SUCCESSFUL TREATMENT OF TWO CASES OF GANGRENOUS INTUSSUSCEPTION IN CHILDHOOD

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Early surgical correction of an acute intestinal intussusception in childhood usually results in a satisfactory recovery, but when gangrene of the constricted bowel has occurred the mortality rate is very high. Only three recoveries were reported by Ladd and Gross (1941) in 18 cases in which a primary anastomosis was carried out to deal with this complication. A Mikulicz double enterostomy operation produced only seven recoveries in 25 cases. Similar experiences have been recorded by Nyborg (1943) and by Wakeley and Atkinson (1938).

The onset of an intussusception in childhood is usually marked by sharp bouts of severe abdominal colic, though sometimes this symptom may be difficult to recognize or quite indefinite. Vomiting on one or more occasions occurs in the first 24 hours. Anorexia is often pronounced, and some pyrexia is present in the majority of cases. The motions are often looser than usual, but in about 50% no blood is passed in the first 24 hours. Though the "red-currant jelly" stool is characteristic, only streaks of blood may be passed or the motions may merely appear dark from altered blood, and the condition should not be overlooked in such cases. The shocked state of the child between paroxysms of colic is also an important point, and it is easier to palpate the abdomen at this time. If an abdominal mass is present it is prominent during peristalsis, though tightening of the abdominal wall and screaming may interfere with examination. Rarely, constriction at the neck of the intussusception is not severe enough to interfere with the vascular supply of the invaginated gut or to cause much intestinal obstruction. In such a case the history is of recurrent bouts of peri-umbilical pain for days or weeks without vomiting or the passage of blood per rectum. In the following two cases absence of a typical clinical picture resulted in a serious delay in diagnosis and admission to hospital.

Case 1

A boy of 22 months was admitted because of vomiting, restlessness, and anorexia since a brief attack of diarrhoea five days before. One convulsion occurred the day before admission. He had been treated for gastro-enteritis with sulphaguanidine, as his mother had suffered from a bout of diarrhoea at the same time. There was now no abdominal colic and the stools were normal. On examination he was listless, hypotonic, and dehydrated, but the skin colour was good. He was distended and resented abdominal palpation, but no localized tenderness or mass was detected. The urine was normal and contained chlorides. Other systems were normal. His temperature was 98.4° F. (36.9° C.), pulse 140, and respirations 40. He was given an intravenous infusion of half-strength Hartmann's solution with 5% glucose. Twelve hours later he passed a tarry motion for the first time, and the distended abdomen then showed peristaltic waves. A barium enema confirmed the presence of an intussusception in the right half of the transverse colon.

Operation under general anaesthesia was performed by Mr. Gardham. On opening the abdomen by a right para-

median incision greatly distended intestine escaped from the wound. Complete reduction of the intussusception was not possible, and there remained a length of about 2 in. (5 cm.) of ileum situated some 6 in. (15 cm.) from the ileo-caecal valve in which there was an irreducible intussusception. Owing to the peritoneum splitting over a distended ileum, and in order to return the small intestine to the abdomen, a catheter was inserted into the ileum and the contents aspirated. The gangrenous intussusception was resected and a double-barrelled ileostomy was formed at the lower end of the incision.

During the operation and for 48 hours afterwards gastric suction was applied. For the first 12 hours it was used continuously, and then during alternate hours. For the first six post-operative days the child had half-strength Hartmann's solution with 5% glucose intravenously, each pint alternating with a pint of half-strength plasma. A watch was kept on the plasma chlorides, and when these were reduced normal saline was infused until the level was corrected. Before oral feeding was started the daily intravenous fluid intake was 3 oz. per lb. (180 ml. per kg.) body weight; later, as the quantities of food by mouth increased, the intravenous infusion was decreased. Twenty-four hours after operation he was given hourly 1-oz. (28-ml.) feeds of water during the day, and after 48 hours small feeds of 1½ oz. (42 ml.) of half-strength reconstituted dried milk three-hourly for six feeds in the day. By the sixth post-operative day he was taking 4-oz. (114-ml.) feeds thickened with a proprietary food five times in the day. He had a pyrexia of 101° F. (38.3° C.) for the first 10 days; penicillin, 50,000 units, was therefore given eight-hourly and a course of sulphadimidine for one week.

Four days after operation the abdomen was still distended. The ileostomy did not work well at first, becoming blocked intermittently. The abdominal wall round the ileostomy became very excoriated and was treated by splinting the child's arms to prevent him from scratching, exposing it to the sun, and applying polyvinyl alcohol jelly buffered to pH7. The jelly was warmed to make it more fluid, and was applied to the skin every two or three hours during the day and night; on cooling, it set as a thin impervious layer protecting the underlying skin.

A month after the original operation the ileostomy was separated from the parietes, the distal loop of ileum closed with catgut, and the proximal loop joined to the caecum by an end-to-side anastomosis. An intravenous infusion of half-strength Hartmann's solution with 5% glucose was again alternated with plasma intravenously for three days; from this time the child's recovery was uneventful, and he was discharged from hospital seven weeks after admission.

Case 2

A boy of 9 months was admitted because of drowsiness and vomiting of all feeds for 24 hours. He had developed a slight cough three days before, which was improving. He had anorexia, though usually his appetite was good. The last normal stool was passed just before the onset of the vomiting. At no time was there obvious colic and he did not scream or draw up his legs.

The child looked ill, shocked, and pale, but was well nourished and big for his age. There was no dehydration. The pulse rate was 180 a minute and the temperature 102° F. (38.9° C.). The abdomen was soft and easily palpated without tenderness or guarding. A small ill-defined swelling was present in the left hypochondrium, extending in the line of the proximal descending colon for 2 to 3 in. (5 to 7.5 cm.). Visible peristalsis was not found, and there was no abnormality on rectal examination. Other systems were normal. Fresh blood and mucus were passed per rectum for the first time an hour after admission. Intussusception was diagnosed, and an intravenous drip of half-strength normal saline and 5% glucose was set up preparatory to surgical treatment.

At operation under general anaesthesia Mr. Gardham found a little free fluid in the abdomen; the intestines were not distended. The head of the intussusception was felt in the splenic region. Reduction of the mass could be effected as far as the middle of the ascending colon. Beyond this point the

bowel was gangrenous, and resection of the proximal 3 in. (7.5 cm.) of ascending colon and caecum, the appendix, and the distal 2 in. (5 cm.) of the ileum was carried out. Thrombosed veins were present in part of the mesentery removed. The ileum and remaining parts of the ascending colon were double-barrelled; they were brought out through the lower end of the incision and clamped with Pringle's clamps, these being left attached and removed after 12 hours.

The post-operative condition of this child was fair. He was put on prophylactic penicillin, 30,000 units four-hourly, and sulphadimidine, 0.5 g. four-hourly. The ileostomy began to function on the third post-operative day. Intermittent gastric suction was continued for three days, and the intravenous infusion was kept up with half-strength Hartmann's solution containing 5% glucose alternated with half-strength plasma. Normal saline was substituted whenever the plasma chlorides were reduced. After 48 hours he started $\frac{1}{2}$ -oz. (14-ml.) feeds of expressed breast milk three-hourly, as he had previously been in process of being weaned. The size of oral feeds was rapidly increased, so that by the fourth post-operative day he was taking eight $\frac{1}{2}$ -oz. (42-ml.) feeds daily.

On the fifth post-operative day the temperature rose and the ileostomy ceased to function, vomiting recurred, and gastric suction was restarted. Next day abdominal distension was apparent, the child looked ill, and an x-ray film of the abdomen showed multiple fluid levels in the small intestine. A high intestinal obstruction was diagnosed.

Operation under local 2% procaine was performed by Mr. Gardham, using the right-oblique-muscle-cut approach. Distended and congested bowel was found in the region of the duodeno-jejunal junction, caused by a band which had kinked the bowel and had obstructed it without interfering with the blood supply. The distended loop was aspirated with a catheter, and a purse-string suture closed the hole. Intermittent gastric suction was continued for 48 hours after the second operation; then the child was given small feeds of breast milk, with gastric suction for an hour before each feed for the next four days. Twelve days after the first operation the intravenous drip was taken down, and on the 13th day a large haematoma was evacuated from the muscle-splitting incision. The sutures were removed and the wound allowed to granulate from the bottom. The wound area was exposed to the sun, and polyvinyl alcohol buffered gel was used to prevent the intestinal juice from digesting the skin. We found on this occasion that the buffered jelly did not completely prevent excoriation, so resort was had to a thick coating of aluminium paste about the ileostomy.

By the 22nd post-operative day the child had gained 1 $\frac{1}{2}$ lb. (0.68 kg.) in weight, but during the next 10 days 2 $\frac{1}{2}$ lb. (1.13 kg.) was lost. The administration of 200 ml. of plasma by tube into the stomach showed satisfactory absorption. As there was no great amino-acid loss in the ileostomy faeces it was concluded that neither intestinal hurry nor lack of absorption of food was primarily responsible, but possibly there was a vitamin deficiency due to failure of synthesis in the isolated colon. When given aneurin, riboflavin, and nicotinamide in adult doses he began to put on weight again and his diet was supplemented by 20 g. of casein added to dried-milk feeds three times a day. On the 32nd day after operation an enterotome was applied; this was followed 18 days later by the passage of the first normal motion. After seven days an extraperitoneal closure of the ileocolostomy was carried out and the wound left open. The child now began to gain weight more rapidly, and he was discharged home on the 75th post-operative day.

Comment

Recent writers have expressed the need for both pre-operative and post-operative intravenous replacement therapy and gastric aspiration (Nyborg, 1943; Hindmarsh, Stewart, and Morrison, 1945; Morrison and Court, 1948). The type of fluid administered depends upon the state of shock and dehydration of the infant and upon the plasma chlorides. In the two cases reported plasma was given for shock and the nutritional state.

When the plasma chlorides were low, normal saline with 5% glucose was given until the chloride estimations were again satisfactory. If dehydration persisted, with normal plasma chlorides, half-strength Hartmann's solution with 5% glucose was given. An anaemia of 50% haemoglobin in one child was treated with whole-blood transfusion. Oral feeding was started 24 hours after operation, with 1 oz. (28 ml.) of water hourly, gradually increasing to 5 oz. (142 ml.) or more of breast milk or dried-milk feeds. Gastric aspiration with the Wangenstein apparatus was continued intermittently for 10 days.

Nyborg has recently recommended neostigmine to combat paralytic ileus, but we consider its use is not free from danger, and prefer nepenthe, intravenous fluid replacement, and gastric suction. Penicillin and sulphonamides should be given in prophylactic courses.

Of the recommended operative procedures, the Mikulicz double enterostomy operation seems to us to be safer than excision and primary suture, or oversewing and hoping the gangrenous part of the bowel will be passed spontaneously per rectum. The primary suture involves anastomosing an acute obstructed gut to a normal gut, while the latter does not relieve the obstruction at all. Oversewing, with a proximal ileostomy of the Witzel type, has been recommended, but in this type of operation the gangrenous infected segment is still left inside the abdomen.

The disadvantages of the Mikulicz procedure have been quoted as being wasting, excoriation of the abdominal wall, and further operative procedures for closure. The first disadvantage can be combated by giving vitamins and extra proteins, the second by polyvinyl alcohol gel or aluminium paste, and it has been noted how soon a well-formed stool comes from the ileostomy. Closure of the ileostomy starts with crushing the spur, with an enterotomy 10 days after the first operation, followed later by an extraperitoneal or intraperitoneal closure.

We believed that the surgical, biochemical, and feeding problems presented by cases such as the two described stand more chance of a successful solution when the surgeon and the paediatrician combine forces in the treatment of the child.

Summary

Two cases of gangrenous intussusception in childhood are described. Both were operated on and a Mikulicz procedure performed. With intravenous infusion and careful feeding both patients recovered.

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A cartoon film entitled "Local Government—a History in Pictures," sponsored by the Ministry of Health and produced by the Central Office of Information, traces the origin and historical development of one local authority—Norwich. Copies are available free of charge to borrowers with their own sound projector, and may be obtained from the Central Film Library, Imperial Institute, London, S.W.7. It can also be shown free by mobile units of the C.O.I. to special audiences. Application for this service should be made to the appropriate regional film officer, whose address can be obtained from the C.O.I., Norgeby House, 83, Baker Street, London, W.1.