NEONATAL ALIMENTARY OBSTRUCTION IN MALAYSIA

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SUMMARY

Over the six-year period from 1976 to 1981, there were 241 neonates referred to the U.K.M. Paediatric Surgical Unit, General Hospital, Kuala Lumpur for alimentary tract obstruction and 207 were operated on. The three commonest conditions were anorectal anomalies (91 cases), Hirschsprung's disease (31 cases) and oesophageal atresia (30 cases). Overall operative mortality was 28.0 percent. This was high when preoperative complications like gut perforation (88.9 percent) or pneumonia (61.9 percent) and associated severe anomalies (90.9 percent) or chromosomal abnormalities (66.7 percent) were present. Emphasis is placed on the establishment of early diagnosis and the significance of the green vomit and maternal hydramnios is highlighted. The need is felt for more specialised nurses and the creation of a separate neonatal ICU in this hospital.

INTRODUCTION

Congenital malformations have now become the fourth killer among children [1] and the third commonest cause of death in perinates [2] in this country. Alimentary tract obstruction constitutes a significant proportion of these cases. In this country, paediatric surgery is still at its early stages of development and a number of obstacles and shortcomings exist. [3] The paediatric surgical unit of the Universiti Kebangsaan Malaysia (UKM) started at the General Hospital Kuala Lumpur in 1976. It is timely that our results be reviewed in order to uncover the problem areas and to assess the progress made in the treatment of neonatal alimentary tract obstruction.

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MATERIALS AND METHOD

All neonates admitted to the UKM surgical unit for alimentary tract obstruction from January 1976 to December 1981 are included. There were 241 babies, 141 boys and 100 girls. The patients' records were reviewed with regards to pathology, clinical presentation, management and complications and adverse factors which contribute to mortality and morbidity. Operative mortality is defined as any deaths occurring within 30 days of operation or before discharge from hospital, whichever is the longer. Majority of the babies were Chinese and Malays, corresponding to the rate of admission of these ethnic groups to the paediatric surgical wards (Table I).

RESULTS

Aetiology and Pathology

Atresias of the alimentary tract constituted 59 cases. There were 11 cases of pyloric stenosis operated on within the neonatal period (Table II).

TABLE I
ETHNIC GROUPS OF CHILDREN ADMITTED FOR SURGERY (1976-1981)

	Malays		Chinese		Indians		Others		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Neonates with alimentary tract obstruction	95	39.4	102	42.3	44	18.3	0	0	241	100.0
All cases	1659	37.8	1572	35.8	1127	25.7	28	0.7	4386	100.0

TABLE II
CAUSES OF ALIMENTARY TRACT OBSTRUCTION IN 241 NEONATES ACCORDING TO THE LEVEL OF OBSTRUCTION*

High		Middle		Low	
Condition	No.	Condition	No.	Condition	No.
Oesophageal atresia**	30	Jejunoileal atresia	16	Anorectal anomalies	91
Pyloric stenosis	11	Meconium peritonitis	4	Hirschsprung's Disease	31
Pyloric atresia	1	Nec. enterocilitis	3	Meconium plug syndrome	3
Duodenal atresia***	12	Ileal stenosis	2		
Malrotation	9	Intussusception	2		
		Obs. inguinal hernia	2		
		Volvulus due to bands	2		
		Perforated appendix	1		
		Duplication cyst	1		
Total	63		33		125

* There were 20 cases of functional obstruction.

** 2 neonates with oesophageal atresia also had anorectal atresia, but both died before operation.

*** 1 neonate who had duodenal atresia and malrotation mentioned as duodenal atresia only.

Apart from 5 patients with acquired conditions (2 cases of intussusception and 3 of enterocolitis) and 20 babies with functional obstruction, the remainder (216 cases) had obstruction of congenital origin (89.6 percent). The three commonest causes of neonatal gut obstruction were anorectal anomalies (91 cases), Hirschsprung's Disease (31 cases) and oesophageal atresia (30 cases) constituting 63.0 percent of all cases. There were no cases of meconium ileus.

Presenting Features

Forty-nine patients with high alimentary tract obstruction presented with vomiting (77.8 percent) whereas only 30.2 percent of those with low obstruction had this feature (Fig. 1), majority of the latter being patients with Hirschsprung's disease. Distention of the abdomen occurred mainly in mid- and low-gut obstruction (90.9 percent and 61.9 percent, respectively). Constipation was present in only 79 of all the obstructed cases (35.6 percent) and in one-third of all babies with complete atresias.

Abnormal or absent anus was detected in 76 patients (86.9 percent) with anorectal anomalies and in the majority of these cases, this was the only presenting feature. On the average, these cases were referred at 4.0 days (Fig. 2) and those without any obvious fistulae, earlier still (1.5 days). On the other hand, children with Hirschsprung's disease tend to come late (average 9.2 days) with vomiting (93.5 percent), distension of abdomen (90.3 percent) and constipation or failure to pass meconium (64.5 percent). Delay in passage of meconium (average 4.2 days) occurred in 15 (48.4 percent) of cases and 9 (29.0 percent) patients passed small amounts of stool from birth.

Eighteen babies (60.0 percent) with oesophageal atresia vomited. In addition, excessive frothing from the mouth was noted in 16 cases (53.3 percent), cyanotic attacks with feeds in 14 (50.0 percent) and dyspnoea in 7 (23.3 percent). Nasogastric tubes had been passed in 16 patients but only one had this done prior to the commencement of feeds. Maternal hydramnios was associated with five cases (16.7 percent). Average day of referral was 2.9 days and only 5 cases were referred under 24 hours. All had associated tracheo-oesophageal fistula.

Majority of the cases admitted with gut obstruction had radiological studies, mostly plain

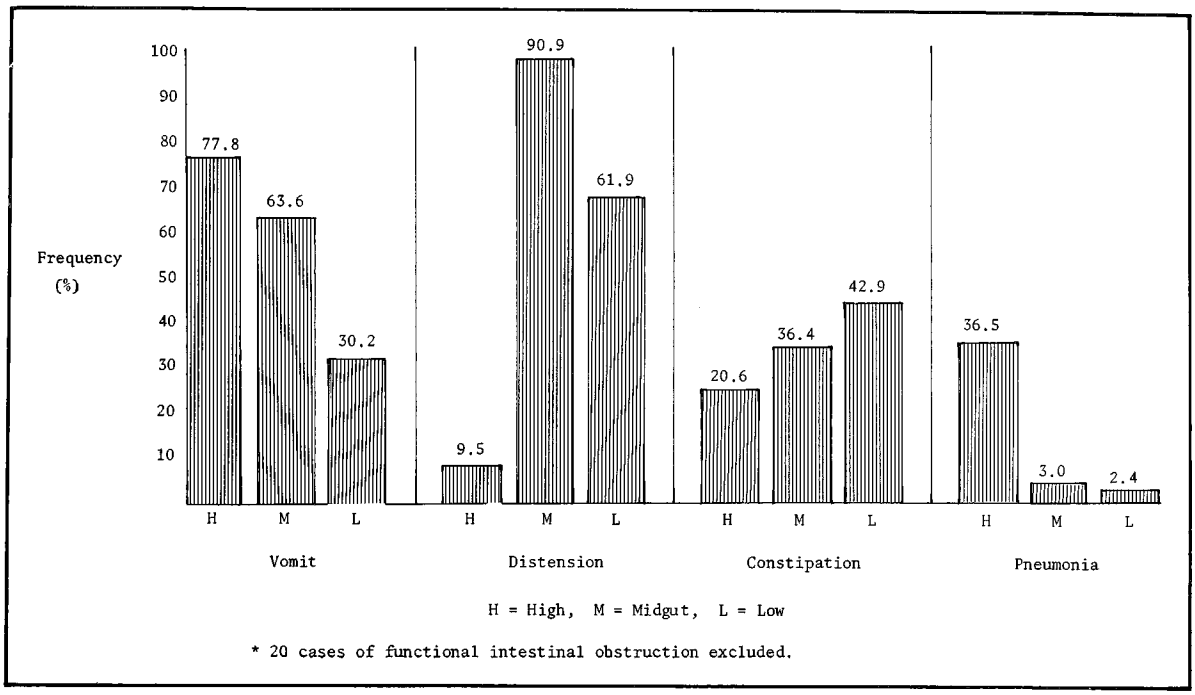

Fig. 1 Presenting Features in 221 patients with alimentary tract obstruction *.

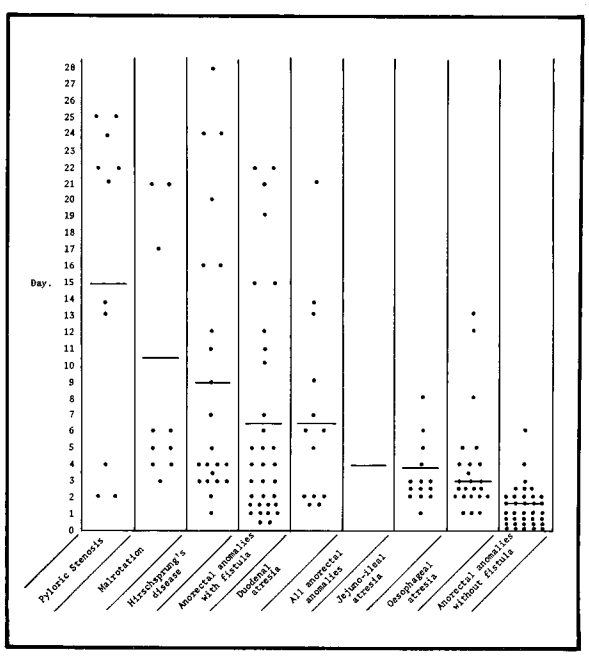

Fig. 2 Age of patient at the time of referral.

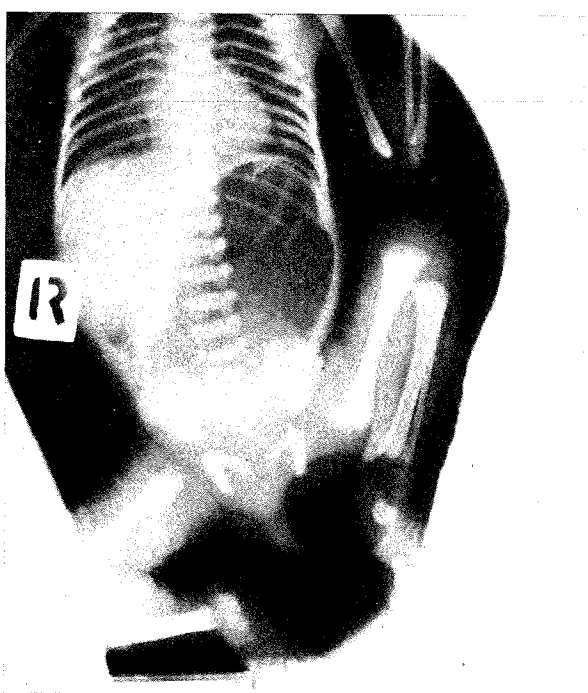

Fig. 3 Duodenal Atresia - The 'double Bubble' sign.

abdominal x-rays to confirm the diagnosis (Fig. 3, 4). Contrast studies were usually done for Hirschsprung's disease (Fig. 5) and malrotation of gut. Nine cases of oesophageal atresia had this done prior to referral (Fig. 6a).

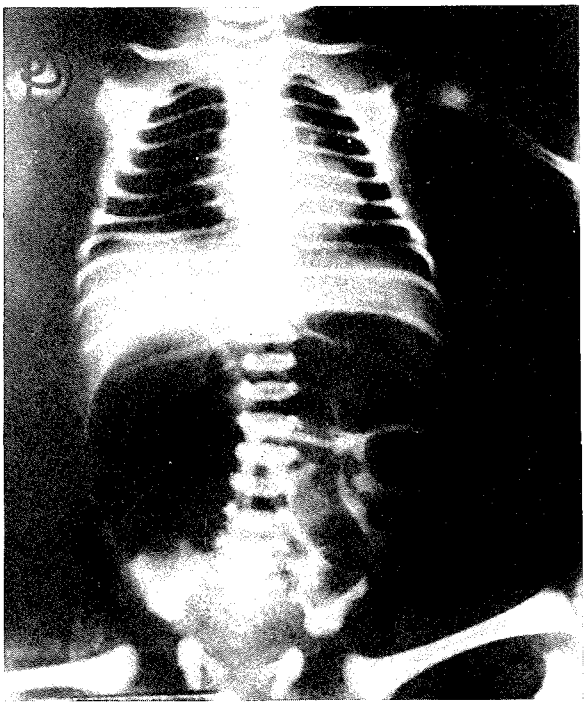

Fig. 4 Ileal Atresia - Plain supine film showing distended bowel loops.

Treatment

The large majority of patients had an initial period of fluid and electrolyte correction before surgery. Procedures performed range from simple cutbacks for low anal atresia and pyloromyotomies for pyloric stenosis to primary oesophageal anastomoses (Table III). Two hundred and seven babies were operated on with 58 deaths (28.0 percent). Mortality was high when gut anastomosis was performed (49.2 percent). There were no deaths in the 11 pyloromyotomies but there were 4 (8.9 percent) with cutback or dilatation for low imperforate anus.

Preexisting complicating factors were present in 67 cases (32.4 percent) and significantly increased mortality (Fig. 7). Preoperative pneumonia was most often associated with high gut obstruction (Fig. 1) mostly oesophageal atresia and duodenal atresia, whereas gut perforation was usually the complication of mid- and low- gut obstruction. Both these complications were more likely to occur in the low birth weight (LBW) babies (Table IV) and both carried a high operative mortality, 61.9 percent and 90.9 percent, respectively.

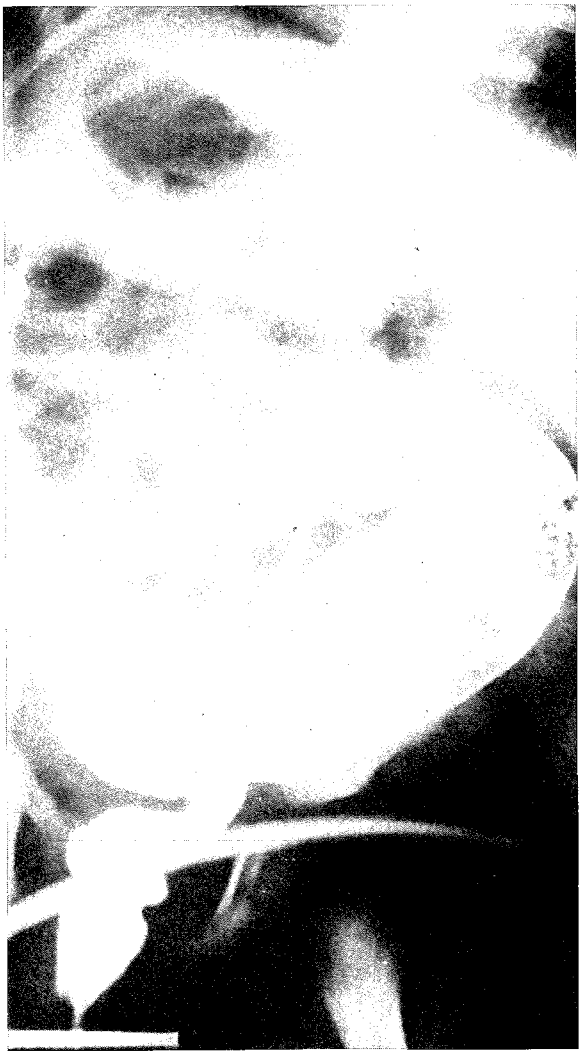

Fig. 5 Hirschprung's disease - barium enema showing distal collapsed segment.

Thirty-four patients were not operated on. Twenty had functional obstruction, 5 had chromosomal abnormalities, 4 had severe associated anomalies, 3 had meconium plug syndrome which settled after digital evacuation and one had necrotising enterocolitis. One was not operated on due to poor general state. Of those with functional obstruction, 3 were attributed to faulty feeding, 8 to ileus secondary to septicaemia and gastroenteritis and 3 to prematurity. The underlying cause of 6 was not known. There were no deaths in this functional obstruction group.

Eighty-two babies had 114 complications (39.6

TABLE III
MORTALITY RELATED TO OPERATIVE PROCEDURE

Procedure	Condition	No.	Died	Mortality (%)
Pyloromyotomy	Pyloric stenosis	11	0	0
Cutback/dilatation	Low anal atresia	45	4	8.9
Loop colostomy	Hirschsprung's disease	31	7	22.6
	High anorectal atresia	40	10	25.0
	Total	71	17	23.9
Primary or delayed anastomosis	Oesophageal atresia	28	12	42.9
	Duodenal atresia	12	7	58.3
	Pyloric atresia	1	0	-
	Jejunoileal atresia	16	8	50.0
	Ileal stenosis	2	2	-
	Total	59	29	49.2
Ladd's operation	Malrotation of gut	9	5	55.6
Others	-	12	3	25.0
All cases		207	58	28.0

TABLE IV
PRE-EXISTING COMPLICATING FACTORS OF 170 FULL-TERM AND 37 LBW BABIES UNDERGOING OPERATION

Factor	Full-term		LBW (under 2.5 kg)	
	No.	%	No.	%
Pneumonia	15	8.8	10	27.0
Gut perforation	5	2.9	4	10.8
Severe associated anomalies	8	4.7	3	8.1
Associated chromosomal abnormalities	3	1.8	3	8.1
All complications*	28	16.5	20	54.1

* Some patients had more than one complication.

TABLE V
POST-OPERATIVE COMPLICATIONS (207 OPERATED CASES)

	Major			Minor	
	No.	%		No.	%
Septicaemia	26	23.2	Wound infection	7	6.3
Respiratory	35	31.3	W. dehiscence	3	2.7
Peritonitis	17	15.2	Diarrhoea	12	10.7
Cardiac	3	2.7	Colostomy Prolapse	3	2.7
Short bowel synd.	2	1.8	Retraction	2	1.8
Severe electrolyte imbalance	2	1.8	Internal hernia	1	0.9
Renal	1	0.9			
Total	86	76.9		28	25.1
Total No. of patients: 82 Total No. of complications: 114					

percent of all operated cases). Respiratory problems, septicaemia and peritonitis were the commonest major complications and these were alone or in combination responsible for 89.2 percent of deaths (Table V).

DISCUSSION

Early diagnosis and prompt referral to a paediatric surgical centre are important to bring about a successful surgical outcome. [4,5,6] Apart from the obvious abnormalities such as an absent anus, diagnosis of these rare conditions causing alimentary tract obstruction in this country is usually made late. [3] This results in the comparatively smaller number of the upper gut obstruction cases as these patients have died often as a result of inhalation of vomitus. [7] Furthermore, the absence of distension in these babies also makes the diagnosis more difficult and causes unnecessary delay. As a consequence, more than a third of them were admitted with pneumonia, which is more than ten times commoner than in the mid- and low-gut obstruction (Fig. 1). Even if they survive the

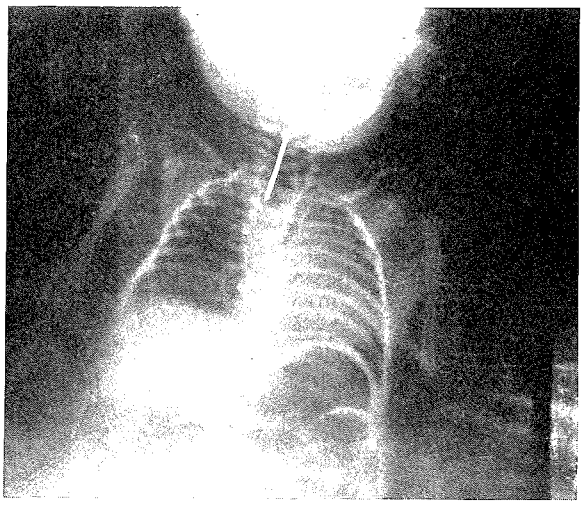

Fig. 6 (a) Oesophageal atresia with stiff tube in upper pouch.

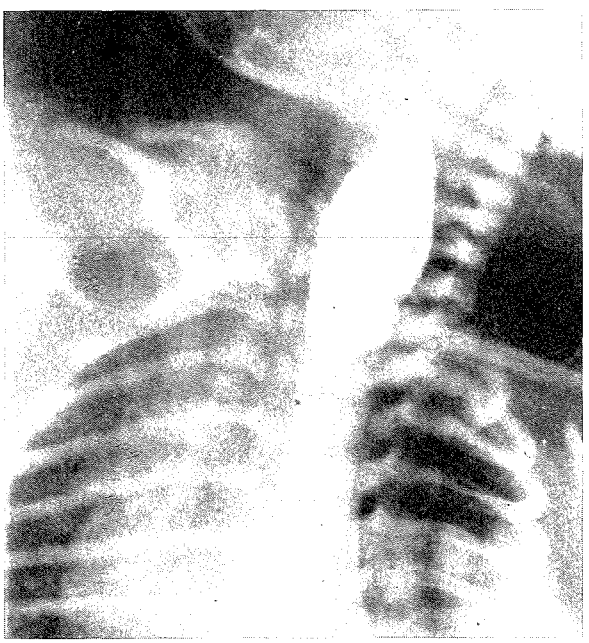

Fig. 6 (c) Oesophageal atresia with barium contrast study - a hazardous and unnecessary procedure.

operation, almost two-thirds of them (61.9 percent) would succumb during the postoperative period (Fig. 7). There is therefore a need to educate doctors and midwives to be alert and have a high level of suspicion when a baby starts having green vomit, fails to pass meconium or gets excessive frothing from the mouth in the first 24 hours of life (Fig. 8). [4,8,9,10] Since more than half the deliveries in

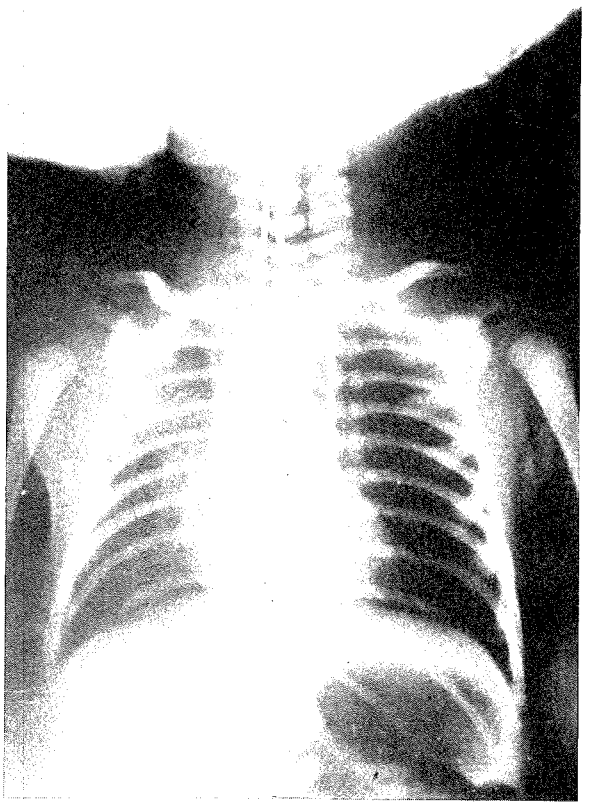

Fig. 6 (b) Oesophageal atresia with tube coiled in upper pouch.

this country is performed at home, [11] rural midwives have a big role to play in the early detection of these cases. Maternal hydramnios should alert the attending midwife or obstetrician to the likelihood of a high gut obstruction in the foetus and it is mandatory that a nasogastric tube be placed and the stomach aspirated before feeding of the newborn is commenced (Fig. 8). If a stiff tube sticks at approximately 10 cm from the gum margin, the diagnosis of oesophageal atresia should be made. A soft tube may coil in the blind pouch and give a false impression that it has reached the stomach. A plain chest x-ray will confirm the diagnosis (Fig. 6a, 6b). Contrast study of the upper pouch (Fig. 6c) is not only unnecessary but also hazardous because of the risk of aspiration and pneumonia. If the tube reaches the stomach but suction reveals more than 20-30 ml of fluid, intestinal obstruction is suspected especially if this fluid is bile-stained. [6,12,13] A plain erect and supine abdominal x-ray may be all that is required. [8,14] The presence of dilated gut with fluid levels

confirms the diagnosis (Fig. 3, 4).

Jejunoileal atresia tend to get referred earlier (average 4 days) than duodenal atresia (average 7 days). This is probably because distension in the former is more commonly present in association with the vomiting than is the case with duodenal atresia (Fig. 1). This underscores the reliance of paediatricians on abdominal distension as the sole diagnostic criterion of intestinal obstruction. When this is absent a medical cause is often sought for and a surgical problem is considered only 'as a last resort'. A plain x-ray is not ordered until after many days of conservative management (Fig. 3). The significance of the green vomit or gastric aspirate cannot be overemphasised. Delay in diagnosis of more than 48 hours particularly in the LBW babies leads usually to complications like pneumonia, gut perforation, fluid, electrolyte and acid-base imbalance and septicaemia with grave consequences (Fig. 7).

A group of conditions which can mimic a surgical obstruction is the 'functional obstruction' group. However, true bilious vomiting is only rarely seen. Prematurity, cerebral damage from birth trauma or septicaemia are important associated findings. [15] Since such babies are often poor surgical risks, accurate diagnosis is essential to avoid unnecessary laparotomies. [9] A surgical opinion should be urgently sought for.

A safe and reliable form of transportation is necessary to prevent deterioration en route particularly in the preterm infant. A nurse should accompany the baby to ensure he is kept warm and oxygenated in an incubator and does not inhale vomitus. Chest physiotherapy and special positioning may be required for those babies with established pneumonia or those with oesophageal atresia.

The overall mortality of 28.0 percent is comparable to that of Forshall and Rickham [4] at Alder Hey, Liverpool for the first six years of its establishment. It is also similar to that obtained from the University Hospital, Kuala Lumpur (28.3 percent), [16] and better than those from other developing countries like Nigeria (33.0 percent) [17] and India (31.4 - 76.0 percent). [18,19,20] However, it is inferior to the 17.5 percent achieved by Atwell (1978) [21] at Southampton. Full-term babies with a single major anomaly and without any preoperative complications had the lowest mortality (12.8 percent). This compares well with that obtained by Forshall and Rickham. [4] Babies with severe multiple anomalies and those with chromosomal abnormalities have a much worse prognosis (Fig. 7). This is probably the result of inadequate care. In an ICU where space is always a problem, such children are often sent back to the wards earlier than usual to make way for a more worthwhile patient. Being severely compromised and deprived of much needed special support they usually fail to survive.

Mortality is also dependent on the operative procedure undertaken (Table V). Colostomies were performed using a modification of the Denis Browne Nixon skin-bridge technique. [22] Mortality for this procedure is usually between 2 — 3 percent. [23,24] The high mortality seen here is a reflection of the severe preoperative state of many of these children. Procedures requiring gut anastomosis carried a mortality of 49.2 percent (Table III). Similar severe complications were seen in many of these babies who would fall into the B and C prognostic groups. [25,26] On the average these groups carry a mortality of approximately 50 percent even in the best centres. Whereas about a third of intestinal atresia cases are referred within 24 hours and almost two-thirds within 48 hours at Alder Hey, [27] the corresponding figures here are 6.3 percent and 25.0 percent. Although much improvements have been made, it must be admitted that postoperative nursing in this hospital is still lacking due to the shortage of nurses specialised in perinatal care. Total intravenous feeding for neonates has now been widely accepted, [28,29] and freely practised here. However, poor supervision especially of the central venous lines has led to morbidity and death in a few cases. Because of this the peripheral route is preferred, [30] and where possible, transpyloric tube feeding is employed.

Careful consideration of the newborn physiology is essential in neonatal surgery if complications are to be minimised. [31] Their early recognition is vital followed by vigorous treatment. Improvements in ICU management for neonates in this hospital both in terms of personnel and machinery have resulted in considerable reduction in mortality. [3] This is best reflected in our results from the treatment of oesophageal atresia. Before 1978, when ICU facilities for neonatal monitoring and ventilation were inadequate, mortality was almost 100 percent. Since 1978, however, this has improved and there were no deaths among the last 12 cases. It is evident

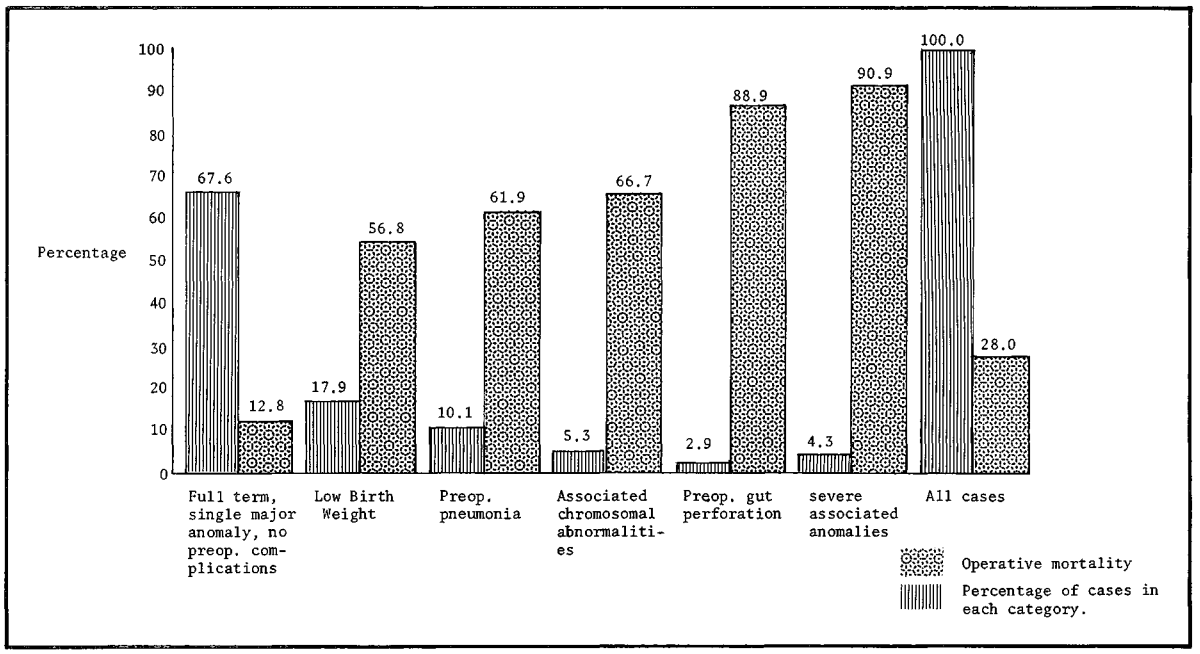

Fig. 7 Operative Mortality related to adverse preoperative factors (207 cases).

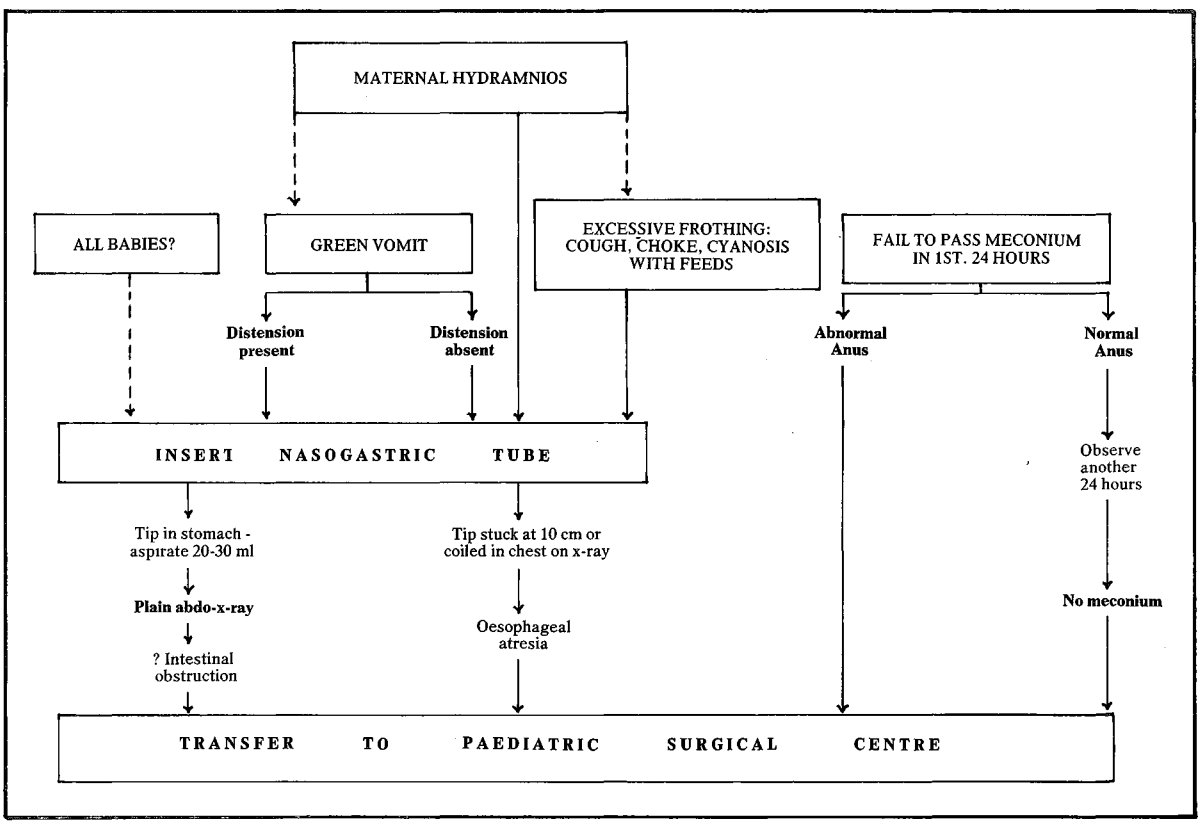

Fig. 8 Scheme for early diagnosis (within 24 hours of life) of neonatal alimentary tract obstruction.

also that mortalities of the earlier years have been converted to mobidities but with eventual survival.

These modest achievements are completely dwarfed by the disastrous results obtained with LBW babies and those with preexisting morbidity. In the former, in addition to being more prone to getting complications both pre- and post-operatively, these babies are also more often associated with severe multiple anomalies and chromosomal abnormalities (Table IV). The need for more skilled nurses and the establishment of a separate neonatal ICU in this hospital is to be stressed. Nevertheless, priority must be given to preventive measures that should be undertaken by the referring doctor to avoid complications. Every effort must be made to ensure early diagnosis and prompt and safe transportation to a paediatric surgical centre.

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