Bahrain Medical Bulletin, Vol. 29, No.3, September 2007

Antenatal Diagnosis and Management of Fetal Mid-gut Volvulus

Khalil E Rajab, FFFR, FRCOG* Zainab Al Juffairi, MRCOG**
Abdulla A Issa, FRCOG***

Fetal volvulus is an uncommon cause of bowel obstruction, which is rarely detected by an antenatal ultrasound scan. We report a case which presented with fetal stomach and small bowels dilatation at 33 weeks of gestation detected by ultrasonography. She was referred to our unit for safe delivery at 34th week of gestation following a spontaneous rupture of membranes and signs of fetal distress. Delivery was accomplished by Cesarean section. Postnatally, the infant was surgically explored with resection of ileum and end to end anastomosis because of bowel gangrene and volvulus. Ultrasound diagnosis during pregnancy with fetal bowels dilatation is an important tool and may lead to early diagnosis and optimal management of intestinal obstruction.

Bahrain Med Bull 2007; 29(3):

Although intrauterine volvulus has been reported as a rare cause of jejuno-ileal atresia (JIA), pediatric surgeons have noted the frequent presence of volvulus as well as intussusception at surgery[1]. While intussusception remains the main cause of atresia, volvulus is a secondary event and in some cases, it may result from anatomic changes after the development of JIA[2]. The incidence of small bowel occlusion in general is approximately 1/3000 birth; however, only few cases of fetal mid-gut volvulus have been reported so far, mostly, in the third trimester of pregnancy. The etiology may be due to delayed return of the fetal mid-gut in the abdomen which has been also reported to result in mid-gut volvulus. Other mid-gut pathologies such as intestinal obstruction and short bowel syndrome were reported in these circumstances[3].

Normally, the mid-gut returns to the abdominal cavity when the embryo reaches 40 mm length. The re-entry of the small bowel does not occur in a normal fashion and the mesentery does not fix normally to the posterior wall[4]. In this situation, neither atresia nor gut malrotation are found. Intestinal malrotation is commonly associated with a short mesentery, which predisposes to mid-gut volvulus as well as intestinal atresia. In such cases, the volvulus, usually appears above the atresia and occurs between the proximal jejunum and the distal ileum.

---

* Professor
Department of Obstetric and Gynecology
Arabian Gulf University
** Professor and Chairman
Department of OB & Gynecology
Consultant OB Gynecologist
Arabian Gulf University
*** Consultant Obstetric and Gynecologist
Salmaniya Medical Centre
Kingdom of Bahrain

Most cases of volvulus were diagnosed in the neonatal period, but recently an increasing number of reports of prenatal ultrasound diagnosis had appeared in the literature[5]. The prenatal ultrasound presentation is usually included polyhydramnios, fetal bowel distension or ascites. Polyhydramnios is present in a quarter of the cases of high atresia[6-8]. Unfortunately, the specificity of ultrasound is still low, since only 28% of suggestive cases are confirmed after delivery[9]. Other forms of imaging such as magnetic resonance have been used to determine the exact site of obstruction. Plain radiography is used in the neonatal period, but upper GI and Barium studies are rarely needed[10].

"The key for successful treatment of the neonates with mid-gut volvulus is comprehensive peri-operative care since the mortality rate is still significant. The best results are obtained when there is a team effort including experienced pediatric surgeon, neonatologist and nutritional support team"[11].

The aim of the paper is to present a case of a woman in her third trimester of pregnancy whose ultrasound scan detected an intra-uterine evidence of fetal upper bowel distention due to mid-gut volvulus. The neonate had undergone laparotomy and resection of gangrenous ileum with ileo-ileal anastomosis. The postoperative recovery of the mother and child were uneventful and by the 10th postoperative day, both were discharged home. To our knowledge, this is the first reported case from Bahrain of a fetal mid-gut volvulus diagnosed antenatally by ultrasound and operated on in the early neonatal period successfully.

THE CASE

Twenty-five year old, G3 P2 Ab1, Asian married woman, was referred to our unit for safe delivery. Her obstetric history included miscarriage of her first pregnancy, which occurred at the 7th week of gestation. In the second pregnancy, she was diagnosed to have macrosomia and was delivered by cesarean section; she had a live and healthy female baby at term. In this pregnancy, she had chicken pox in the first trimester; otherwise, the progress was normal. At the 34th week of gestation, she had routine ultrasound scan which was reported as follows: Single viable fetus in cephalic presentation. Placental maturation grade II; lying in the posterior upper part of the uterus. The amniotic fluid was slightly reduced. The umbilical cord had three vessels and the fetal heart rate was 143 per minute. The fetal stomach appears dilated but no duodenal bubble was seen. Small bowels appear slightly dilated. The findings were suggestive of distal bowel atresia.

In the following week, the patient complained of sluggish fetal movements and had a spontaneous preterm rupture of membranes. Non-stress test revealed signs of intra-uterine fetal distress. The patient was referred to our unit for safe delivery.

On admission, cardiotocographic monitoring of the fetus revealed signs of non-reactive recordings. In view of the already known possibility of fetal bowel obstruction which was detected by ultrasound and evidence of intra uterine fetal distress, Cesarean section was planned after nine hours. A live male fetus weighing 2.2 kg was delivered and resuscitated. The cord was round the neck but the baby gasped, cried, and breathed spontaneously. The Apgar score was 9 – 10 – 10, and the placental weight 620 gm. The fetal abdomen was tense and distended. Suction with

naso-gastric tube (NGT) drained a large amount of bilious fluid and the baby transferred to the Special Care Baby Unit (SCBU).

The post-delivery ultrasound report: The stomach was distended. Proximal small bowel loops are also distended with fluid and shows whorled appearance in the epigastric region (Fig. 1&2). The superior mesenteric vessels could not be identified. There was small amount of free fluid in the abdomen. The conclusion was a proximal small gut obstruction possibly due to mid-gut volvulus.

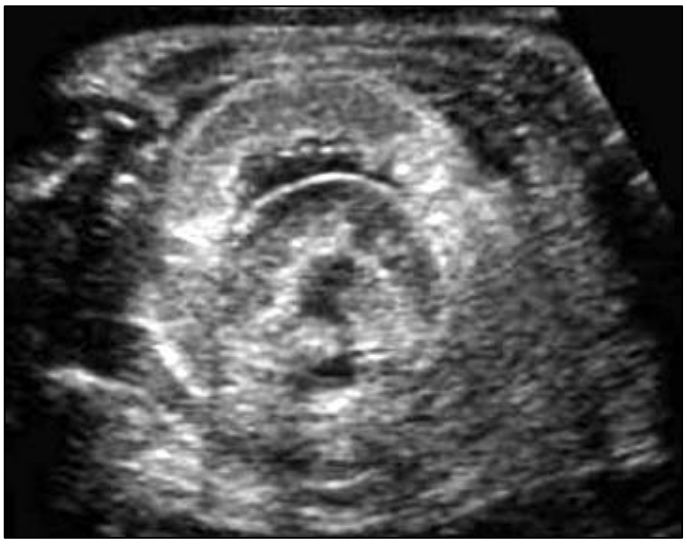

Figure 1: Spiral appearance of mid-gut volvulus

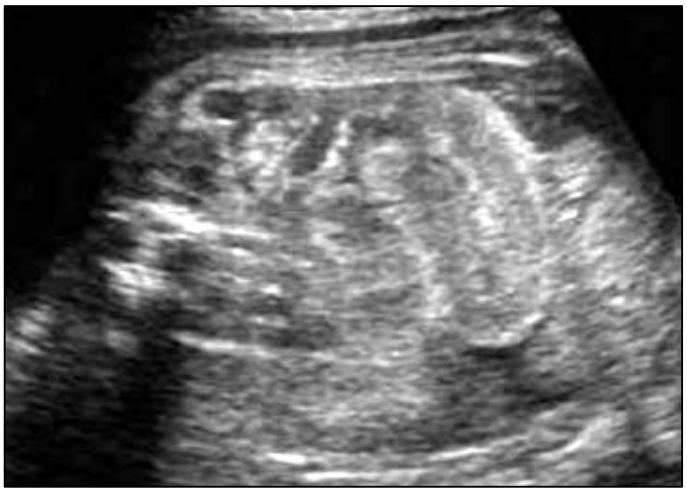

Figure 2: Spiral appearance of mid-gut volvulus

The baby was transferred to Surgical Pediatrics Unit for emergency laparotomy. Large amount of peritoneal hemorrhagic fluid was found. The caecum was in right iliac fossa and the colon appeared normal. Distended gangrenous loop of bowel was seen. The gangrenous bowel delivered through the incision and de-rotation of the ileal volvulus was done. A loop of ileum proximal to ilio-caecal junction was gangrenous

and was resected. Ileo-ileal anastomosis was done and peritoneal lavage performed with normal saline.

Histopathology report macroscopically revealed gangrenous, blackish segment of small bowel measuring 22 cm in length, central segment which is 8 cm long with dilated maximum diameter of 2 cm. The rest of the bowel was collapsed at one end with diameter of 0.5 cm and the other end 1 cm in diameter. An area of perforation is noted in the empty mesenteric border 10 cm away from the resection end. Microscopically it revealed small intestinal hemorrhagic infarction (gangrene).

The mother progressed satisfactorily and discharged home. The baby had a fairly smooth postoperative progress and was discharged home on the 10th postoperative day.

DISCUSSION

Until recently**,** most of the reported cases of mid-gut volvulus were diagnosed neonatally. The diagnosis of intra-uterine fetal mid-gut volvulus has become easier with the availability of high resolution ultrasound technology imaging[11]. Ultrasound findings together with clinical presentation can help in reaching the diagnosis before birth. The ultrasound findings show the typical image of whirlpool or snail configuration, without peristalsis. The absence of blood flow by Doppler exploration in the center of the mass suggests gut ischemia. Intestinal gangrene and blood sequestration can be diagnosed by the search for fetal anemia. Clinically, sluggish fetal movements or the observation of non-reactive reading on cardiotocography would help in reaching the diagnosis[12,13].

In this case, the diagnosis was made prenatally based on signs, symptoms and routine ultrasound findings. The subsequent clinical development such as the diminution of fetal movements, the non-reactive recordings, preterm rupture of membranes and the potential necessity of immediate neonatal surgery all indicated the need for transfer to a tertiary centre[14]. The prognosis in such cases depends on the extent of the ischemia and infarction of the small bowel and the period of gestation at the time of diagnosis.

CONCLUSION

Rare case of intra-uterine fetal mid-gut volvulus is described. The condition diagnosed prenatally after the mother presented with decreased fetal movements and fetal distress at 33 weeks of gestation. The baby was delivered by emergency cesarean section and resuscitated before proceeding to laparotomy and bowel resection. The fetus subsequently made good recovery. Intra-uterine mid-gut volvulus presenting with signs of fetal distress and preterm rupture of membranes has rarely been described[15].

REFERENCES

1. Ashworth TG. Fetal volvulus of the small intestine, *J clin Path*, 1988; 41:594-5.
2. Sweeney B, Surana R, Puri P. Jejuno-ileal atresia and associated malformations: Correlation with the timing of in utero insult. *J Pediatr Surg*, 2001;36,5:774-6.
3. Komouro H, Hori T, Amagai T, et al. The etiological role of intrauterine volvulus

and intussusception in jejunoileal atresia. *J Pediatr Surg*. 2004;39:1812-4.
4. Shaklkow J. Small Intestinal Atresia and Stenosis (last updated July 26, 2006). http://www.emedicine.com/ped/topic2992.htm. Accessed on 30.04.07.
5. Has R, Gunay S. 'Whirlpool' sign in the prenatal diagnosis of intestinal volvulus. *Ultrasound Obstet Gynecol*, 2002; 20: 307-8.
6. Heydanus R, Spaargaren MC, Wladimiroff W. Prenatal ultrasonic diagnosis of obstructive bowel disease: a retrospective analysis, *Prenat Diag* 1994; 14:1035-41.
7. Kimble RM, Harding JE, Kolbe A Does gut atresia cause polyhydramnios? *Pediatr Surg Ir.*1998; 13:115-7.
8. Alvares M, Lasker MR, Friedman F, et al. Sonographic findings in a twin with congenital fetal volvulus. *J clin Ultrasound* 1992;19:98-100.
9. Uerpairojkit B, Charoenvidhya D, Tanawattanacharoen S, et al. Fetal intestinal volvulus: a clinico-sonographic finding. *Ultrasound Obstet Gynecol*, 2001;18:186-7.
10 Miyakoshi K, Ishimoto H, Tanigaki S, et al. Prenatal diagnosis of mid-gut volvulus by sonography and magnetic resonance imaging. *Am J Perinat* 2001; 18:447-50.
11. Monikawa N, Namba S, Fujii S, et al. Intrauterine volvulus with malrotation associated with segmental absence of small intestine musculature *J Pediatr Surgery*, 1999; 34:1549-51.
12. Yoo S J, Park KW, Cho SY, et al. Definitive diagnosis of intestinal volvulus in utero. *Ultrasound Obstet Gyneco* 1999;13:200-3.
13. Miyakoshi K, Ishimoto H, Tanigaki S, et al. Prenatal diagnosis of mid-gut volvulus by sonography and magnetic resonance imaging. *Am J Perinat* 2001; 18:447-50.
14. Thomas D, Goolaerts JP, Watkins L, et al. Mid-gut volvulus, 2003-02-20-21. http://www.thefetus.net/page.php?id=1036. Accessed on 30.04.07.
15. Craig S, Easton M. Intrauterine fetal volvulus presenting as fetal distress on cardiotocographic monitoring. A case report, *J Perinat Med* 1998; 26:244-7.