SHORT COMMUNICATION

Successful Outcome of Intrathoracic Injection of Autologous Amniotic Fluid in Fetal Reduction: Report of Two Cases

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Potassium chloride is reported to kill both monochorionic twins after injection into only one. In this study, two women undergoing in vitro fertilization and embryo transfer were pregnant with triplets containing monochorionic twinning, which were detected by ultrasound with the presence of a "twin-peak" sign. Instead of potassium chloride, intrathoracic injection of amniotic fluid was employed to sacrifice one of the monochorionic fetuses in dichorionic triplets. Our aim was to sacrifice one of the monochorionic twins in order to prevent adverse perinatal outcomes and to avoid the harmful effect of potassium chloride on monochorionic cotwins. One twin pregnancy was terminated with preterm premature rupture of membranes at 25 weeks of gestation. In the second one, two healthy babies were delivered by cesarean section at 36 weeks of gestation. The female baby weighed 2100 gm and the male baby 2600 gm, respectively. Intrathoracic injection of amniotic fluid to create a tamponade is an alternative management for fetal reduction.

KEY WORDS: Amniotic fluid; fetal reduction; monochorionic twin; tamponade.

INTRODUCTION

The incidence of high-ordered pregnancies containing monozygotic twins after in vitro fertilization and embryo transfer (IVF/ET) has increased mainly because of manipulation of oocytes or embryos (1). Chorionicity in multiple pregnancies is a key factor to the prognosis (2). It was reported that 30% of dizygotic triplets cases were complicated by loss of viability and twin-to-twin transfusion (TTTS) (3), which can lead to neurological damage or other major morbidity in about half of the survivors after one monochorionic fetus had demised (4). Reduction of dichorionic triplets

in the first trimester has been to preserve either the monochorionic pairs or singletons because potassium chloride (KCl) injected in one monochorionic fetus will adversely affect the other one (5). We present two triplet pregnancies containing monochorionic twins in which dichorionic twins were successfully preserved after sacrificing one of the monochorionic twins by amniotic fluid tamponade.

CASE REPORT

Case 1

The 30-year-old infertile patient required IVF-ET after counseling because of oligoasthenospermia. She underwent controlled ovarian stimulation with a combination of gonadotropin-releasing hormone agonists and gonadotrophins. Ovulation was induced with human chorionic gonadotropin (hCG) and oocyte retrieval was performed 36 h later. Two embryos were transferred 44 h after intracytoplasmic sperm injection. Pregnancies were detected by urinary β -hCG 14 days after embryo transfer. Early ultrasonography performed at 7 weeks of pregnancy showed a triplet pregnancy. Diamniotic monochorionic twins were established at 10 weeks of gestation by the presence of T and twin-peak signs (6,7). Selective embryo reduction was proposed, and meanwhile, psychological counseling was also offered.

The purpose of fetal reduction was to preserve dichorionic twins by sacrificing one of monochorionic fetus. The complications of multiple gestations, especially those with monochorionic components, and risks of fetal reduction were explained. The benefits and risks of preserving the monozygotic twins and the unknown effects on the second one after selectively sacrificing one monozygotic twin were fully explained and discussed with the patient.

The outpatient procedure was performed after informed consent was obtained. Selective fetal reduction was performed at 10 weeks of gestation. After regional anesthesia, the vagina was prepared with normal saline. A needle of gauge #18 was inserted into the amniotic sacs under the guide of transvaginal ultrasound. Amniotic fluid was aspirated or drained first to fill the puncture needle until 0.5 mL of amniotic fluid was loaded in a 1-mL syringe. The needle was then advanced into the intrathoracic cavity. We injected 0.1-mL amniotic fluid each time. After 0.2-mL of amniotic fluid was injected, the fetal heartbeat ceased immediately. During the procedure, monitoring

of fetal heart beating was continued for at least 3 min after cessation of the heartbeat of the sacrificed fetuses. The heartbeats of other cotwin did not show any slowing-down. Serial follow-up by ultrasonography was performed on the following day, 7 days after fetal reduction, and at 15 weeks of gestation, and the results confirmed separate placentation and fetal well-being. Unfortunately, preterm premature rupture of membranes (PPROM) occurred at 25 weeks of gestation. Both female fetuses failed to survive.

Case 2

A 30-year-old infertile patient underwent IVF-ET after counseling because of bilateral hydrosalpinx. Controlled ovarian stimulation was performed in a similar way as to Case 1. Three embryos were transferred 72 h after oocyte retrieval. Pregnancy was confirmed by early β -hCG measurement 14 days later. On ultrasonography, fetal heartbeats were visible in four gestational sacs at 7 weeks of gestation; however, one fetus demised and diamniotic monochorionic twins were seen at 10 weeks of gestation.

Selective fetal reduction was proposed and the procedure was performed as described in Case 1. After the procedure, ultrasound performed at 15 weeks of gestation confirmed the status of placentation and fetuses. At 36 weeks of gestation, two healthy babies were delivered by cesarean section. The female baby weighed 2100 gm and the male baby 2600 gm, respectively. Both babies and the mother were discharged uneventfully.

DISCUSSION

Triplets have an increased incidence of prematurity and associated retinopathy in comparison to twins (8), and, therefore, more expensive perinatal care is needed. Among triplet pregnancies, the outcomes of dichorionic triplet pregnancies were reportedly even worse. TTTS or spontaneous loss before viability complicated about 30% of cases (3). Furthermore, higher rates of fetal growth restriction and congenital anomalies were also observed in dichorionic triplets (9). Multifetal pregnancy reduction has improved the outcomes for both early losses and prematurity. Reduction from triplets to twins has been proven to produce outcomes as good as those of unreduced twin gestations (10).

Compared with dichorionic twin pregnancies, higher rates of fetal loss, perinatal mortality, preterm

delivery, and birth weight below the 5th percentile in monochorionic twin pregnancies were reported (11). In twin pregnancies, monochorionicity increases the risk of adverse perinatal outcomes, including lower mean birth weights and higher perinatal mortality than dichorionic twins. In addition, medically indicated preterm deliveries were also increased because monochorionic twins had higher rates of intrauterine growth retardation and congenital anomalies (2). Accordingly, for fetal reduction performed in these two cases, we intended to sacrifice one of the monochorionic twins in the dichorionic triplets.

On ultrasonography, chorionicity can be determined by looking for the "twin-peak" or lambda sign (6,7), which is only seen in dichorionic twinning as a result of the placenta fusion process. This sign facilitates us identifying chorionicity with 99–100% accuracy in twins between 10 and 14 weeks of gestation (12) and therefore can be used in differentiating zygosity in the dichorionic triplets. The importance of this accuracy is that not only vascularity is connected but also the chromosomes between the monochorionic fetuses are the same. Sharing the same template of chromosome, monozygotic twins, presenting with a T sign (7), will both be affected if chromosome abnormality occurs. Indeed, it was suggested that a higher expected risk of Down's syndrome than that for a singleton of comparable maternal age was observed in monozygotic twins (13). If twin pregnancy is planned after fetal reduction and the technique is feasible, it is again reasonable to preserve dichorionic twins in dichorionic triplets.

Nevertheless, toxic substances can circulate between monochorionic twins through the placental vascular connection (5). This is the reason why blocking fetal blood flow is the only option for fetal reduction in monochorionic twins. Bipolar coagulation of cords is usually employed when one of monochorionic twins is affected. However, there are several problems in using this technique, including the selection of fetus and gestational age, higher risks of PPRM, more procedure-related complications, and the surgeon's experience (14). Once one monochorionic twin has demised after TTTS, risks of major morbidity in survivors are increased (4). Moreover the influence of using bipolar coagulation in latter trimesters on triplet pregnancy still remains unknown.

Embryo aspiration and cardiac puncture have been reported with favorable outcomes, but it may be technically difficult or time-consuming at later gestational ages (15,16). On the contrary, intrathoracic injection of a toxic substance to block fetal blood flow would

be less complicated and less time-consuming. Air embolism has been employed in fetal reduction, but the acoustic disturbance makes ultrasound images unclear. In this study, we injected amniotic fluid instead of air embolism into the intrathoracic cavity to create a tamponade, which blocks fetal blood flow without disturbing ultrasound images.

In conclusion, the observation of this study demonstrated that, for a fetus at early gestational age, a small amount of amniotic fluid seems sufficient to create a tamponade without affecting the cotwins. The usage of KCl can be replaced by autologous amniotic fluid injection to create a tamponade for successful fetal reduction.

REFERENCES

1. Abusheika N, Salha O, Sharma V, Brinsden P: Monozygotic twinning and IVF/ICSI treatment: A report of 11 cases and review of literature. *Hum Reprod Update* 2000;6:396–403
2. Dubé J, Dodds L, Armson BA: Does chorionicity or zygosity predict adverse perinatal outcomes in twins? *Am J Obstet Gynecol* 2002;186:579–583
3. Chasen ST, Al-Kouatly HB, Ballabh P, Skupski DW, Chervenak FA: Outcomes of dichorionic triplet pregnancies. *Am J Obstet Gynecol* 2002;186:765–767
4. van Heteren CF, Nijhuis JG, Semmekrot BA, Mulders LG, van den Berg PP: Risk for surviving twin after fetal death of co-twin in twin–twin transfusion syndrome. *Obstet Gynecol* 1998;92:215–219
5. Olivennes F, Doumerc S, Senat MV, Audibert FA, Fanchin R, Frydman R: Evidence of early placental vascular anastomosis during selective embryo reduction in monozygotic twins. *Fertil Steril* 2002;77:183–184
6. Kurtz AB, Wapner RJ, Mata J, Johnson A, Morgan P: Twin pregnancies: Accuracy of first-trimester abdominal US in predicting chorionicity and amnionity. *Radiology* 1992;185:759–762
7. Monteagudo A, Timor-Tritsch IE, Sharma S: Early and simple determination of chorionic and amniotic type in multifetal gestations in the first fourteen weeks by high-frequency transvaginal ultrasonography. *Am J Obstet Gynecol* 1994;170:824–829
8. Kaufman GE, Malone FD, Harvey-Wilkes KB, Chelmow D, Penzias AS, D'Alton ME: Neonatal morbidity and mortality associated with triplet pregnancy. *Obstet Gynecol* 1998;91:342–348
9. Bajoria R, Kingdom J: The case for routine determination of chorionicity and zygosity in multiple pregnancy. *Prenat Diagn* 1997;17:1207–1225
10. Evans MI, Berkowitz RL, Wapner RJ, Carpenter RJ, Goldberg JD, Ayoub MA, Horenstein J, Dommergues M, Brambati B, Nicolaides KH, Holzgreve W, Timor-Tritsch IE: Improvement in outcomes of multifetal pregnancy reduction with increased experience. *Am J Obstet Gynecol* 2001;184:97–103
11. Sebire NJ, Snijders RJ, Hughes K, Sepulveda W, Nicolaides KH: The hidden mortality of monochorionic twin pregnancy. *Br J Obstet Gynaecol* 1997;104:1203–1207
12. Sepulveda W, Sebire NJ, Hughes K, Odibo A, Nicolaides KH: The lambda sign at 10–14 weeks of gestation as a predictor of chorionicity in twin pregnancies. *Ultrasound Obstet Gynecol* 1996;7:421–423
13. Baldwin V. J. Anomalous development of twins. *In: Pathology of Multiple Pregnancies*. New York, Springer-Verlag, 1994, pp. 169–197
14. Taylor MJ, Shalev E, Tanawattanacharoen S, Jolly M, Kumar S, Weiner E, Cox PM, Fisk NM: Ultrasound-guided umbilical cord occlusion using bipolar diathermy for Stage III/IV twin–twin transfusion syndrome. *Prenat Diagn* 2002;22:70–76
15. Mansour RT, Aboulghar MA, Serour GI, Sattar MA, Kamal A, Amin YM: Multifetal pregnancy reduction: Modification of the technique and analysis of the outcome. *Fertil Steril* 1999;71:380–384
16. Ibérico G, Navarro J, Blasco L, Simón C, Pellicer A, Remohí J: Embryo reduction of multifetal pregnancies following assisted reproduction treatment: A modification of the transvaginal ultrasound-guided technique. *Hum Reprod* 2000;15:2228–2233

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