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Original Article

Mirror syndrome associated with heart failure in a pregnant woman: a case report

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Abstract: Mirror syndrome is also known as Ballantyne syndrome, maternal hydrops, triple edema and pseudotoxemia. The disease can be difficult to diagnose, is related to pregnancy and can grievously endanger the health of both the mother and fetus. The pathogenesis of the disease has not been fully elucidated, and this disease may be confused with preeclampsia, even though distinguishing features can be identified. In this report case, we describe a pregnant woman who suffered from mirror syndrome associated with heart failure. After delivery, the heart failure symptoms also disappeared.

Keywords: Mirror syndrome, heart failure, edema

Introduction

Mirror syndrome is also known as Ballantyne syndrome, maternal hydrops, triple edema and pseudotoxemia. The disease can be difficult to diagnose, is related to pregnancy and can grievously endanger the health of both the mother and fetus. Ballantyne first identified a syndrome of maternal edema during pregnancy that was associated with fetal and placental hydrops due to rhesus (Rh) isoimmunization during pregnancy. The causes of mirror syndrome involve rhesus isoimmunization, twin-twin transfusion syndrome, viral infection, fetal malformations and fetal or placental tumors [1]. The disease pathogenesis remains unknown. Mirror syndrome can occur from 22.5 to 27.8 weeks of gestation. This case report presents a rare case of a pregnant woman who suffered from mirror syndrome associated with heart failure. After the delivery and other treatment measures, the heart failure symptoms also disappeared.

Case report

A 34-year-old woman, gravida 4, para 0, group B rhesus-positive, was referred at 27 weeks of gestation to our department because of polyhydramnios for one month and fetal edema. Upon admission, the patient revealed fairly stable vital signs, including normal blood pressure (108/63 mmHg), a body temperature of 37.3°C, a respiratory frequency of 20 breaths per minute, a heart rate of 60 beats per minute and a weight of 69 kg. Upon physical examination, the pregnant woman had edema of the ankles and legs. The abdominal examination revealed that the bottom of the uterus was higher than the corresponding gestational age; the fetus was in cephalic presentation and had a normal fetal heart rate of 150 beats per minute. The patient's past surgical history was unremarkable. The patient reported anaphylaxis with vitamin K1. A fetal ultrasound at 23 weeks of gestation showed bilateral pleural effusions, a nuchal translucency thickness of 9.3 mm, a short fetal nasal bone, polyhydramnios with amniotic fluid volume of 81 mm, and fetal edema. Conventional antenatal screening, such as the diagnostic amniocentesis test on 22 weeks and 3 days, was regular for chromosomal abnormalities. The laboratory examination was normal upon admission to the hospital (**Table 1**).

On the first day of admission, a dexamethasone course was used to accelerate pulmonary maturation because of the concern for preterm labor. On day two of admission, the patient underwent a therapeutic amniocentesis for worsening polyhydramnios; approximately

Table 1. Laboratory changes during hospitalization

Index	First day	Forth day	Fifth day	Seventh day	Ninth day	Twelfth day	Normal value	Unit
Liver function								
AST	10	21	21	10	9	9	10-40	U/L
ALT	9	15	16	12	6	7	0-60	U/L
ALB	26	24	20	25	27	30	34-48	g/L
CBC								
RBCs	3.08	2.51	2.82	2.72	3.17	3.45	3.68-5.13	10^9/L
Hb	94	77	85	83	95	104	113-151	g/L
WBCs	7.36	8.61	22.23	15.85	11.17	13.16	3.69-9.16	10^9/L
PLTs	141	126	106	171	240	290	101-320	10^9/L
Neutrophils	75	81	91	85	77	79	54-70	%
HCT	28.6	23.3	25.5	25	29	31.8	33.5-45	%
MCV	92.9	92.8	90.4	91.9	91.5	92.2	82.6-99.1	fL
Renal function								
Cr	41	46	48	40	44	43	40-88	mmol/L
BUN	4.4	6	4.3	4.1	4.7	3.5	2.9-7.2	mmol/L
K	4.2	4	3.2	4.1	4	4.1	3.3-5.3	mmol/L
BNP	976	1077	590	305	73		0-50	pg/ml
β-HCG	90618		6642		2214		<2.67	mIU/ml

AST, aspartate aminoransferase; ALT, alanine aminotransferase; ALB, albumin; CBC, complete blood count; RBCs, red blood cells; Hb, hemoglobin; WBCs, white blood cells; PLT, platelets; HCT, hematocrit; MCV, mean corpuscular volume; MCH, mean corpuscular hemoglobin; Cr, serum creatinine; BUN, blood urea nitrogen; K, potassium ion; BNP, B-type natriuretic peptide; β-HCG, human chorionic gonadotropin.

1400 ml of amniotic fluid was released. Repeated two-dimensional ultrasound immediately revealed normal amniotic fluid volume, with an amniotic fluid volume of 33 mm following ascites, pleural effusions, fetal skin edema and placentomegaly of 70 mm (**Figure 1A-D**). On hospital day 4, intrauterine fetal demise of the fetus was diagnosed. The patient presented with marked abdominal distention and dyspnea. The 24-hour quantity of protein in the urine was 0.75 g. Considering the increasingly serious condition of the patient, we induced labor via an amniotic cavity injection of rivanol after discussion with the patient and her family. After 10 minutes of the surgery, the patient presented with palpitations, asthma, and blood pressure (137/74 mmHg). The laboratory BNP value was 976 pg/L. Coagulation function was normal. Her left lung was clear to auscultation, but rale was heard in her right lung. Radioactive examination showed bilateral pleural effusions and enlargement of the heart of the patient (**Figure 2A**). The worsening dyspnea, increasing edema, fetal edema, placentomegaly, the increasing value of BNP, and enlargement of the heart in the setting of mildly elevated blood pressure (147/96 mmHg) raised concern for mirror syndrome and heart failure. During the 4 days of admission in our hospital, the patient was treated with normal diet and without any intravenous fluid therapy. Her 24-h urine volume was less than 1000 ml. Intravenous nitroglycerin, furosemide, and cedilanid were given to the patient. Antibiotics were used to prevent infection. The maternal condition was stabilized within 5 h. The urine volume was 1700 ml in 5 h. On hospital day 5, the patient was in labor with cervical dilatation of 10 cm, and we chose to perform an artificial rupture of the fetal membranes to accelerate the delivery rather than perform an emergency cesarean section. A girl weighing 1,260 g was delivered with the fetal anasarca. The placenta adhered to the uterus and could not spontaneously separate from the uterus; thus, immediate manual removal of the placenta was performed. The placenta was incomplete and grossly edematous. Subsequently, the patient underwent successful curettage guided by ultrasonic monitoring; two-dimensional ultrasound showed a 4.7 × 4.5 × 3.2 cm placenta with increased vascularity still residing in the uterine cavity. Her serum β-HCG was 90618 mIU/ml. Oral mifepristone (100 mg two times per day) was given

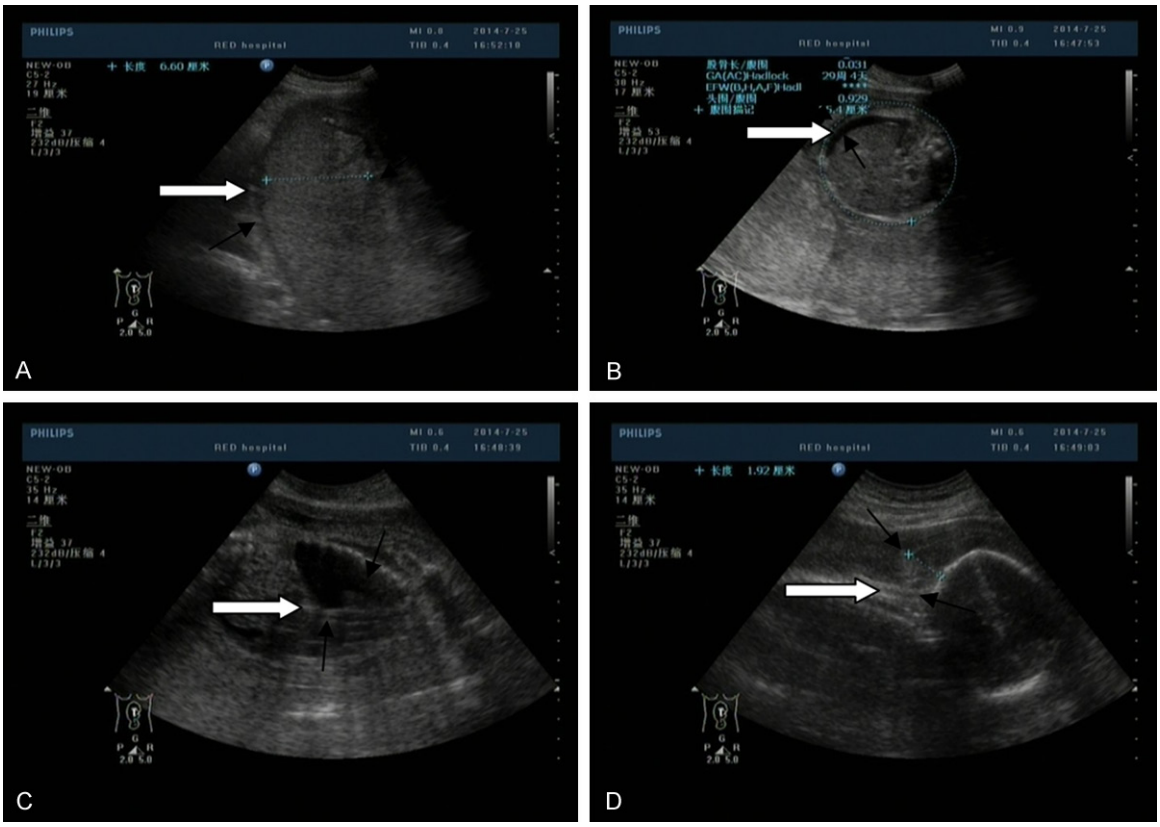

Figure 1. Fetal hydrops, asdemonstrated by a thickened placenta (A), ascites (B), pleural effusions (C) and fetal skin edema (D).

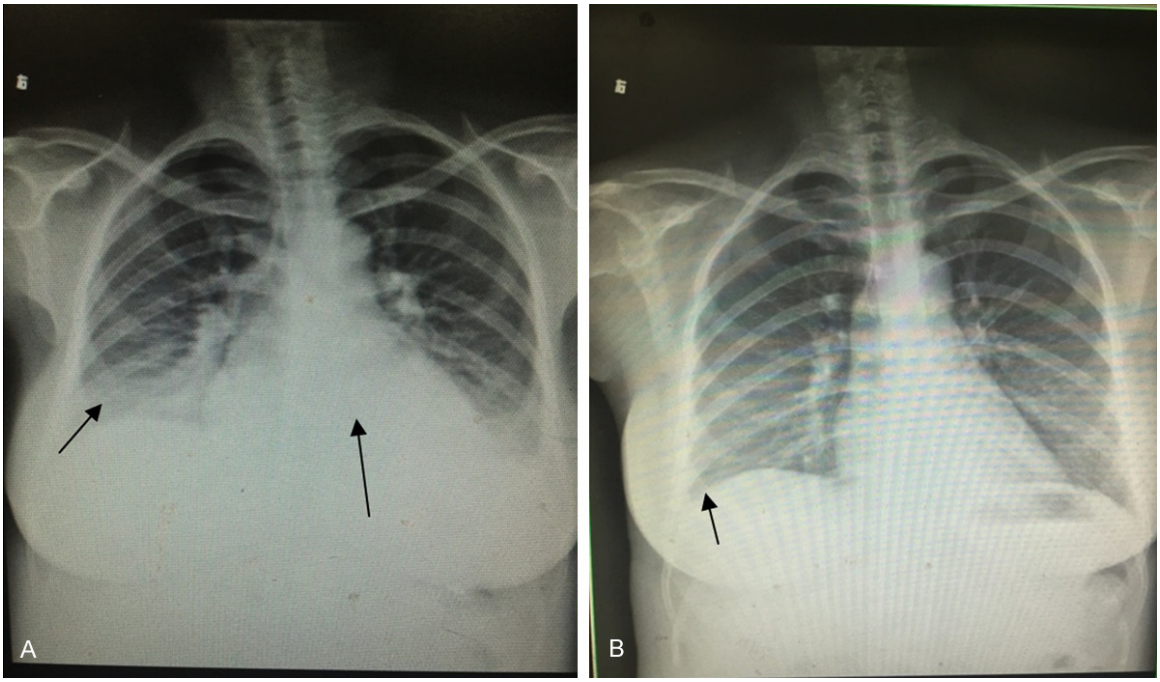

Figure 2. Bilateral pleural effusions, including the enlargement of the heart (A) and a small amount of pleural effusion (B).

to the patient for 5 days. The laboratory value of BNP was 1077 pg/L. Isosorbide dinitrate, trimetazidine hydrochloride, spironolactone, furosemide, albumin and cedilanid were given to the patient (Isosorbide dinitrate 1/4 tablet tid × 2 d po, trimetazidine hydrochloride 20 mg tid× 6d, spironolactone 40 mg bid × 6 d po, furosemide 20 mg bid × 6 d po, cedilanid 0.2 mg iv × 5 d, albumin 20 mg ivgtt). On hospital day 6, the patient presented with chest pain, chest tightness and a bad cough. Computed tomography revealed bilateral pleural effusions. According to the drug-sensitive test, moxifloxacin was used as an anti-infection treatment. On hospital day 10, the patient revealed a fairly stable condition. Radioactive examination showed a small amount of pleural effusion (**Figure 2B**). The maternal edema progressively decreased over seven postpartum days, and the patient was discharged. At autopsy, the fetal had edema of the skin and immature organs with autolysis. The pathological diagnosis report of the placenta revealed multiple hemorrhagic infarctions with calcification.

Discussion

We have described a case of mirror syndrome, which is maternal edema that reflects fetal hydrops, which led to heart failure of the patient. The symptom of heart failure and edema of the lower extremities disappeared after one week of the delivery. Maternal findings included hypertension, anemia, palpitation asthma and proteinuria. The placenta was enlarged. The infant died intrauterine. With treatment to expand the blood vessels, the use of adiuretic, and maintenance of heart function, the patient was discharged one week after the delivery.

Although the etiologic associations are known, the pathogenesis of mirror syndrome is not clear. The etiologic associations include twin-twin transfusion, viral infection such as parvovirus B19, and rhesus isoimmunization. Some reports have already shown that the levels of circulating sFlt1 increase in women who developed mirror syndrome in pregnancies that are affected by fetal hydrops caused by parvovirus B1 [2] and cytomegalovirus infections [3]. A rare case presented one of the severe conditions due to mirror syndrome caused by hemoglobin Bart's [4]. A recent study showed that fetal leukemia can have a major impact on mirror syndrome [5]. In our case, the etiology of fetal hydrops and maternal edema was not identified. The cause of the heart failure may be related to blood dilution and an increase in blood volume.

By shunting of the bilateral hydrothorax in mirror syndrome, the fetal hydrops is successfully treated; however, the gravida is in danger as long as edema of the placenta remains [6]. Reversal of the maternal symptoms after a successful termination of the hydropic fetus in twin-twin transfusion syndrome is complicated [7]. The selective feticide of a hydropic fetus in a dichorionic diamniotic twin pregnancy can reverse mirror syndrome [8]. Masakazu Matsubara reported that successful fetoscopic laser photocoagulation of communicating placental vessels in severe twin-twin transfusion syndrome can resolve the mirror syndrome, with a good prognosis for both twins [9]. The only way to reverse the maternal conditions is to deliver the fetus if treatments to resolve the edema of the mother and fetus have failed. In our case, the main treatments included preventive measures and symptomatic treatment.

The presentation of mirror syndrome can be subtle and without obvious precipitating events. In cases with proteinuria and mild elevated blood pressure, preeclampsia was among our considerations, but the low hematocrit level allowed us to rule it out. Mirror syndrome can be confused with preeclampsia.

However, mirror syndrome does not typically present with hemoconcentration, hypertension and/or oligohydramnios compared with preeclampsia. The earliest occurrence time of mirror syndrome is the 16th gestational week, and it is related to the onset of fetal hydrops [1]. However, preeclampsia can generally not be definitively diagnosed within the first 20 weeks. Preeclampsia is characterized by the simultaneous or successive involvement of various organs, which is accompanied by general deterioration in the final stages of disease development. However, the symptoms of mirror syndrome vary, and each symptom shows uneven and atypical progression. An increased fetal placental/mass ratio is an important manifestation of mirror syndrome and rarely appears in preeclampsia patients [10]. In addition to peripheral edema, mirror syndrome includes increased levels of maternal uric acid, pulmo-

nary edema and proteinuria. The maternal symptoms disappear 5 to 14 days after delivery.

Many significant factors led to the wonderful outcome for our patient, including the timely diagnosis of mirror syndrome, excellent collaboration among the members of the obstetric teams and cautious management of the pregnant woman. Once a diagnosis of mirror syndrome is made, timely treatment is essential to achieve the best outcome.

Disclosure of conflict of interest

None.

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