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Case Report

ECG Challenge

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Introduction

A 65 day old female infant presented with symptoms of heart failure and failure to thrive. She was born out of a non-consanguineous marriage, at full term through normal vaginal delivery. There was no history of cyanosis at birth or post partum. The child was symptomatic in the preceding one month with complaints of fast breathing and difficulty with breast feeding. On examination there was tachycardia and tachypnoea with normal auscultatory findings. Chest x-ray was suggestive of cardiomegaly. Screening transthoracic echocardiography was suggestive of a dilated left ventricle (LV) with global LV hypokinesia and ejection fraction of 32%. Severe central mitral regurgitation was present. A 12 lead ECG obtained in the emergency department is shown in Fig 1a,b. What is your possible diagnosis?

Response to ECG challenge

Figure 1 ECG shows sinus rhythm, normal axis with increased left ventricular voltage and q waves in I,aVL,V5,V6. The Q wave amplitude measures 0.4-0.7mV in the limb leads (I, aVL) and 6mV in precordial leads (V5, V6). Duration of q waves in the leads mentioned was 25msec. Interestingly R wave progression in precordial leads is abnormal with large R wave in V3 followed by tiny R wave in V4. These ECG findings in the clinical setting of a child with heart failure, point towards a diagnosis of Anomalous Left Coronary Artery from Pulmonary Artery (ALCAPA).

Keeping the above diagnosis in mind the child underwent a focused echocardiographic examination. Right coronary artery (RCA) origin could be localized to the aortic right coronary cusp. However, left coronary artery (LCA) origin was not seen arising from aorta. Origin of the LCA was from pulmonary artery (PA). On color Doppler interrogation, flow reversal was present in left anterior descending artery with retrograde flow into the PA from LCA (Figure 2). Papillary muscles were highly echogenic and thinned out without any evidence of increased echogenicity of adjacent myocardium.

Patient was taken for surgical correction. LCA was found to originate from posterior PA intra-operatively. The anomalous LCA was excised from PA with a button of PA wall and was reimplanted into anterior wall of ascending aorta (Figure 3).

There are some ECG features which are unique to the diagnosis of ALCAPA. An anterolateral infarction pattern with Q waves that are much deeper and narrower as compared to adult pattern ischemic Q waves can provide an initial clue. Johnsrude et al compared ECG of 28 patients with ALCAPA and 28 patients with myocarditis, cardiomyopathy or both and concluded that presence of QR pattern in at least one of leads I, aVL,V5,V6 with Q wave amplitude greater than 0.3mv and duration longer

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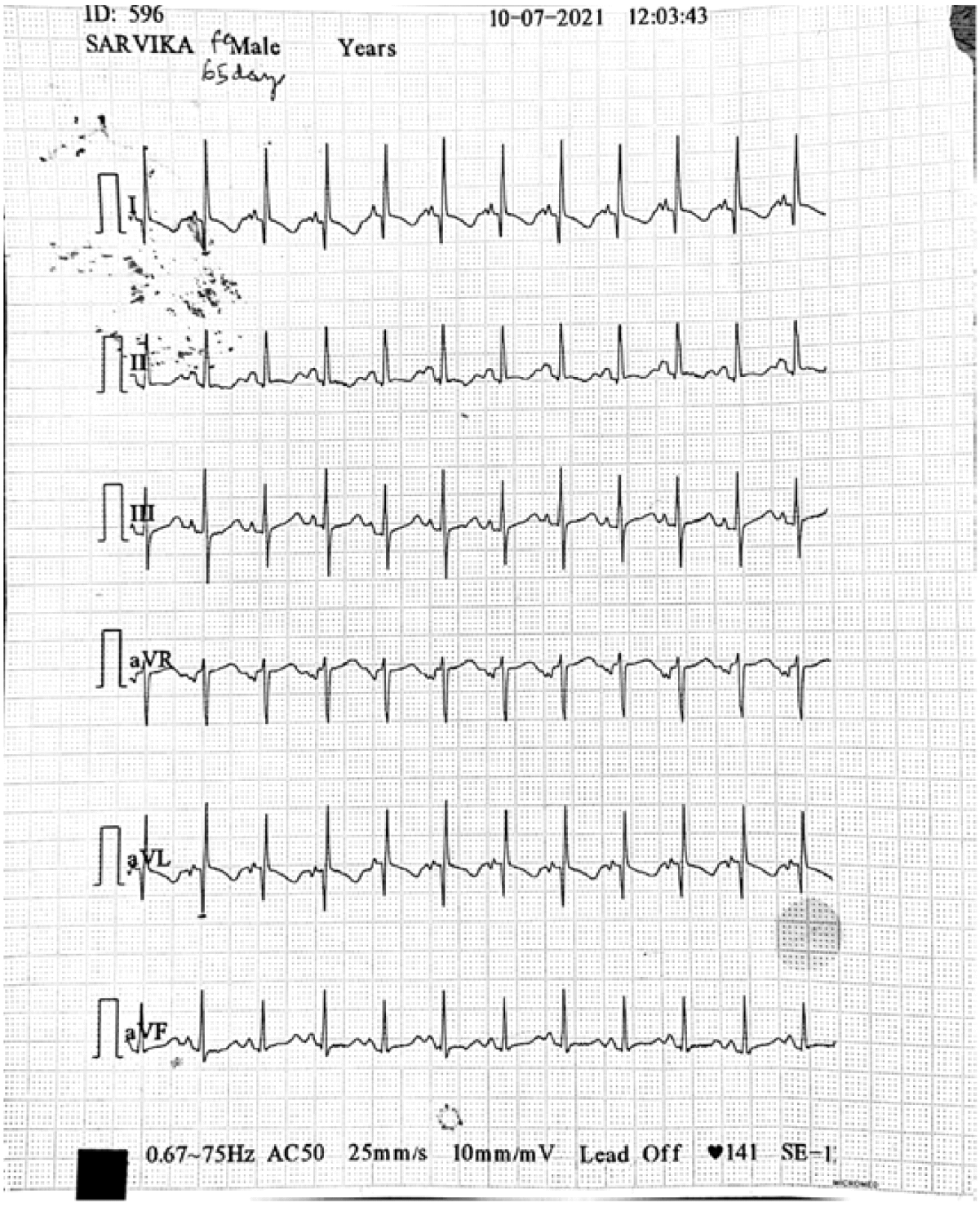

Fig. 1 (A) : ECG (limb leads) of the child with heart failure in question

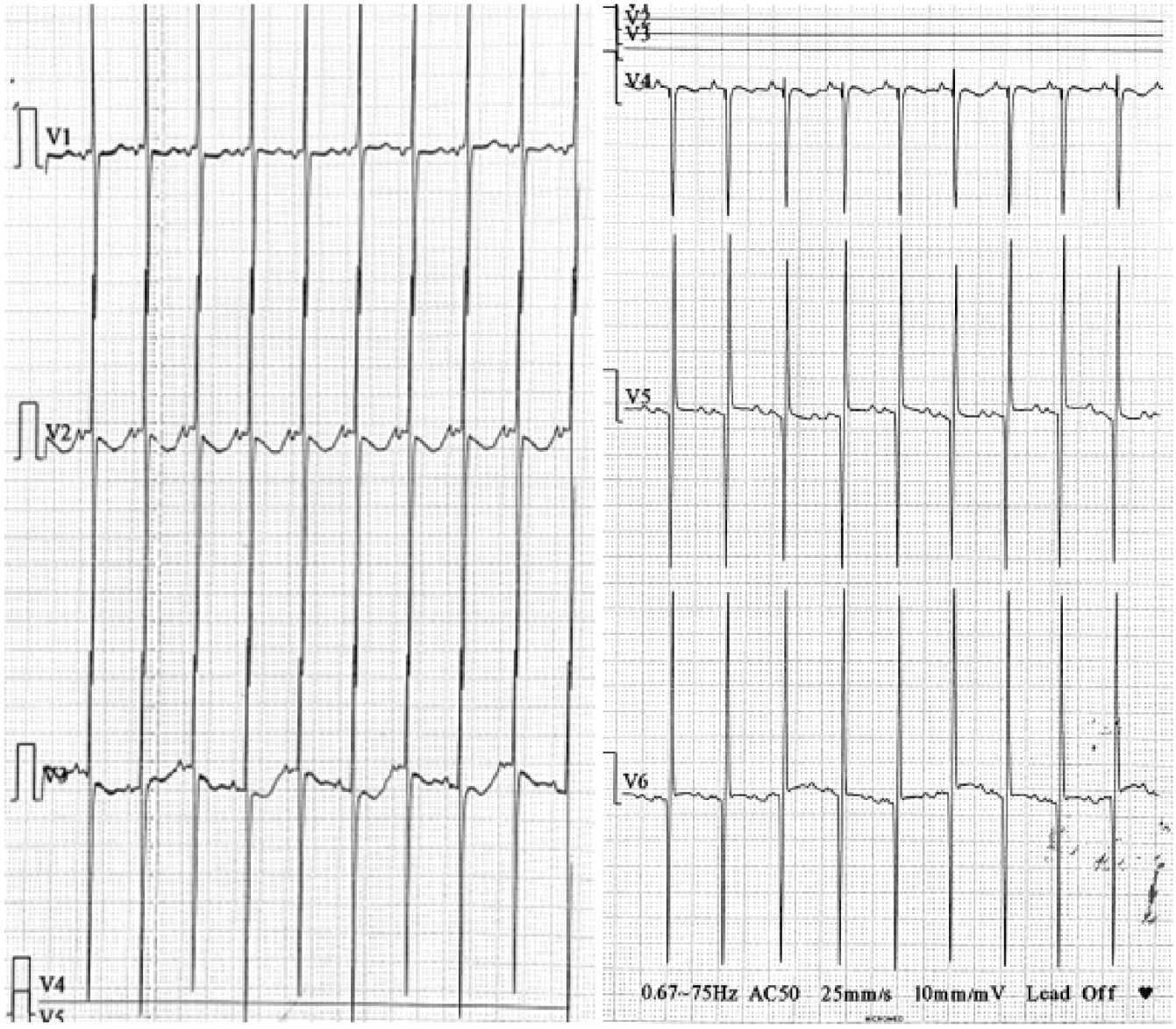

Fig. 1 (B) : ECG (precordial leads) of the child with heart failure in question

than 30msec with absence of Q waves in inferior leads can help to diagnose ALCAPA[1]. Accordingly a scoring system P(ALCAMA)=12d+24s-w,where d=Q wave depth in aVL, s=ST amplitude in aVL and w=Q wave width in lead I, was developed to differentiate ALCAPA from myocarditis/dialated cardiomyopathy. A score more than 27 predicts a diagnosis of ALCAPA. In our patient this score was 59(d=7, s=0, w=25), which correctly predicts the diagnosis of ALCAPA.

However in patients with absence of abnormal Q waves diagnosing the condition from ECG may be challenging. In such cases presence of abnormal R wave progression in precordial leads may be the only ECG finding available to suspect this condition[2]. Interestingly our case had ECG evidence of both abnormal Q waves and poor R wave progression, which made bedside diagnosis of ALCAPA possible.

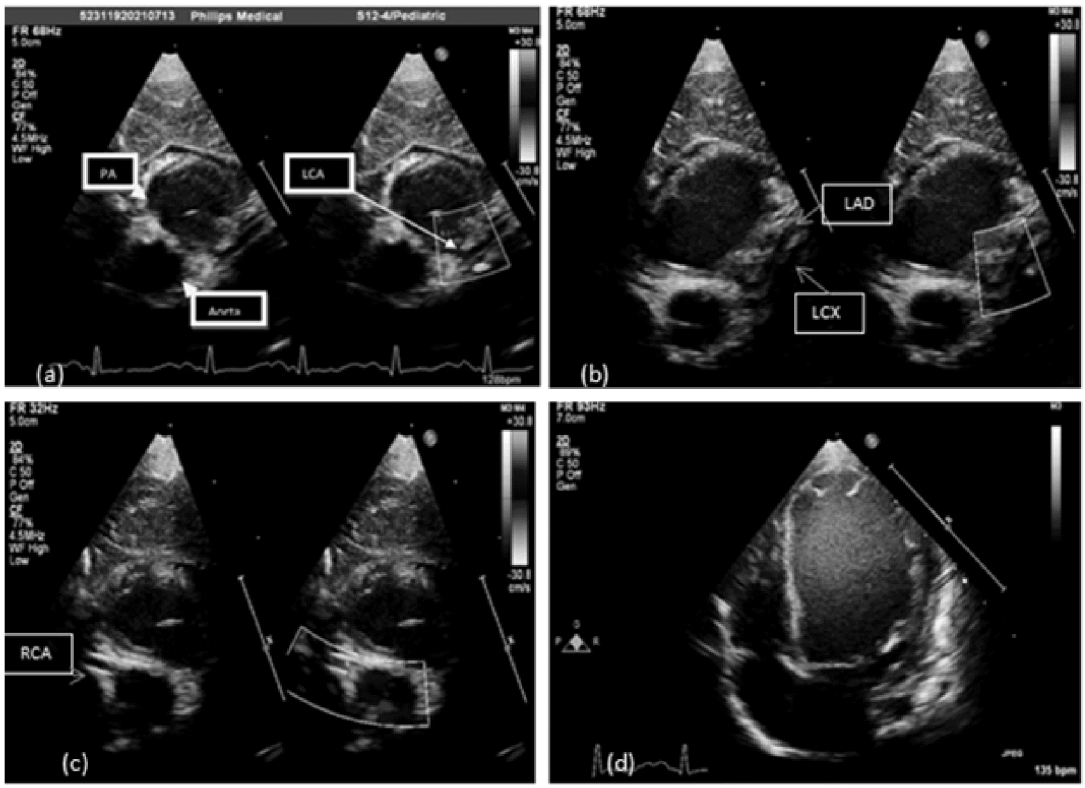

Fig. 2 : (a) Parasternal short axis view (PSAX) showing LCA originating from posterior facing sinus of PA. Aorta is seen posterior to PA.Flow reversal of LCA into PA
(b) LCA arising from PA bifurcating into LAD and LCX
(c) PSAX showing RCA origin from RCC of aorta
(d) Dilated LV with scarred papillary

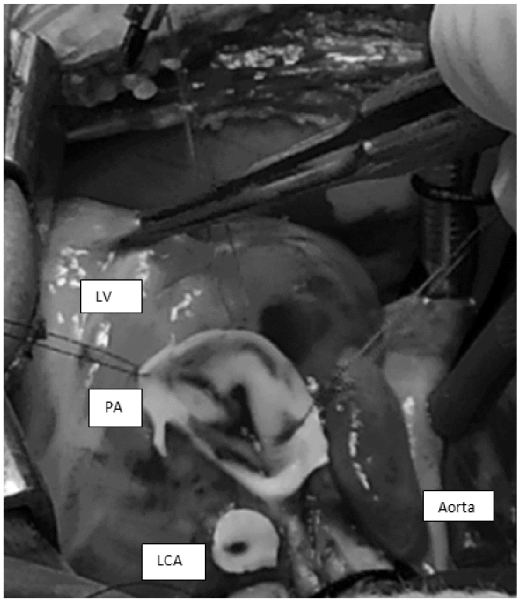

Fig. 3 : : Intra-operative image of anomalous LCA excised from PA with PA button (picture taken from head end of patient)

References

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