Current Practice

Management of intestinal obstruction in the neonate

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Introduction

Vomiting, abdominal distension and failure to pass normal meconium stools are symptoms common to the various forms of intestinal obstruction seen in the neonate[1]. The vomitus is usually, but not always, bile stained[1]. Loss of gastric and other enzymatic secretions rapidly leads to hypovolaemia, dehydration and acid-base imbalance[1]. Furthermore, aspiration of vomitus can cause airway obstruction, followed by a chemical and bacterial pneumonia[1]. The gastrointestinal tract, which is sterile at birth, becomes colonized with swallowed bacteria which in turn, having reached the obstruction, proliferate and cause sepsis as they enter the blood stream through a frank perforation or through damaged intestinal mucosa[1]. Prompt diagnosis and treatment can forestall this sequence of events. But early diagnosis rests almost entirely on a high index of suspicion among nurses and physicians who care for newborn babies. Plain radiograph of abdomen is one of the most useful investigations[1]. Resuscitation commences with passage of a gastric tube and administration of intravenous fluids and antibiotics[1]. Relief of obstruction and restoration of continuity of gastrointestinal tract poses a challenge for the surgeon. Necrotizing enterocolitis as a cause of intestinal obstruction is becoming commoner as the number of preterm babies born keeps increasing[2]. Although the surgical technique in treatment of most obstructions has not changed during the last decade or so it is the advances in neonatal and anaesthetic care which have increased survival of this group of babies. Intestinal obstruction in the neonate is one of the commonest reasons for a surgeon to see a neonate. It is an important cause of morbidity and mortality and to reduce this early recognition is needed. This will allow prompt referral and correct treatment to be instituted.

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Categories

Newborn intestinal obstruction could be broadly divided into mechanical and functional categorizes1.

Mechanical causes include duodenal atresia, duodenal stenosis, midgut malrotation with or without volvulus, small bowel atresia, meconium ileus, colonic stenosis or atresia (uncommon), anorectal anomalies and duplication cyst (uncommon).

Functional causes include necrotising enterocolitis and Hirschsprung disease.

Diagnosis

Diagnosis of the newborn with intestinal obstruction requires a high index of suspicion. Presence of various signs and symptoms in the pregnant mother and the newborn baby should make one suspect the possibility of obstruction in the baby.

Maternal polyhydramnios, detected by antenatal ultrasound, will be an indication of the possibility of upper intestinal obstruction including oesophageal atresia[1]. Maternal diabetes might cause a transient functional obstruction of colon called left colon syndrome which is sometimes difficult to differentiate clinically from Hirschsprung disease[1].

Vomiting, especially when it is bile stained, regurgitation and abdominal distension of varying degrees may be the first symptoms of possible obstruction .It has to be appreciated that vomiting will be a prominent symptom when the obstruction is proximal and distension will be a prominent symptom when it is distal[1].

About 94% of newborn term babies are expected to pass meconium in the first 24 hours[3]. Any delay in this important event will be the first indication that the baby may be having intestinal obstruction.

A premature baby with a low birth weight who has passed meconium but starts passing blood in the stool may be having necrotizing enterocolitis or a volvulus of the midgut due to malrotation[1]. Abdominal wall oedema with redness of the umbilicus, especially in a premature baby, may indicate dead bowel due to one of these conditions[1].

A fit in the newborn due to hyponatremia may be caused by vomiting due to obstruction[1]. A baby with Down syndrome may be having vomiting due to duodenal stenosis which may be missed as the obstruction is partial and will not cause an immediate threat to life[4].

Examination of the newborn for the presence of syndromes and their associated abnormalities, the amount of dehydration, abdominal examination for evidence of perforation and local perineal examination for anorectal anomalies will be very useful in detecting possible obstructive pathology in the newborn[1].

Insertion of a nasogastric tube and aspiration of it will help in establishing a suspected oesophageal atresia or a duodenal atresia[1]. The former can be confirmed by taking a chest radiograph with a size 7 or 8 FG tube coiled in the upper pouch of the atretic oesophagus[1]. The double bubble of the latter can be made prominent by injecting about 15 ml of air through the nasogastric tube before taking the abdominal radiograph[1].

Management of the baby with suspected obstruction

General Measures

The baby is kept warm and nursed preferably on the side to prevent aspiration. A size 7 or 8 nasogastric tube is inserted and gastric contents aspirated regularly and kept on free drainage connected to a bag. A baby with intestinal obstruction will be subjected to dehydration, loss of electrolytes, acid-base imbalance, ischaemia of the gut, perforation of the gut, septicaemia depending on the severity of the condition[1].

Treatment of a baby with intestinal obstruction includes resuscitation and operative treatment[1]. General measures include keeping the baby warm, giving intravenous fluids and antibiotics[1]. Lactated Ringer solution or 0.9% N saline is indicated to replace the losses through vomitus and nasogastric aspirate. 0.18% N saline with 4% dextrose is used only for maintenance requirement[1]. Intravenous antibiotics should include both aerobic and anaerobic cover[1]. The nasogastric tube should be kept on free drainage and aspirated regularly depending on the amount of aspiration and the amount replaced with intravenous Ringers or normal saline with potassium chloride added[1].

Once a baby is suspected to have intestinal obstruction certain biochemical investigations would be indicated. A full blood count would indicate some evidence of perforation or septicaemia due to the obstruction. Blood urea and electrolytes are necessary for correction of fluid and electrolyte disturbances[1].

Radiological investigations

A plain radiograph of the abdomen is the most useful investigation in establishing the diagnosis and the site of obstruction[1]. Although an erect film is done in most instances, a supine film will give the necessary information with less trouble to the baby[1]. Complete obstructions like duodenal atresia and small bowel atresia can be diagnosed with the help of the plain film. These will show abnormally dilated loops of bowel with no gas beyond the most dilated loop[1]. A baby with suspected Hirschsprung disease will show dilated loops with no gas in rectum[1]. A baby with necrotizing enterocolitis might show intramural gas in the early stages or free gas or gas in the portal vein in the later stages[1]. In a suspected case of midgut malrotation as the obstruction is in the duodenal region the gas distribution will be confined mainly to stomach and duodenum with very little gas beyond that[1]. In that situation if the baby has no clinical evidence of bowel ischaemia, such as tenderness, guarding and blood per rectum, an upper gastrointestinal contrast study will confirm the diagnosis of midgut malrotation[1]. If the baby has clinical evidence of ischaemia surgical intervention is indicated immediately, as any delay will lead to necrosis of the entire midgut with certain death to the baby[1].

An upper gastrointestinal contrast study is indicated when a partial obstruction is suspected as in midgut malrotation with no clinical evidence of ischaemia, and in suspected duodenal stenosis with or without annular pancreas[1].

In the newborn with suspected Hirschsprung disease barium enema is generally not useful as demarcation between the dilated normal bowel and narrow abnormal bowel is not marked as there is not enough time for this demarcation to take place[1]. A rectal biopsy is more useful in establishing the diagnosis[1].

A baby with an anorectal anomaly will have either a blind ending rectum (10-20%) or a fistulous connection either to the urinary tract in the case of a male or to the genital tract in the case of the female[5]. If this fact is appreciated correct management can be started easily. A male new born baby with a fistula to the urinary tract will pass meconium with urine when the baby passes urine and this baby will need a colostomy to divert the faecal stream away from the urinary tract[5]. A radiograph to assess the level of rectum is not essential. A female baby with a fistula into the genital tract will have it opening into the vestibule below the vagina in the majority of anorectal anomalies[5]. Here also a radiograph for assessment of rectum is not indicated. A male baby who does not pass meconium with urine or a female baby who does not pass meconium through an abnormal opening in the vestibule or vagina even after about 18 hours of age, a cross table lateral film is indicated to assess the level of the rectum[6]. In this radiograph the baby is kept prone with buttocks under a sand bag to allow rectal gas to go to the highest point. The information obtained by this cross table lateral film is useful in assessing the need for a colostomy or otherwise[5]. The invertogram, which used to be done in the past, is cumbersome and hazardous to the baby and this can be avoided by using the cross table film[6].

Specific causes

In Hirschsprung disease the absence of ganglion cells in the nerve plexuses in the large bowel causes a functional obstruction which occurs in the recto-sigmoid area in about 85% of the babies with this condition[3]. This causes a distal colonic obstruction which manifests as no passage of meconium, abdominal distension and vomiting[3]. The history of delayed passage of meconium in a term baby should make one suspect this condition[3]. A digital rectal examination, which will allow passage of meconium by dilating the narrow rectum, sometimes solves the problem temporarily. Here a plain radiograph of the abdomen will show dilated bowel loops right up to the pelvis and no gas in the rectum[3]. A baby with this clinical scenario who improves on digital rectal examination or a bowel wash needs to be followed up, because a baby who shows temporary improvement like that might be quite asymptomatic while being on breast milk in the first 4 months as the stools are soft and not bulky; however once weaned the baby tends to get symptoms again as the stool consistency become bulky and somewhat thick. Unless this fact is kept in mind some babies with Hirschsprung disease tend to get missed and to be on long term laxatives with general ill health.

Meconium ileus is a condition where the meconium is abnormally thick and forms pellets causing obstruction of the lumen[7]. Generally this is associated with cystic fibrosis and is rare in Sri Lanka. In this country the diagnosis is generally made at laparotomy which is done on clinical and radiological evidence for intestinal obstruction.

Necrotising enterocolitis is a condition with a spectrum of illness that varies from a mild case that will recover with no sequelae to a severe case characterized by intestinal necrosis to peritonitis and death[8]. A newborn premature baby with low birth weight who develops general ill health, abdominal distension and poor sucking may be having necrotising enterocolitis. Management of this should involve both the paediatrician and the surgeon as intensive treatment of the premature baby with surgical intervention should be the correct approach. A baby who has perforation will generally need surgical resection of that bowel followed by either primary anastomosis or stoma formation initially depending on general condition of the baby[8]. A baby who has no evidence of perforation might improve on intensive care management which might include a period of parenteral nutrition to rest the ischaemic bowel[8].

Surgical intervention

About 100 ml of blood should be cross matched and reserved. Once resuscitation has been started, depending on the clinical picture and the radiological investigations, a working diagnosis could be arrived at. If a definitive diagnosis of duodenal or small bowel atresia can be made the treatment would be primary surgical correction by way of duodeno-duodenostomy, jejuno-jejunostomy or ileo-ileostomy[9].

If Hirschsprung disease is suspected one of two options is available. The first is to perform a laparotomy, do multiple biopsies to map the diseased bowel and do a colostomy[10]. The other option is to see whether the baby can be managed with regular laxatives or bowel washes by the mother while the baby is thriving till about 6 months of age when a primary pull through to remove the affected bowel is done[10.] With this approach the parents should be intelligent enough to respond quickly to various complications the baby might develop if laxatives do not cause bowel opening for a few days. If properly done this will help the baby to avoid multiple operations.

A baby with suspected malrotation with clinical evidence of bowel ischaemia will have to have an urgent laparotomy to untwist the bowel followed by correction of obstruction[11]. If the suspected baby has no evidence of ischaemia, malrotation can be confirmed by an upper gastrointestinal contrast study before surgery is undertaken[11].

A baby with clinical and radiological evidence of intestinal obstruction but who does not fit in to any of these conditions will need a laparotomy at which various uncommon causes like meconium ileus, duplication cysts, colonic atresia will be found. Each of these conditions will need to be treated differently.

For low anorectal anomalies a local perineal operation will suffice[5]. In high anomalies either a primary correction or an initial colostomy followed by full correction when the baby is about 4 months old will be done depending on the surgeon's preference[5].

Neonatal intestinal obstruction is a common cause of neonatal morbidity and mortality. Better neonatal and anaesthetic care has remarkably brought down both morbidity and mortality of the congenital causes of neonatal intestinal obstruction. Most conditions can be diagnosed with a few investigations and with correct surgical treatment they recover well. At the same time with number of premature births going up at present the incidence of necrotizing enterocolitis also keeps increasing. Management of these babies involves a joint approach with a lot of intensive care having to be given for these sick babies.

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