
RESEARCH ARTICLE

Antenatal Diagnosis of Intestinal Mal-rotation: King Hamad University Hospital Approach to Congenital Fetal Anomalies

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ABSTRACT

Antenatal diagnosis of congenital fetal anomalies is a major contributor to the outcome of the condition, the effects on the progression of pregnancy, and the quality of life of the child. Intestinal malrotation and duodenal atresia are some of the diagnoses that can be easily made. In this case, we are highlighting the importance of early detection and the factors that allow for an early diagnosis. The report will discuss the case of a 33-year-old pregnant woman whose complaint of antepartum hemorrhage was the key to diagnosing her fetus with intestinal mal-rotation. In addition, this case report will describe the approach of KHUH in managing congenital fetal anomalies.

KEYWORDS

Mal-Rotation Antenatal Diagnosis Ultrasound Fetal Anomalies

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1. Introduction

During fetal development, the gastrointestinal system develops into three parts: the foregut, mid-gut, and hindgut. The mid-gut, specifically, helps give rise to one of the most crucial parts in the human gastrointestinal tract, which includes: (1) the duodenum (specifically distal to the ampulla of Vater), jejunum and ileum, and (2) the cecum, ascending colon and the transverse colon (the proximal two thirds). These structures are integral for normal human development, as they play a part in the absorption of micro and macronutrients, the reabsorption of water, and the release of waste products in the form of feces (Malone, 2022). The embryological development occurs in the abdominal cavity, where the mid-gut will differentiate within the sixth week of gestation and herniate outside the abdominal cavity (Hao, 2016). The development will continue in the outside of the cavity until the 10th week of gestation (Ueda, 2016). Over time, certain signaling pathways will help specific organs to differentiate and develop within (Hao, 2016). When the developed organs return to the abdomen, rotation occurs to fit within the cavity (Stockmann, 2005). Any arrest in this process will lead to pathologies such as Mal-rotation. Mal-rotation is defined as partial rotation into the cavity, which is at 90 degrees instead of the normal 180 degrees (Stockmann, 2005). This case study follows the antenatal diagnosis of gastrointestinal mal-rotation and the management of such cases within KHUH.

2. Case Study

In September 2022, a 33-year-old female (Gravida 4 Para 1 + 2) came to the clinic at 34 weeks of gestation. She had a history of two missed first-trimester miscarriages with unknown causes and one previous full-term vaginal delivery six years ago. It was her first visit and had a sure date for of Last Menstrual Period (LMP) as 30/1/2022 with an Expected Date of Delivery (EDD) of 7/11/2022. As per the patient, the pregnancy was uneventful, and she had no active complaints and had positive fetal movements. A fetal anomaly scan was done at a different institute and was said to be normal, as per the patient. She did not have a copy of the report

at the time. 75g Oral Glucose Tolerance test was not done; therefore, it was ordered to be done urgently. It was impaired with fasting at 5 mmol/L, one hour at 11 mmol/L, and 2 hours at 9.48 mmol/L.

At 32 weeks of gestation, she was admitted to a different institution with the impression of mild antepartum hemorrhage and completed a full dose of steroids. She was managed conservatively and discharged. Trans Abdominal Ultrasound was done on her presentation, which showed: "Single, viable, fetus at cephalic presentation with an increase in Liquor (Amniotic Fluid Index of 29cm) with positive fetal heart and normal umbilical artery Doppler. The placenta was found to be posterior with biometry corresponding to 33 + 6 weeks. The estimated fetal weight was 2347 grams; fetal dilated stomach was noted".

She was then identified as a high-risk pregnancy that required the care of a tertiary hospital with a competent Gynecologist, Neonatologist, and pediatric surgeon. She was advised to make a follow-up appointment in one week for a repeated anomaly scan.

The anomaly scan showed a dilated stomach and duodenum up to the ligament of Treitz. Five days later, the patient attended the obstetrics assessment room complaining of vaginal leaking. Cardio-Toco-Graphy (CTG) was reactive with no contractions seen. A sterile speculum exam showed pink fluid leaking from the vagina. The diagnosis of premature rupture of the membrane was made, and she was admitted. The risks of ultrasound findings and her condition were made clear by the obstetrics, pediatric surgery, and neonatal intensive care unit (NICU). The pediatric surgeon explained the suspicion of duodenal atresia with intestinal mal-rotation and the need for surgical management. She was admitted to the hospital for close monitoring and observation.

In October 2022, the patient had a temperature of 37.7 degrees with painful and palpable contractions and was shifted to the labor and delivery ward. She delivered a live female baby vaginally with a right mediolateral episiotomy. The baby was delivered at the gestational age of 35 + 2 weeks and had a birth weight of 2.320kg. Her Length was 43cm, and her head circumference was 30.5 cm. APGAR score at 1 minute was 8, and at 5 minutes was 9. She was handed over to the NICU and pediatric surgery teams for further management. Laboratory and radiological investigations were ordered for preoperative assessment. Abdominal X-ray showed dilated stomach and duodenum with distal normal caliber jejunum loops seen but a paucity of gas distally. Emergency exploratory laparotomy was done, showing mal-rotation with midgut volvulus. Ladd's Procedure was done for fixation. The baby was discharged on the 20th day of life. A follow-up appointment in November 2022 was booked; she was seen in the clinic and was doing well, with normal growth parameters, and just complaining of mild colic, according to the mother, and was treated with herbal medicine.

Figure (1): Ultrasound showing the Ligament of Terez and the mal-rotation and Abdominal X-Ray showing gas bubble within the abdomen



3. Discussion

Detection of congenital anomalies within a growing fetus is a crucial part of obstetricians due to its effect on the care and approach of such high-risk patients. Moreover, early detection of anomalies will lead to better and more favorable outcomes as there is a direct relationship between early detection and perinatal morbidity and mortality (NICE, 2003). According to the National Institute for Health and Care Excellence (NICE) guidelines, between the gestational age of 18 + 0 and 20 + 6, the patient will need to have a fetal anomaly screening scan (NICE, 2003). According to its findings, certain steps and measures are to be considered to ensure the safety of mother and child.

Mal-rotation occurs in 1 per 6000 births (MIDGUT VOLVULUS CAUSING FETAL DEMISE IN UTERO, n.d). The most serious complication of mal-rotation is the volvulus, more specifically, the mid-gut volvulus. Volvulus is defined as the “twisting of the bowel”, leading to complete obstruction of the tract. Therefore, such complications might lead to underdevelopment of the gut or loss of organ viability postpartum. In extremely rare cases, intrauterine fetal death may occur, which was reported in 8 cases reported between 2007 and 2014 in the United Kingdom (Fetal Midgut Volvulus, n.d).

Antenatal ultrasound is useful in the early detection of mal-rotation, yet it is also limited in aiding in the diagnosis. Most women appear to have no complications leading to different presentations with our case. She presented with antepartum hemorrhage rather than any effect on amniotic fluids as per other work. Studies have shown that the prenatal detection of gastrointestinal atresia was at 40%, with 34% detected before 20 weeks of gestation (Prenatal Ultrasonographic Detection of Gastrointestinal Obstruction, n.d). Therefore, the decrease in sensitivity can be related to multiple factors, the most important factor being the experience of the radiologist and his/her ability to detect such findings in early gestational age. In addition to that, the accuracy of the machine itself. Related radiological findings may include a “double bubble” sign, indicating dilation of the stomach and bowel, which was reported to be seen in 87% of cases. However, such findings are regarded after 20 weeks of gestation, therefore showing a normal fetal anomaly scan as per the patient discussed (Congenital Duodenal Obstruction, n.d). It was also regarded that some patients do not present with any radiological findings (Congenital Duodenal Obstruction, n.d). The fetal growth chart is usually seen in the normal range. In the case mentioned above, the ability of the obstetric department to detect such a case aided in proving the effectiveness of the fetal anomaly scans and departmental scans, which are done daily.

After the confirmation of the diagnosis, counseling the parents and explaining the effects of the diagnosis on the pregnancy is important. This was established by a multi-disciplinary approach, including experienced obstetricians, neonatologists, and pediatric surgeons in our institute. The parents were walked thoroughly through the steps of management and prognosis of their case. According to the NICE guideline, the diagnosis of atresia is not an indication for cesarean section, as the patient can deliver through spontaneous, normal vaginal delivery safely (Barnewolt, 2004). A cesarean section is indicated if the abdominal circumference is larger than the head circumference, as the bowel may be compromised (Route of Delivery of Infants with Congenital Anomalies, n.d). After delivery, proper care and evaluation should be done for the neonate (Neonatal Laparoscopic Ladd’s Procedure Can Safely Be Performed Even If the Bowel Shows Signs of Ischemia, n.d). Surgical management should be done within the first few days of life to ensure a good prognosis for neonates. Ladd’s procedure is the treatment of choice due to the better outcome and fewer complications seen in neonates postoperatively (Neonatal Laparoscopic Ladd’s Procedure Can Safely Be Performed Even If the Bowel Shows Signs of Ischemia, n.d). Proper follow-up with regular outpatient appointments was done to ensure the stability of the procedure over time as the child is growing.

4. Conclusion

Intestinal mal-rotation and intestinal atresia are some of the conditions that can be easily diagnosed in the antenatal period, with proper imaging and interpretation of the product images by experienced radiologists. When such a diagnosis is made, decision-making should not be done by a single team; rather, it should be a multi-disciplinary approach while taking into account the parent’s opinions and including them in the process. The surgical approach can guarantee a good prognosis and a better quality of life. It’s important to continue with the visits even after the surgery to monitor the outcome as the child is growing and look out for any complications.

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