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Case Report
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Severe fetomaternal hemorrhage: a case report

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Abstract

Objective: This case report aims to review the literature on fetomaternal hemorrhage, its prevalence, etiology, clinical presentation, and diagnosis through this case.

Case(s): A primigravida of 38+5 weeks of gestation consulted for absent fetal movements. Cardiotocography showed fetal tachycardia, alternating with a pseudo-sinusoidal pattern. An emergency cesarean section was performed due to suspected fetal distress, and the newborn presented an hemoglobin of 4.6 g/dl at birth. A Kleihauer-Betke test was performed diagnosing a fetomaternal hemorrhage, requiring neonatal care without further consequences.

Conclusion: Fetomaternal hemorrhage is rare and often of unknown etiology. In this case, it was diagnosed post-birth. Recognizing cardiotocography patterns and clinical presentations is crucial to reduce fetal consequences, as fetal hemoglobin at birth is a prognostic factor for neonatal morbidity and mortality.

Keywords: Fetomaternal, hemorrhage, Kleihauer-Betke

Introduction

Fetomaternal hemorrhage (FMH) is defined as the transplacental passage of fetal blood into the maternal circulation, which occurs through disruption of the placental barrier.[1] The placental barrier prevents passage of fetal red blood cells into maternal circulation, nevertheless, minimum amount of fetal blood (less than 15 mL in more than 99% cases) can enter the maternal circulation during the pregnancy without hemodynamic repercussions, and without clinical significance in most cases.[2] Some authors have indicated 30 ml as the recommended cut-off point to establish pathological levels, and it can be classified as a massive hemorrhage with volumes of 50 ml, 80 ml, 150 ml according to gestational age, or a volume loss of more than 20% of fetal blood volume[3] which may cause fetal death or subsequent neurological impairment.[4]

FMH is a rare condition, and it has been sparsely described in the literature. It is a challenging diagnosis because the clinical manifestations are variable and nonspecific, being a decrease or absent fetal movements the most frequent symptom, which is usually followed by a sinusoidal pattern in the cardiotocographic recording (CTG) and hydrops fetalis if the condition progresses.[2]

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FMH is caused by the disruption of the placental barrier. The etiology is unknown in most cases, and it may appear spontaneously without any history of trauma.[5] However, different risk factors have been reported such as abdominal traumatic antecedents, amniocentesis, cordocentesis or external cephalic version.[6]

Case(s)

We present the case of a 32-year-old woman, primigravida of 38+5 weeks with no medical or obstetric history of interest. She was a smoker of 3-4 cigarettes per day, blood type B, Rhesus positive, BMI 25.10 and was not on any medication.

The pregnancy was conceived spontaneously, and no complications had been recorded to date. Both, first trimester screening for aneuploidies and preeclampsia screening were low risk. The gestational diabetes mellitus screening and group B Streptococcus screening test were negative. The anomaly scan performed at 20+6 weeks was normal, with the maternal mean pulsatility index in the uterine arteries below the 95th centile. Third-trimester growth scan performed at 35-36 weeks recorded an estimated fetal weight on the 38 centile with normal amniotic fluid. Arterial blood pressure was normal during gestation.

She consulted for reduced fetal movements of three hours of evolution at the emergency department at 38+5 weeks. On her arrival, no information about recent abdominal trauma or invasive procedures was recorded. An abdominal ultrasound was performed in the emergency department, which showed a positive fetal heartbeat, normal placenta and regular amniotic fluid. Cardiotocography was performed and presented a basal fetal heart rate of 170 beats per minute (bpm), reduced variability (less than 5 bpm) alternating with pseudo-sinusoidal pattern of saw-tooth appearance, without accelerations and isolated decelerations with chemoreceptor characteristics, without uterine dynamics.[Fig 1,2,3] Due to sustained fetal tachycardia, despite the intrauterine resuscitation, a maternal blood test was ordered with: hemoglobin (Hb) 13.2 g/dl, leukocytes 9.19 x 10^3/µl, normal formula, c-reactive protein 0.96 mg/dl, platelets 314x10^3/µl, normal coagulation. Mother afebrile, hemodynamically stable.

Two hours later, the on-call team decided to perform an emergency cesarean section due to sustained fetal tachycardia, unfavorable Bishop, and suspected fetal distress.[Fig 1,2,3]

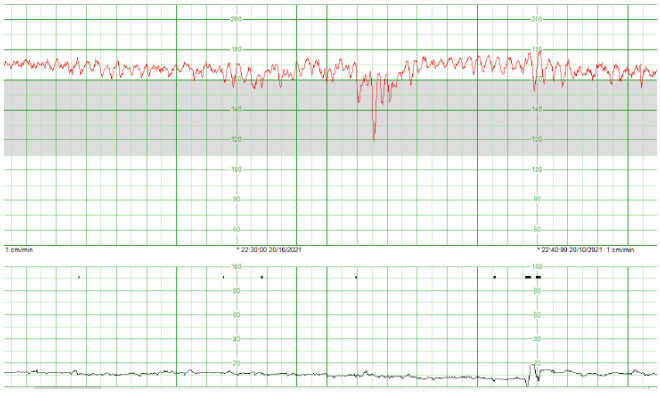

Fig 1. Fetal CTG of the clinical case on admission: Baseline at 160-170 bpm, reduced variability (less than 5 bpm) alternating with pseudo-sinusoidal pattern (saw-tooth appearance), without accelerations and a deceleration with chemoreceptor characteristics. No uterine contractions.

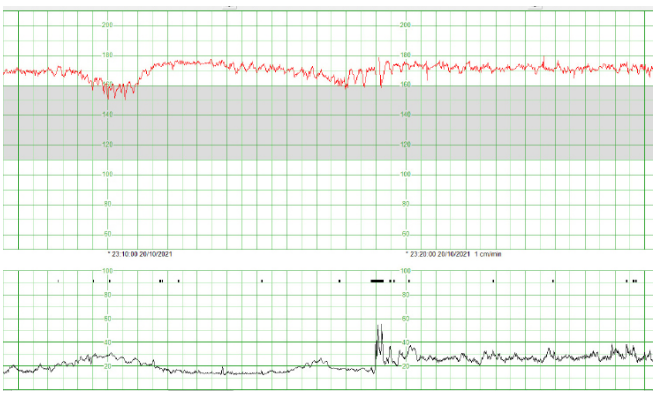

Fig 2. Fetal CTG of the clinical case: Baseline at 170 bpm, reduced variability (less than 5 bpm) without accelerations and a deceleration with chemoreceptor characteristics. No uterine contractions.

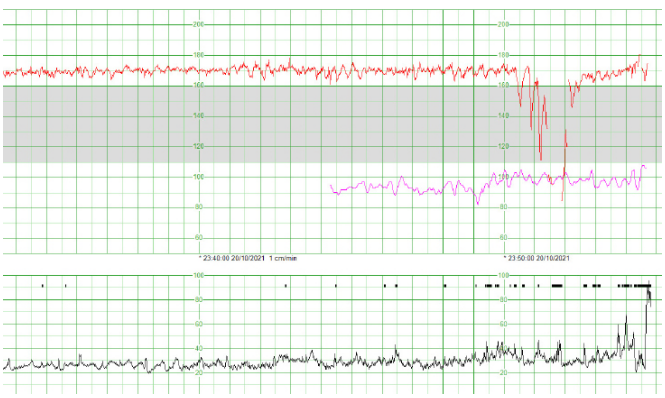

Fig 3. Fetal CTG of the clinical case, previous to cesarean section: Baseline at 170 bpm, reduced variability (less than 5 bpm), without accelerations and isolated deceleration with chemoreceptor characteristics. No uterine contractions.

A live male was born, Apgar score 6/7/8, type III resuscitation, Arterial pH 7.24. No cord twisting. He presented meconium amniotic fluid (+++/+++). Early cord clamping was performed, and the baby was transferred to a thermal crib for resuscitation due to pallor and hypotonia. The baby was born without respiratory effort and with a heart rate of 60-100 bpm, requiring ventilation with intermittent positive pressure (CPAP) and later switching to continuous pressure with a maximum FIO2 of 40% to maintain saturation between 80-90% at 10 minutes of life. After stabilization, he was transferred to neonatal intensive care (NICU) with CPAP. At NICU, physical examination showed 3,000 grams of weight, poor general condition, pallor, rhythmic tones, no murmurs on cardiac auscultation, constant moaning, with moderate suprasternal and subcostal pull, capillary refill >3s, hypotonia on admission, with progressive improvement. Due to generalized pallor, a blood test was performed showing a Hb of 4.6 gr/dl. Transfusion was decided and crossmatching tests were requested. There was no apparent perinatal sentinel event. In the same analysis, he presented figures of 50,000x10^3/µl leukocytes, segmented neutrophils 27x10^3/µl, 204x10^3/µl platelets and altered coagulation prothrombin time of 18.1s, International normalized ratio 1.7 and partial thromboplastin time test of 63.3s.

The diagnostic impression of the newborn was the presence of unspecified anemia with neonatal acidosis, suspected sepsis and coagulopathy. Antibiotic treatment with cefotaxime and ampicillin was started. He required orotracheal intubation and mechanical ventilation. He was transferred to the NICU.

Given the suspicion of fetomaternal transfusion syndrome, Kleihauer-Betke test was requested. The result of the test showed the presence of fetal cells in 11.2% (reference value <0.1%) with an estimated volume of fetal blood transferred of 560ml.The placenta was sent to microbiology and pathology for study, but unspecific findings were described.

After 21 days in NICU, the newborn was discharged from the hospital. Subsequently, after 2 years, there was no neurological or psychomotor delay.

Discussion

Fetomaternal hemorrhage is a rare condition which is often misdiagnosed. The incidence of fetomaternal hemorrhage is 3 per 1,000 births (cutoff of 30 ml) and it increases as gestation progresses, reaching the highest risk at the time of birth.[2] The prevalence of massive FMH is 1: 1,000- 1: 5,000 births, depending on where the volume threshold is set (at 80ml or 150ml).[2] However, these figures are likely underestimated. Our clinical case, represents an example of the challenging diagnosis. Despite the amount of volume transfused was 560 ml with neonatal repercussions, thus classified as severe MFH, we did not identify it until a few hours after birth. Prenatally, severe FMH can be suspected by Doppler assessment, where the presence of a mean cerebral artery peak systolic velocity (MCA-PSV) 91.5 multiples of the median (MoM) indicates severe hemorrhage.[4] Unfortunately, Doppler ultrasound was not performed in this case.

The etiology of fetomaternal hemorrhage is unknown in most cases, about 80%.[6] When there are not known previous risk factors, like our case, spontaneous FMH may be suspected in the presence of absent fetal movements, sinusoidal FHR pattern, intrauterine growth restriction, fetal hydrops or fetal death.[5]

There are different clinical manifestations of fetomaternal hemorrhage. The most common presenting symptom, and the one presented in the clinical case, is decreased or absent fetal movements in up to 27-54% of cases.[6] Other forms of presentation can be assessed by CTG, which is very useful in the diagnosis, where a sinusoidal FHR pattern is typical and a sign of FMH[5], absence of accelerations, recurrent late decelerations and fetal tachycardia, as it happened in this clinical case, may be found. Other possible manifestations may be fetal death (12.5%), fetal hydrops (7.5%) or intrauterine growth restriction (3.3%).[6] Occasionally, the mother may present fever, chills or nausea as a reaction to the transfusion (1%). Once the baby is born, unexplained neonatal anemia may occur (35%) sometimes with pallor, which is diagnosed only after birth, as it happened in our case.

The gold standard test to diagnose FMH is flow cytometry, which identifies fetal cells by measuring the intensity of fluorescence generated by monoclonal antibodies that bind to fetal hemoglobin. It accu-

rately and objectively quantifies the content of fetal hemoglobin, but it is not available in many hospitals.[7]

The Kleihauer-Betke test is the most commonly used method for the detection and quantification of hemorrhage.[1] This test measures the percentage of red blood cells containing fetal hemoglobin in maternal blood. It should be performed in case of: non-immune hydrops fetalis with peak systolic blood flow in the middle cerebral artery (MCA-PSV) 91.5 MoM, sinusoidal fetal heart rate pattern, fetal death or neonatal anemia.[8] It has been suggested that the test could also be performed prenatally in gestations with persistent decreased fetal movements.[2] Some experts proposed performing this test in all pregnant women who have had abdominal trauma; however, in several recent studies, it has been observed that the test does not seem useful for preventing adverse fetal outcome in women whose only risk factor is abdominal trauma during pregnancy.[9] The disadvantages of the Kleihauer-Betke test are that it may underestimate and most commonly, overestimate the degree of FMH in situations in which there is an increase in fetal hemoglobin in maternal blood, such as in hereditary hemoglobinopathies (thalassemias or sickle cell disease). Besides, it is dependent operator.

Several series determine that, when massive FMH is suspected by clinical criteria prenatally, a laboratory test should be performed according to availability, and in case of a positive result, a uterine transfusion or induction of labor should be considered depending on the gestational age, experience in this type of transfusion, and fetal status.[2] Even though the flow cytometry is more accurate than the Kleihauer-Betke test, this test was the only one available in our center, therefore the one we performed. The result of the Kleihauer-Betke test showed fetal cells of 11.2% (reference value <0.1%) with an estimated volume of fetal blood transferred of 560ml, which confirmed the presumptive diagnosis of massive fetomaternal hemorrhage.

In terms of prognosis, estimated fetal blood loss of more than 20 mL/kg increases the risk of death and neurological impairment[10], and in this case, that amount was exceeded. Also, after birth neonatal Hb levels are described as a prognostic factor for death and neonatal morbidity, especially with values below 5 g/dl.[4] However, there are described cases with lower Hb values with good postnatal results. The lowest described in the literature was 1.2 g/dL with no subsequent sequelae.[11] Our newborn presented Hb 4.6 gr/dl at birth, requiring perinatal care but was subsequently discharged and evolved favorably with no sequelae described.

Conclusion

Fetomaternal hemorrhage is rare and often of unknown etiology. In this case, it was diagnosed postbirth. Recognizing cardiotocography patterns and clinical presentations is crucial to reduce fetal consequences, as fetal hemoglobin at birth is a prognostic factor for neonatal morbidity and mortality.

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