Think Beyond Right Bundle Branch Block in Atrial Septal Defect

The Editor,

A 48-year-old woman presented with shortness of breath on routine activities for 6 months. On cardiac auscultation, an ejection systolic murmur was heard at the upper left sternal border with wide and fixed splitting of the second heart sound. Electrocardiogram (ECG) was suggestive of normal sinus rhythm with right-axis deviation, incomplete right bundle branch block (RBBB), and crochetage sign (notch near the apex of R-wave) [Figure 1]. Transthoracic echocardiography was performed which revealed large ostium secundum atrial septal defect (ASD) of size 28 mm with large left-to-right shunt (Qp: Qs – 2.2:1) [Figure 2]. Coronary angiography of the patient was normal. The patient underwent cardiac surgery, and ASD was closed using the Dacron patch. No residual shunt across interatrial septum was observed after the surgery. Postoperative ECG showed disappearance of crochetage pattern [Figure 3].

Normal axis or right-axis deviation and incomplete RBBB are the most commonly observed ECG findings in patients of ostium secundum ASD. Incomplete RBBB is due to delayed depolarization of the thickened right ventricular outflow tract and possibly right ventricular volume overload. RSR’ pattern in lead V1 carries the specificity of 80%, sensitivity of 36.1%, positive predictive value of 14.7%, and negative predictive value of 92.9% for the diagnosis of ASD. Hence, incomplete RBBB alone is inadequate to diagnose ASD. Sinus venosus ASDs may show ectopic atrial activity or inverted P-waves in the inferior leads suggestive of absent or deficient sinus node function. Left-axis deviation and atrioventricular nodal delay may be observed in ostium primum ASDs.

The presence of crochetage pattern has been reported to have very well correlation with the degree of left-to-right shunting and with the size of the ASD. A notch near the apex of the R-wave in inferior limb leads resembles the work of a crochet needle, hence it is called “crochetage” sign. Crochetage pattern if present in only one lead has a specificity of 92.6% and sensitivity of 73.1% with a positive predictive value of 69% for the diagnosis of ostium secundum ASD. Specificity becomes 100% if the pattern is observed in all the three inferior leads. Crochetage pattern in all inferior limb leads along with RBBB is suggestive of specific ECG diagnosis of ASD. Patients with patent foramen ovale (PFO) and crochetage sign are more prone to suffer from cerebral infarction than the PFO patients without crochetage. Crochetage sign has a specificity of 91% and a positive predictive value of 77% in recognizing PFO patients prone to paradoxical embolism. After surgical correction of ASD, crochetage pattern disappeared in 35.1% of patients while RBBB pattern persisted. Crochetage sign can be a good and useful ECG marker in recognizing ASD and predicting stroke risk.

Wang et al. used the defective T-wave pattern which was defined as “inverted or horizontal displacement of the proximal T-wave limb in the right precordial leads.” Incomplete RBBB along with the presence of defective T-wave had 100% specificity and 87.1% sensitivity for the diagnosis of ASD. These ECG findings can
potentially help clinicians diagnose ASD and assess the risk of transient ischemic attack even before confirming the diagnosis on echocardiography.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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