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GENERAL STAFF MEETING
UNIVERSITY HOSPITALS
UNIVERSITY OF MINNESOTA

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ANNOUNCEMENTS

1. Meeting, 10-29-31. A special appeal was made to the Staff to give to the Community Fund. 100% subscription is desired because of the very fortunate position we occupy during the present depression. It was hoped that all would give something and that those who can afford to do so would contribute very liberally.

The new policy of the American Society for the Control of Cancer was discussed.

Stuart William Harrington, special guest, who later delivered an address to staff and students, was introduced. It was requested that the Staff make corrections of notes of prior meetings. This will help those who are not here in person to get something out of the discussions.

The mortality report was reviewed. It was pointed out that the probable reason for the better showing during the last three months was the straight internship. Longer contact with patients with prolonged illness means greater confidence on the part of the family. There is apparently only one month when a letdown occurs and that is June. This year, June will be watched with great interest.

Superintendent Fesler then made a few remarks. He told of the meetings of the American Hospital Association in Toronto and the American College of Surgeons in New York. The paper by Dr. Vernon Smith of the Minneapolis General Hospital on "Straight Versus Rotating Internships" provoked the greatest comment. The analysis of the opinion of internes showed that they all favored a rotating internship at some time in their training. The value of the straight internship was also discussed.

Should general hospitals care for the Tuberculous? Sanatoria are placed in out of the way places. With greater interest in other forms of treatment than bed rest, the need of a general staff is becoming more apparent. Either the location of sanatoria must be changed or their patients referred to general hospitals for special treatment. The staff was asked to watch the turn-over more carefully as it is beginning to drag. Shorter stays result in increased hospital costs on the one hand but greater service to a larger number of people on the other. The statement that the average hospital mortality is about 3% needs correction as this does not include first 24-hour mortality rates. As far as the cancer work is concerned (both meetings) we are apparently doing everything that is being done at the best institutions.

The differential diagnosis of testicular tumors was difficult according to Dr. Wangensteen. The biological test would be of great assistance in many. It is interesting that starting out as a specific test for pregnancy, the Aschoim-Zondek reaction can be used for other things. Even female animals are not necessary as recent reports indicate that the effect on male genital tract is equally characteristic.

The case of pleural endothelioma was discussed by Drs. Rigler, Wangensteen, and Harrington. Apparently, there were specific complaints, one year and six months before the mass was discovered by fluoroscopic examination. This will always be a stumbling block in the early diagnosis of any disease, i.e., minimal complaints. When the speciman was shown, the behavior of the tumor was clarified. Metastasis, undoubtedly, took place to the hilum and then extended to the left lung. There was no recurrence at the operative site. Dr. Harrington said that he had seen four endotheliomata of the pleura. All had certain features in common. They usually give a history of injury (see our case). The pathologist makes a diagnosis of low grade malignancy. The surgeon is usually able to remove them and feels rather good about the possibility of cure. Most of them recur very promptly after a one or two year period in a rather vicious way. Dr. Harrington's address at 2:00 P.M. to the students and staff was greatly enjoyed. Interest in chest tumors, aside from those in the lung, was stimulated by the day's discussions.

2. Community Fund contributions: are now wanted. You will find a yellow card in this bulletin. Please fill in the sum you desire to give and sign it. Cash is not necessary. The payments may be made quarterly or monthly. 68 agencies will profit by your contribution. The money will be used primarily for real relief. Note that if you do not care to make any immediate contribution, the payment can be deferred until January 1st.

You may be interested to know that the Staff of Nurses made a 100% contribution last year. Those who occupy less remunerative positions in our organization, i.e., housekeeping department, also, were represented in the 100% list.

With their small salaries and many dependents, their small contributions often entail real sacrifice. Surely, we, who are more fortunate, can do as well. The University's quota is $16,000. Up to last night, $5,789.00 was pledged.

If you have given elsewhere, please make a note on the card to that effect, including the amount. This is necessary in order that the University may know how much our people have contributed. If you are giving in St. Paul, please make a note to that effect. In any event, we wish a card returned with your name even though you do not feel you can afford to give. Close this matter today so that personal interviews can be made with those who have not yet been solicited.

This is not a drive but a voluntary contribution. Do not feel that the wealthy will take care of this matter. As in the past, the poor and those in less fortunate circumstances will be the mainstay of those in distress. There is a new type of indigent person this year. In the past, we had the group who always needed society's aid. This year, proud, sensitive persons are in need for the first time in many years. Shall we fail those who need us now? Do not hesitate any longer, for now is the accepted time.

II. CASE I

ILEOCECAL INTUSSUSCEPTION

Path. Pearson.

The case is that of a white female infant, four months of age, admitted to the University Hospitals, 10-14-31 and died 10-20-31 (6 days).

Vomits

9-5-31 - Patient began to vomit about ten or fifteen minutes after each feeding. Vomitus usually contained undigested food material and shortly before admission it had assumed a brownish discoloration.

Bloody mucus diarrhoea

9-12-31 - Patient began to have diarrhea, had from six to ten stools per day. These consisted mostly of mucus; the mother stated that it looked a great deal like pus. There was blood in the stools on several occasions. Patient had a fever during the first week of illness, which went up to 105. Patient has lost about six pounds in weight within six weeks.

Past History

Patient was a normal full-term baby. Spontaneous delivery. Breast fed for about two and one-half months, then given whole, boiled, cow's milk--half and half with Karo's syrup. She was given this mixture up until the time of illness.

Ninth day

10-14-31 - Admitted to University Hospitals. Physical examination reveals a white, baby girl, four months of age, who has the appearance of being ill for some time. The skin is loose and dehydrated. Throat - slightly reddened. Laboratory: Urine - negative. Blood - Hb. 81%, wbc's 8,130, Pmn's 47%, L 49%, and M 4%. Progress: Patient was admitted to Infant Pediatrics. Put on a diet of whole lactic acid milk, 4 oz. every four hours; times five. Temperature 100.8.

Diarrhoea

10-17-31 - Medical note: Stools are loose and show a moderate amount of mucus but no gross blood at this time. Stool examination - foul odor, normal consistency and color, moderately positive benzidene test, no parasites found, mucus present. Temperature 102. Patient is very listless. Ears are negative. Chest is negative. Pharynx is somewhat reddened. Cod liver oil, i dram, three times daily. Orange juice, iii drams, three times daily. Phenol in glycerin, ii drops in each ear, followed by wick, three times daily. Hypodermoclysis, 300 cc. Hartman's solution. Temperature to 103.8. Weight - 4400 grams.

Blood

10-19-31 - Patient had four stools which contained mucus and blood. Hartman's solution in normal saline 300 cc. given. Cod liver oil, i dram, three times daily. Orange juice, iii drams, three times daily. Medical note: Temperature was normal yesterday but up to 101 today. Has had several stools of mucus and gross blood.

Surgical mass

10-20-31 - The baby is very listless, has bloody stools containing mucus. 300 cc. Hartman's solution given by hyperdomoclysis. Surgical consultation: Since admission, the baby has not vomited. Had mucus in the stools until yesterday when blood was also noted. For the last two days, the stools contained blood and mucus. The abdomen has become distended. Patient is very listless. Has had a temperature since admission, 101 to 103+. This morning, a mass was palpable in the left abdomen, no pain on manipulation. Dilated bowel is seen on the anterior abdominal wall. No peristalsis noted.

X-ray

X-ray of abdomen and colon: There is a marked distension of the small bowel with gas and also of the stomach. The appearance suggests an intestinal obstruction. A mass is obvious in the left lower quadrant possibly associated with this. Barium enema examination was made but was unsatisfactory owing to the inability to retain. An obstruction appeared to be met within the upper portion of the rectum, the appearance suggesting intussusception. Conclusions: Probable intestinal obstruction. Probable intussusception. Further surgical note: Barium enema stops at point of mass which is palpable by rectal examination. Patient was taken to the operating

room.

Operation

Ether anaesthesia. Time of operation - 8 minutes. Patient was admitted to the Pediatric Service a week ago with a history of some abdominal pain and vomiting. On the Service, the child developed running ears. At this time, blood was noticed in the stool and the colon palpated. Blood in the stool persisted, and the mass was felt later and also per rectum. At this time, a diagnosis of chronic intussusception was made. Incision - right rectus. Procedure: The skin had been incised and peritoneum was being nicked as the patient stopped breathing. Patient was obviously in very poor condition prior to the operation.

Exitus

Respirations could not be re-established. The incision was then extended and the bowel was eviscerated, and an intussusception was found. It was of an ileocecal nature. There was a tiny twist in the sigmoid flexure but this was easily straightened out and the bowel rather easily pushed back with a couple peritoneal tears in it. Bowel was easily reduced until one came in the region of the hepatic flexure. At this point, it was apparent that the terminal ileum and cecum were irreducible. Greater effort was used here and the bowel was finally extruded. Both the cecum and the appendix were highly discolored, and had the baby survived certainly a short circuit in the nature of an enter-anastomosis would have to be done. Because of the strangulating features of the case, it appears to me that this is rather an acute intussusception of a lesser duration than of several weeks. 3:45 P.M. patient stopped breathing. Artificial respiration given. Patient expired.

Autopsy

The body is that of a well-developed but poorly nourished, white, female infant weighing approximately 4500 grams and measuring about 60 cm. in length. Rigor is present. Hypostasis is purplish and posterior. There is no edema, cyanosis, nor jaundice. The pupils measure 3 mm. in diameter and are regular. There is a recent rectus incision. There is no fluid in the Peritoneal Cavity. The peritoneum is found to be glistening and free. The cecum, appendix, and ascending colon as far as the hepatic flexure are very much discolored and show a gangrenous change. This is more evident when approaching the cecum.

The Pleural Cavities are normal and contain no fluid. The Pericardial Sac contains a minimal amount of fluid.

The Heart weighs 15 grams. The valve edges are free and normal. The chambers are normal.

Each of the Lungs weighs 20 grams and shows no evidence of infection.

The Spleen weighs 20 grams. The capsule is grayish. On cut section, the pulp is moderately firm and a deep red.

The Liver weighs 240 grams and is dark red in appearance.

The Gall-bladder and ducts, Pancreas, and Adrenals are normal.

The Gastro-Intestinal Tract is normal in its entirety, except for the portion of the cecum as described above. The cecum is removed and appendix and also a portion of the ileum. Upon cutting these open, it is found that the lower portion of the intussusceptum protrudes into the cecum about 1.0 cm. This is rather edematous and gangrenous. Sections are taken of this for microscopic study.

Each Kidney weighs 20 grams. The capsules strip easily, revealing smooth surfaces. On cut section, nothing of note is found. The ureters and Bladder are normal.

Diagnosis

1. Ileocecal intussusception.
2. Intussusception (reduced).
3. Gangrenous cecum, ascending colon, and appendix.
4. Recent operative wound.
5. Emaciation.

Comment:

Was the acute intussusception induced by the diarrhoea? Operative risk was great but medical efforts to reduce it (barium enema) had failed. Note ear report.

III. CASE II.

INTUSSUSCEPTION. GANGRENOUS CECUM WITH PERFORATION. Path. Pearson.

The case is that of a white female,

6 months of age, admitted to the University Hospitals 9-21-31 and died 10-7-31 (16 days).

Acute onset - blood

9-20-31 - Patient took ill suddenly. Vomited, loss of appetite, and had blood stools. A physician was called who prescribed medicine. The condition became worse. Stools became more bloody until at present they seem to be made entirely of fresh blood. The temperature was normal before admission.

Hospital

9-21-31 - Admitted to University Hospitals. Physical examination revealed a white, female infant lying quietly in bed with legs flexed to the abdomen. She appears acutely ill. Head - anterior fontanelle is open. Throat - slightly injected. Medical note: Approximately 30 hours duration (probably ileocecal intussusception). Bloody stools, vomiting, intermittent pain, temperature 103. Rectal examination reveals a mass which extends, further with a straining, distance of about 5 cm. from the anus. Mass in the left lower quadrant. Auscultation of the abdomen shows essentially a silent abdomen with occasional peristaltic rushes. Heart sounds clearly audible. No great effort was made with barium to reduce. 2 quarts at 2-1/2 feet elevation. This apparently pushed the intussusception up to nearly the sigmoid flexure. Treatment - immediate operation. Fluids.

X-ray

X-ray of abdomen - Flat plate of the abdomen shows a markedly dilated stretch of small bowel perhaps 50 to 50 cm. in length. Barium enema shows definite filling occupying the splenic flexure and transverse colon. The bowel could not be filled beyond this point. A second enema done somewhat later again showed this filling defect which was forced back by the barium into the middle portion of the transverse colon. The appearance is quite characteristic of an ileocecal or ileocolic intussusception of marked degree. Conclusion: Intussusception, marked. Patient admitted to Pediatrics. Passes mucus and blood per rectum.

Operation

50 cc. normal saline given subcutaneously. Another 40 cc. added. Atropine sulphate gr. 1/1000. Patient operated upon and the remaining intussusception reduced manually in about 28 minutes. The bowel was quite friable and gangrenous, 6 inches from the ileocolic valve. Patient returned from the operating room in fairly good condition. Temperature 103.2

Restless

9-22-31 - Patient is somewhat restless and turns from side to side. Nothing is given by mouth. Hypodermoclysis given. Urine - trace of sugar, slight trace of albumen, numerous hyaline casts, numerous white blood cells, and occasional red blood cells. Blood - Hb. 62%, rbc's 2,040,000, wbc's 7,500, Pmn's 71%, L 23%, M 6%.

Better

9-24-31 - Patient seems quite comfortable. Passes soft stool containing mucus. Put on whole lactic acid milk with 6% dextro-maltose every 4 hours times 5, 3 oz. Patient is somewhat listless. Temperature 102.2. Weight 7550 grams.

Emesis

9-26-31 - Patient had a large emesis of milk. Respirations are rapid. Somewhat restless. Codeine sulphate gr. 1/16. Considerable flatus expelled with continuous curdled stools. Subcutaneous fluid 200 cc. started. Temperature to 105.2.

Ear: 9-28-31 - Hypodermoclysis of 200 cc. given. Put on 6 month diet with whole lactic acid milk with 6% dextro-maltose, 4 oz. every 4 hours times 5. 10% phenol and glycerine, 1 drop in each ear, 4 times daily. Temperature 102. Blood - hb. 65%, wbc's 16,000. Iodine 3-1/2%, alcohol 70% to wound. Alternate sutures removed. Dry dressings applied.

Infected wound

9-29-31 - Patient tosses about and cries loudly at intervals. 10% phenol in glycerin, 1 drop in each ear every four hours. 100 cc. normal saline by nasal gavage, four times daily. Wound inspected, 2 lower sutures removed. Cultures taken from pus from wound - there is considerable pus drainage from the wound. Culture from pus of wound shows

staphlococcus and short gram negative bacilli. Hot boric packs applied to drassings every 2 hours, 200 cc. subcutaneous saline given. Temperature 101. Ear, nose and throat consultation - there is slight injection and bulging of both ear drums. Bilateral serous otitis. Advise - myringotomy.

Fair

9-30-31 - Patient expelled much flatus during the night. Seems somewhat listless. 10% phenol in glycerin in left ear every four hours. Normal saline by nasal gavage, four times daily, 100 cc. Hot boric packs to wound every 2 hours. Myringotomy performed of right ear. Emesis of 100 cc. water. Wound inspected. Iodine 3-1/2%. Remaining sutures removed. Less drainage this time. 70% alcohol and dry dressings used. Stools of greenish, watery consistency with much flatus expelled. Patient regurgitates a great deal. Hartman's solution with normal saline, 125 cc. given by nasal gavage. Temperature to 101.2. Weight 6650 grams.

Myringotomy

10-1-31 - Regurgitating feeding. Given 125 cc. of Hartman's solution by nasal gavage. Feeding formula changed to 1 qt. whole cow's milk with 6% dextro-maltose with lactic acid and 2 eggs. The ears are wiped dry every two hours. Hot boric packs to wound every 2 hours. 200 cc. citrated blood given per saggital sinus. 70% alcohol to dressings. Flamed tape applied. Considerable drainage from wound. Myringotomy of the right and left ear performed. Nasal gavage by Murphy drip given. Alcohol sponge bath given for elevated temperature, 104.8. Reduced temperature to 104. Patient regurgitated about 4 oz. Nasal gavage by Murphy drip discontinued. About 9 oz. retained. Patient is very listless.

Same

10-2-31 - 250 cc. Hartman's solution started by Murphy drip nasal gavage. Considerable drainage from wound. 150 cc. citrated blood given, 60 cc. normal saline per saggital sinus. 70% alcohol and dry dressings applied to wound. Hartman's solution 100 cc. started subcutaneously. Feeding formula given by nasal gavage by Murphy drip method. 2 buttons removed from incision, flamed adhesive applied. Temperature to 104. Tepid sponge bath given. Somewhat listless. Myringotomy performed on the right ear.

Worse

10-6-31 - Dichloramin - T to wound every 4 hours. 2 drops of paregoric every 4 hours. Profuse drainage from right ear. 200 cc. Hartman's solution given subcutaneously. 70% alcohol, flamed tape, dichloramin - T. and dry dressings applied to wound. Patient's breathing is very fast and labored. Appears somewhat cyanotic. Feet are cold and clammy. Respirations are now 90. 200 cc. citrated blood given per saggital sinus. Formula changed to alternate tube feedings with 2 oz. of protein milk. Given small amounts of cottage cheese. Urine - heavy cloud of albumen, many hyaline and granular casts, numerous rbc's, and few wbc's. Smear from ear shows no bacteria.

Exitus

10-7-31 - Oxygen tank given. Respirations are very rapid and labored. 2 watery stools, dark greenish in color, and of foul odor. Slight edema of both eyes noted. Alcohol 70%, flamed tape, dichloramin - T, and dry dressings applied to the wound. 200 cc. citrated blood per saggital sinus. Respirations are very labored. Body is very cyanotic. Caffeine sodium benzoate gr. v. Adrenalin iv gr. given every 15 minutes, times 5. Respiration and pulse somewhat more regular after each medication. 3:50 P.M. Cheyne-Stokes respiration noted. 4 P.M. - patient died.

Autopsy

The body is thatof a white, female child, 6 months of age, weighing approximately 6000 grams, and measuring 66 cm. in length (crown - heel). She is well-developed and nourished. There is slight rigor present. Hypostasis is purplish and posterior. There is no edema or jaundice but there is slight cyanosis of the finger-nails. Each pupil measures 3 mm. and are regular. There are several puncture wounds over the anterior fontanelle which is somewhat suppressed. The fontanelle measures 3 by 4 cm. There is a right rectus incision below the umbilicus about 6 cm. long. Upon inspection, this is found to be open and gaping, the transverse diameter bein-

2.5 cm. The coils of bowel can be seen protruding through the opening. Purulent exudate is also noted over the coils of bowel and around the margin of the incision.

Upon opening the Peritoneal Cavity, it is found that there are adhesions constricting the bowel in the region of the wound, especially the transverse colon which is dilated. There are numerous adhesions between the coils of small bowel which are carefully separated. The cecum and Appendix are not in their usual position but are drawn up into the region of the liver.

The Pleural Cavities contain no fluid. The Pericardial Sac contains a minimal amount of fluid.

The Heart weighs 30 grams. The valve edges and chambers are normal.

The Right Lung weighs 80 grams, Left 70 grams. The bases of both lungs show pulmonary congestion but no evidence of any infectious process.

The Spleen weighs 20 grams. The capsule is grayish in color. The pulp is dark red and soft.

The Liver weighs 275 grams and is lightish in color and shows a cloudy swelling.

The Gall-bladder and ducts are normal.

The Gastro-Intestinal Tract is next inspected. It is found, as previously described, that the cecum and appendix and adjacent portion of the ileum was drawn up to the under surface of the right lobe of the liver. It is also noted at this point, that there is a slight exudation of the content of the intestine into the peritoneal cavity. Upon separation, it is found that there is a perforation in the lower portion of the cecum about 2 cm. in diameter which is adherent to this portion of the liver and is walled-off except for a very small leaking point, as previously described. The lower portion of the cecum which is adherent to the liver is somewhat discolored and somewhat dark, suggesting a gangrenous sluffing at this point. The liver and peritoneum in this vicinity is covered with an exudate. (Sections of the peritoneum are taken at this point. Sections of the terminal ileum and cecum are removed and preserved.)

The Pancreas and Adrenals are normal.

Each Kidney weighs 30 grams. Fetal lobulations are not present. The capsules strip easily and reveal quite smooth surfaces. Upon section of the kidney, it is found somewhat congestive but no evidence, grossly, can be seen of any infection.

The uterus and ovaries are normal.

The organs of the Head and Neck are not examined.

Diagnosis:

1. Intussusception (clinical).
2. Localized peritonitis.
3. Perforation of the terminal cecum (gangrene).
4. Intestinal obstruction.
5. Acute nephritis (clinical) Type?
6. Separation of the abdominal wound.
7. Gaseous distension.
8. Pulmonary congestion.
9. Recent operative incision.
10. Puncture wounds in the anterior fontanelle.

Comment

Acute onset, little delay; x-ray diagnosis; operation after failure of enema. Note: stormy course, infected wound, ears and operative site. Walled-off perforation of ileum is probably gangrenous slough.

IV. CASE 3

ILEOCOLIC INTUSSUSCEPTION, OPERATIVE REDUCTION.

The case is that of a white female, age 3 years, admitted to University Hospitals September 29, 1931 and dismissed on October 9th (11 days).

First Day

9-27-31 - The mother stated that the child had been well until this morning, when she awoke with a stomach ache which was relieved by a hot water bottle. She continued to vomit during the day.

Second Day

9-28-31 - Bowel movements were normal on September 26th but there were no subsequent bowel movements until today, at which time there was bloody staining of the stool. The child continued to vomit although the pain was apparently less when admitted to the Hospital.

Hospital - Third Day

9-29-31 - On physical examination the child appeared apathetic, and did not show much evidence of pain. The abdomen was soft. There was little or no distension. The child wrenched when the abdomen was palpated. There was a palpable mass in the left upper quadrant, cylindrical in shape, possibly extending across the abdomen. When palpation was continued to the right no definite mass could be made out although there seemed to be an area of fullness. On rectal examination there was no definite mass. No blood was seen on the examining finger.

X-ray

A simple X-ray plate showed some gas in the small bowel apparently an increased thickness of the inter-intestinal septa. There was a horseshoe curve of the region of the transverse colon which had some of the characteristics of small bowel. Fluroscopic examination with barium enema showed an area of obstruction partly surrounded by a thin layer of barium just below the splenic flexure. This finding was verified by plates. A diagnosis on the basis of the physical and x-ray findings was made of intussusception.

Laboratory

Examination of the urine showed a few white blood cells and a few red blood cells. The blood picture was normal.

Operation

Immediate operation was decided upon. The abdomen was explored thru a right rectus incision. An intussusception was found which had its origin in the lower ileum and extended thru the ileocecal valve, thru the ascending transverse and a short portion of the descending colon. It was reduced by means of two fingers within the abdomen and one on the outside.

Progress

Postoperatively the patient's convalescence was very satisfactory, and she was permitted to return home on the 11th postoperative day.

Diagnosis

Ileocolic Intussusception (reduced).
Laparotomy.

V. ABSTRACTS: INTUSSUSCEPTION.

Abstr. Pearson.

1. References:

(1) Brown, Henry P. - Ann. Surg. 81; 637-645 (Mar.) 1925.

(2) Prof. Monrad - Acta Pediat. 6; 31-52, 1926-27.

(3) Stalman, J.F.H. - Ann. Surg. 84; 735-752, 1926.

(4) Koch and Oerum (400 cases) - Edin. Med. J. 9; 227-241, 1912.

(5) Edberg, Einar - Acta Pediat. 8; 130-184, 1928-29.

(6) Perrin, W.S. & Lindsay, E.C. - (400 cases) - Brit. J. Surg. 9; 416-471, 1921-22.

(7) Lavesson, H. - Acta Chirurgica Scandinav. 61; 48-90, 1926-27.

(8) Arntzon, Leif & Helstad, Alfred - Acta Radiol. 9; 592-599, 1928.

2. Frequency

Ref. (1). Intussusception is frequent in Australia. Kelly states that he has seen 40 cases in 2-1/2 years at the Children's Hospital in Melbourne. Eccles saw 28 cases at St. Bartholemew's Hospital (London) from 1871 to 1880 and 40 cases from 1891 to 1896. Torrance: 63 cases at the Massachusetts' General Hospital (Boston) from 1908 to 1917.

(2) In 20 years (i.e., 1906 to 1925) in Dronning Louise Children's Hospital, 115 cases were observed (5.75%).

(3) 117 cases seen at Hospital for Sick Children at Ormond Street, London. Dates?

(4) Koch and Oerum think that intussusception is more frequent in Denmark and Great Britain because of indiscriminate use of castor oil. Comment: This might be a factor in any country.

3. Sex Distribution

Ref. (5) Einar Edberg saw 67 cases (66% boys). Monrad; 72 boys and 35 girls (67.%). Wiggin - 75% boys. Dunbar - 76% boys.

Note: Diverticuli of intestine is more common malformation in boys. Monrad states that spastic pyloric stenosis shows same sex distribution as intussusception.

(6) Perrin and Lindsay - 400 cases, 272 males and 128 females (64% males). Fitz Williams - 788 cases, 536 males (68%). Adams - 100 cases, 66% males. Leichtenstern's series, 593 cases, ratio 1.8 males to 1.0 females.

(7)

Age	Boys	Girls
Under 1 yr.	4	1
1 to 5 yrs.	7	1
6 to 10 yrs.	2	3
11 to 15 yrs.	2	2
Over 15 yrs.	1	1
	16	8

4. Age

Ref. (6). (Perrin and Lindsay) Vast majority of cases occur in first two years of life. Of 400 patients, 314 were under age of 2 (79%), while 279 were under age of 1 (70%). In this series, there were 18 cases over 14, falling between 15th and 58th years of life. The youngest patient was 1 day and the oldest 58 years. In a series of 648 cases under 12 years of age, Fitzwilliams found 72% occurred in children under 1 yr. That 79% of all acute intussusceptions occur in children under 2 years suggests that some peculiar mechanism operates at this age period. An analysis of monthly incidence during first year of life throws further light upon the question. By years, the following frequency is found:

Acute Intussusception by years - 382 cases up to 14. 18 after 14. Total 400.

1st year	279	8th year	5
2nd "	35	9th "	2
3rd "	14	10th "	4
4th "	17	11th "	1
5th "	7	12th "	1
6th "	9	13th "	4
7th "	3	14th "	1

Incidence of Acute Intussusception up to 1st year by months.

279 cases

1st month	1	7th month	43
2nd "	1	8th "	40
3rd "	7	9th "	38
4th "	15	10th "	30
5th "	28	11th "	15
6th "	52	12th "	12

It will be seen that the condition gradually rises from the third month to the sixth month with a gradual fall to the three months level.

(6) Of 279 cases in the first year of life, 203 (73%) occurred between 5th and 9th months. Fitzwilliams (458 cases) shows maximum at 6 months.

(5) Wichman, 1049 cases, 48% under 2 years. Among these, 81% were under 10 months. Most cases occur between the 4th and 10th months, with the peak of the curve at the 6th or 7th month. Barnard, 187 cases, found 165 under 10 years and of these 135 were in the first year.

(4) Koch and Oerum collected 397 cases (1880-1909) including 107 from Hirschsprung's series. 60% of all cases occurred in first year; of these 66% occurred between the 5th and 7th months, the youngest being 7 days.

(1) Henry Brown, 31 cases, 24 or 65% occurred in second half of first year of life.

(2) Monrad of 107 children, 73 were first year of life. They were as follows:

1 - 3 mo.	1 case
4 - 6 "	21 "
7 - 9 "	34 "
10 - 12 "	17 "
Total under 1 yr.	73 cases.

Over one year as follows:

1 - 2 yr.	23 cases
2 - 3 "	15 "
3 - 4 "	4 "
Over 4 "	0 "
Total	115 cases.

Ref. (7).

Author	No.	Under 1 yr.	1-15 yr.	Grown
Weiss	322	177(55%)	85(26%)	60(19%)
Barnard	187	135(72%)	30(16%)	22(12%)
Flesch-Thebesius	38	17(45%)	16(42%)	5(13%)
Osmansky	21	12(57%)	7(33%)	2(10%)
Snellman	16	6(38%)	5(31%)	5(31%)
Laveson	34	5(21%)	17(71%)	2(8%)
Walton	239	173(72%)	66(28%)	only children
Koch & Oerum	400	248(57%)	152(43%)	" "
Grisell	267	183(69%)	84(32%)	" "
Becker	23	19(83%)	4(17%)	" "
Totals	1647	975(59%)	466(28%)	96(5%)

Ref. (2) Monrad does not know whether it has any connection with weaning but the fact that intussusception is most common from the 7th to the 9th months is significant? He studied 73 cases in infants under one year of age, 26 were entirely breast fed and 40 received an admixture from other sources, only 7 were bottle fed; so, apparently artificial feedings do not predispose to invagination as most of the infants were wholly or partially breast fed.

(4) Koch and Oerum believe that period of weaning followed by addition of food sets up peristalsis and Nothnagel has shown that strong anti-peristalsis can cause disinvagination just as strong peristalsis can cause invagination.

5. Seasonal Incidence

Ref. (6) Two periods of maximum occurrence, April and January. 60% of cases occurred during first 6 months of year. It is rather difficult to show relationship between intussusception and seasonal diarrhea on this account, although various authors point that this association is not unusual. Note: See one of our cases.

6. Etiology

Ref. (4) Koch and Oerum point out that food unsuited to infants may be a factor, others - seeds, buttons, ascaris lumbricoides, and oxyuris, and vermicularis. Misuse of purgatives is also cited. Traumatic cases have been described. Bohmannson reports one case of intussusception of the colon which apparently was caused by rowing. (Svenske Läkaresällskapets forhandlinger 1917.

(5) Later in life tumors of bowel or mesentery are a factor. Author's material shows two cases due to mesocecal lymphoma. About 80 cases of Meckel's diverticulum which played a part as caput of the invagination have been reported. Author has four cases. Lindsay and Perrin show that important changes in the lymphoid apparatus are a factor in inversion. In first year of life, quantity of lymphoid tissue in ileocecal valve and degree of projection into valve is at its maximum. Both are less marked during second year. Author thinks majority of ileocecal, ileocolic, and enteric types are due to inflammatory swelling of this tissue.

(6) Enteric intussusception due to swelling of Peyer's patches is author's belief. Barnard's explanation of genesis of intussusception in Meckel's diverticulum is as follows: "There is a prolapse of the mucosa of the lining of the diverticulum to a greater or lesser degree into the ileum." Many of the colic type are iliopathic.

(5) Author believes in importance of entero-colitis as a cause. 39% of cases preceded by diarrhea and 20% of lymphatics were enlarged. After reposition, either by laparotomy or Danish Method, (dry taxis), a considerable rise in temperature takes place. Note: In one of our previous cases, this was most marked. This is interpreted as resorption of toxic material from entero-colitis. One case replaced, had colitis and death from pyelonephritis one month later.

7. Types

Ref. (2) Monrad divides invaginations into two groups, large and small intestine.

(1) Large intestinal invaginations are either purely colic where a variable portion of colon is invaginated in a lower part; or ileocecal, where the head of the invagination is formed in the cecum; or ileocecal valve. In the latter variety, the appendix is situated in the intussuscipiens.

(2) Small intestinal invaginations are either purely ileac, that is where a piece of small intestine is invaginated in a piece of small intestine below it or ileo-colic by which is understood a small intestinal invagination is situated low down which goes through the ileocecal valve. Sir Frederick Eves (1899) describes an additional type, caput ceci, in which the cecum forms the apex.

Relative Frequency Ref. (6)

Variety	Males	Females	Both Sexes	Own Series Total	%	Lichtenstern Total	%	Fitzwilliam Total	%
Ileocecal	73	40	113)						
Caput-ceci	29	9	38)						
Ileocecal and Caput-ceci	3	2	5)	156	39	212	44		60
Ileocoli	90	36	126	126	32	39	8		26
Enterie	17	10	27	27	7	142	30		
Colic	12	7	19	19	5	86	18		7
Compound	2	2	4	4	1				7
Retrograde	1	1	2	2	.5				
Meckel's	4	1	5	5	1				
Unclassified	39	20	59	59	15				
Appendicular	1	0	1	1	.2				
Jejunogastric	1	0	1	1	.2				
			Totals	400	100	479	100	500	100

Ref. (6) Relative frequency of types. If all of the intussusceptions involving Meckel's diverticulum, are included as enteric and the retrograde types are placed in their appropriate class and if the compound and appendicular and jejunogastric are excluded, and adding 19 chronic cases of colic intussusception are added the frequency would be something like this:

	Author Total	%	Lichtenstern Total	%	Fitzwilliams Total	%
Ileocecal	163	47	212	44	-	61
Ileocolic	128	37	39	8	-	-
Enteric	36	8	142	30	-	26
Colic	27	8	86	18	-	73
Totals	354		479		506	

It can be seen that the ileocecal and ileocolic are most frequent and the enteric and colic less frequent.

(2) Monrad's series:

Large intestinal invagination

	Total	%
Ileocecal	66	57%
Colic	21	19%
Total		76%

Small intestinal invagination

Ileocolic	19	17%
Iliac	6	5%
Total		22%

Three-fourths of cases in present series are of large intestine, one-fourth of small, and over one-half are ileocecal.

(5) Einar Edberg:

Ileocolic	18
Ileocecal	28
Colic	10
Ileocecal & Ileocolic	2
Iliac due to Meckel's diverticulum	9
Total	67 cases

(7) Wichmann states (in suckling age) 94 and 76% of the group from one to 10 years are ileocecal types. Clubbe 100 cases, 64% were ileocecal. If the type is compared to the age, some interest observations are found.

(6) Acute ileocecal intussusception

1ST	year	126
2nd	"	17
3rd	"	2
4th	"	3
5th	"	0
6th	"	1

Acute ileocolic intussusception

1st	year	91
2nd	"	14
3rd	"	3
4th	"	6
5th	"	2
6th	"	3
7th	"	0
8th	"	0
9th	"	1
10th	"	1

These curves follow the general curve of incidence.
When acute enteric intussusception is studied by years, the following frequency is found:

Acute Enteric Intussusception

1st year -	3	9th year -	1
2nd "	2	10th "	0
3rd "	1	11th "	0
4th "	4	12th "	0
5th "	1	13th "	4
6th "	0	14th "	1
7th "	0	15th "	0
8th "	3		

This curve does not follow the one previously stated, probably because Meckel's diverticulum, polyps, and tumors are more often responsible for this type. The others are enteric infection, changes in food, hypertrophy of lymphoid apparatus, etc.
If acute colic intussusception is studied by years, the following curve can be made:

Acute Colic Intussusception

1st year -	8	6th year -	3
2nd "	2	7th "	1
3rd "	5	8th "	0
4th "	2	9th "	0
5th "	0		

Author rightly states that in order to explain the etiology of intussusception the questions raised by these curves must be answered.

(2) Monrad: 87 large intestinal invaginations found that 59 occurred in infants under one year, only 28% in children over one year. Of 25 small intestinal invaginations, only 11 occurred under one year while 14 were found after the first year.

8. Symptomatology

Ref. (6) Plump, healthy children are usually seized with severe attacks of spasmodic and violent abdominal pain (I.C.C.P. OHW) followed by passage of blood and slime per rectum, but symptomatology varies with type -- 89% showed blood or blood and mucus alone; 60% tumor; Other authors, Lett found 100% blood or blood and slime; Barnard 75%, MacAdam and Eccles 80%. Frequently an intussusception presents at the anus. 156 ileocecal types, 27% were found at anus. Ileocolic, 16 of 126 or 13%. 49% of ileocecal types arrive at splenic flexure; 21% of ileocolic at splenic flexure. It is common to find that after 18, 16, and 10 hours intussusception can be felt at rectum. The distance traveled does not affect mortality as the duration is more important. For example, 156 ileocecal types duration 38 hours; 126 ileocolic types, duration 33 hours. Ileocolic is more severe. Enteric variety occurs in older patients less severe and with longer duration, average 84 hours.

(2) Monrad states:

① Pain is most constantly the first symptom, usually due to tension and dragging of mesentery which develops as the invagination occurs. There are intervals where the patient is free of pain. (Most important to remember.)

② Vomiting appears shortly after the pain but it may not develop until five to ten hours later. Both pain and vomiting are most severe in small intestinal invagination.

③ Blood and mucus indicates that the obstruction has begun and is pathognomonic. 21 colic invaginations show blood and mucus in all; 66 ileocecal present in 61, absent in 5; 18 ileocolic passed blood, absent in 1; 6 iliac, one passed blood, 5 absent (higher obstruction). The appearance of blood may be shown by type and hour as follows:

Hours:	0-6	6-12	12-24	24-48	No Blood
21 colic	19	1	1	0	0
66 ileocecal	42	16	3	0	5
6 iliac	0	1	0	0	5
19 ileo-colic	5	2	6	5	1

In large intestinal invagination, the blood occurred at once or during first twelve hours in 90% of the cases. In the ileocolic group (over one-half of the cases) the blood did not appear

until twelve to forty-eight hours after the intussusception has occurred. In the ileac group, no blood was seen.

④ Tumor was palpable in 109 cases (one-half of these were of the ileocecal type).

(4) Koch and Oerum found pain in 76% under one year, 85% after first year; vomiting 92% under first year, 91% after first year; blood 95% under first year, 75% after first year; tumor 85% under first year, 86% after first year.

9. Treatment and Mortality

Ref. (6) Perrin and Lindsay 400 cases.

	Total	Died	% Deaths
Laparatomy with reduction	309	69	22
Reduction with appendectomy	18	5	33
Resection with anastomosis with clamps	29	20	68
Laparatomy attempted reduction or anastomosis followed by closure	12	12	100
Resection with Paul's tube	12	12	100
Resection with Murphy button	6	6	100
Paul's tube	4	4	100
No operation	7	7	100
Resection--(?) Paul's tube and (?) anastomosis	2	2	100

When intussusception is irreducible, only form of treatment is resection. Mortality is very high from resection (earlier diagnosis is really more important). Total mortality in above series 35%.

Cuthbert Wallace 20%; Busher (40% collected series), own cases 28%; Sargent 61%.

Poor operative results usually due to duration of obstruction; e.g., 21 cases operated by 11 surgeons, mortality of 14% all early diagnoses.

Mortality as to type:

	Cases	Died	%
Enteric	27	15	56.
Ileocecal	156	51	33
Ileocolic	126	39	30
Colic	19	3	16

Difference chiefly due to time each presents symptoms, highest in the enteric and lowest im colic.
Enteris, average 48 hours; ileocecal 38 hours; ileocolic 33 hours; colic 33 hours.
Mortality is parallel to duration.
Another factor is ability to palpate tumor, enteric only 28% and colic 73%.
By tabulation, this appears as follows:

	No. cases	Mortal. %	Hrs.	Resection	Tumor %
Enteric	27	56	84	16	29
Ileocecal	156	33	38	14	74
Ileocolic	126	30	33	11	60
Colic	19	16	33	1	73

(5) Einar Edberg. 9 cases ileac invagination, 2 saved, laparatomy within 24 hours after symptoms; ileocolic, 18 cases, 11 deaths (1 died 12 days after infection from abdominal wound). (See our case); ileocecal, 28 cases, 5 deaths; 10 colic, 1 death.

(4) Koch and Oerum -- 400 cases (Denmark) under one year.

	Cases	Died %
Bloodless treatment	135	35
Operative treatment	83	75
Total	228 cases	52%

Operative type--
Disinvagination 68% mortality
Resection 100 % "
Other methods 100% "

Mortality increases with time: therefore 1 to 2 days (80% mortality).
"In all children under one year, bloodless treatment should be tried."

Monrad: Laparatomy after 2 years without taxis. In colic form, taxis may be prescribed providing invagination is not more than 36 hours old. In ileocecal not more than 24 hours old. Ileac not more than 12 hours old.

		Cases	Mortality %
(over 1 yr.)	Bloodless operations	74	12%
" "	Operative treatments	74	38%
	Total	152	27%

(2) Monrad uses taxis followed by injection of water. Barium (?) (newer method).

Result:	Cases	% Mortality
Taxis alone	84	14
Taxis and laparatomy	10	60
Total	94	19%

Result of bloodless operation in different types:

	Cases	Died
Colic	19	5
Ileocecal	59	12
Iliac	5	20
Ileocecal	10	80
Mixed	1	100

(1)
Of Monrad's 74 cases with taxis alone, mortality 10%. If various author's figures are taken, mortality reads something like this: 45% under 24 hours, 20% after second day. 37% first day, 39% second day; 70% first day, 90% second day; 49% total; 35% total; 25% total; etc.
It can be seen that the mortality varies greatly. Hipsley (1918) reported 51 cases from Australia, no deaths, operations performed on all within 36 hours, illustrating importance of time factor.

(8) Leif Arntzen and Alfred Helsted point out that as the diagnosis is being made by barium that reduction can be attempted under the fluoroscope.

IMPRESSIONS

1. Intussusception varies in frequency in different parts of the world. This may be due to many factors. In England (most bowel-conscious nation) and Denmark (?) the abuse of cathartics is blamed.

2. Sex in large series -- males 67%, females 33% (2 to 1).

3. Age factor in 1647 cases -- 975 under one year (59%), 446 between one and fifteen years (27%), after fifteen years 96 cases (5%). Others not stated.

4. If first year is studied curve rises steadily from birth to fifth month, falling gradually to ninth month, then suddenly to twelfth month (73% occurs between the fifth and ninth months.) Is weaning and introduction of strange food responsible?

5. Other factors in first year are mobile cecum, lymphoid hyperplasia in cecum, enterocolitis.

6. If age is correlated with type, ileocecal and ileocolic types follow general age distribution, acute enteric and colic types are rather evenly distributed through all the years (polyp, adenoma, Meckel's diverticulum, and other tumors).

7. Types: Invagination of large intestine (75%), small intestine (25%), ileocecal (58%), colic (18%), ileocolic (17%), iliac (5%). Mixtures may occur (Monrad).

8. Symptomatology: Pain, vomiting, passage of blood and mucus, tumor. Pain is usually severe, spasmodic (often free interval) present in most cases. Vomiting usually follows pain but may be delayed, appearance of blood and mucus not constant (about 85%) because ileac types do not show it. Tumor palpable in about 60% (all observers), more felt under anesthesia also depends on location, resistance, etc. X-ray is now of value? (gas).

9. Intussusception reaches anus in about 20%? Not so important as duration of symptoms.

10. Treatment is medical and surgical. Mortality varies with age, type, duration, and method of treatment. Of these duration is most important?

11. Bloodless taxis, injections of air, oil, water, barium should be tried iff seen very early, especially in young subjects? Many questions are raised. Should this be tried by the first physician to see the case (time factor) or at hospital when laparotomy can be done at once if it fails? Injury (rupture) may occur? Splendid results are reported in the hands of experienced observers in early cases.

12. In older children, reduction by laparotomy is safer.

13. If the mass cannot be reduced, resection should be done but the mortality is very high.

14. High fever (toxemia) frequently follows reduction and may be associated factor in early lethal cases even though reduction is complete. (Also our observation). No special changes seen at autopsy.

15. Condition may recur (chronic intussusception). (Our case with diarrhea?) Usually, however, when tumor is the cause.

16. Many milder forms of intussusception probably reduce themselves.