

Emre Erdogan, Resul Arisoy, Oya Demirci, Oya Pekin, Semih Tugrul, Pinar Kumru  
Zeynep Kamil Research Hospital, Istanbul, Turkey

## • Introduction:

Mirror syndrome refers to a condition of generalized maternal edema, often with pulmonary involvement, that mirrors the edema of the hydropic fetus and placenta. Because condition is rare and frequently misdiagnosed as preeclampsia, the exact incidence is still unknown. We reported a case of maternal mirror syndrome caused by fetal tachycardia that progressed to fetal hydrops with the interesting feature was that there was a rapid improvement in maternal status after fetal therapy.

## • Presentation of case:

A 33-year-old woman, gravida 3, para 2, group A, rhesus negative was referred at 27 weeks gestation to our department because of hydrops fetalis. Fetal ultrasonographic examination revealed massive ascites, right hydrothorax, polyhydramnios and placentalomegaly (Figure-1). Fetal arrhythmia was suspected due to abnormal heart rate during fetal cardiac examination. Fetal echocardiography presented mild cardiomegaly, severe tricuspid regurgitation with normal cardiac anatomy (Figure-2). Pulsed wave doppler demonstrated short runs of tachycardia at 300-350 bpm (Figure-3). Although the supraventricular tachycardia was of short duration, due to the elevated rate and fetal hydrops in utero therapy via maternal administration of antiarrhythmic drugs was planned. Digoxin 0.5mg, 0.25mg and 0.25mg initiated over the first 24 hours. The digoxin levels were 1 to 1.2ng/ml. Maintenance dose of 0.5mg per day was initiated for 48 hours with the digoxin levels 1.2ng/ml. But because of sustained tachycardia and fetal hydrops, digoxin was continued and sotalol 80mg three times was initiated. Tachycardia transiently terminated at 96 hours. Ventricular function was in sinus rhythm with the improvement of the fetal hydrops within one week. Complete resolution of the fetal hydrops occurred three weeks after treatment (Figure-4).

The patient presented significant vulvar and pretibial edema on the third day of treatment. At clinical examination blood pressure was 140/90mmHg and no value above 140/90 was detected. The laboratory findings showed decrement of hematocrit level from 35% to 28%, albumin 3.2g/dl to 2.6 g/dl and platelets 132000 to 119000. The 24-hour protein collection was 199mg/dl. As the patient had severe headache she was followed in our intensive care unit with an initial diagnosis of preeclampsia. Magnesium sulphate prophylaxis was continued for 24 hours. Over the following days maternal and fetal condition showed resolution of the maternal edema and fetal hydrops. Improvement in maternal clinical picture and fetal hydrops favoured mirror syndrome.

As the maternal symptoms resolved and no maternal side effect of the drug was detected; fetal therapy was continued until 37 weeks of gestation. Cesarean section was performed at 37 weeks due to rupture of membranes and breech presentation. Postnatal evaluation of the baby revealed no echocardiographic and electrocardiographic abnormality.



Figure 1: Ascites at 27 weeks of gestation

Figure-2: Fetal echocardiography presenting mild cardiomegaly with normal cardiac anatomy



Figure-3: Pulsed wave doppler demonstrating short runs of tachycardia at 300-350 bpm

Figure-4: Complete resolution of the fetal hydrops at 30 weeks of gestation

## • Discussion:

Maternal mirror syndrome is a rare condition characterized by a combination of fetal hydrops and maternal fluid retention which 'mirrors' fetal hydropic changes. John W. Ballantyne first described the association of maternal edema in pregnancy with fetal and placental hydrops due to rhesus isoimmunization(1).

The pathogenesis of mirror syndrome is unknown. There are several hypotheses. Redman et al reported that the hydropic placenta can cause a systemic inflammatory response as a result of increased shedding of trophoblastic debris into maternal blood(2). Stephan et al have postulated that the hydropic placenta may increase production of soluble fms-like tyrosine kinase (sFlt1), which is an important mediator of maternal endothelial and vascular abnormalities in preeclampsia(3). Moreover, Llubra et al reported a case of maternal mirror syndrome caused by bilateral fetal hydrothorax that the antiangiogenic state similar to that seen in preeclampsia resolved after intrauterine pleuroamniotic shunt placement(4). Similarly increases in sFlt-1 have been described in cases of mirror syndrome associated with parvovirus infection, Rh-isoimmunization, cytomegalovirus infection and twin-twin transfusion syndrome(5).

We present a case of fetal tachycardia as an unusual example of maternal mirror syndrome with significant vulvar edema. In this case the patient presented preeclampsia-like symptoms with severe edema, mild anemia, decreased platelets and transient mild hypertension. Mirror syndrome may present with rapid weight gain, peripheral edema and progressive shortness of breath. Edema is always a key feature, albuminuria usually mild and preeclampsia unusual. The problem of distinguishing between mirror syndrome and preeclampsia is obvious. In contrast to preeclampsia, the maternal hematocrit is often low (hemodilution) rather than high (hemoconcentration), amniotic fluid volume is often high (polyhydramnios) rather than low (oligohydramnios), and the fetus always shows signs of hydrops. The etiology of the mirror syndrome includes a wide variety of fetal causes. In the review of 56 cases published by Braun et al; severe rhesus isoimmunization(29%) was the most of the cases associated with the mirror syndrome(6). Mirror syndrome caused by fetal supraventricular tachycardia is a very rare condition. There is only one case report similar to our case that showed the resolution of mirror syndrome caused by fetal supraventricular tachycardia with maternal flecainide administration. Maternal reconvalescence was reported one week after flecainide treatment and resolution of the fetal supraventricular tachycardia(7). Similarly in our case maternal edema resolved and the laboratory findings came to normal ranges on the sixth day of the treatment. We ruled out that the maternal symptoms appearing 3 days after Digoxin treatment were not due to side effects of the drug because we continued Digoxin until delivery.

The key in this syndrome is to recognize and identify a treatable cause which can lead to the reversal of the syndrome and continue the pregnancy. Adequate treatment of fetal tachycardia in fetuses with hydrops resulted in improvement in fetal hydrops. Individual series report that cardioversion is successful in 65 to 95 percent of cases, within 48 hours to one week of initiating therapy(8). But treatment of hydrops depends on the cause. When the fetal conditions are not treatable, continuing the pregnancy worsens the maternal symptoms. Delivery or termination of the pregnancy is usually required to induce remission of maternal symptoms, which can be life-threatening. Also spontaneous resolution of mirror syndrome has been described after spontaneous resolution of fetal hydrops related to parvovirus infection and after fetal death.

Finally, this case of fetal supraventricular tachycardia and mirror syndrome demonstrates how fetal symptoms of cardiac failure, fetal hydrops can be mirrored into maternal symptoms and the treatment improves fetal hydrops and mirror syndrome. Because of increased maternal morbidity, the clinicians should be alerted about mirror syndrome in the existence of maternal edema and hemodilution. Future studies are needed on the mechanism of the disease and lead to both therapeutic and preventive strategies.

## • References:

1. Dunn PM: Dr John Ballantyne (1861–1923): perinatologist extraordinary of Edinburgh. Arch Dis Child 1993; 68: 66–67.
2. Redman CW, Sargent IL. Placental debris, oxidative stress and pre-eclampsia. Placenta 2000; 21:597.
3. Stepan H, Faber R. Elevated sFlt1 level and preeclampsia with parvovirus-induced hydrops. N Engl J Med 2006; 354:1857.
4. Llubra E, Marsal G, Sanchez O et al. Angiogenic and antiangiogenic factors before and after resolution of maternal mirror syndrome. Ultrasound Obstet Gynecol. 2012; 40: 367-9.
5. Espinoza J, Romero R, Nien JK et al. A role of the anti-angiogenic factor sVEGFR-1 in the 'mirror syndrome' (Ballantyne's syndrome). J Matern Fetal Neonatal Med 2006; 19: 607–613.
6. Braun T, Brauer M, Fuchs I et al. Mirror syndrome: a systematic review of fetal associated conditions, maternal presentation and perinatal outcome. Fetal Diagn Ther. 2010; 27: 191-203.
7. Midgley DY, Harding K: The mirror syndrome. Eur J Obstet Gynecol Reprod Biol 2000; 88: 201–202.
8. Simpson JM, Sharland GK. Fetal tachycardias: management and outcome of 127 consecutive cases. Heart 1998; 79: 576–581.