NEONATAL SURGICAL EMERGENCIES *

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The surgical emergencies of the neonatal period are as much a problem of the paediatrician as of the surgeon. Unless the lesion is diagnosed early by the paediatrician the surgeon will be unable to operate with a chance of success. Generally speaking the prognosis of any particular neonatal surgical emergency depends on two factors:

Firstly the promptness with which it is diagnosed; the sooner the condition is diagnosed after birth the better the prognosis. Thus for example the mortality of treated cases of oesophageal atresia which are operated within the first 48 hours of life is about 30 - 40% while this rises to 80 or 90 % in cases which are not operated until the fifth or sixth day. Secondly the prognosis depends on the maturity of the baby; the mortality for any particular lesion is higher in a premature baby than in a mature one but on the other hand most abnormalities tend to be commoner in premature babies than in mature ones.

Needless to say, successful neonatal surgery requires not only a surgeon with adequate experience and skill but also an equally experienced anaesthetist and a good nursing and medical staff, completely familiar with the fluid and electrolyte requirements of a newborn baby. Undoubtedly this type of surgery should, whenever possible, be carried out in a special unit in a children's hospital.

It is a widely held opinion that a baby does not tolerate surgery well; this is not so, and a newborn baby is extremely tolerant of surgical trauma. The natural process of birth is probably more traumatic than many operations and the vast majority of babies survive birth. Really adequate oxygenation is probably one of the most important factors to take care of during operations on babies and rapid and accurate replacement of blood lost is essential. On the other hand the baby's resistance to trauma decreases rapidly after birth and a baby which is a week old is less able to tolerate an operation than one which is only a day or two old. Generally speaking any surgery which is not carried out in the first few days of life should, if possible, be withheld

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until the baby is three months old and weighs no less than 5 kilos.

The most important factor in the diagnosis of neonatal surgical conditions is an awareness that these lesions exist; if they are suspected they can usually be confirmed or disproved by nothing more than a simple X-ray. A history of hydramnios or of a virus infection during pregnancy, especially within the first trimester, should make the paediatrician particularly alert for a congenital abnormality. I would also like to point out that quite often more than one congenital abnormality may exist and a baby may, for example, have an oesophageal atresia well as an imperforate anus.

The conditions which I wish to discuss are almost all lesions which, if untreated, are incompatible with life, whereas prompt surgical relief very often produces a normal baby.

They are:

Oesophageal atresia and tracheo-oesophageal fistula
Diaphragmatic hernia (if causing symptoms)
Intestinal atresias: duodenal, jejunal, ileal, colic
Imperforate anus
Meconium ileus
Meconium peritonitis
Omphalocoele
Urethral valves

Other conditions which should be treated in the neonatal period:

Congenital dislocation of the hips
Talipes equino varus.

Oesophageal Atresia:

This is a relatively common abnormality and there are a number of variations which this can take. Occasionally a tracheo-oesophageal fistula may exist without an atresia; a particularly difficult condition to diagnose.

Typically the baby has intermittent cyanotic attacks, especially after attempted feeding, and regurgitation of the fluid drunk invariably occurs. In practice any newborn baby with "feeding difficulties" should be regarded as a case of oesophageal atresia until proved otherwise. If untreated the baby will develop pneumonia in a short time from the aspiration into the air passages of fluid spilt over from the blind oesophageal pouch or from the gastiric contents regurgitated through the fistula.

If this lesion is suspected a soft rubber catheter should be introduced through the mouth into the oesophagus; if this passes easily into the stomach an oesophageal atresia is obviously excluded although

the rare solitary fistula is not diagnosable in this fashion. This procedure is so simple and so harmless that it should be done in every baby with cyanotic attacks or feeding difficulties; in fact in some clinics this is done on every baby born.

If an atresia is present the catheter is held up after a few centimeters and a few cc of Lipiodol should be injected through it and an X-ray taken; this will outline the length and depth of the upper-oesophageal pouch. The Lipiodol should be aspirated after the X-ray to prevent it from spilling into the bronchial tree and on no account should barium sulphate be used for investigation as any spill of this would cause a severe chemical pneumonia. Once diagnosed the baby should be kept with the head end elevated to prevent the reflux of gastric contents through the fistula. The mouth should be aspirated at intervals and obviously feeding should not be attempted. The baby should be prepared for surgery as soon as possible after this although if a pneumonia is already present by the time an atresia is diagnosed this should be treated for a day or so with antibiotics and aspiration before operation.

I will not describe the operative procedure in detail but it essentially consists of a transthoracic approach; the tracheo-oesophageal fistula is divided and the tracheal defect is repaired with fine sutures. The two ends of the oesophagus are mobilised and anastomosed. Sometimes the gap between the two ends is too large for a primary anastomosis to be carried out; in these cases the upper end is brought out in the neck and a gastrostomy is made. The oesophagus is reconstructed later by using a loop of intestine or by mobilising the stomach and bringing this up into the chest.

Congenital Diaphragmatic Hernia:

This usually takes place through the foramen of Bochdalek or the persistent pleuro-peritoneal canal. In other words there is no peritoneal sac in this hernia and the intestinal contents lie freely in the pleural cavity. The amount of the abdominal viscera which has herniated varies considerably; it may just be a loop of colon on the left side or a part of the liver on the right, neither producing any symptoms, or it may be almost the entire intestine as well as the spleen. Usually the more viscera have herniated the more will the symptoms be and the more urgent will be the need for operative interference and surgical relief.

These cases may present either as intestinal obstruction caused by constriction at the diaphragmatic opening or they may present as cyanosis caused by collapse of a lung and mediastinal compression.

Typically cyanosis follows feeding and is relieved by the passage of a gastric tube. Often bowel sounds can be heard in the chest and the abdomen gives a characteristic "empty" feeling. A plain X-ray of the chest shows "cavity-like" lesions caused by gas shadows within the loops of intestine. The appearances on X-ray are rather similar to those of neonatal staphylococcal pneumonia with abscess formation but the administration of a little Lipiodol will quickly show the true nature of the lesion (Fig. 1 — 2).

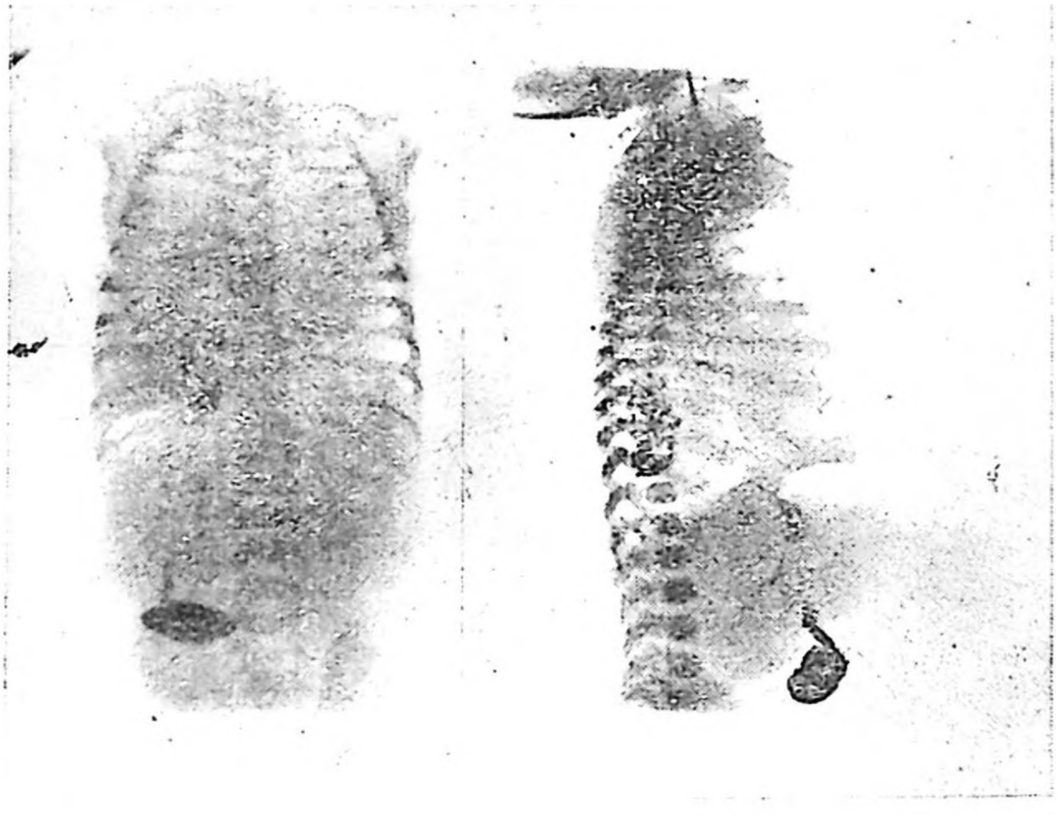

Fig. 1 Fig. 2

Cyanosis should be relieved by passing a stomach tube but surgery should be carried out as early as possible in those cases with cyanosis or obstruction. The abdomen is opened and the herniated viscera can usually be reduced out of the chest without difficulty; the defect in the diaphragm is then repaired and the most difficult part of the operation is usually the closure of the abdomen as the abdominal cavity may be too small for all the viscera. One case successfully treated in this hospital had necrosis of the spleen following torsion as a complication of such a hernia. [1]

Intestinal Artesias:

Atresia may occur anywhere in the intestine; 50% of cases occur in the ileum, 25% in the duodenum and the remainder in the jejunum

and colon. Vomiting is the dominating symptom and dehydration occurs rapidly. The vomit will contain bile unless the atresia is in the first or second part of the duodenum. Meconium is often passed normally. Abdominal distension is related to the level of the obstruction; the lower down the intestine the obstruction is the greater will be the distension. A plain X-ray of the abdomen in the erect position will show gas shadows and fluid levels, one taken supine will show gas shadows only.

The baby's dehydration and electrolyte disturbance should be corrected by parenteral fluids and the obstruction is bypassed by a side-to-side anastomosis. The whole of the intestine should be examined carefully at operation to exclude the rare cases of multiple stenoses.

An annular pancreas will present in the same fashion; bile is usually absent from the vomitus. At operation the obstruction is bypassed by a gastro-duodenostomy

Imperforate Anus:

This is an abnormality which is easily diagnosed by physical examination and an inspection of the anus should in fact be part of the routine examination of any new-born baby. The anus may be occluded by a thin membrane or there may be a considerable gap between the blind rectal pouch and the anal dimple. A recto-urethral or rectovaginal fistula is present in a considerable proportion of these cases. An X-ray taken a few hours after birth with the baby hanging upside-down will show an air shadow in the rectum and a metal marker placed on the anal dimple will enable us to assess to size of the gap. Meconium is of course not passed and abdominal distension develops rapidly except in those cases in which a large recto-vaginal fistula is present and acts as a safety-valve. If only a thin obstructing membrane is present (up to 1 cm.) the rectum can be opened through a perineal approach only but if the gap is larger an abdomino-perineal pull through type of operation is carried out. (Fig. 3).

In very ill or premature infants a temporary inguinal colostomy is preferable to a radical operation but it should be remembered that a colostomy in a baby is very difficult to manage and carries a considerable mortality of its own.

We have, in the past six months, seen four cases of imperforate anus; in two of these a radical pull through operation was done; one had a perineal operation only and the fourth, a premature baby, had a colostomy.

Meconium Ileus:

This is in effect a form of intestinal obstruction. The meconium is tenacious and viscid and the intestinal peristalsis is insufficient to expell it normally. The disease is associated witn pancreatic fibrosis and the babies which survive meconium ileus are liable to recurrent pulmonary infections from which they often succumb during the first few years of life. However, prolonged wide-spectrum antibiotic therapy has produced some long-term survivors.

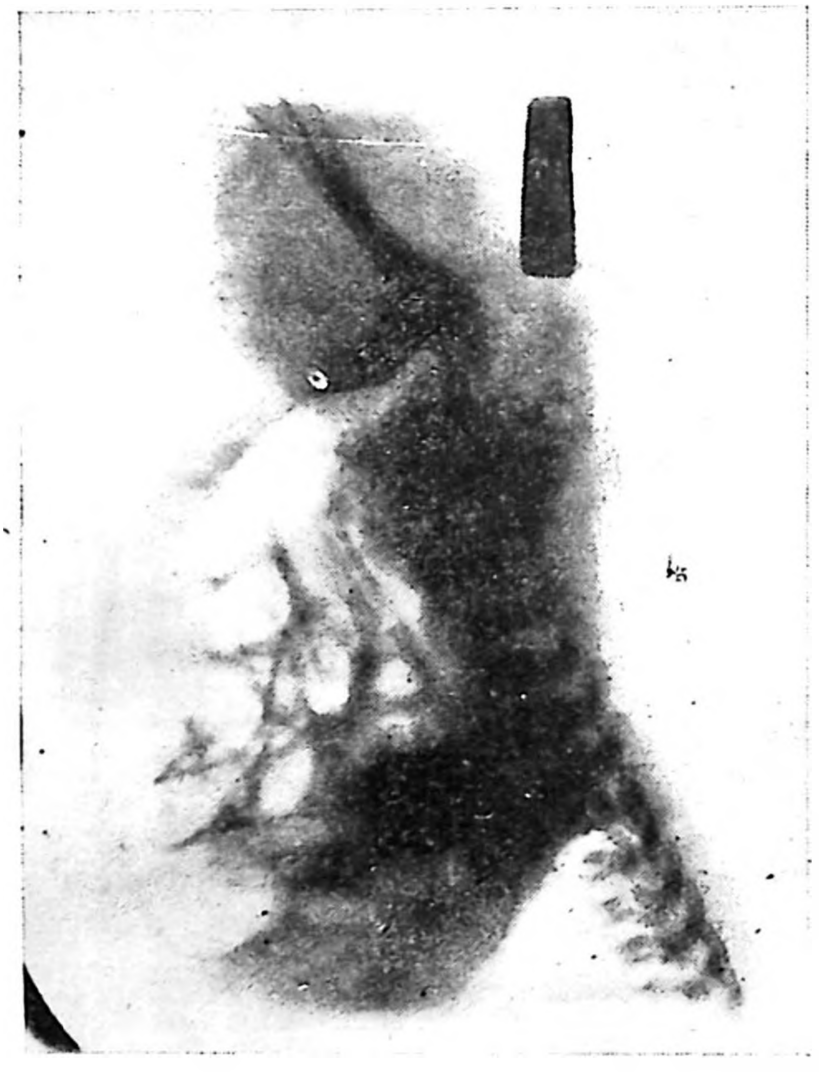

Fig. 3

Meconium ileus is characterised by vomiting and abdominal distension; the meconium filled intestine has a characteristic "feel" as the masses can be indented by the examining fingers. Usually no meconium is passed per rectum but somethimes a small plug of this tenacious materials is passed spontaneously or after an enema. Perforation of the intestine and meconium peritonitis sometimes occurs.

On X-ray of the abdomen gas shadows and fluid levels typical of intestinal obstruction may be seen but at the same time the meconium

gives a characteristic picture. In perforated cases free air may be seen in the abdomen.

Surgical treatment consists of excision of the distended segment of intestine with a double barreled temporary ileostomy into which the enzyme pancreatin can be instilled through a catheter.

Meconium Peritonitis:

This results from intestinal perforation during intra-uterine life. Often the cause of the perforation is obscure and the perforation has become sealed off by the time the baby is born. It is the sequelae of peritonitis, causing obstruction from adhesions and kinking of the intestine, which require relief. On X-ray calcified specks of meconium can usually be seen. The treatment is relief of the obstruction by entero-anastomosis but this condition carries a very high mortality.

Omphalocoele:

This condition, in contrast to most of the ones previously discussed is quite obvious at birth. Owing to faulty development of the abdominal wall there is a defect of skin muscle between the umbilicus and the symphysis and viscera are covered by amnion only. Ectopia vesicae sometimes accompanies this defect.

If untreated the thin membrane ruptures and the baby will succumb to peritonitis in a short time. The usual treatment is to repair the abdominal wall defect; this may have to be done in stages if the omphalocoele is large and the abdominal cavity is relatively small. In this case the skin only is closed over the protruding viscera and the repair of the muscle layer is postponed until the abdominal cavity has enlarged enough to accomodate them.

Recently Grob [2] has advocated a conservative treatment of patients with omphalocoele; the amnion is painted repeatedly with mercurochrome which shrinks the covering membrane and prevents infection. Epithelialisation takes place gradually from the skin edges but this treatment is unsuitable if rupture of the covering membrane has already occured.

Urethral Valves:

This is a completely different type of lesion from those described before. Urinary obstruction results the from presence of valvular folds below the verumontanum. The bladder becomes distended and never empties properly although a dribble of urine may occur.

Dilatation of the ureters and hydronephrosis develop; the blood N. P. N. rises rapidly and the baby develops renal failure. These

babies often present as poor feeders or show a failure to thrive and unless the distended bladder and the absence of a good stream of urine are looked for the diagnosis is easily missed.

The urinary obstruction should be relieved promptly and a suprapubic cystotomy or preferably bilateral nephrostomies should be made initiallly. The valves can be destroyed by open operation or by transurethral diathermy at a later date when the baby's condition has improved. Owing to the shape of the valves a catheter can usually be passed into the bladder without difficulty and successful catheterisation is therefore of no use in the diagnosis but the catheter should not be left in situ for more than 24 hours as ascending infection invariably occurs and a urethral stricture is likely to result.

There are two conditions which are of no danger to life but are most successfully treated within the first few days of life. These are talipes equino varus and congenital dislocation of the hips. At this age no anaesthetic is required for the manipulative reduction. Manipulation and prolonged fixation in plaster casts or special splints is all that is required if these lesions are treated early.

On the other hand abnormalities like cleft palate, hare lip, ectopia vesicae, meningocoele and the many various cardiac anbormalities should usually not be treated during the neonatal period.

I have not included lesions associated with birth trauma, most of which are preventable by good obstetrics, and the management of birth fractures is essentially the same as those in older children.

REFERENCES

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[2] Grob, M.: Lehrbuch der Kinderchirurgie, 311. Georg Thieme, Stuttgart, 1957