First-trimester diagnosis of conjoined twins in a multifetal pregnancy after assisted reproduction technique using HDlive rendering

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Currently, assisted reproduction techniques (ART) are widely used to treat infertility and have increased the number of multiple pregnancies, consequently increasing maternal, fetal, and neonatal risks, in relation to the number of fetuses [1]. The incidence of monozygotic twin (MZT) pregnancy following ART is believed to range between two- and 12-fold the natural occurrence of 0.4% [1]. Conjoined twins (CT) are a rare complication of MZT pregnancies with an estimated 1 case per 1,00,000–2,00,000 spontaneous pregnancies and in 1% of MZT pregnancies. Prognosis in CT depends on the type of intertwin connection and associated malformations [2]. Three-dimensional ultrasonography (3DUS) with HDlive rendering is a technique that uses a fixed virtual light source that calculates the propagation of light through the skin and tissue. This technique allows realistic viewing of fetal structures, resulting in a better understanding of fetal anomalies by parents and the multidisciplinary team [3].

We report a case of a dichorionic diamniotic triplet pregnancy with one CT and one normal embryo confirmed at the ninth week of pregnancy using 3DUS with HDlive rendering. The evaluation of the fetal anatomy led to the clinical decision.

A 32-year-old pregnant woman was referred for a sonographic evaluation at 9 weeks after the transfer of two

embryos. The embryos were the result of intracytoplasmic sperm injection (ICSI) procedure. The ultrasonographic examination performed transvaginally at 9 weeks using a Voluson E8 apparatus (General Electric, Healthcare, Zipf, Austria) equipped with a transvaginal probe (RIC 5-9 W) showed clearly one sac with an apparently normal living fetus. In the other sac, two embryos joined at the thorax were seen (Figs. 1, 2). 3DUS using HDlive rendering clearly showed a realistic image of two gestational sacs with one thoraco-omphalopagus CT and one normal embryo, allowing for better understanding of the gestational prognosis by parents.

At the 11th week, an ultrasound examination showed one sac with a normal living fetus, and in the other sac, two living fetuses, joined at the thorax with a common heart, clearly identified by color Doppler. At the 12th week, the single fetus remained without any sign of abnormality and CT showed signs of hydrops. CT showed no cardiac activity at the 13th week of pregnancy, and the single fetus remained normal until the term of pregnancy. The prenatal course for the single fetus was uneventful, and a healthy girl weighing 2.750 g was vaginally delivered at 38 weeks.

ART has become popular for the treatment of infertility worldwide; consequently, the incidence of MZT has increased [1]. First-trimester screening and intense surveillance in early pregnancy after ART have made the diagnosis of CT more common during the first trimester. Prenatal ultrasonography suspicion can arise at 7 weeks of pregnancy, and diagnosis of CT has been reported during the ninth week of pregnancy [4]; however, false positives are common before the tenth week of pregnancy.

ART increases the risk of multifetal pregnancies and consequently malformations as CT. In our case, we confirmed thoraco-omphalopagus CT at 9 weeks. The conservative decision was made based on the anatomical

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Fig. 1 Dichorionic diamniotic triplet pregnancy at ninth week showing a normal embryo in one sac and conjoined twins in the other sac using three-dimensional ultrasonography with HDlive rendering

Fig. 2 Dichorionic diamniotic triplet pregnancy at ninth week showing thoraco-omphalopagus conjoined twins using three-dimensional ultrasonography with HDlive rendering

evaluation of CT. One week later, signs of cardiac dysfunction were observed, delaying the decision of embryo reduction and reducing the risks for the normal fetus. Multifetal embryo reduction and selective termination are safe therapeutic options for improving pregnancy outcomes [2]. In some cases, the incidence of CT in ART pregnancies is misreported which can hamper decisions for embryo reduction and selective termination. So, new larger studies are necessary to establish the real incidence of this condition in patients under treatment for infertility.

In this case, 3DUS using HDlive rendering allowed a realistic image of dichorionic diamniotic triplet pregnancy with CT in one sac and a normal embryo in the other sac. HDlive rendering has been applied in the assessment of normal pregnancy in the first trimester [5]; however, to the best of our knowledge this is the first description of a diagnosis of dichorionic diamniotic triplet pregnancy with CT in the literature by 3DUS using HDlive rendering.

Compliance with ethical standards

Conflict of interest All authors declare no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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