In summary, methyl dopa, provided it is tolerated, produces the best all-round blood pressure control of these three drugs, but 20% of our patients could not tolerate it. Bethanidine was tolerated by all patients, but brought slightly greater postural and exercise hypotension than guanethidine, which, however, produced the largest number of side-effects.

We wish to thank Professor D. R. Laurence for his advice in the planning of the trial. We would like to record our appreciation to Dr. J. J. F. Merry, of Merck Sharp and Dohme, for supplies of methyl dopa; to Dr. A. D. Munro-Faure, of the Wellcome Foundation, for supplies of bethanidine; and to Dr. A. K. Pittman, of Ciba, for supplies of guanethidine. We thank Mr. A. Axon and his staff of the Wellcome Foundation for preparing the capsules in the trial. We would also like to thank Dr. P. M. S. Gillam and other colleagues, who occasionally acted as "other observers"; Mr. B. R. Graham for help in preparing the clinics, drawing the figures, and checking the calculations; and Miss V. M. Price for secretarial assistance.

REFERENCES

- Bauer, G. E., *et al.* (1961). *Brit. med. J.*, 2, 410.
Boura, A. I. A., and Green, A. F. (1962). *Brit. J. Pharmacol.*, 19, 13.
— (1963). *Ibid.*, 20, 36.

- Cannon, P. J., Whitlock, R. T., Morris, R. C., Angers, M., and Laragh, J. H. (1962). *J. Amer. med. Ass.*, 179, 673.
Conway, J., and Lauwers, P. (1960). *Circulation*, 21, 21.
Cranston, W. I., Juel-Jensen, B. E., Semmence, A. M., Handfield Jones, R. P. C., Forbes, J. A., and Mutch, L. M. M. (1963). *Lancet*, 2, 966.
Day, M. D., and Rand, M. J. (1963). *J. Pharm. Pharmacol.*, 15, 221.
Dollery, C. T., Emslie-Smith, D., and Milne, M. D. (1960). *Lancet*, 2, 381.
— and Harington, M. (1962). *Ibid.*, 1, 759.
Freis, E. D., Wanko, A., Wilson, I. M., and Parrish, A. E. (1958). *J. Amer. med. Ass.*, 166, 137.
Gifford, R. W. (1965). *Ibid.*, 193, 901.
Goldberg, L. I., and Zimmerman, A. M. (1963). *Postgrad. Med.*, 33, 548.
Hamilton, M., and Kopelman H. (1963). *Brit. med. J.*, 1, 151.
Johnson, P., Kitchin, A. H., Lowther, C. P., and Turner, R. W. D. (1966). *Ibid.*, 1, 133.
Johnston, A. W., Prichard, B. N. C., and Rosenheim, M. L. (1962). *Lancet*, 2, 996.
— (1964). *Ibid.*, 2, 659.
Lauwers, P., Verstraete, M., and Joossens, J. V. (1963). *Brit. med. J.*, 1, 295.
Leishman, A. W. D., Matthews, H. L., and Smith, A. J. (1959). *Lancet*, 2, 1044.
Lowther, C. P., and Turner, R. W. D. (1963). *Brit. med. J.*, 2, 776.
Montuschi, E., and Pickens, P. T. (1962). *Lancet*, 2, 897.
Oates, J. A., Seligmann, A. W., Clark, M. A., Rousseau, P., and Lee, R. E. (1965). *New Engl. J. Med.*, 273, 729.
Page, I. H., and Dustan, H. P. (1959). *J. Amer. med. Ass.*, 170, 1265.
Rose, G. A., Holland, W. W., and Crowley, E. A. (1964). *Lancet*, 1, 296.
Smirk, H. (1963a). *Brit. med. J.*, 1, 146.
— (1963b). *Lancet*, 1, 743.
Wilson, R., Long, C., and Jagoe, W. S. (1965). *J. Irish med. Ass.*, 56, 9.

Congenital Abnormalities of Anus and Rectum: Mortality and Function

F. COZZI,* M.D.; A. W. WILKINSON,† CH.M., F.R.C.S., F.R.C.S.ED.

Brit. med. J., 1968, 1, 144–147

When the results of the surgical treatment of any congenital abnormality which threatens survival are reviewed two aspects seem to be of particular importance: firstly, how many children survive their surgical treatment, and, secondly, the quality of the functional result eventually achieved. This report reviews the mortality and function in 133 patients with anorectal anomalies who were treated in the professorial surgical unit at the Hospital for Sick Children between September 1958 and June 1967.

Anatomical Classification and Method of Treatment

The anorectal lesions have been classified anatomically (Table I) according to a modification (Wilkinson, 1963) of the scheme originally proposed by Ladd and Gross (1934). In this classification stenosis at or just above the anus is due to fibrosis in the wall of the anal canal; this can be relieved simply by repeated dilatation, preferably under general analgesia. In covered anus the orifice of the anus is covered over completely or almost completely by a lid of skin. In both these types the rest of the anorectal region is normal, and when the stenosis has been fully dilated or the skin lid has been excised from a covered anus subsequent bowel and sphincter function will usually be good. With the exception of a very small group, which includes examples of cloaca and other complicated anomalies such as vesicointestinal fissure, the remaining anorectal anomalies are regarded as variants of rectal atresia. In this the rectum ends blindly in the pelvis above the levator ani muscles but in most cases communicates through a fistula with the urethra, the vagina, or the perineum.

In all cases with a low fistula to the vagina or perineum this passes forwards from the blind stump of the rectum between the limbs of the puborectalis part of the levator ani. In the high fistulas to the prostatic or membranous urethra or to the posterior fornix of the vagina the fistula is above the levator muscles.

TABLE I.—Anatomical Classification

Primary Lesion	Male	Female	Total Cases		Deaths	
			No.	%	No.	%
Anorectal stenosis ..	8	6	14	10.5	2	14
Covered anus ..	22	5	27	20.3	2	7
Rectal atresia ..	47	43	90	67.7	23	25
Perineal fistula ..	4	8	12	9	1	8
Low vaginal fistula ..	—	28	28	21	7	25
High vaginal fistula ..	—	6	6	4.6	—	16
Rectourethral fistula ..	29	—	29	21.8	5	17
No fistula ..	14	1	15	11.3	9	60
Rectal atresia middle third of rectum ..	1	1	2	1.5	—	—
Total ..	73	55	133	100	27	20

The object of treatment was to mobilize the rectum and bring it down to the perineum through the limbs of an intact puborectalis sling so as to ensure continence. This so-called "pull-through" operation, which involves a laparotomy and often the division of some of the blood supply of the rectum to gain sufficient mobility, was delayed until the child was a year old or weighed 9.1 kg. (20 lb.). The partial or complete intestinal obstruction associated with rectal atresia at birth was usually relieved by a transverse colostomy in the first few days of life. The exception to this was atresia with a rectoperineal fistula in which dilatation of the fistula alone was employed; this is possible because since the fistula passes through the levator sling the child will be continent, and in girls the opening of the fistula is usually far enough from the vagina for the

* Formerly NATO Scholarship Holder. Research Assistant, the Hospital for Sick Children, Great Ormond Street, London W.C.1.

† Nuffield Professor of Paediatric Surgery, Institute of Child Health, University of London.

faeces to be discharged away from it. In a few cases a recto-vaginal fistula also was treated initially by dilatation. The distribution between the groups is similar to that in other reported series (Partridge and Gough, 1961).

Sex, Age, Weight, and Associated Anomalies.—There were 55 girls and 78 boys. Of 81 admitted in the first week of life 22 died; of 10 admitted between 1 and 4 weeks after birth one died; and of the 42 who were admitted when more than a month old four died. Of the 33 babies who weighed less than 2.5 kg. (5 lb. 8 oz.) 13 died, of whom seven weighed less than 1.8 kg. (4 lb.); 13 were born of gestations which had lasted 37 weeks or less. There were one or more associated anomalies in 74 (Table II), the genitourinary (34), skeletal (28), and cardiovascular systems (23) being most often affected. The associated anomalies were judged to be mild or moderate in degree and not to endanger life in 38, of whom 3 (8%) died, and as severe in 36, of whom 22 (61%) died.

TABLE II.—Associated Congenital Abnormalities

Associated Anomalies	Ano-rectal Stenosis	Covered Anus	Rectal Atresia	Rectal Atresia Middle Third of Rectum	Total	
					No.	%
Genitourinary ..	3	4	27	—	34	26
Skeletal ..	3	5	20	—	28	21
Cardiovascular ..	1	2	18	2	23	17
Oesophageal ..	—	2	14	—	16	12
Nervous system ..	—	—	4	—	4	3
Respiratory ..	—	—	4	—	4	3
Duodenal atresia ..	—	—	2	—	2	1.5
Ileal atresia ..	—	—	1	—	1	0.75
Others ..	1	1	7	—	9	7

Classification of Risk

Twenty-seven patients died (20%), of whom 23 were admitted as neonates, and the most common factors in these deaths were low birth weight and the presence of severe anomalies. In order to assess the risks of treatment in the 91 neonates more precisely we used a method of subdivision into three grades similar to that used for jejuno-ileal obstruction by Nixon (1963) and for duodenal atresia by Young and Wilkinson (1966) (Table III). The mortality was low in groups A and B but was high in group C. There seems little to choose between low birth weight and a severe anomaly as contributory factors. Of the five babies who weighed less than 1.8 kg. (4 lb.) at birth four died. It is also notable that the mortality of group C neonates was high regardless of the anatomical type of anorectal anomaly.

TABLE III.—Classification of Risk in Neonates

Group	Anorectal Stenosis	Covered Anus	Rectal Atresia	Rectal Atresia Middle Third of Rectum	Total Cases	Total Deaths	
	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)		No.	%
A	2 (—)	11 (—)	13 (1)	— (—)	26	1	3.8
B	1 (—)	5 (—)	21 (1)	— (—)	27	1	3.7
C	2 (2)	5 (2)	29 (17)	2 (—)	38	21	55

Group A. Birth weight > 2.5 kg. (5½ lb.) with no abnormality.
Group B. Birth weight 1.8–2.5 kg. (4–5½ lb.) with no abnormality. Birth weight > 2.5 kg. (5½ lb.) with mild abnormality.
Group C. Birth weight < 1.8 kg. (4 lb.). Birth weight > 2.5 kg. (5½ lb.) with severe abnormality. Birth weight 1.8–2.5 kg. (4–5½ lb.) with mild abnormality.

Treatment and Cause of Death

The methods of treatment used after the first admission and the associated mortality are shown in Table IV. They have been separated according to whether the baby was admitted within a month of birth or later.

One of the babies with anorectal stenosis died of cardiac failure 12 hours after admission without treatment, but the

other died of peritonitis secondary to perforation of the rectum and bladder during dilatation in another hospital. Both the babies who had covered anus and died were very small (1,360 g. and 1,785 g.; 3 lb. and 3 lb. 15 oz.) and also had oesophageal atresia. Twelve babies with rectal atresia died after colostomy. Of these five had oesophageal atresia, two died of respiratory failure associated with prematurity, and three died of cardiac failure secondary to congenital heart lesions, one of whom died at home. One died of widespread *Escherichia coli* meningitis and peritonitis, and another of *E. coli* gastroenteritis and congenital cardiac lesions. Two died after dilatation alone—one at home aged 4 months of coarctation of the aorta and the other

TABLE IV.—Method of Initial Treatment, Time of Admission, and Mortality

Time admitted (weeks):	Anatomical Type					
	Anorectal Stenosis		Covered Anus		Rectal Atresia	
	0–4	Over 4	0–4	Over 4	0–4	Over 4
	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)	Cases (Deaths)
Treatment:						
Dilatation ..	5 (2)	9 (—)	—	—	15 (2)	7 (1)
Excision of skin cover ..	—	—	21 (2)	6 (—)	44 (12)	2 (—)
Colostomy ..	—	—	—	—	6 (5)	3 (—)
None ..	—	—	—	—	—	15 (—)
Elsewhere ..	—	—	—	—	—	—
Total ..	5	9	21	6	65	27

after leakage from the anastomosis after treatment of oesophageal atresia. Five patients died before treatment of the rectal atresia could be undertaken—two after the first stage of treatment of oesophageal atresia and three so soon after admission that no treatment was possible. Only one died in the group admitted after one month—at home of bronchopneumonia some time after dilatation of a fistula. In all cases the cause of death was established at necropsy.

None of the deaths was due directly to the colostomy, though in some cases this procedure undoubtedly contributed to the death. The complications associated with 44 neonatal and two later colostomies were prolapse in 11, retraction in two, faecal fistula after closure in one, and incisional hernia in one.

An abdominoperineal operation to mobilize the rectum and bring it down through the puborectalis sling of the levator ani muscles to the perineum was carried out in 48 patients with one death. In all but one of those who were first admitted as neonates this definitive operation was deferred until the child was a year old or weighed more than 9.1 kg. (20 lb.). In the one exception the operation was done at the age of 6 months because of recurrent urinary infection through a rectourethral fistula, a complication which was avoided in other patients with such a fistula by washing out the colon and the stump of rectum distal to the colostomy as soon as the colostomy had been made. One child died three days after the abdominoperineal operation, of cardiac failure secondary to Fallot's tetralogy for which a Blalock operation had been done at the age of 6 months. The only important complications of the operation were intestinal obstruction in two patients and a pelvic abscess in one other.

In five patients the fistula was transplanted from the vagina to farther back in the perineum—in three with satisfactory results, but pull-through operations were subsequently needed in two. Satisfactory dilatation of the fistula was achieved in eight patients with rectoperineal fistulas. Six patients have still to undergo the abdominoperineal operation; of six treated elsewhere three are waiting for extensive repair of the pelvic floor and three for further local anal operations. One neonate was taken home by his father without any treatment. Two patients died at home of renal failure due to congenital lesions

of the urinary tract five and six years after the treatment of their rectal atresias had been completed.

Functional Results

Of the 133 patients 27 died, 6 have so far had only a colostomy, and in 16 the completion of treatment was too recent for assessment of function. The other 84 patients have been reviewed and 76 of them have been recently seen by us or have replied by letter to our inquiries about bowel function. Of the remaining eight patients, four with covered anuses, two with anorectal stenosis, and one with a perineal fistula had been discharged with good function from further attendance and have not yet been traced; the remaining girl, who had a low-level rectovaginal fistula, emigrated with her parents to Australia, and when last seen had good function.

The results in the other 76 patients are shown in Table V, judged on the basis of control of faeces, sensation of fullness of

Warning Period.—This was taken to be the time between the sensation of fullness was noticed and the bowel moved. It was said to be normal, at least several minutes, in all those with a covered or stenosed anus, and in all but one with a rectoperineal fistula. After pull-through operations the warning was short in more than two-thirds and absent in one out of seven patients. Many mothers found a variation in function between school terms and the holidays, and it was common to hear that a child was more often dirty in the holidays because he or she was out playing and ignored the sensation of fullness too long, and, with the shorter warning period, did not return to the house in time.

Control of Flatus.—This function was difficult to judge. It was absent even after treatment of a stenosed or covered anus in four patients and more often absent than not after a pull-through operation.

Control of Urine.—There was normal control of urine in 64 out of 76 patients and partial control in five; of the latter

TABLE V.—Functional Results

Primary Lesion	No. of Cases	Control of Faeces			Sensation			Warning Period			Control of Flatus			Control of Urine			Medicine	
		Normal	Partial	Absent	Present	Partial	Absent	Normal	Partial	Absent	Present	Partial	Absent	Normal	Partial	Absent	No	Yes
Anorectal stenosis ..	10	7	3	—	10	—	—	10	—	—	8	—	2	8	—	—	8	2
Covered anus ..	14	12	2	—	13	1	—	12†	—	—	10†	—	2	13	—	—	12	2
Rectal atresia ..	51	18	29	4	34	14	3	18	25	5	13	6	23	42	3	6	38	13
Perineal fistula ..	9	8	1	—	9	—	—	8	1	—	6†	—	1	7	—	—	8	1
Low vaginal fistula	14	6	8	—	10	4	—	5	9	—	1†	3	6	13	—	—	12	2
High vaginal fistula	4	1	2	1**	3	—	1**	1	2	1**	1	1	2	2	1†	1**	2	2
Rectourethral fistula	14	—	11	1§	8	5	1§	2††	7	2§	3††	1	7	12	1	1§	10	4
Rectourethral fistula (open elsewhere)	7	—	5	2	3	3	1	1	4	2	1	1	5	6	1	—	3	4
No fistula ..	3	1	2	—	1	2	—	1	2	—	—	—	2	2	—	1	1	—
Rectal atresia middle third of rectum ..	1	1	—	—	1	—	—	1	—	—	1	—	—	1	—	—	1	—
Total ..	76	38	34	4	58	15	3	41	25	5	32	6	27	64	5	7	59	17

* Enuresis. † Unknown in two cases. ‡ Ectopia vesicae. § 1 ectopia vesicae + 1 sacral defect. || Unknown in four cases. ¶ Sacral defect (one case). ** Myelomeningocele. †† Unknown in three cases.

the bowel, the length of the warning period, control of flatus and of urine, and whether laxatives were needed. The simplest possible criteria were used—for example, control was present, partial, or absent.

Control of Faeces.—In half the patients there was normal control of faeces. This was most often found in those with stenosis, covered anus, or rectoperineal fistula in which a pull-through operation was not necessary, in most of whom control was complete. Slight soiling of the underclothes with faecal stained mucus from the bowel was most common after the pull-through operation because the superficial or subcutaneous parts of the external anal sphincter did not close off the anal opening. In 34 function varied from child to child and from time to time in individuals, from slight soiling to running diarrhoea or severe constipation. In some the situation, though not perfect, might be acceptable for much of the time, while in others repeated variation of the type and dose of laxative or sedative was necessary to control the bowel movements. In some cases improvement in function came only after several years of patient unremitting care and effort by the mothers, and often coincided with the time the child started at school. There was only partial control in 16 out of 21 patients who had had a rectourethral fistula but also in 10 out of 18 with rectovaginal fistulas, which suggests that poor control is not particularly related to the type of lesion. Control was absent in four children—one had an extensive bony defect of the sacrum, one had a myelomeningocele, and two had had pull-through operations elsewhere during the neonatal period.

Sensation.—Sensation of fullness of the bowel was judged on the opinion of the child's mother in answer to the question, "Does he or she know when he needs to go?" and was present in 58 out of 76 children. All but one of the children whose anomalies were treated locally or without operation had this sensation, but also more than half of those who had had pull-through operations.

two were enuretic and one girl had also been treated for an ectopic bladder. There was no control of the urine in seven—two also had ectopic bladders, three had extensive defects of the sacrum, one had a myelomeningocele, and in the remaining child the lack of urinary control has not been explained.

Laxatives.—In 59 patients the bowels moved spontaneously, perhaps not always every day in some and perhaps more than once a day in others. In 17 (22%), however, some kind of medicinal help was needed to encourage or, less often, to diminish bowel movements. It was disappointing that in some children constipation even amounting to faecal retention might persist for several years, though there was often a spontaneous improvement when the child started school.

Discussion

There has been considerable variation in the overall mortality rates—from 12 to 30% in all the larger series of patients with anorectal anomalies that have been reported during the past 10 years (Table VI). Some of this variation seems to be due to the number of patients in any particular series who had associated abnormalities of other systems or were of low birth weight. It is very difficult to compare results without classification of the degree of risk. Expression of the results in terms of overall mortality is misleading, since it does not clearly indicate the chance of survival of any particular child, which can be judged fairly only in relation to birth weight and the existence of other significant congenital anomalies. In the present series only two died out of 53 patients with rectal atresia placed in groups A and B, whereas half of those in group C died, mainly of their associated congenital lesions, regardless of the nature of the rectal anomaly.

The lack of information about birth weight in previous reports is indicated in Table VI, but in our own and Forshall's

(1962) series there was a striking similarity between the number of small babies and the number who died. Other congenital anomalies have been found in from a third to a half of the patients, but the important anomalies are those which reduce the chance of survival—that is, the serious cardiovascular or genitourinary anomalies and oesophageal atresia. Only two patients with oesophageal atresia died in the series of Swenson and Grana (1962), and we found almost twice as many cardiovascular anomalies as the next highest incidence—that of Trusler and Wilkinson (1962). There have been various esti-

TABLE VI.—Comparison of Mortality and Incidence of Associated Anomalies in Published Reports

Author	No. Cases	Overall Mortality (%)	Birth Weight Under 2.5 kg. (5½ lb.) (%)	Associated Anomalies (%)			
				Total	Genito-urinary	Cardio-vascular	Oeso-phageal Atresia
Brayton and Norris (1958)	93	25.8	13.9	53.7	—	—	4.3
Partridge and Gough (1961)	323	17.9	—	40.8	17.9	7.4	4.9
Santulli (1962) ..	220	11.8	—	31.8	19.5	6.8	6.3
Forshall (1962) ..	83	30.0	34.9	33.7*	—	—	—
Lynn and Arcari (1962)	58	29.3	—	30.0	—	—	—
Swenson and Grana (1962)	112	14.2	—	38.6	25.0	3.5	1.7
Trusler and Wilkinson (1962)	147	27.0	—	38.0	24.5	8.1	7.5
Kiesewetter <i>et al.</i> (1964)	146	19.1	6.1†	47.9	26.0	5.4	9.5
Present series ..	133	20.0	24.8	55.6	25.0	17.0	12.0

* Severe abnormalities. † Under 2.3 kg. (5 lb.).

mates also of how much these anomalies contributed to the death of the patient. Swenson and Grana found that 10 out of 16 deaths were due to associated anomalies. Brayton and Norris (1958) stated that 13 out of their 24 deaths were due to the associated anomaly. The anomaly was thought to be a contributory factor in 19 out of 28 deaths reported by Kiesewetter *et al.* (1964) and in 12 out of 17 deaths in the series of Lynn and Arcari (1962). The associated anomaly was either the cause or an important contributory factor in 24 of our 27 deaths. The relief of anorectal lesions must be delayed until obstruction of the alimentary tract at a higher level has been relieved. Half the patients of the present series in group C died, and it seems likely that if less had been done at the initial operation at least four patients might have survived longer.

The results in our series have been compared with those reported earlier from this hospital by Partridge and Gough (1961) to see if it had been justified to delay the pull-through operation until the end of the first year and to use that operation also for the treatment of low rectovaginal fistulas. Partridge and Gough reported that 9 died out of 33 patients (27%) who were treated by the pull-through operation in the neonatal period and 20 died out of 36 babies (55%) who were treated by colostomy in the first month. In the present series the mortality after neonatal colostomy was still high—12 out of 44 (27%)—but only one child out of 48 died after the delayed pull-through operation at the age of a year.

It is very difficult to compare our functional results with those in other series. In some respects a good deal depends on the age of the child at the time of assessment, and in many children improvement continues slowly for some years after operation. Half of the patients had normal control of the bowel at the time of review, but further improvement is likely in almost all, and two-thirds had good sensation of fullness of the bowel. Control of micturition also was good in over 80% of the children who were followed up. There have not been any recurrences of rectourethral fistulas after division at the pull-through operation, and urinary infection made the earlier division of fistula necessary in only one patient. Two out of the four patients in this series who remain incontinent of faeces had already had neonatal pull-through operations when they were referred, and if these are excluded the results when the definitive operation is delayed until the age of a year are appreciably better than when it is done during the neonatal period.

Summary

The results of treatment of 133 children with anorectal anomalies are described. Twenty-seven died, 22 of whom were admitted within a month of birth. Low birth weight and the association of other severe congenital defects were the most important factors contributing to death. Five of the patients died at home of causes not related to these anorectal anomalies.

Twelve died out of 44 patients treated by colostomy in the neonatal period. The abdominoperineal, or pull-through, operation was delayed until one child was 6 months old and until a year in the remaining 47. There was one death after operation on these 48 children.

The functional result depends partly on the age of the child and the time which has elapsed since operative treatment.

Half the patients had normal control, two-thirds had good sensation of fullness of the bowel, and over 80% had good control of micturition. There were no recurrences after division of the rectourethral fistula. When the abdominoperineal pull-through operation is delayed until the age of 1 year the results are better than when it is done during the neonatal period.

REFERENCES

- Brayton, D., and Norris, W. J. (1958). *Surg. Gynec. Obstet.*, **107**, 719.
 Forshall, I. (1962). In *Surgery of Childhood*, p. 926, edited by J. J. Mason Brown. London.
 Kiesewetter, W. B., Turner, C. R., and Sieber, W. K. (1964). *Amer. J. Surg.*, **107**, 412.
 Ladd, W. E., and Gross, R. E. (1934). *Ibid.*, **23**, 167.
 Lynn, H. B., and Arcari, F. A. (1962). *Surgery*, **51**, 691.
 Nixon, H. H. (1963). *Develop. Med. Child Neurol.*, **5**, 58.
 Partridge, J. P., and Gough, M. H. (1961). *Brit. J. Surg.*, **49**, 37.
 Santulli, T. V. (1962). In *Pediatric Surgery*, vol. 2, p. 821, edited by C. D. Benson, W. T. Mustard, M. M. Ravitch, W. H. Snyder, and K. J. Welch. Chicago.
 Swenson, O., and Grana, L. (1962). *Dis. Colon Rect.*, **5**, 13.
 Trusler, G. A., and Wilkinson, R. H. (1962). *Canad. J. Surg.*, **5**, 269.
 Wilkinson, A. W. (1963). *Recent Advances in Paediatric Surgery*, p. 165. London.
 Young, D. G., and Wilkinson, A. W. (1966). *Lancet*, **2**, 18.