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ORIGINAL ARTICLE

Comparison of perinatal outcomes of vanishing twin and twin pregnancies conceived following assisted reproductive technology: A retrospective analysis

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Abstract *Objective:* The purpose of this study was to compare the perinatal outcomes of vanishing twin (VT) pregnancies with twin pregnancies following assisted reproductive technology treatment (ART). *Design:* Retrospective analysis. *Setting:* Infertility unit of a university level hospital. *Materials and methods:* We included all the women with dichorionic diamniotic twin pregnancies conceived following ART from Jan 2010 to Dec 2014 in our unit. We matched the VT group and twin group for maternal age and body mass index. *Results:* A total of 63 vanishing twin and 135 twin pregnancies were followed up. The vanishing twin rate was 31.8%. The live birth rate at term was significantly higher in VT group compared to twin group (69.8% vs. 16.3%, $P < 0.001$). The preterm delivery rates between 34–37 weeks (12.7% vs. 46.6%, $P < 0.001$) and less than 34 weeks (4.7% vs. 23.7%, $P = 0.0006$) were significantly lower in VT group as compared to twin group. Significantly higher number of babies were born with birth weight > 2500 g in VT group than in twin group (77.8% vs. 25.4%, $P < 0.001$). The miscarriage, Cesarean and congenital anomaly rates were similar in both the groups. *Conclusion:* Our study finding suggests better perinatal outcomes for ART pregnancies undergoing spontaneous reduction in first trimester compared to those pregnancies which continue as twins.

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1. Introduction

Worldwide, more than 5 million children have been born following assisted reproductive technology (ART) treatment (1). Due to limited implantation potential of the in vitro cultured embryos, transfer of more than one embryo in order to increase the ART success has been the widely adopted practice across the world (2). This policy of transferring multiple

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embryos has resulted in increase in multiple pregnancies following ART. The Society of Assisted Reproduction Technology registry (SART) revealed a multiple birth rate of 35.4% (3).

Multiple pregnancies following spontaneous conception or after ART treatment may take a varied course as the period of gestation advances and in many cases end up as singleton births. The vanishing twins phenomenon is defined as an empty gestational sac or first, second or third trimester intrauterine fetal demise (4). Following ART, if two gestational sacs were documented on first trimester ultrasound, loss of one twin is 27% and vanishing twin rate following documentation of two embryos is 38% (5). The vanishing twin contributes to up to 10% of singleton births (6).

There are conflicting studies regarding the obstetrical and neonatal outcomes in vanishing twin pregnancies following ART treatment when compared to singleton and twin pregnancies. Pinborg et al. found the higher risk of preterm delivery, low birth weight and neurological sequelae in singleton survivors of vanishing twins compared to singletons (6). This risk was entirely in those pregnancies where the spontaneous reduction occurred after 8 weeks of gestation. Another study found increased chances of small for gestational age in vanishing twin survivors when compared to matched singleton pregnancies (7). The surviving twin has also been associated with higher incidence of congenital anomalies when compared to singletons (8).

Spontaneous reduction in twin pregnancies was found to be associated with less preterm delivery rate and higher birth weight when compared to twin pregnancies following ART (9). Another study found the adverse obstetrics outcomes in vanishing twin pregnancies and twin pregnancies to be similar (10). A recent retrospective study found significantly higher perinatal mortality and congenital malformation rate in vanishing twin group compared to twins (11).

The incidence of gestational diabetes, placental abruption, premature rupture of membrane and vasa previa was found to be significantly higher in vanishing twin pregnancies compared to singleton pregnancies in a study which included spontaneous and post fertility treatment conceptions (11).

Though most studies comparing perinatal outcomes in vanishing twin pregnancies with singleton pregnancies following ART suggest adverse outcome for the former, the literature is ambiguous when the comparison is extended to twin pregnancies (6–11). We decided to evaluate the obstetrics and perinatal outcomes following vanishing twin phenomenon and compare it with twin pregnancies conceived following ART.

2. Materials and methods

2.1. Study design and analysis

We conducted a retrospective cohort study of all twin pregnancies conceived after ART treatment during Jan 2010 to Dec 2014. The study was conducted in the Reproductive Medicine Unit of a university level hospital. We included patients with twin pregnancies following fresh and frozen embryo transfers.

We screened the charts of all the women with twin pregnancies and an anonymized data collection was done.

We followed up the pregnancies until delivery and contacted the included patients for outcome related details. A predetermined data collection form was used to collect all the data. All the data were entered in Epidata and analysis was done using statistical software. A *p* value of less than 0.05 was considered significant.

2.2. ART pregnancy follow-up protocol

As per the unit protocol, all the women who conceived after ART as documented by positive serum beta hCG value were advised a transvaginal ultrasound after ten days. The ultrasound was done to identify and confirm pregnancy location, viability, and number of gestational sacs. In case twin pregnancies were identified, a diagnosis of dichorionic diamniotic or monochorionic diamniotic pregnancy was made by the presence of 'lambda' sign (dichorionic) or 'T' sign (monochorionic) during the first trimester ultrasound.

We included only dichorionic diamniotic twin pregnancies conceived after fresh and frozen embryo transfer. Pregnancies with two intrauterine gestational sacs with or without yolk sac or embryonic pole were followed up during the study.

After the initial confirmation ultrasound, follow-up ultrasound was done after two weeks. Following confirmation of a viable intrauterine pregnancy, patient was referred for further antenatal care. Some patients had antenatal care in the same institution and others had antenatal care at their home town.

2.3. Eligibility and outcomes measurement

Vanishing twin syndrome is used to describe pregnancies in which one of the gestational sacs shows the absence of yolk sac, or embryonic demise and other sac shows viable embryo (9). Some consider vanishing twin as a first trimester loss of one twin with survival of co twin (12), while others include the fetal demise in first, second and third trimester as well (11). Our study included only those vanishing twin pregnancies where the loss of one twin along with surviving co twin was documented during first trimester. During the same study period, the pregnancies which continued as twin pregnancies were taken as controls which were matched for age and body mass index.

The included vanishing twin pregnancies were further divided into two subgroups: Group A included women who had spontaneous reduction in one twin after appearance of embryonic pole and group B consisted of women who had spontaneous reduction before the appearance of embryonic pole.

We excluded monochorionic and higher order multiple pregnancies.

The primary outcome was live birth rate at term defined as delivery of a live fetus after 37 completed weeks of gestation. Other outcomes such as preterm delivery (delivery of a live fetus before 37 completed weeks of gestation), threatened miscarriage (bleeding per vaginum at any time before 20 weeks of pregnancy), antepartum hemorrhage, premature rupture of membrane, mode of delivery, birth weight and congenital anomaly rates were assessed (13).

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