대 한 주 산 회 지 제25권 제4호, 2014
Korean J Perinatol Vol.25, No.4, Dec., 2014
http://dx.doi.org/10.14734/kjp.2014.25.4.292

A Case Report of Heterokaryotypic Monochorionic Twin Pregnancy with Discordant for Turner Syndrome

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Monochorionic twins with discordant karyotypes are rare and mostly caused by post-zygotic mitotic non-disjunction. A 32 year old nulliparous woman at 11 weeks of gestation with spontaneous twin pregnancy was referred to our hospital. An amniocentesis was performed in both amniotic sacs at 15 weeks of pregnancy. One fetus in monochorionic twin pregnancy was diagnosed with Turner syndrome with cystic hygroma, and the other fetus was normal. Because of high mortality rate in abnormal fetuses, the umbilical cord coagulation was performed using radiofrequency ablation to prevent the damage of co-twin that may be caused by the demise of one fetus. After delivery, chorionicity of placenta was ascertained by pathologic exam. Postnatal findings of physical exam, abdominal and brain sonography were normal in the surviving neonate.

Key Words : Monochorionic twin, Discordant karyotype, Turner syndrome, Radiofrequency ablation

The perinatal morbidity and mortality rates in monochorionic twin pregnancies are known to be 3 to 6 times higher than those in dichorionic twin pregnancies.[1] Monochorionic twin pregnancies have significant complications such as twin to twin transfusion syndrome, twin-reversed arterial perfusion sequence, conjoined twin, and the risk for significant neurologic morbidity and the increased risk of mortality in a survival fetus by intrauterine demise of one fetus.[1] Those complications may develop because of intertwin various vascular anastomoses within the placenta. In addition, the phenotypic discordant may occur because structural fetal anomalies are 3 times more common in monozygotic twins, compared to dizygotic twins.[2,3] Although extremely rare, post-zygotic mitotic non-disjunction and asymmetric X-chromosome inactivation can result in the discordant karyotype.[4] The discordant karyotype of monochorionic twins has the low prevalence and has never been reported in Korea. Therefore, we report our experience with a case of monochorionic twin discordant for Turner syndrome with cystic hygroma that treated with radiofrequency ablation (RFA).

Case report

A 32 year old nulliparous woman at 11 weeks of gestation with spontaneous twin pregnancy was referred to this hospital. One placenta with T-sign and thin inter-twin membrane were identified by ultrasound and the woman was diagnosed with a monochorionic twin pregnancy (Fig. 1A). One fetus presented with 8.0 mm cystic hygroma. It was

Received : 1 October 2014, Revised : 27 November 2014
Accepted : 1 December 2014
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increased to 18.7 mm at 15 weeks of pregnancy. At the first visit, chorionic villous sampling (CVS) was not conducted but amniocentesis was done to examine both fetuses at 15 weeks of gestation. The result of karyotyping was 45,X in one twin with cystic hygroma and 46,XX in the other normal twin. Fetal hydrops with anasarca and ascites were developed in the fetus with Turner syndrome at 17 weeks of gestation (Fig. 1B). If cystic hygroma is persistent until mid–pregnancy, it can be a cause of fetal death in most cases. Accordingly, we decided to conduct a selective fetal reduction to prevent subsequent damage of the normal fetus after one fetal demise in monochorioinic twin pregnancy.

At 17 weeks 5 days pregnant, the intrafetal ablation was performed on the umbilical cord insertion site of the anomalous twin, under local anesthesia and ultrasound guide with a 17 gauge RFA needle (VIVA RF system, Starmed, Korea). Immediately after the procedure, we confirmed that there were no cord flow and bleeding and the heart rate was gradually slow down using a color Doppler. Also, there were no abnormal Doppler findings in the normal fetus. Six hours after the procedure, the ultrasound confirmed that the heartbeat of abnormal fetus was completely stopped.

After the intrafetal ablation, the woman stayed in the hospital for 2 days for observation. At one and two weeks follow up after RFA procedure, no problem was found in the surviving fetus. After that, the woman received the routine outpatient care according to gestational age.

The woman visited the emergency room with symptoms of irregular abdominal pain, a small amount of vaginal bleeding and expulsion of the abortus at 36 weeks and 3 days of gestation. After the delivery of abortus, the severe abdominal pain was disappeared. There, however, were irregular contractions ranging from 3 to 6 minutes apart on cardiotocography. The cervix was 50% effaced and 3 centimeters dilated. The ultrasound indicated that the baby was in cephalic presentation. The estimated fetal weights were 2.7 kg and the amniotic fluid index was 4.9 cm. The woman was hospitalized due to preterm labor and oligohydramnios. She underwent the induction of delivery with oxytocin infusion and gave birth to a healthy baby girl weighing 2,645 g, with Apgar scores of 9 at one minute and 9 at five minutes. The

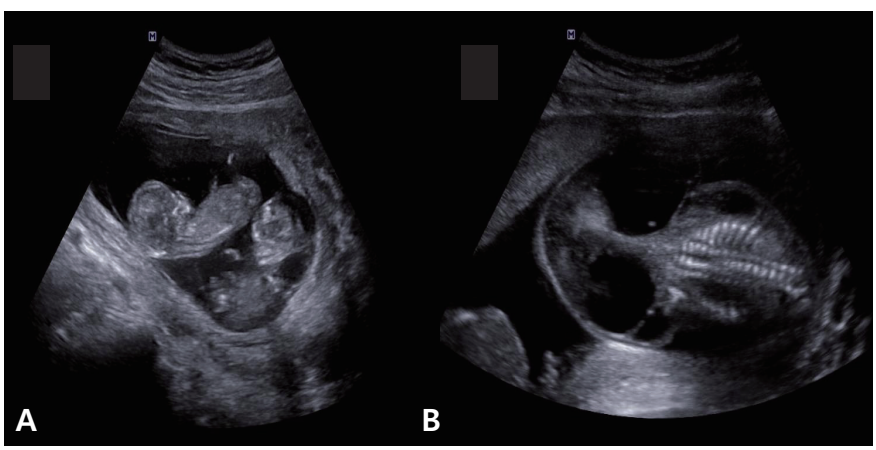

Fig. 1. (A) Monochorionic diamniotic twin at 11 weeks of gestation. (B) Cystic hygroma at 17 weeks of gestation.

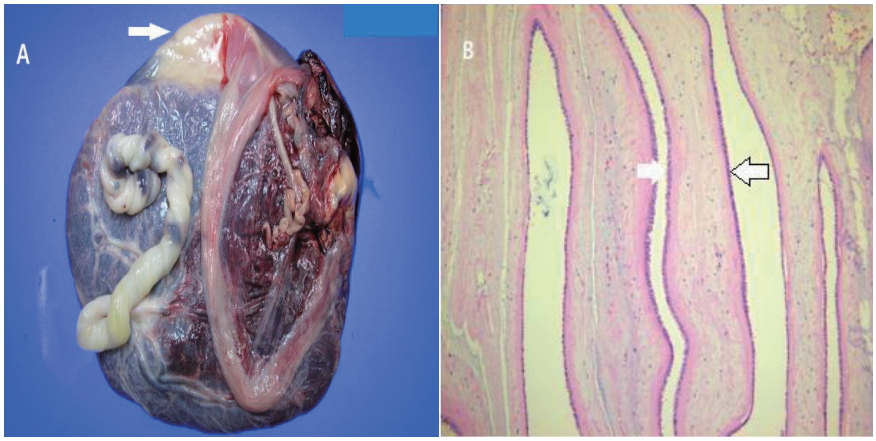

Fig. 2. (A) A gross photograph of monochorionic diamniotic placenta shows the necrotic portion (arrow) of the abnormal twin. (B) Pathologic finding of interfetal amniotic membrane (arrow) shows the absence of an intervening chorionic layer (H&E, x200).

placental weight was 748 g and monochorionic diamniotic twin placenta was confirmed by the pathologic exam (Fig. 2). The umbilical cord of the fetus who underwent RFA measured 26 cm in length and 0.6 cm in thickness and it was already autolyzed. The surviving neonate has been in excellent health during follow-up, without any abnormal findings on abdominal and brain ultrasonography. There was no maternal morbidity.

Discussion

A monochorionic twin pregnancy is a type of monozygotic twin pregnancy. They are nearly identical in appearance, genetic composition and even major abnormalities. However, it does not mean that monochorionic twins are completely identical.[5] Heterokaryotypic monochorionic twin are very rare and karyotypic difference is caused by asymmetric X-chromosome inactivation and differential gene imprinting post-zygotic mitotic errors such as nondisjunction and anaphase lag.[6] The most common cause of this is nondisjunction of homologous chromosomes. According to the phase of zygote formation in which the nondisjunction occurs, it is determined whether genetic abnormalities occur in all fetuses or in only one fetus. In other words, one fetus will have genetic abnormalities but another fetus will be normal if the nondisjunction occurs after zygote formation is completed.[7]

For genetic diagnosis in monochorionic twins, CVS, amniocentesis, and cordocentesis may be considered. It is most appropriate to perform amniocentesis to both amniotic sacs, as Lewi et al. reported that dual amniocentesis should be performed to examine both amniotic sacs for establishing zygosity. CVS may have false negative or false positive results. In their study, as a result of performing CVS on cord insertion site of both twins, the result of karyotype of the aneuploid fetus was normal, but the result of karyotype of the euploid fetus was abnormal.[8,9] The results of cordocentesis showed that an intrauterine exchange of lymphocytes through vessel anastomoses can lead to false blood cord results.[10] Therefore, in this study, we did not perform CVS at 11 weeks of gestation because of the false result caused by performing CVS before amniocentesis and the high risk for pregnancy loss. We performed amniocentesis

in both amniotic sac only once at 15 weeks of gestation, instead.

If cystic hygroma is diagnosed at 11 to 14 weeks of gestation, the chance of intact survival is only 17 %. In addition, the mortality rate of cases seen at mid gestation is close to 100%.[11] After the death of one fetus in a monochorionic twin pregnancy, around 15 % of remaining fetus also dies. Although the remaining fetus is survived, the risk for significant neurologic morbidity can be increased.[12] We conducted the selective fetal reduction in order to prevent the damage of the normal fetus associated with the high mortality rate of the abnormal fetus. In dichorionic pregnancies, the method of fetal reduction is similar to singleton' s one, such as intracardiac injection of potassium chloride.[13] However, the cardiotoxic agent injection can affect the normal fetus because the twin fetal circulation is connected by placental vessel anastomosis in monochorionic twin pregrancies. Accordingly, bipolar cord occlusion (BCO), laser cord coagulation, and RFA are used for the vascular ablation.[14, 15] In bipolar or laser cord occlusion technique, 3.8 mm of operative sleeve is used, as required to insert a relative large-diameter into an amniotic sac. This may increase the risk for membrane complication, hemorrhage, and preterm birth. RFA has been advocated as an alternative for the selective termination procedure. This method is less invasive because it is performed under the ultrasound guide using a 17-gauge (1.4 mm) of RF-electrode 16. Bebbington et al. reported that the use of RFA for the management of complicated monochorionic pregnancies reasonably decreases the preterm premature rupture of membrane, compared to BCO (P=0.05). However, the survival after BCO was significantly higher than the survival after RFA in their study. This difference was due to the increase of intrauterine fetal death of co-twin before 28 weeks of gestation. It was reported that this was caused by the time differences to reach the complete cessation of blood flow between two procedures. RFA depends on the applied energy. It, thus, takes more time to cease the cord flow by coagulating the vessels in RFA, compared to BCO which coagulates the cord by clamping. Accordingly, they insisted that the rapid application of high energy for achieving coagulation in RFA is absolutely necessary to reduce the mortality of the survival twin.[16]

It is important to diagnose chorionicity accurately in a multiple pregnancy when the abnormalities are found in only one fetus. The genetic discordance is very rare in monochorionic twin pregnancy. Both fetuses, however, should be examined with amniocentesis if chromosomal anomalies are suspected in only one fetus. If one fetal reduction is inevitable, RFA is the best recommended method.

References

1) Asztalos E, Barrett JF, Lacy M, Luther M. Evaluating 2 year outcome in twins < or = 30 weeks gestation at birth: a regional perinatal unit's experience. Twin Res 2001;4:431-8.
2) Mastroiacovo P, Castilla EE, Arpino C, Botting B, Cocchi G, Goujard J, et al. Congenital malformations in twins: an international study. Am J Med Genet 1999;83:117-24.
3) Paramasivam G, Wimalasundera R, Wiechec M, Zhang E, Saeed F, Kumar S. Radiofrequency ablation for selective reduction in complex monochorionic pregnancies. BJOG 2010;117:1294-8.
4) Machin GA. Some causes of genotypic and phenotypic discordance in monozygotic twin pairs. Am J Med Genet 1996;61:216-28.
5) Keith L, Machin G. Zygosity testing. Current status and evolving issues. J Reprod Med 1997;42:699-707.
6) Hall JG. Twinning. Lancet 2003;362:735-43.
7) Machin G. Non-identical monozygotic twins, intermediate twin types, zygosity testing, and the non-random nature of monozygotic twinning: a review. Am J Med Genet C Semin

Med Genet 2009;151C:110-27.
8) Bohec C1, Douet-Guilbert N, Basinko A, Le Bris MJ, Marcorelles P, Audrézet MP, et al. Difficult diagnosis and management of an heterokaryotypic monochorionic twin pregnancy with discordant fetal sex and 45,X/47,XYY karyotypes. Fetal Pediatr Pathol 2010;29:424-30.
9) Lewi L1, Blickstein I, Van Schoubroeck D, Gloning KP, Casteels M, Brandenburg H, et al. Diagnosis and management of heterokaryotypic monochorionic twins. Am J Med Genet A 2006;140:272-5.
10) Schmid O, Trautmann U, Ashour H, Ulmer R, Pfeiffer RA, Beinder E. Prenatal diagnosis of heterokaryotypic mosaic twins discordant for fetal sex. Prenat Diagn 2000;20:999-1003.
11) Malone FD, Ball RH, Nyberg DA, Comstock CH, Saade GR, Berkowitz RL, et al. First-trimester septated cystic hygroma: prevalence, natural history, and pediatric outcome. Obstet Gynecol 2005;106:288-94.
12) Hillman SC, Morris RK, Kilby MD. Co-twin prognosis after single fetal death: a systematic review and meta-analysis. Obstet Gynecol 2011;118:928-40.
13) Pasquini L, Pontello V, Kumar S. Intracardiac injection of potassium chloride as method for feticide: experience from a single UK tertiary centre. BJOG 2008;115:528-31.
14) Nobili E, Paramasivam G, Kumar S. Outcome following selective fetal reduction in monochorionic and dichorionic twin pregnancies discordant for structural, chromosomal and genetic disorders. Aust N Z J Obstet Gynaecol 2013;53:114-8.
15) Shevell T, Malone FD, Weintraub J, Thaker HM, D'alton ME. Radiofrequency ablation in a monochorionic twin discordant for fetal anomalies. Am J Obstet Gynecol 2004;190:575-6.
16) Bebbington MW, Danzer E, Moldenhauer J, Khalek N, Johnson MP. Radiofrequency ablation vs bipolar umbilical cord coagulation in the management of complicated monochorionic pregnancies. Ultrasound Obstet Gynecol 2012; 40:319-24.

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단일 융모막 쌍태아에서 한쪽 태아의 터너 증후군 증례 보고

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장정희 · 경규상 · 홍덕호 · 홍승화 · 지일운 · 정은환

단일 융모막 쌍태아에서 불일치 핵형은 대부분 접합 후 유사분열에서 비분리 현상에 의하며 드물게 발생한다. 본 증례 보고는 자연 임신된 단일 융모막 쌍태아의 한쪽 태아에서 낭포성 림프관종이 발견되어 임신 11주에 본원으로 전원 된 32세 초임부에 대한 내용이다. 산모는 임신 15주에 양쪽 태아에서 양수검사를 받았고, 단일 융모막 쌍태아 중 낭포성 림프관종이 있는 태아가 터너증후군으로 진단되었다. 낭포성 림프관종이 동반 된 터너 증후군은 자궁 내 사망률이 높다. 단일 융모막에서 일측 태아의 자궁 내 사망으로 인한 정상 태아의 손상을 예방하기 위해 고주파 치료기를 사용하여 선택적 유산술을 시행하였다. 반면 정상 태아는 임신 36주 5일에 조기양막파수로 분만되었고, 신체검사 및 복부, 뇌 초음파 검사 결과 정상이었다. 태반은 병리학적 조직검사를 통하여 단일 융모막임을 확인하였다.

중심 단어 : 단일 융모막 다태아, 불일치 핵형, 터너 증후군, 고주파 열치료