Clinical Practice

Ex utero Intrapartum Treatment for the Pericardial Effusion Drain of a Fetal Cardiac Tumor

Jian Zhuang¹, Wei Pan², Cheng-Bin Zhou¹, Feng-Zhen Han³

¹Department of Cardiovascular Surgery, Guangdong Cardiovascular Institute, Guangdong Provincial Key Laboratory of South China Structural Heart Disease, Guangdong General Hospital, Guangdong Academy of Medical Sciences, Guangzhou, Guangdong 510080, China
²Department of Maternal-fetal Cardiology, Guangdong Cardiovascular Institute, Guangdong General Hospital, Guangdong Academy of Medical Sciences, Guangzhou, Guangdong 510080, China
³Department of Obstetrics, Guangdong General Hospital, Guangdong Academy of Medical Sciences, Guangzhou, Guangdong 510080, China

Key words: Ex utero Intrapartum Treatment; Fetal Surgery; Heart Neoplasms; Pericardial Effusion

INTRODUCTION

The incidence of fetal cardiac tumor was about 0.14% as determined by fetal echocardiography.¹ It was extremely difficult to deal with the fetus when the severe circulatory instability was induced by a cardiac tumor in the womb. It was reported that ex utero intrapartum treatment (EXIT) procedure solved the problems of fetal airway or pulmonary lesion during delivery to avoid hypoxia after birth.² The goal of EXIT is to maintain placental circulation while steps are taken to optimize the transition of the baby from fetal to neonatal life. This study introduced the experience of EXIT procedure to solve the problems of fetal circulation induced by a fetal cardiac tumor.

CASE REPORT

A 32-year-old healthy pregnant woman with more than 30 gestational weeks was admitted to the hospital due to the fetal cardiac mass. The fetal echocardiography showed a heterogeneous lesion of 2.85 cm × 2.25 cm on the right side of the heart, which compressed the tricuspid annulus by 50% with pericardial effusion [Figure 1a]. It was difficult to distinguish the source of fetal cardiac mass either within the heart or in the pericardial cavity by fetal echocardiography. The fetus was at risk when the fetal heart rate decreased to less than 80 bpm and pericardial effusion continued to increase during the hospitalization. The EXIT procedure was performed to resect fetal cardiac tumor if it was located in the pericardial cavity or to ameliorate cardiac compression and bradycardia by pericardial effusion drainage.

The cesarean section was performed, and the uterine relaxation was attained with the inhalation of a high dose of sevoflurane (5–10%). The fetus was released from the uterus, and the placental circulation was kept intact. The fetal heart was exposed through the median sternotomy. The mass was located within the right atrium and hence could not be quickly removed without cardiopulmonary bypass. Therefore, about 30 ml of pericardial effusion was drained, and the skin was just sutured without closing the sternum to release the space for the cardiac mass. The tricuspid annulus compression was ameliorated as demonstrated by fetal echocardiography [Figure 1b]. The fetus delivered weighed 2.2 kg and had a sinus rhythm of 130–150 bpm. The cesarean section was completed with the administration of oxytocin and termination of sevoflurane inhalation after fetal delivery. The pregnant woman recovered uneventfully and was discharged on the 5th day postoperatively.

The neonate was intubated with mechanical respiratory support, and his heart function was still impaired by the cardiac mass compression. Dopamine was administered at a rate of 10 μg·kg⁻¹·min⁻¹ to maintain the mean blood pressure.

Access this article online

Quick Response Code:

Website: www.cmj.org

DOI: 10.4103/0366-6999.206342

Address for correspondence: Dr. Cheng-Bin Zhou, Department of Cardiovascular Surgery, Guangdong Cardiovascular Institute, Guangdong Provincial Key Laboratory of South China Structural Heart Disease, Guangdong General Hospital, Guangdong Academy of Medical Sciences, No. 96 Dongchuan Road, Yuyiu District, Guangzhou, Guangdong 510080, China

E-Mail: zcbwwww@163.com

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

© 2017 Chinese Medical Journal | Produced by Wolters Kluwer - Medknow

Received: 03-02-2017 Edited by: Peng Lyu
How to cite this article: Zhuang J, Pan W, Zhou CB, Han FZ. Ex utero Intrapartum Treatment for the Pericardial Effusion Drain of a Fetal Cardiac Tumor. Chin Med J 2017;130:1381-2.
ranging from 40 to 50 mmHg (1 mmHg = 0.133 kPa). Therefore, cardiac tumor resection was performed under the cardiopulmonary bypass on the 2nd day after birth [Figure 1c]. The pathological examination demonstrated the diagnosis of cardiac hemangioma. The neonate recovered well and was discharged after 1 month with 2.75 kg weight. No evidence of cardiac tumor recurrence was reported after a follow-up of 10 months.

**Discussion**

Rhabdomyoma was the most common lesion in the fetal heart, and fetal cardiac hemangioma was extremely rare.\(^2\) The therapeutic strategy and the interventional timing for fetal cardiac tumor depended on the influence of lesions on fetal cardiac function, complicated inherited metabolic disease, and gestational weeks. The nonimmune fetal edema and (or) reduced fetal heart rate were indications for fetal cardiac intervention.\(^3\) If the lesion was complicated only with a large amount of pericardial effusion, the fetal pericardio-amniotic shunting could be made to release the cardiac compression.\(^4\) However, 50% compression of the tricuspid annulus and pericardial effusion might restrict blood flow into the right ventricle and could not be solved by pericardio-amniotic shunting. Fetal bradycardia occurred due to the atrioventricular node compression. It was at high risk for the fetus in the womb and also dangerous for the transition from the fetal circulation to the postnatal circulation after delivery.

The EXIT procedure was performed to rescue the fetus at 32 gestational weeks. An effort was made to resect the cardiac tumor assuming it was in the pericardial cavity. However, the fetal cardiac tumor was located within the right atrium. It could not be resected because fetal cardiopulmonary bypass was not safe for both the mother and the fetus. Therefore, the cardiac compression was relieved by pericardial effusion drainage and delayed sternal closure. The fetus was delivered without marked circulatory instability, and the sinus rhythm was recovered after fetal cardiac decompression. The result demonstrated that fetal cardiac intervention was possible with the EXIT procedure to ameliorate the cardiac compression induced by the cardiac tumor. The therapeutic strategy for this fetal cardiac tumor expanded the indications of EXIT procedure.

**Declaration of patient's parents consent**

The authors certify that they have obtained the appropriate patient's parents agreement. The patient's parents have their consent for their baby images and other clinical information to be reported in the journal. The patient's parents understand that their baby name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

This study was supported by grants from the National Natural Science Foundation of China (No. 81370274), and Guangdong Project of Science and Technology (No. 2014A020213010).

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Yuan SM. Fetal primary cardiac tumors during perinatal period. Pediatr Neonatol 2016. pii: S1875-957230244-3. doi: 10.1016/j.pedneo.2016.07.004.
2. Cass DL, Olutoye OO, Cassady CI, Zamora IJ, Ivey RT, Ayres NA, et al. EXIT-to-resection for fetuses with large lung masses and persistent mediastinal compression near birth. J Pediatr Surg 2013;48:138-44. doi: 10.1016/j.jpedsurg.2012.10.067.
3. Tollens M, Grab D, Lang D, Hess J, Oberhoffer R. Pericardial teratoma: Prenatal diagnosis and course. Fetal Diagn Ther 2003;18:432-6. doi: 10.1159/000073138.
4. Tomek V, Vlk R, Tláskal T, Skovránek J. Successful pericardio-amniotic shunting for fetal intrapericardial teratoma. Pediatr Cardiol 2010;31:1236-8. doi: 10.1007/s00246-010-9774-x.