

Intussusception in Infancy and Childhood in Southern Africa

A Review of 223 Cases

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Mayell, M. J. (1972). *Archives of Disease in Childhood*, 47, 20. **Intussusception in infancy and childhood in Southern Africa. A review of 223 cases.** Two hundred and twenty-three cases of intussusception admitted over a 9½-year period are analysed. Six deaths occurred.

Sigmoidorectal intussusception occurred on 5 occasions and in each case was referred as a case of rectal prolapse, and the diagnosis and management of this particular form of intussusception are discussed.

Intussusception is a common cause of intestinal obstruction in infancy and childhood and its occurrence is world wide. That there are geographical variations in its incidence is well known, but a review of the cases admitted to the Children's Hospital in Cape Town has shown certain other differences not previously reported. It is the purpose of this paper to present the Cape Town experience with intussusception and to draw attention to and comment upon these apparent continental and racial variations in the disease pattern.

The data presented are drawn from a review of 223 children admitted with intussusception to hospital during a 9½-year period ending in May 1970. The hospital is multiracial and admits children of all ages up to and including 12 years. The mean annual admission rate for the review period was 23·5 but the variation from year to year was quite marked (Fig. 1).

Aetiology

A localized leadpoint pathology was present in 17 of the 223 cases (7·6%). The type of pathology found is shown in Table I. The remaining 206 cases (92·4%)

have been termed idiopathic in the absence of any obvious local lesion though in many cases more general predisposing factors were present; their significance is discussed later.

The age range was from 1 month to 11 years, the peak incidence being between 4 and 8 months (Fig. 2). Idiopathic intussusception was more common in infants under 1 year (129/206 or 63%), whereas 14 of the 17 cases with leadpoint pathology were over the age of 1 year. Separate consideration of the 3 main racial groups showed that most of the European children were under 1 year (36/41), two-thirds of the African

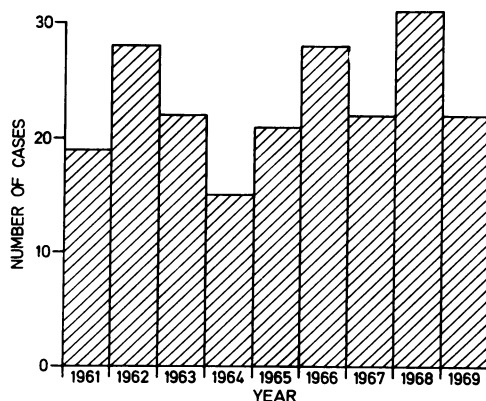


FIG. 1.—Intussusception—annual incidence.

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TABLE I
Aetiology

	No. of Cases	%
Idiopathic	206	92.4
Specific local pathology		
Polyp	8	7.6
Bolus of ascaris	5	
Ileocaecal lymphoid hyperplasia	2	
Partial nonrotation of bowel	1	
Meckel's diverticulum	1	

children (16/24) were under 1 year, but only half of the Cape Coloured children (80/158) were under 1 year.

The sex distribution showed a male predominance, again affected to some extent by race. It was most marked in the African children, 17 of 24 of whom were male, and least so in the Europeans (28/41). Overall, 140/223 were male (63%).

The racial breakdown of the 223 children showed that there were 158 Cape Coloured, 41 European, and 24 African children in the series. These figures of approximately 70%, 20%, and 10%, respectively, correspond closely with the overall hospital admission figures.

The seasonal variation in admissions is shown in Fig. 3, in which the monthly aggregate figures for the whole review period are plotted. Two peaks occur, one towards the end of the summer and another at the end of the winter, coinciding with the peak periods of diarrhoeal and upper respiratory tract infection.

The previous health and nutritional status of the children in this series was an important factor from two points of view: (1) a recent history of gastrointestinal infection was common (diarrhoea was a presenting feature in 63 cases (28%)) and this tended to cause some diagnostic confusion and delay; and (2) many of the children were undernourished, and this, together with recurrent infection, tended to increase postoperative

morbidity. Gross clinical evidence of protein-calorie malnutrition was present in some and, in particular, in 3 of the 6 children who died.

Clinical Features

The comparative frequency of the presenting symptoms and signs is shown in Table II. The most frequent symptom was vomiting which occurred in 88% of cases; and the most frequently found sign was a palpable abdominal mass in 72%. Prolapse of bowel *per rectum* was the only complaint in the 9 children in whom it occurred; 5 of these were sigmoid intussuscep-

TABLE II
Symptoms and Signs

	No. of Cases	%		No. of Cases	%
Vomiting	196	88	Palpable abdominal mass	160	72
Pain	157	70	Bleeding	137	61
Bleeding	155	70	Abdominal distension	67	30
Diarrhoea	63	28	Palpable rectal mass	59	26
Prolapse	9	4	Prolapse	9	4

tions and 4 were ileocolic. The distinction from complete rectal prolapse was easily made in 8 of these 9 cases by the presence of a sulcus between the anal canal and the prolapsed bowel, but in the 9th (sigmoid) case the condition had progressed to complete stripping of the wall of the rectum and anal canal, with resultant obliteration of the sulcus (Mayell, 1970).

Despite the very considerable distance over which the 4 ileocolic lesions had progressed, the length of the small bowel mesentery and the presence of an ascending mesocolon which had allowed this extensive progress to

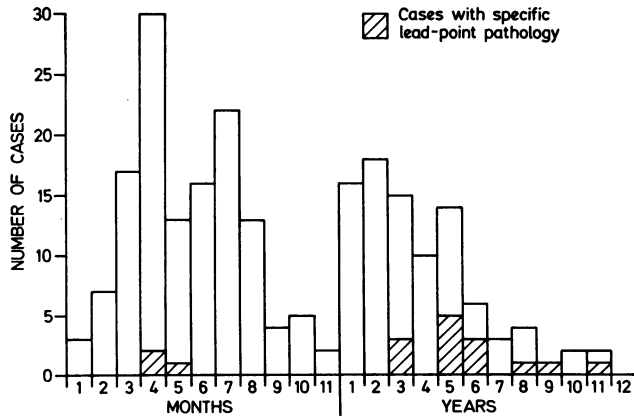


FIG. 2.—Intussusception—age at presentation.

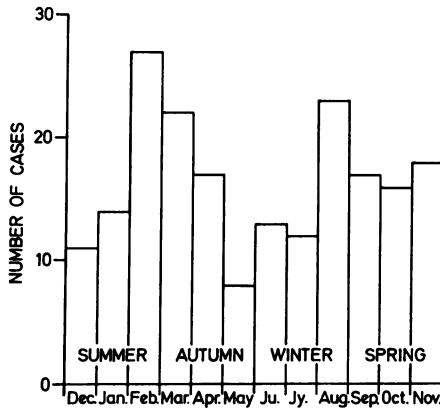


FIG. 3.—Intussusception—seasonal incidence.

occur in the first place also allowed complete reduction in 2 instances, and almost complete reduction with only a very limited ileocaecal resection in the other 2. The absence of pain, vomiting, or bleeding in these prolapsed ileocolic lesions indicates their essentially loose nature from the onset, with neither complete bowel obstruction nor significant vascular impairment. The apex of the intussusception was palpable rectally in 59 cases (26%).

It is difficult in this review to give accurate figures for the length of history for two reasons: (1) many children were transferred from distant hospitals with little accompanying information and without either parent; and (2) a history of loose stools due to infection or malnutrition was comparatively common, and it was often difficult to assess from the history at what point the child became more ill. From the histories obtained however about 126/223 (56.5%) had been symptomatic for more than 24 hours (Fig. 4).

Investigations

Assessment of Hb, serum electrolytes, and acid-base status was made in all cases.

Where the diagnosis was evident on clinical examination radiography was not performed. Where doubt existed plain films and, if necessary, barium enema examinations were performed. In this series 37 children had plain films and contrast examination, and another 37 had plain films only.

Anatomical Types of Intussusception

The relative occurrence of the various types according to the region of bowel involved is shown in Table III. 70% of the whole series were of the ileocolic or boundary variety, 16% were colic, and 14% were enteric. The 35 colic intussusceptions were unusual in two respects: (1) only one showed a leadpoint pathology; and (2) 5 originated in the sigmoid colon and presented only with prolapse. There were no examples of retrograde intussusception in this series.

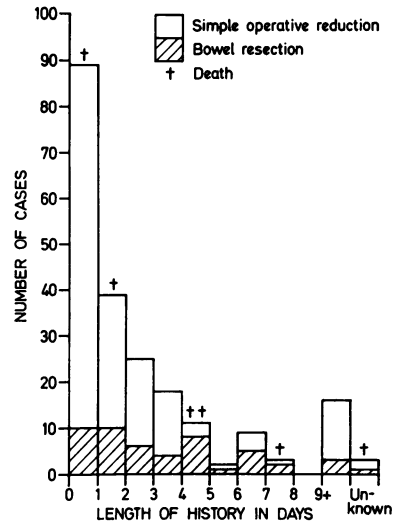


FIG. 4.—Intussusception—resection and mortality rates related to length of history.

TABLE III
Anatomical Type of Intussusception

	Idiopathic	With Local Pathology
Enteric	24	6
Boundary	148	10
Colic (sigmoid 5)	34	1

Treatment

This was surgical in almost all cases (Table IV). 4 children with undoubted histories and clinical findings of intussusception underwent spontaneous reduction with remission of all symptoms shortly after admission. In 7 children, during diagnostic barium enema examination, the intussusception was seen to reduce: the reduction was accepted without doubt in 3 of these cases but the remaining 4 underwent confirmatory laparotomy.

TABLE IV
Treatment

	No. of Patients
None-spontaneous reduction	4
Hydrostatic reduction	
(a) Electively, for recurrence	1
(b) Incidentally, during diagnostic examination	3
Surgery	
(a) Confirmatory laparotomy	4
(b) Simple reduction	161 (2 deaths)
(c) Resection	50 (4 deaths)

One child, in whom there was a history of a preceding idiopathic intussusception reducing easily at surgery, underwent elective hydrostatic reduction using barium with complete success. Thus of 223 children, 8 had no surgery.

Prolapsed sigmoid intussusception was treated initially by sedation, elevation of the buttocks, using a form of gallows traction, and digital reduction of the prolapsed bowel. All 5 children subsequently underwent surgery for confirmation of complete reduction or for treatment of compromised bowel (Mayell, 1970).

In the remaining children laparotomy was performed after a period of intensive resuscitation not usually exceeding 4 to 6 hours. Nasogastric aspiration, intravenous plasma and electrolyte solutions and intramuscular γ -globulin were given in all cases; and blood transfusion, antibiotic administration, and correction of hypothermia were carried out where there was specific indication.

In the 50 cases in which resection was necessary for irreducibility or for compromised bowel, an immediate end-to-end anastomosis was performed for all resections proximal to the mid-transverse colon, and a temporary double-barrelled colostomy for more distal resections. In the latter event a definitive intraperitoneal end-to-end anastomosis with preoperative bowel preparation was carried out about one month after the emergency procedure. Postoperative management followed the standard pattern. Routine appendectomy was not performed.

Results and Complications

These are shown in Table V. Diarrhoea was the most common and troublesome postoperative complication and it occurred most commonly in children in whom the ileocaecal valve had been resected. Of the 5 early postoperative obstructions, 1 was a recurrent intussusception, small bowel in type; the remaining 4 all settled on conservative management. In Fig. 4 an attempt has been made to correlate length of history, within its limits of significance previously discussed, with the resection and mortality rates. It can be seen that with

histories of more than 6 days the resection rate seems to be less (and the complication rate follows the same trend), possibly because a proportion of these lesions was of the loose variety described earlier, with neither complete bowel obstruction nor impairment of the blood supply. It is for this reason that other writers have suggested that length of history is not necessarily a good index of probable reducibility (Caffey and Silverman, 1967).

Mortality. Six children died; the relevant details are contained in Table VI, from which it may be seen that the overall, postreduction and postresection mortality rates are, respectively, 6/223 (2.7%), 2/161 (1.2%), and 4/50 (8.0%).

Recurrence. Of the 223 cases, 9 were recurrences; 7 children had 1 recurrence and 1 child had 2 recurrences. A polyp was found on the second occasion in 1 and a malrotation was considered to be a provocative factor in another; the remainder were idiopathic but different episodes were not necessarily of the same anatomical type. Apart from the postoperative small bowel recurrence the interval ranged from 4 months to 2 years.

Discussion

The statistics published during the past decade from 12 centres in America (Hays *et al.*, 1960; Kellogg and Bill, 1961; Swenson and Oeconomopoulos, 1962; Benson, Lloyd, and Fischer, 1963; Peck, Lynn, and DuShane, 1963), Britain (Dennison and Shaker, 1970; Suita, 1970; Hood, 1967), Scandinavia (Hansen and Pedersen, 1968), and Australia (Wright, 1963; Nelson, 1960; Auld, 1970) compared with the present figures from South Africa show in many respects fair similarity. The numbers admitted per annum to various centres differ widely, but without accurate incidence figures interpretation is difficult. The sex ratios vary little, from 54% males in Dublin (Hood, 1967) to 73% males in Boston (Swenson and Oeconomopoulos, 1962). The proportion of children under 1 year of age varies between 56% and 71% with one exception: in the Danish (Hansen and Pedersen, 1968) series only 37% fell into this age group. The much smaller proportion of Cape Coloured children in the age group under 1 year suggests perhaps that the occurrence of idiopathic intussusception may be related to body weight and development rather than to age, since many of these children are underweight for age. The relative incidence of presenting complaints and clinical signs varies in only two respects—diarrhoea as a presenting complaint occurs to a similar

TABLE V
Results and Complications

	No. of Cases
Uncomplicated recovery	165
Death	6
Complications—eventual recovery:	
Diarrhoea	17
Chest infection	16
Wound disruption	10
Wound infection	9
Early postoperative obstruction	5
Faecal fistula	2
Anastomotic leak and peritonitis	1
Total	223

TABLE VI
Deaths

Case No.	Year	Age, Race, Sex	History on Referral	Clinical State on Admission	Management	Time and Mode of Death
1	1961	1½ yr Coloured Male	Gastroenteritis followed by intestinal obstruction; unknown duration	Gross malnutrition and rickets; bronchopneumonia; dehydration	Resuscitation; reduction of colocolic lesion	1 hr postop.; circulatory collapse
2	1965	6 mth Coloured Male	Diarrhoea for 5 dy blood-stained vomitus and bleeding <i>per rectum</i> for 3 dy	Abdominal distension with peritonitis; gross dehydration, acid-base disturbance, anaemia and hypothermia	Resuscitation—cardiac arrest occurred preop.; successfully treated; resection of extensive ileocolic lesion with perforation of descending colon	Immediately postop.; cardiac arrest after aspiration of re-gurgitated gastric content
3	1966	6 mth Coloured Male	Vomiting and constipation for 2 dy; bleeding <i>per rectum</i> for 12 hr	Gross abdominal distension with dehydration and anaemia	Resuscitation; resection	4 hr postop.; persistent tachycardia and tachypnoea, terminating in circulatory collapse
4	1967	3 mth Coloured Male	Recurrent rectal prolapse for 8 dy	Gross malnutrition (weight 2.66 kg); moderate abdominal distension, dehydration, and anaemia; 7 cm congested oedematous bowel prolapsed <i>per rectum</i>	Reduction of prolapsed bowel (see text); signs of peritonitis supervened in 48 hr; resection of sigmoid lesion and colostomy	3 mth after admission; gradual deterioration due to peritonitis, multiple small bowel fistulae, wound infection, and disruption, etc.
5	1969	1½ yr Coloured Male	Gastroenteritis for 12 days; vomiting and mucopus <i>per rectum</i> for 3 dy	Moribund; extensive 'wet' kwashiorkor lesions; gross abdominal distensions dehydration, and anaemia	Resuscitation; reduction of double ileoileal lesion	7 dy postop.; cardiac failure and inability to tolerate oral feeds because of severe degree of kwashiorkor
6	1970	6 yr Coloured Male	Vomiting and abdominal distension for 5 dy	Gross abdominal distension, dehydration, and acid-base disturbance	Resuscitation; resection of ileoileal lesion	42 hr postop.; circulatory failure due to overwhelming <i>Clostridium welchii</i> infection

extent in Cape Town and Liverpool (Suita, 1970) to a lesser extent in Glasgow (Dennison and Shaker, 1970) and Melbourne (Wright, 1963; Auldlist, 1970), and is not mentioned specifically in the other series, though Benson *et al.* (1963) mention preceding enteritis as a contributory factor. There is no doubt that in this series diarrhoea as a presenting complaint is a significant factor in several respects: (1) it may cause diagnostic confusion with resultant delay in instituting definitive treatment; (2) a higher proportion of infants and children are admitted considerably dehydrated; and (3) it may be a factor in the increased proportion of colic lesions. There is no doubt that in South Africa at any rate intussusception *does* occur in the thin, undernourished, and underdeveloped child contrary to what is sometimes stated (Gross, 1953; Ravitch, 1969). The apex of the intussusception was palpable *per rectum* in 26% of the Cape Town series, whereas the percentage from other centres varies from 4% to 11% (Dennison and Shaker,

1970; Hays *et al.*, 1960; Suita, 1970; Wright, 1963; Swenson and Oeconomopoulos, 1962; Auldlist, 1970).

The proportion of cases undergoing laparotomy ranges from about 95% in those centres where hydrostatic reduction is virtually never used (Dennison and Shaker, 1970; Hays *et al.*, 1960; Suita, 1970; Benson *et al.*, 1963; Peck *et al.*, 1963) to 40% where it is used primarily in all suitable cases (Hansen and Pedersen, 1968; Nelson, 1960). The comment is made by several authors that cases are tending to be referred later and that more resections are proving necessary now than was the case 10 years ago (Dennison and Shaker, 1970; Hays *et al.*, 1960; Wright, 1963).

Mortality rates are not easy to compare when the 13 series differ so greatly in size, in year, and in the number of children included who died before any treatment could be offered. Excluding the 5 smaller series of less than 130 patients however (Wright, 1963; Kellogg and Bill, 1961; Swenson

and Oeconomopoulos, 1962; Peck *et al.*, 1963; Hood, 1967), the best results in every respect are from Liverpool (485 cases) with an overall mortality of 0.6%, no deaths in 59 resections, and 2 deaths in 403 operative reductions (0.5%). One child died before treatment could be offered (Suita, 1970). Comparison of the results since 1951 from the remaining series shows in most cases postreduction, postresection, and overall mortality rates of the order of 1.0%, 8.0%, and 2.5% respectively. Our results compare well, particularly in view of the poor state of many of the children on admission. Recurrences are quoted to a varying extent from each centre. Hays *et al.* (1960) and Suita (1970) report much larger numbers of early postoperative recurrences than have been seen in Cape Town. The higher recurrence rates tend to come from those centres practising hydrostatic reduction (Kellogg and Bill, 1961; Hansen and Pedersen, 1968). A specific aetiological factor is present in about 6% of cases in most series; the exceptions are Melbourne (12%) and the Mayo Clinic (19%). Whereas Meckel's diverticulum is without exception the most frequent lesion from all other centres, in Cape Town it was the cause in only 1 of the 17 cases.

An interesting variation is apparent when the incidence of the different anatomical types of lesion is compared, idiopathic colic lesions being four times more common in Cape Town than elsewhere. Idiopathic sigmoidorectal intussusception is not mentioned specifically in any of the other reported series; we feel that these cases merit a slightly different approach in management but would emphasize that confirmation of complete reduction and viability, either by barium enema together with sigmoidoscopy or by laparotomy, is obligatory if disaster is to be avoided (Mayell, 1970). Further breakdown of the anatomical lesion occurring in the 158 Cape Coloured children shows that 20% of the lesions were colic, occurring predominantly in children over 1 year (80%), and predominantly in males (22/29), whereas the ileocolic lesions, forming 67% of the group, occurred predominantly under 1 year (62%) and equally in

the two sexes. It is possible that dietary factors, ascaris infestation, malnutrition, and frequent bouts of diarrhoea are to some extent the cause of the higher number of otherwise idiopathic colic lesions in older children, but why there should be such a male predominance remains a matter of doubt.

I wish to express my thanks to Professor J. H. Louw for the opportunity to study the case records of his patients.

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