Sir,

We report a timely managed case of impending hypoplastic left heart syndrome (HLHS) due to critical aortic stenosis in a fetus. Fetal echocardiogram of a 25-year-old 2nd gravida during midgestation showed severe aortic stenosis. On followup, fetal heart assessment showed redistribution of flow, namely, flow reversal in the arch, left to right flow across the foramen ovale, mitral regurgitation, ventricular dysfunction, and endocardial fibroelastosis [Figure 1a-d]. The published data supports in-utero progression to HLHS in the presence of these features.[1] Biventricular circulation is reported to be achieved in 43% of liveborn infants if fetal aortic valvotomy is performed.[2] Informed consent was obtained for the fetal balloon aortic valvotomy. At 26 weeks of gestation, after an initial unsuccessful attempt because of unfavorable fetal position, the procedure was reattempted 1 week later involving a multidisciplinary team [Table 1]. General anesthesia was given to the mother. After obtaining an ideal fetal position, intramuscular injection of vecuronium and fentanyl was given to the fetus using a 21 G needle. Under ultrasound guidance, an 18 G Hawkins-Akins needle (Cook Medical Inc, Bloomington, Indiana, USA) was introduced through the maternal abdomen, fetal thorax, and subsequently into the left ventricle. A 0.014 Galeo extrasupport wire (Biotronik AG, Ackerstrasse, Switzerland) was passed through the aortic valve and a 3.5 mm × 10 mm Hiryu balloon (Terumo Europe NV, Leuven, Belgium) was advanced over it. The balloon was inflated twice across the valve [Figure 2a-d]. There was transient bradycardia during the procedure that recovered with atropine injection into the fetal ventricle. Mild pericardial effusion developed following the procedure, which resolved spontaneously over the next 48 h. There were no maternal complications.

The serial ultrasound assessment showed improvement of ventricular function, aortic flow, disappearance of mitral regurgitation, and reversal of shunt across foramen ovale [Figure 3a-d]. The left ventricle and mitral annulus showed steady growth [Figure 4]. Baby was delivered by an elective cesarian section and underwent percutaneous balloon aortic valvotomy using a 5 × 20 mm Tyshak mini balloon (NuMED, Inc, Hopkinton, New York, USA). The gradient across the aortic valve dropped from 120 to 45 mmHg following the procedure. On followup, the child had normal growth and development. In the fourth month of life, the child needed a repeat balloon valvotomy using

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**Figure 1:** Fetal echocardiographic images prior to procedure. (a) Color Doppler image showing the stenotic aortic valve. (b) Four-chamber view revealing mitral regurgitation. (c) Foramen ovale shunting from left to right atrium. (d) Endocardial fibroelastosis of the left ventricle. AV: Aortic valve, LA: Left atrium, RA: Right atrium
Figure 2: Fetal sonographic images during the procedure. 
(a) Intramuscular injection of anesthetic agent into the fetus. 
(b) Needle entry into the fetal thorax. 
(c) Needle alignment with the left ventricular outflow tract and wire across the aortic valve. 
(d) Inflated balloon across the aortic valve. AV: Aortic valve, Ba: Balloon, N: Needle, W: Wire

Figure 3: Fetal echocardiographic images 6 weeks following the procedure. 
(a) Four-chamber view showing resolution of endocardial fibroelastosis. 
(b) Color Doppler image revealing improved flow through the aortic valve. 
(c) Four-chamber view in systole showing absence of mitral regurgitation. 
(d) Foramen ovale shunting from right to left atrium. AV: Aortic valve, LA: Left atrium, MV: Mitral valve, RA: Right atrium

7 × 20 mm Tyshak mini (NuMED, Inc, Hopkinon, New York, USA) balloon because of the suboptimal result obtained during neonatal period. At present, the child is 1 year old with normal growth and developmental milestones. There is mild residual aortic stenosis without regurgitation.

Although the world's first fetal intervention for aortic stenosis was reported 24 years ago,[2] there have been no reports of successful fetal balloon aortic valvotomy in India until now. Many social, cultural, and financial constraints play a role apart from identifying an ideal case. The success of fetal intervention depends on appropriate case selection, timing of intervention, organizing the team, selection of appropriate hardware, and experience in handling complications and postnatal management. Follow-up data of first 100 cases of fetal aortic valvuloplasty revealed achievement of biventricular circulation in 43% of liveborn cases.[1] However, the family has to be counseled that fetal intervention is never a standalone procedure. They usually need postnatal valvuloplasty as in our case. Up to 55% of those who achieved biventricular circulation also required additional cardiac surgeries during followup, such as aortic/mitral valve replacement, Ross-Konno procedure, or endocardial fibroelastosis resection.[2]

Early detection of congenital heart defects in the fetus and timely referral to a tertiary care center may help achieve biventricular circulation, which has better survival and lesser morbidity compared to Norwood procedure.
Multiple pericardial abscesses in a child with known chronic granulomatous disease

Sir,

Chronic granulomatous disease (CGD) is a rare primary immunodeficiency that affects about 1 in 250,000 individuals. [1] It is known by a defective intracellular killing of phagocytized organisms. Pneumonia was noted in 79%, suppurative lymphadenitis in 53%, whereas subcutaneous abscesses in 52% in these patients. [1] Pericardial involvement is rarely seen in patients with CGD and mostly presented with pericardial effusion rather than abscess. [1]

Herein, we present a case of a CGD with diffuse multiple pericardial abscesses, which is diagnosed by cardiac magnetic resonance imaging (MRI). An 8-year-old child with known CGD was administered to emergency service with cough and chest pain. Chest x-ray showed cardiomegaly and right paracardiac infiltration. Routine biochemical tests were reflected an inflammatory condition (C-reactive protein: 18.8 mg/l, erythrocyte sedimentation rate: 116 mm/h, and white blood cell count: 13 × 10^3/µl). Ceftriaxone was intravenously administered with diagnosis of pneumonia. Echocardiography was performed to identify potential cause of cardiomegaly. Pericardial effusion including fibrin bands with suspicious lesions suggesting pericardial abscesses in pericardium was identified. For further evaluation of these lesions, cardiac MRI was performed (Avanto, Siemens Medical Systems, Enlargen, Germany). Apart from routine cardiac MRI sequences, diffusion-weighted sequence, which is very reliable MRI technique to demonstrate pericardial abscess, was added to our cardiac MRI examination. [2]

Cardiac MRI of the patient revealed multiple pericardial abscesses extending to the left pleura and mediastinum [Figure 1]. In the following days, patient showed symptoms of tamponade, thus urgent pericardiectomy was performed. Pathologic examination of the excised pericardial specimen showed multiple abscesses. Patient died because of cardiac arrest 1 month later despite all the efforts.

In conclusion, to our knowledge this is the first article that report a case of a CGD presented with multiple pericardial abscesses. On the basis of our report, we suggested that although cardiac involvement is a very rare condition in patients with CGD, if the clinical findings are supporting cardiac involvement, pericardial abscesses should also be kept in mind in addition to outcomes of the first 100 patients. Circulation 2014;130:638-45.