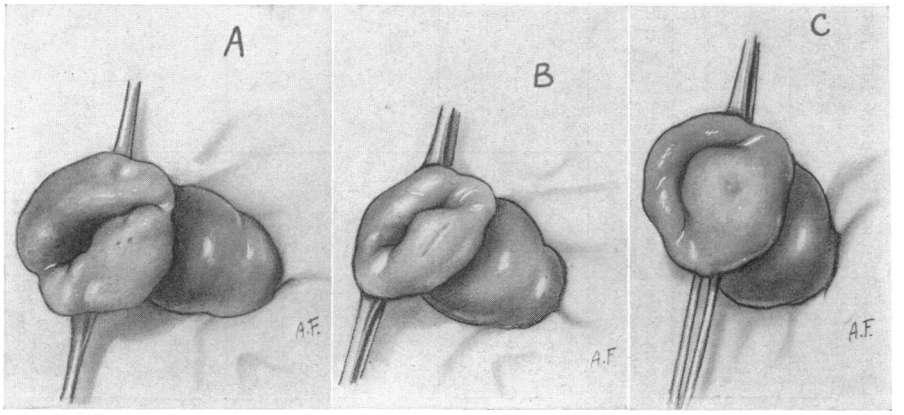

FIG. 10.—A. Showing two small concavities produced on the mucosa of small intestine of dog by gentle pricks of needle point. They were preceded by temporary area of anemia and appeared in about two minutes, gradually becoming deeper and slowly disappearing in about ten minutes. B. Similar trough-like reaction produced by gentle stroke of needle point. It disappeared in about fifteen minutes. C. Concavity with surrounding area of marked anemia produced by pushing into mucosa gently with blunt end of artery clamp. The anemia persisted for about twenty minutes, and the concavity fifteen minutes.

of a foreign body is expectant. The size and the nature of the foreign body, the possibility of its localization, and the condition of the intestine itself will decide the wisdom of a subsequent radical procedure. The fear and the actual danger of the potential harm from the foreign body are never to be discounted. The unexpected may occur at any time from an apparently innocent foreign body. Close observation and immediate operative therapy when the symptoms so warrant are of paramount importance. On the other hand, we have shown by statistics and by experimental work that there is a natural tendency for the spontaneous passage of foreign bodies without untoward symptoms. To help nature, two factors are essential: the prevention of intestinal hypermotility, and the ingestion of such material as might aid in the formation of a protective coat around the foreign body. The idea of hastening the exit of a foreign body by the use of a cathartic is, I think, a mistake. Powerful intestinal contractions may drive the foreign body into or through the intestinal wall. Bran, agar-agar, whisps of cotton, pultaceous

SYNOPTICAL TABLE OF CASES OF FOREIGN BODY IN THE INTESTINE

Hospital No.	Age	Sex	Foreign body	Symptoms	Treatment	X-ray findings and fluoroscope	Result	Complications
67277	9	Male	Melon seed and hairs in appendix	Acute appendicitis	Appendectomy		Improved — perhaps foreign body cause of symptoms. As examination of appendix and abdomen negative	
Dr. Carp Private case	11	Female	Bank pin	None until 7th day—acute lower abdominal pain with signs of peritonitis	Dietetic until perforation, no castor oil—cereals, agar-agar, bread	Six days after ingestion pin in L. L. Q.	Cured after operation (laparotomy, extraction of pin drainage)	Head of pin perforated sigmoid, local peritonitis.
50788	64	Female	Numerous foreign bodies (fruit seeds, leaves, fecalites)	Previous acute ileus (volvulus of small intestine) followed by operation with reduction of volvulus. Chronic ileus followed by an acute attack	Ileostomy (13 days later) Removal of foreign bodies. Removal of specimen		Died from post-operative complications	Chronic ileus and ulcer of colon.
55115	35	Female	Prune pit covered with calcium phosphate crystals	Acute ileus	Exploratory operation		Died	(Autopsy) Foreign body impacted in sigmoid at point of stenosis by adhesions—resulting ulcer—and perforation—associated acute diphtheritic colitis.
62323	24	Male	Piece of bone (bird?) 2.5 cm. long and 2 mm. in diameter	1. Pain in L. U. Q. radiating to L. L. Q. and lasting 3 weeks 2. Palpable mass in L. L. Q.	Incision and drainage of pelvic abscess with removal of foreign body. (Abscess surrounded by large coils of small intestine and sigmoid)		Improved	Peritoneal abscess
64370	15	Female	50 mg. radium in brass container which screened all but gamma rays. (Radium had been placed in nose for an ethmoidal condition)	None	Enterostomy, enterorrhaphy, and removal of foreign body from duodenum (operated on same day as swallowed)	X-ray—radium tube in region of stomach (apparently)	Cured	

51797	6	Male	Nail—3″ long	Slight pain in R. L. Q. —of short duration	Castor oil by mother. Bowels kept open by enemas when needed. Given barium enema day before passing of foreign body	Two days later in cæcum. Repeated X-rays during following 3 weeks, nail apparently remaining in cæcum	Passed 3 weeks later	
23350	3	Female	Pin with large top	None	Mucilagenous foods and cotton	In second portion of duodenum	Passed 14 days after ingestion	
17807	11 mos.	Female	Safety pin (closed)	Vomited once, otherwise negative	None mentioned	Pain in abdomen	Passed 3 days after ingestion	
30458	2½	Male	Screw ¾″ long	None except for slight tenderness in R.L.Q.	Soft diet containing much residue plus mild cathartic	Screw in pelvis 24 hours later	Passed screw 3 days after ingestion	
94811	1 yr. 8 mos.	Male	Penny	None	Castor oil	Fluoroscope ½ hour later—penny in fundus of stomach	Passed in 20 hours	
130507	2	Male	Toy metal horse ½″ square	None	Castoria	Foreign body in duodenum ½ hour later. In lower right quadrant (cæcum or terminal ileum one day later	Passed 2 days later	
84898	16 mos.	Female	Lead pencil 3 cm. long, blunt point	None	Dry bread, prune juice, S.S. enema		Passed in 24 hours	
18274	3	Female	Tin not painted, 1″ x 1½″	None	Castor oil (by mother) vegetable diet—agar-agar	24 hours later, foreign body seen in R.L.Q.	Passed in 74 hours	
120086	2	Male	Tack	None	Rest, bulky food, mild cathartic	10 minutes later, tack in stomach	Passed in 3 days	
80997	2	Male	Penny	None	Castor oil		Penny appeared in stool 2 days later	
119929	5 mos.	Male	Bar pin (open) 1¼″ long	None		On same day pin seen in stomach. Pin in R.L.Q. 2 following days	Passed 3 days after ingestion	
136220	5	Female	Straight pin	None	Bed, no cathartic	Pin in decending colon or proximal sigmoid 2 days later	Passed pin 3 days later	
63672	16 mos.	Female	Screw	None	Bread and castor oil	Foreign body in lower abdomen one day after ingestion	Passed foreign body 2 days after ingestion	
79560	7	Female	Penny	Vomiting 2 days	Castor oil		Passed in one week	
86626	5	Female	Safety pin (closed)	None	Mashed potatoes, pan cakes, water	Pin in small intestine to left side of abdomen below umbilicus—6 hours after ingestion	Pin passed 2 days after ingestion	

SYNOPTICAL TABLE OF CASES OF FOREIGN BODY IN THE INTESTINE—*Continued*

Hospital No.	Age	Sex	Foreign body	Symptoms	Treatment	X-ray findings and fluoroscope	Result	Complications
147269	2½ yrs.	Female	Safety pin (closed)	None		Pin in L. U. Q. (fundus of stomach) 2 days after ingestion. 4 days later pin in same position	Passed 8 days later	
138862	14 mos.	Male	Safety pin (closed)	None		Pin in stomach same day	Passed 2 days later	
136220	5	Female	Straight pin		Bed, no cathartics	Pin in stomach with head toward pylorus, ½ hour later. Pin in descending colon on proximal sigmoid 2 days later	Passed 3 days later	
130507	2	Male	Toy horse (metal) ½" square	None	1 tsp. castoria	In duodenum, 15 minutes later. In cæcum or terminal ileum 1 day later	Passed 2 days later	
129435	3	Male	Penny	None	Castor oil	None	Passed in 4 days	
142431	24	Female	Needle	Pain in R. L. Q.	Cathartic	Needle in L. U. Q.	Passed in 2 weeks	
128735	3½	Male	Nickel	Pain in R. L. Q.	Cathartic	Needle in stomach	Passed in 4 weeks	
55412	27	Male	Intra-nasal feeding tube	None	Fluids by mouth. *Exploratory operation 14 days later*—tube found in cæcum but not removed	*4 days* later—object in duodenum, *23 days* later—in terminal ileum or rectum, *28 days* later—no evidence of tube	Tube is discharged—date unknown	Infection of abdominal wound healed 24 days later.
118098	16	Male	Straight pin	None	Bulky food	Fluoroscope—one hour later shows pin in stomach	Passed—time unknown	
7914	5	Female	Whistle	None	Large meal followed by emetic (advice of Dr. Lambert who believes foreign body will not pass pylorus)	3 days later foreign body in stomach	Passed in several days	
68435	3½	Male	Ring	None	Food with much carbohydrate	Ring in stomach or duodenum 4 days after ingestion	Lost to follow-up	
19844	10 mos.	Female	Pin with large top	None	Soft diet with wisps of cotton in oatmeal—also potatoes	Two days later pin in stomach	Observed in ward for 6 days—foreign body not noticed in stools	
48281	8½	Female	Hair pin 3" long	Nausea and pain in epigastrium for 2 days	Castor oil		Lost to follow-up	

98275	26	Female	Tooth with sharp screw attached	Vague pains in epigastrium	Diet		Lost to follow-up	
96197	2½	Male	Nickle	None	Castor oil (by mother)—bulky food	Following day foreign body in L.U.Q. In R.L.Q. (cæcum?) 1 week later	Not passed after 1 week's observation	
54873	38	Female	Fish-bone	None—symptoms of existing ulcer and gall-stones	Gastro-enterostomy for ulcer (duodenal) and gall-stones—fish-bone found in course of operation, situated subserously and no ulcer in its vicinity	None pertaining to fish-bone	Improved	
55871	14	Female	Pin	Some generalized abdominal tenderness		Pin left in left iliac fossa at junction of descending colon and sigmoid—few minutes later shadow seen 3″ higher in descending colon	Lost to follow-up	
NOTE.—No symptoms, treatment, etc.—foreign body discovered in course of general physical examination in a case of acute rheumatic fever.								
18222	2 yrs. and 9 mos.	Female	Needle	None at first, later constipation and one vomiting	Regular diet with oatmeal and potato	Two days later needle in L.U.Q. Repeated X-rays showed needle in same locality	Discharged as unimproved—case not followed	
7520	25	Male	False molar tooth with plate attached (2 cm. long)	Immediate "sticking" sensation in left sub-diaphragmatic region. Otherwise negative	Bulky food	Object seen in region of duodenum—same day	Lost to follow-up	
128906	3	Female	Small screw ½″ long	Abdominal pain—not severe	Castor oil, soft food with bread	One day later screw in descending limb of duodenum	Lost to follow-up	
113981	7	Male	Black-headed pin	None	Bulky food	Pin in stomach on same day	Lost to follow-up	
109436	1	Male	Small ring	None	Castor oil, oatmeal gruel and agar-agar	On same day foreign body in antrum of stomach	Lost to follow-up	
108894	2½ yrs.	Male	Pin	None	Castor oil	Pin in region of cæcum (?)	Lost to follow-up	
147786	46	Male	Small plate with 2 teeth	None			Lost to follow-up	
140057	3	Female	Nickle	Slight gagging at time of ingestion. Otherwise negative		In cardia of stomach (½ hour after ingestion)	Lost to follow-up	
148905	3	Female	Whistle	None	None	Whistle in stomach	Lost to follow-up	
151335	3½	Female	Penny	None	None	None	Lost to follow-up	

and stodgy food leaving a residue, such as oatmeal, vegetables, figs, raisins, et cetera, with the addition of a lubricant such as mineral oil, would help to surround the foreign body with a protective coat. When present in the large intestine longer than expected, barium or oil enemata may be used. If symptoms are produced when a foreign body gets to the rectum, it is better to remove it with the finger or proctoscope. Ambulatory treatment is not contra-indicated, although rest is to be desired.

CONCLUSIONS

I. Most foreign bodies of the intestine are ingested accidently and in the majority of cases are evacuated spontaneously regardless of their size, shape, material and number.

II. Trauma from intestinal foreign bodies is guarded against by the protective mechanism of the intestinal wall which produces concavities with muscular boundaries on the mucosal aspect at the points of contact (Exner). This causes an increase in diameter of the intestinal lumen which facilitates propulsion forward of the foreign body by peristalsis and movement of intestinal contents.

III. Foreign bodies, pointed at one end, have a tendency to pass through the intestine with point antiperistaltic and to be evacuated blunt end forward. In this position the point is less likely to impede the progress of the foreign body through the intestinal canal and consequently foreign bodies with blunt end forward will be evacuated more quickly than those with point forward.

IV. A foreign body may travel from the intestine into another organ or into the peritoneal cavity and from there into muscle planes, with little or no symptoms. When late symptoms occur they are referable to the other organ or tissue involved.

V. Conservative treatment of intestinal foreign bodies is indicated in the large majority of cases as shown by statistics and experimental work. Careful observation, rest, and food, or any substance leaving a large intestinal residue may help the successful passage of a foreign body. Cathartics are interdicted.

VI. Obstruction or acute perforation of the intestine or impaction of a foreign body in its wall demands operative therapy.

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