

# Immediate single-chamber pacemaker implantation in a 2-hour-old infant with complete congenital atrioventricular block

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Congenital complete atrioventricular block (CCAVB) is a rare disease that occurs in approximately 1 of every 20 000 pregnancies [1] and is believed to be caused by transplacental passage of maternal anti-SSA/Ro-SSB/La antibodies [2]. An early diagnosis is crucial as without pacemaker implantation this condition is associated with a high neonatal mortality rate. The risk factors for unfavorable diagnosis are a slow ventricular rate (below 50–60/min), cardiogenic shock, and fetal edema [3–5].

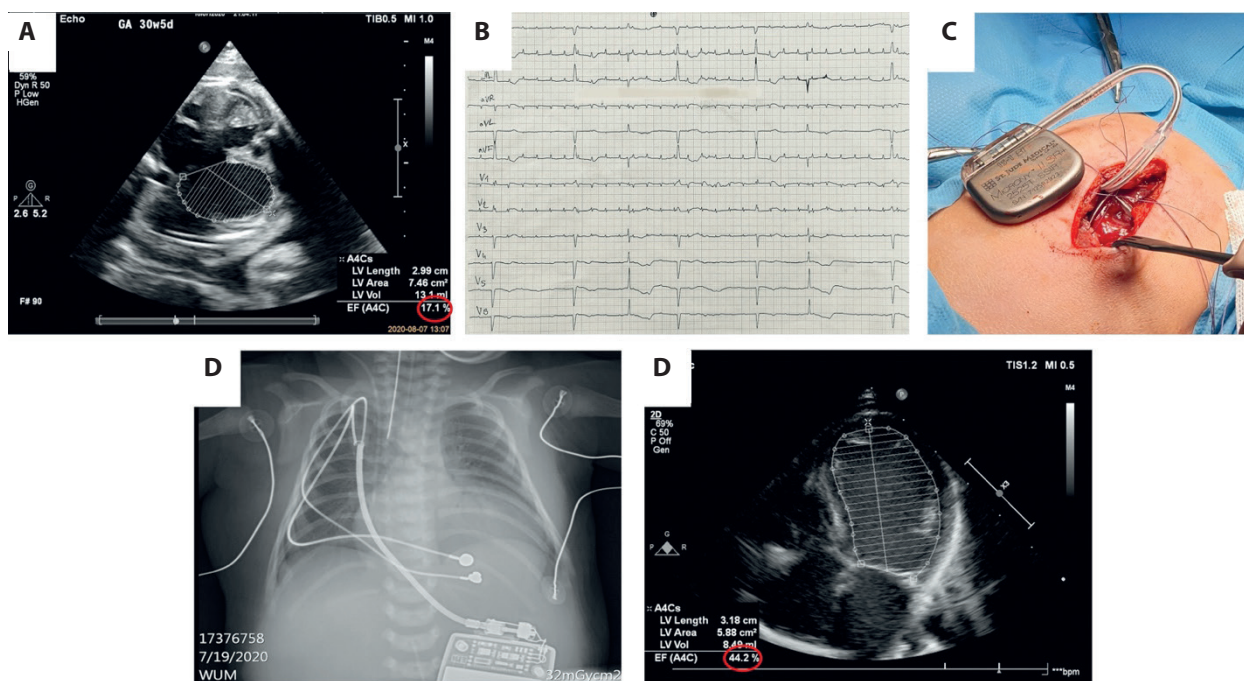
The presented case concerns a premature female infant, in whom pacemaker implantation was performed within 2 hours after birth. The CCAVB was diagnosed at the beginning of the 3<sup>rd</sup> trimester based on fetal echocardiography.

After CCAVB diagnosis, watchful waiting strategy was implemented. At the 29<sup>th</sup> week of gestation, the fetus presented with a heart rate below 60/min. Pharmacological therapy with salbutamol, digoxin, and steroid therapy was started. The fetus's condition worsened, and it started to accumulate fluid in the body cavities. Control echocardiography showed a significantly enlarged left ventricle with impaired contractility with low ejection fraction (EF) of 17% (Figure 1A) and significant bradycardia of 40–50/min. The pregnant female was transported to our Center and a cesarean section (CC) was performed. The infant was delivered at the 31<sup>st</sup> week of gestational age. The birth weight was 1970 g. Due to cardiopulmonary compromise, the newborn required respiratory therapy. Electrocardiography (ECG) showed a complete atrioventricular block with an atrial rate of 167/min and ven-

tricular rate of 42/min (Figure 1B). Single bolus of atropine followed by adrenaline, milrinone, and dopamine infusions were administered without any improvement. Isoprenaline was not given due to immediate surgical qualification for pacemaker implantation. Transthoracic echocardiography (TTE) showed a markedly enlarged left ventricle with decreased myocardial contractility (LVEF, 21%), bradycardia 28–40/min, and decreased cardiac output. Implantation of a single chamber pacing system Microny II SR+2525T by Jude Medical with a bipolar epicardial electrode (Figure 1C, D) was performed. On the 12<sup>th</sup> day following pacemaker implantation, the left ventricular EF was 40% as measured by the biplane Simpson method.

This case is not the first described in the literature; however, what stands out is the fact that the patient's mother was intentionally transferred to our Center before delivery for the procedure of pacemaker implantation immediately after the CC, which reduced the total length of intervention and risk of inter-hospital transport. We believe that in children in the gestational age group (31–34 hbd) with previously mentioned risk factors, the decision to deliver the baby and perform immediate implantation of the pacemaker should not be delayed [4].

In 1-month follow-up, the general condition of our patient was good, with proper body weight gain. TTE showed decreased EF (44%) measured by the Simpson method (Figure 1E) requiring spironolactone and digoxin. However, in 2-year follow-up, the contractility decreased significantly down to 20% due to



**Figure 1.** A. TTE with EF before pacemaker implantation B. ECG after birth. C. Intraoperative view of the Microny II SR+ pacemaker D. RTG after implantation E. Control TTE before the patient's discharge

Abbreviations: ECG, electrocardiography; EF, ejection fraction; RTG, radiography; TTE, transthoracic echocardiography

progressive dilated cardiomyopathy, requiring cardiac resynchronization therapy (CRT) and pharmacotherapy including angiotensin-converting enzyme 1 (ACE1), carvedilol, digoxin, and diuretics. Despite effective electrostimulation and CRT, the prognosis is poor due to dilated cardiomyopathy, and the patient is a candidate for a heart transplant.

### Article information

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### REFERENCES

1. Rein AJ, Mevorach D, Perles Z, et al. Early diagnosis and treatment of atrioventricular block in the fetus exposed to maternal anti-SSA/Ro-SSB/La antibodies: a prospective, observational, fetal kinetocardiogram-based study. *Circulation*. 2009; 119(14): 1867–1872, doi: [10.1161/CIRCULATIONAHA.108.773143](https://doi.org/10.1161/CIRCULATIONAHA.108.773143), indexed in Pubmed: 19332471.
2. Baruteau AE, Pass RH, Thambo JB, et al. Congenital and childhood atrioventricular blocks: pathophysiology and contemporary management. *Eur J Pediatr*. 2016; 175(9): 1235–1248, doi: [10.1007/s00431-016-2748-0](https://doi.org/10.1007/s00431-016-2748-0), indexed in Pubmed: 27351174.
3. Janoušek J, van Geldorp IE, Krupičková S, et al. Permanent cardiac pacing in children: choosing the optimal pacing site: a multicenter study. *Circulation*. 2013; 127(5): 613–623, doi: [10.1161/CIRCULATIONAHA.112.115428](https://doi.org/10.1161/CIRCULATIONAHA.112.115428), indexed in Pubmed: 23275383.
4. Leszczyńska K, Chojnicki M, Haponiuk I, et al. Analysis of pregnancy, labor and neonatal course in babies with prenatally-diagnosed complete atrioventricular heart block [article in Polish]. *Ginekol Pol*. 2015; 86(5): 366–371, doi: [10.17772/gp/2424](https://doi.org/10.17772/gp/2424), indexed in Pubmed: 26117975.
5. Brzezinska-Paszke M, Bieganowska K, Miszczak-Knecht M, et al. Steroid-eluting epicardial pacing in children. *Folia Cardiol*. 2006; 13(4): 312–318.