

Feeding Difficulties in the newborn

by

Wong Hock Boon, MB, BS, FRCP (E), FRFPS (G), DCH (LOND).

DEPARTMENT OF PAEDIATRICS, UNIVERSITY OF SINGAPORE.

Before one can label any condition or symptom as a feeding difficulty, one should be familiar with the acceptable norm or pattern which newborns exhibit, and the pattern can be accepted as normal if the infant does not suffer any harm, puts on weight in a normal fashion and develops in a normal way. There are 2 groups of such newborns; firstly, the majority who have no "abnormal" symptoms or signs at all but because of ignorance of parents about the normal they become anxious; the doctor should be able to educate them in this regard; and secondly, a small minority of newborns have "symptoms" and "signs" which do not affect the infant but are construed by parents, and doctors sometimes, as abnormal.

Taking the first group, the newborn infant passes meconium within an hour or two after delivery. Meconium is a dark green sticky mass composed of a complex mixture of bile, intestinal secretions, swallowed amniotic fluid, lanugo hairs, intestinal squames, etc. The newborn usually will be able to suck fluid offered to him a few hours after birth, after which he may take about 10 feeds in 24 hours for about the first few days, and then settle down to three or four hourly feeds taking 6 or 5 feeds in the 24 hours. The breast-fed infant produces a soft yellow stool while the artificially fed infant has a greener and harder faecal product. The newborn infant may lose weight at an average of 1oz./day for the first week and then puts on about 1oz./day for the next 3 weeks. In the subsequent 5 months he increases his weight by about approximately a minimum of 1 1/3 lb/month, and in the second 6 months he increases by 1 1/4 lb/month, so that he doubles his birth weight by 4 or 5 months of age and triples it by his first birthday.

However, there are certain signs and symptoms which may occur but which are still considered normal in that weight gain and general well-being are preserved and these form the second group of "normal" infants. The conditions are:—

1. "Diarrhoea" of the breast-fed infant:

Some infants on the breast pass frequent soft yellow stools which is *not* diarrhoea and is due to the increased carbohydrate content in breast milk compare to cow's milk. As a result of the increased carbohydrate content, the stools may be frothy and acid and prolonged contact with the peri-anal skin may cause erythema and even excoriation. This is usually only temporary, the peri-anal skin should be cleaned immediately after a stool with soft wool and the skin layered with a barrier cream such as lanoline, and the mother reassured that this is not abnormal.

2. Regurgitation:

The small amount of milk possetted out after a feed usually with extrusion of air in belching is normal. Such infants put on weight normally and lose this propensity with time.

3. The late meconium passer:

Some newborns pass very little meconium after considerable delay, but real stools are passed with time. These infants are those who had passed large amounts of meconium in utero or during delivery due to foetal distress or the placental insufficiency syndrome.

4. The "changing-stool":

On the second or third day, many infants pass loose greenish stools which are sometimes

considered by parents and nurses as diarrhoea. This is a combination of real stools plus dilution of the meconium, giving the green watery stool which disappears within 24 hours.

Having disposed off the normal we now come to the abnormal and the subject will be dealt with in accordance with symptoms, and where possible, their production at different ages in the newborn period. The most common and most serious abnormality is vomiting.

Vomiting

The symptom will be dealt with in accordance with the *frequency* of the different causes at various ages. Such a classification must not be taken to be all exclusive which it does not pretend to be. Exceptions will occur and overlap must of necessity take place, but it is practical and serves as a starting point for the doctor to search for the most probable causes till experience allows him to range over the exceptions.

1. First 24 hours:

In an investigation of the causes of vomiting in the first 24 hours in infants born in K.K. H. in August 1963 it was discovered that out of 70 infants who vomited, the causes were as follows:—

| | |
|--------------------------|-----------|
| "Gastritis" | 67 |
| Intracranial haemorrhage | 2 |
| Oesophageal atresia | 1 |
| Total | 70 |

Out of the 67 with "gastritis", 6 had blue asphyxia and 2 suffered from placental insufficiency.

a) "Gastritis"

This is the commonest cause of vomiting in the first day of life and is due to swallowing of large amounts of amniotic fluid, maternal blood and mucus. The vomitus is usually full of mucus and "haematemesis" without pallor and even the passage of malaena stools are seen with swallowing of

large amounts of maternal blood which can be distinguished from foetal blood by the alkali denaturation test. The infant may vomit only once and having got rid of the gastric irritants may then be well. Others vomit repeatedly till all the swallowed foreign liquids have been expelled.

Some people consider that this vomiting is inconsequential as there is no organic or structural cause. This is erroneous, as the analysis of another 43 "gastritis" vomiting occurring in July 1964 in K.K.H. shows:—

TABLE I

| Type of Delivery | % Gastritis Vomiting |
|------------------|----------------------|
| Caesar | 12.5% |
| Breech | 5% |
| Forceps | 4.4% |
| Normal | 1.0% |

This shows that conditions associated with abnormal modes of delivery are more prone to vomiting than if delivery was normal, *i.e.* the infant itself may already be enfeebled even before vomiting occurs.

Analysis of the same series from the point of view of pathological state of infant reveals the following (Table II):—

TABLE II

| Pathological State | % Gastritis Vomiting |
|-----------------------------|----------------------|
| Infants of diabetic mothers | 60% |
| Placental Insufficiency | 23.1% |
| Blue asphyxia | 12.7% |
| Prematurity | 6.0% |

This clearly demonstrates the "enfeebled" state of the infant even before vomiting occurs. The importance of this fact is that such feeble infants have a poor pharyngeal reflex, as a result of which the vomitus tends to be aspirated into the respiratory tract with consequent aspiration pneumonia and its attendant complications of septic pneumonia, obstructive emphysema and pneumothorax.

Therefore all newborn infants with vomiting should have a polyvinyl tube passed down into the stomach and the thick mucus, etc. aspirated and the stomach washed out before feeding with boiled water or dextrose. This procedure accomplishes 4 objectives:—

1. It will confirm the diagnosis of cases of oesophageal atresia as the tube will fail to enter the stomach;
2. It removes the cause of "gastric" vomiting so that aspiration pneumonia will be prevented;
3. If vomiting should recur, and if aspiration occurs, the use of bland fluids is relatively safer.
4. If vomiting recurs, the possibility of missed organic obstruction such as small intestinal atresia, will have to be strongly considered.

The infants also should be placed lying on the right as this helps to prevent "aerophagic" vomiting and lessens the chance of pulmonary aspiration if vomiting should recur.

b) Oesophageal atresia:

Infants with atresia of the oesophagus vomit almost immediately after delivery and the condition should be suspected in the labour ward. The vomiting is usually characteristic in that it is frequent (as the capacity of the atretic pouch is small compared to the volume of the stomach) and choking is a marked feature. In the commonest variety there is a fistula between the trachea and the lower segment of the oesophagus so that in spite of the atresia air is found in the

stomach on X-ray. It must be emphasized that these infants do pass meconium.

A tube must be passed and it will be found to be coiled up and retrace its path out through the pharynx again. The contents of the blind end can be aspirated and tested with litmus and found to be alkaline instead of the acidity of gastric contents. An X-ray is then taken to show the coiled up tube for confirmation of diagnosis and delineating the extent of the pouch. This can be made more evident by dipping the tube in lipiodal before the X-ray. Barium must never be used as aspiration with this thick dye can be disastrous. An infant with oesophageal atresia must never be fed till after surgery. The condition should always be considered whenever there is hydramnios in the mother.

c) Atresia or stenosis of small intestine:

Vomiting in these conditions is usually bilious and the site of the obstruction can be in the duodenum, jejunum or ileum. Meconium can still be passed. Vomiting may occur very shortly after a feed or after some time. Distension of the abdomen is

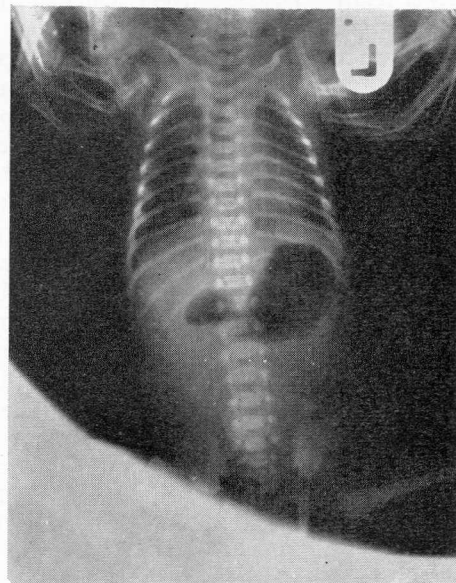


Fig. 1. Double sign of duodenal atresia. The bubble on the left side is that of the stomach and that on the right is due to the distended proximal duodenum. (Erect X-ray).

not conspicuous in the duodenal or jejunal groups but those with ileal obstruction may show abdominal distension. In atresias, if meconium had been passed previously, later on there is absolute constipation, but if stenosis alone is present, then the vomiting is less in frequency and even ordinary faeces may be passed.

The diagnosis may be confirmed by taking an erect X-ray when small intestinal fluid levels will be seen and in this regard, the duodenal atresias show the characteristic "double-bubble" sign (Fig. 1), one air bubble for the distended stomach and the other for the distended proximal portion of the duodenum. Lipiodal swallow is usually not necessary but it may be used in doubtful cases.

Treatment is surgical and is urgent before the infant succumbs to dehydration, electrolyte failure and aspiration pneumonia.

d) Intracranial haemorrhage:

Intracranial injury is not uncommon after difficult delivery or in prematures even after a relatively easy delivery. Clinical diagnosis is usually not difficult as often the history of the delivery would reveal disproportion, POP, breech, instrumentation such as forceps or vacuum extractor, or prolonged labour with opportunities for cerebral anoxia predisposing to cerebral capillary damage, or prematurity itself with its undue vascular fragility. The behaviour of the infant is usually characteristic; he is feeble and drowsy having a poor weak cry or may emit high-pitched cries. The fontanelle may be tense and if bleeding is severe palor is evident. Neurological examination may show dilated or inequality of pupils, deep reflexes often increased or totally depressed and the tone may be increased or totally flaccid. Paralysis or peresis is seen and a lumbar puncture is unnecessary for confirmation of diagnosis.

Since the majority of intracranial haemorrhages is intracerebral, treatment is usually conservative, except in the case of the acute subdural haematomas when subdural taps may have to be undertaken.

2. First week of life:

Besides the above conditions which may have its onset later than 24 hours, the following conditions cause vomiting in the first week of life:—

a) Intestinal bands or adhesions:

These bands are usually associated with gut malrotation, and usually produces very similar symptoms to the small intestinal stenoses, *viz.* the symptomatology of partial obstruction. The vomitus is also bile-stained. An erect X-ray will confirm the obstruction with its multiple fluid levels.

b) Hirschsprung's Disease:

Aganglionosis of the colon or Hirschsprung's Disease, although a congenital disorder, seldom causes vomiting and signs of acute obstruction in the first week of life. However, it can occur. The abdomen is grossly distended and passage of a flatus tube will often result in a gush of faecal matter with subsidence of the abdominal distension. If obstruction is not acute conservative treatment is carried out, but if obstruction is acute and serious, then surgical operation will have to be done even at this age (Fig. 2).



Fig. 2. Multiple fluid levels in obstruction due to obstruction as a result of Hirschsprung's disease in first week of life (Erect X-ray).

c) Imperforate anus:

Infants with imperforate anus seldom vomit in the first 24 hours but may do so after that if there is no associated fistula connecting the rectum with the vagina, bladder or urethra. The diagnosis is usually made by the attending obstetric staff at delivery as the anal orifice is absent. However, a few cases have been missed and sent home from hospital after a superficial examination of the anus as the atretic tissue may be about $\frac{1}{2}$ to 1 inch above the anal orifice. Such cases are rare (Fig. 3).



Fig. 3. X-ray of infant taken upside down, showing air in the blind rectal path due to imperforate anus. The distance between the metal ring and the rectal air gives some idea of the extent of the anal atresia.

3. First month of life:

a) Aerophagy:

The swallowing and retention of large amounts of air as a cause of vomiting and abdominal colic in infants has not been stressed enough. Where vomiting is concerned there are 2 syndromes due to aerophagy, viz. those who regurgitate small amounts at the same time as air is "burped" out—the mild vomiter, and those who really vomit large amounts often with a

force equal to the infant with pyloric stenosis—the severe vomiters. The mild vomiters produce no problem as they grow well and do not lose weight. However, the severe cases fail to gain weight or may actually lose weight. (Fig. 4).

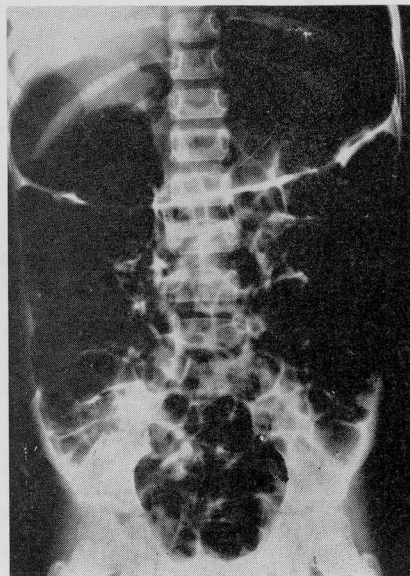


Fig. 4. The large amounts of air which may be swallowed in a patient is seen clearly in this X-ray.

The main problem is the severe vomiter. These infants are often misdiagnosed as congenital pyloric stenosis as the vomitus is copious, early on after a feed and often just after the baby had been put back to bed. The vomiting is forceful consisting of bile-free gastric contents. The infant gains weight very slowly or has stopped gaining weight or may actually lose weight. The cause of the vomiting is due to excessive amounts of air swallowed during a feed and as this air passes beyond the pylorus it finally reaches the transverse colon which being distended by air, rises to the anterior abdominal wall when the infant is placed supine on his back. In this supine position, the liver at the same time "falls" down leaving a space between its anterior surface and the anterior abdominal wall (Figs. 5 and 6). Into this space, the air-filled transverse colon now insinuates itself, so that the transverse colon has now moved anteriorly and cephalad.

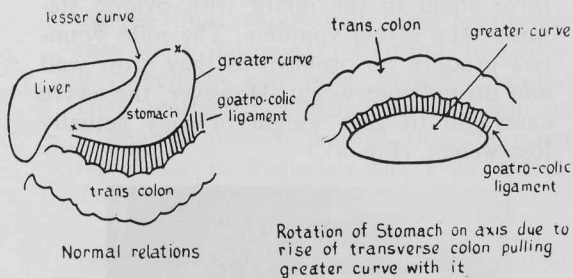
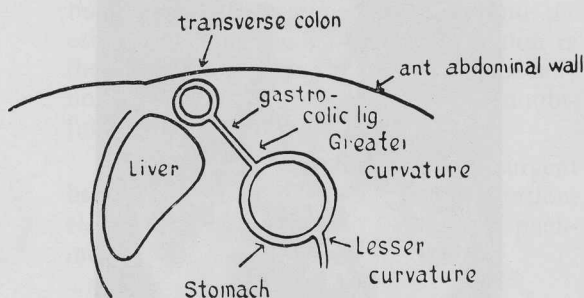


Fig. 5. Torsion of stomach. For explanation see text.



Torsion of stomach in supine position due to aerophagy.

Fig. 6. Torsion of stomach. For explanation see text.

However, the transverse colon is attached to the stomach by the gastro-colic ligament which stretches from the greater curvature of the stomach to the upper surface of the transverse colon. Hence, the transverse colon in its anterior and cephalic movement pulls the gastro-colic ligament with it, so that the greater curvature of the stomach is now pulled from its inferior position through 90° to an anterior position. This will result therefore in a torsion action at the narrow pylorus obstructing it with consequent vomiting whose characteristics resemble congenital pyloric stenosis to a remarkable degree. This condition of aerophagy and torsion of the stomach was given prominence by Eek & Hagelsteen (1958) but does not seem to merit the attention of paediatricians that it deserves.

The management of these severe aerophagy vomiters is simple. The infant is placed in a prone position, *i.e.* on his tummy

or in the right lateral position. In both these positions, the liver occludes the space between its anterior surface and the anterior abdominal wall and hence presents the movement of the air-filled transverse colon and thereby prevents the twisting of the

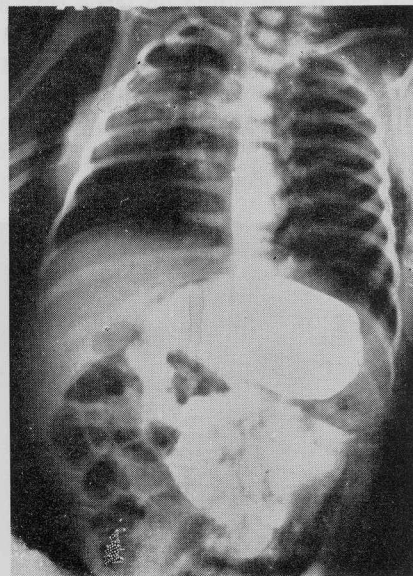


Fig. 7. Lipiodol swollen showing the horizontal position of stomach after torsion in one patient.

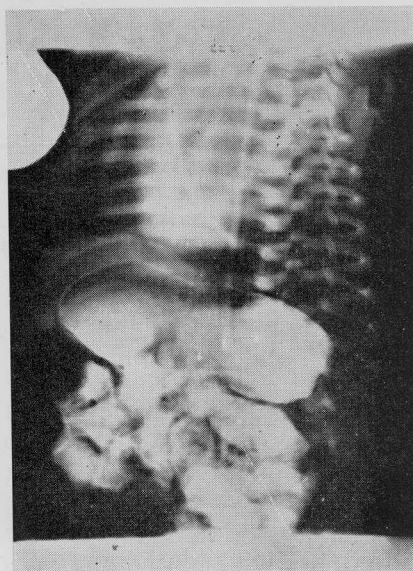


Fig. 8. Lipiodol swollen showing the same horizontal position of stomach after torsion in another patient.

stomach. We have encountered 4 infants in this category, 2 in the first month of life and 2 between 2 and 3 months. Vomiting ceased almost immediately after nursing them in the prone or right lateral position. These 2 positions have also been found by Hood (1964) as a result of radiological examination to be such that the air above the milk in the stomach is immediately under the cardia, and hence allowing the escape of air to the exterior while in the supine position the air is in the fundus separated from the cardia by the milk. Figs. 7 and 8 shows the horizontal position of the stomach after torsion as a result of aerophagy. At the same time, attention is paid to the causes of aerophagy such as size of hole in teat, technique of feeding such as milk filling the bottle neck, and special care is taken to bring the wind up during the feed as well as after the feed.

b) Congenital hypertrophic pyloric stenosis:

Vomiting in this condition usually starts at the 2nd or 3rd week of life, seldom in the first week. This condition is commoner in males and its incidence in this country is less than in Western countries. Vomiting of bile-free gastric contents with some degree of force is the rule and on examination there is visible peristalsis and the presence of a palpable "tumor" mass usually situated in the right hypochondrium. This mass is about the size of a 10-20 cent piece, firm and may change in size becoming more obvious and felt to harden with increased peristalsis so that palpation of the mass is easier after feeding the infant.

Treatment is either surgical or medical. Surgical treatment consists in incising the hypertrophied muscle down to but not through the mucous membrane. Medical treatment consists of a regime of stomach washouts to reduce the mucosal oedema and increasing the feeds slowly with the use of antispasmodics (Eumydrine). Because of the difficulty in obtaining consent for operation in this country we have carried out medical treatment for the last 3 years. The small mortality rate is no different from the mortality rate after surgery in this country. The rationale of medical treatment is that

congenital pyloric stenosis resolves by itself after about 3 months and hence if the infant can be tided over this period, the condition slowly improves often even in 2 weeks.

c) Infections:

Any infection in an infant can result in vomiting especially the following:—

1. Upper respiratory infections—vomiting may be spontaneous or as a result of a cough spasm.
2. Any high fever especially in association with pyelonephritis.
3. Intracranial infections such as meningitis, encephalitis and cerebral abscess.
4. Thrush
5. Gastro-enteritis

The treatment for vomiting from these causes is the treatment of the underlying infection.

d) Hiatus Hernia:

Hiatus hernia or the congenital short oesophagus results in vomiting especially in the supine position and is relieved while assuming the erect posture. Confirmation of the diagnosis is obtained on barium studies.

Treatment consists in thickening the feed and putting the infant in a special chair maintaining the infant in an erect position.

4. First 6 months of life:

Two conditions should be especially looked for from the point of view of serious pathology, viz.:—

a) Intussusception: (Fig. 9)

Vomiting occurs early even before blood is passed per rectum. The typical clinical features are known to all but certain uncommon features observed here should be noted:—

1. In some cases intussusception may

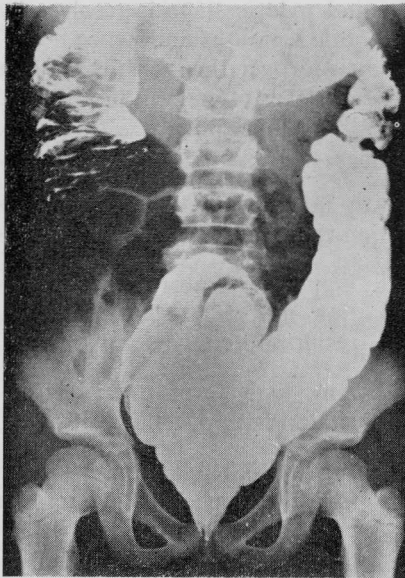


Fig. 9. Barium enema showing intussusception involving the ileocaecal junction and proceeding to the ascending colon.

start off as a diarrhoea before constipation supervenes.

2. Some cases of true infantile gastroenteritis may develop intussusception after a few days.
3. Intussusception may even occur in the first month of life.

b) Appendicitis:

Appendicitis may occur even in the first 6 months of life although it is rare, and should always be considered in the differential diagnosis of vomiting in this age group.

Diarrhoea

Just as vomiting is a symptom likely to cause alarm to both parents and doctors, diarrhoea also causes as much concern. Besides the "normal diarrhoea" described at the beginning of the article, the pathologic causes are as follows:—

| Organism | Route | Drug | Daily Dose | Interval |
|----------------|-------|-----------------|-------------|----------|
| Path. E. Coli | Oral | Neomycin | 50-100mg/kg | 6-8hrs |
| | Oral | Polymixin B | 10-20mg/kg | 6-8hrs |
| | Oral | Kanamycin | 50-100mg/kg | 6hrs |
| Shigella | Oral | Sulphadiazine | 200mg/kg | 6hrs |
| Salmonella | Oral | Chloramphenicol | 80-100mg/kg | 6hrs |
| Staphylococcus | Oral | Chloramphenicol | 50-100mg/kg | 6hrs |
| Pseudomonas | Oral | Polymixin B | 10-20mg/kg | 6-8hrs |

1. Infantile gastro-enteritis:

This may be due to infective, dietetic or parenteral causes. The important pathology here is that of dehydration and electrolyte loss and the treatment is directed to hydration and electrolyte repair. In only a small percentage can pathogenic bacteria be cultured and in the first 6 months of life, the commonest organisms are the group of pathogenic B. Coli, and the strains in this country usually encountered include 0125, 0126, 0127 and 0119. Other organisms are rare, even the dysenteric group.

The management is predominantly that of fluid and electrolyte repair and in case of identifiable organisms, the correct chemotherapeutic agents with their average doses is as follows:-

2. Thrush diarrhoea:

This entity has not deserved the serious attention it should in this country and occurs in infants with very low resistance and given one antibiotic after another because the diarrhoea does not clear up, instead of which it becomes worse, as it would be with further sterilization of the gut. The infant is usually marasmic and very toxic and by this time the typical oral thrush lesions may be absent but the thrush-laden stools would cause perianal thrush lesions with excoriation and whitish plaques (Fig. 10). Microscopy or culture of stools on special media will reveal the fungus *Candida Albicans*. Treatment is with the anti-fungal antibiotic nystatin, the dose of which is



Fig. 10. Thrush diarrhoea with whitish plaques in perineal region.

300,000 to 1,500,000 units daily in 3 divided doses.

3. Iatrogenic diarrhoeas:

By this is meant that group of infantile diarrhoeas characterised by frequent loose stools as a result of something taken orally. Usually the diarrhoea is not severe enough to cause serious fluid or electrolyte disturbances but weight gain may be slow. The use of broad-spectrum antibiotics especially terramycin resulting in loose stools is well known. A breast fed infant whose mother has been taking laxatives may have non-specific diarrhoea. Some infants may have diarrhoea in early introduction of orange juice. Finally, the possibility of allergy to food or animal milk must be considered. This is extremely rare in this country but reported often in America and we have seen a few here. The use of one of the hypoallergic milk preparations available in this country may overcome the difficulty but in one case, the condition was cured only after changing over to soya bean milk.

Constipation

Constipation is not just the infrequent evacuation of stools of normal consistency unassociated with any symptoms. The infrequency is associated with hard pellets and straining, crying at stool which may be blood-stained. Feeds may be refused at this time and even occasionally vomiting. There are 2 groups of such constipated infants:—

1. Those with obvious pathology:

Hirschsprung's disease has been mentioned before. Hypothyroidism and severe mental deficiency are another causes. The other organic gut obstructive lesions mentioned as responsible for vomiting above obviously also cause constipation. However, these conditions are usually excluded if they are thought of constantly.

2. Those without obvious pathology:

It is this group that diagnosis of the predisposing factors may be difficult. Inadequate fluid intake in a hot country like ours and underfeeding should always be considered and the deficiencies corrected. Many

of the causes are idiopathic and may be due to increased water absorption in individual infants. But a factor which perpetuates the constipation and makes it worse is the vicious cycle of anal fissure formation. As the stool becomes hard from whatever cause, it tears off the anal mucosa and the resultant fissure is extremely painful. This causes the infant to hold back his stool for fear of pain and renders the faeces even harder and until he has to pass it, with even greater trauma to the anal mucosa and the vicious cycle is set up. The management of such a case is to find out predisposing causes, eradicate them and attack the condition from both ends. A mild laxative is given orally to soften the stool and generous amounts of sugar added to the feeds to soften the stool and at the same time the fissures are treated with a combination of topical application of antiseptic and analgesic ointments. Occasionally, the treatment can only be initiated by evacuation of the hard stools by means of a small rectal washout.

Abdominal Colic

This condition is well recognised by doctors and parents and seen usually from the first month of life. The infant would cry incessantly, clench its fists, flex the thighs on the abdomen as if in great pain. The extremities are cold and such crying attacks of abdominal colic put the parents in a flap. Parents are rebuffed of their sleep, become irritable and tense, a state which is often communicated to the infant. These babies are often avid feeders and a bottle given to them may quiet them for some time only temporarily. The cause of this is really obscure but without doubt, air swallowing plays a great part in distending the gut and causing pain as evidenced by the large amounts of flatus passed by these infants.

The principles of management are the same as for aerophagy in the cause of vomiting, *i.e.* precautions taken to prevent air swallowing, burping the infant even during a feed, use of carminatives, and to let them lie on their abdomen or in the right lateral position. Other helpful aids include mild sedation with antispasmodics such as paediatric "piptal" drops for a period, calm the parents and assure them that there is nothing serious and even give them

some sedatives if necessary; the offering of a dummy sometimes works wonders. The dummy has been unfairly condemned and so long as it is left clean one sees no disadvantages in its use, psychologically or organically.

Another possible cause needs to be explored and that is milk allergy which can cause crying due to abdominal colic as well as diarrhoea. In these cases the use of a soya bean milk preparation would abruptly stop these crying fits.

Finally obvious organic causes of abdominal colic such as organic gut obstruction (usually associated with vomiting), and constipation with anal fissures should be routinely looked for.

Underfeeding and Overfeeding

Underfeeding if it occurs result in failure to gain weight. Among the educated and more privileged socio-economic group in this country, this is rare, but is not uncommon among the poor who may feed their infants on artificial milks. This is well exemplified by the most unfortunate widespread use of sweetened condensed milk for infant feeding. The reasons for the use of such milks by the less privileged group are that they can only afford a small sum of ready cash to purchase them as they are daily paid, the milk because of its high content of sucrose prevents its deterioration without the use of refrigeration, the ease of mixing with water, the ease with which the final mixture is still white in spite of severe over-dilution and hence psychologically still milk, and finally the fallacious weight gain due to the high sugar content lulls the parents into a false sense of security until the infant with its low resistance succumbs to respiratory and gastro-intestinal infections. An overdilution of 1 in 20 is not uncommon.

Overfeeding, however, is uncommon. It is not easy to overfeed an infant who will generally only take what it needs and rejects the rest, unless he is extremely thirsty and milk offered to assuage his thirst instead of bland fluids, or milk offered every time the infant cries without first finding the cause of the crying.

References

- Eek, S & Hagelsteen, H (1958) Lowell, 1, 26.
Hood, J.H. (1964) Lowell, 2 107.