Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci
November 2025; 11(4): 401-410

ORGINAL ARTICLE
DOI: 10.19127/mbsjohs.1603923

The Prevalence, Morphological Patterns, and Clinical Correlations of Complete Right Bundle Branch Block in Pediatric Patients: A Single-Center Retrospective Study

Taner Kasar[1](ID), Emine Yurdakul Ertürk[2](ID)

[1]Ordu University, Faculty of Medicine, Department of Pediatrics, Ordu, Türkiye

Received: 21 August 2025, Accepted: 19 October 2025, Published online: 30 November 2025

Abstract

Objective: Complete right bundle branch block (CRBBB) is one of the most common intraventricular conduction disorders encountered in electrocardiogram (ECG) examinations of children. Information on how frequently CRBBB is seen in pediatric patients, what morphological patterns it exhibits, and its clinical significance is quite limited. This study aims to reveal the frequency, types, and correlation with echocardiography (ECHO) findings of CRBBB in children without a history of cardiac surgery.

Method: A total of 45,160 pediatric ECGs recorded at a single center between December 2017, and July 2025 were retrospectively reviewed. Fifty-one cases aged 0-18 whose ECGs met the diagnostic criteria for CRBBB were included in the study. Patients with a history of cardiac surgery, myocarditis or acute rheumatic fever, a known diagnosis of congenital heart disease, and repeated ECG recordings were excluded. The demographic data, ECG measurements, ECHO results, and, if available, Holter and exercise test findings of all patients were evaluated.

Results: CRBBB was detected in a total of 51 cases (0.113%); 86.3% of them were male. The highest number of cases were in the 4-16 age group (62.7%). The morphological distribution was as follows: Type 3 (39.2%), Type 2 (29.4%), Type 1 (17.6%), and Type 4 (13.7%). ECHO examinations revealed normal findings in 76.5% of the cases, while 23.5% had structural anomalies. The most common pathologies were large secundum ASD (5.9%) and mitral valve anomalies (13.7%). Holter and exercise test results were largely normal. There was no significant difference in basic ECG parameters between the different RBBB types ($p>0.05$).

Conclusion: Although CRBBB is rare in children, approximately one-quarter of the cases are associated with structural heart disease. Its higher frequency in males and the 4-16 age group, the prominence of the Type 3 pattern, and the presence of right ventricular dilation in cases with ASD suggest that this finding should not be overlooked. Although CRBBB follows a benign course in most children, echocardiographic evaluation is recommended in the presence of a wide QRS duration, additional ECG abnormalities, or clinical suspicion.

Keyword: Complete right bundle branch block, child, prevalence, morphological pattern, echocardiography, atrial septal defect.

Suggested Citation Yurdakul Erturk E, Kasar T. The Prevalence, Morphological Patterns, and Clinical Correlations of Complete Right Bundle Branch Block in Pediatric Patients: A Single-Center Retrospective Study. Mid Blac Sea Journal of Health Sci, 2025;11(4):401-410

Address for correspondence/reprints:

Emine Yurdakul Erturk

Telephone number: +90 (505) 389 27 71

E-mail: eyurdakul52@hotmail.com

INTRODUCTION

Complete right bundle branch block (CRBBB) is one of the most common intraventricular conduction disorders identified in pediatric electrocardiogram (ECG) evaluations. While the right and left ventricles normally depolarize simultaneously via the His-Purkinje system, the activation of the right ventricle is delayed in the presence of CRBBB. This condition is characterized by the ECG by a widened QRS complex (1,2). CRBBB is known to be a finding whose prevalence increases with age in adults and is more frequently reported in males and in conditions causing right heart strain, such as hypertension, diabetes, and cor pulmonale (3–6).

In the pediatric age group, it has been reported that CRBBB may often be associated with structural heart diseases, particularly seen in the context of atrial septal defect (ASD), Ebstein's anomaly, and in the post-operative period following tetralogy of Fallot repair (7–9). However, the presence of isolated CRBBB in children without structural heart disease is generally considered benign, although data on this subject are limited, and most studies have focused on patient groups who have undergone surgery or have underlying cardiac pathology (10–12).

Although large-scale cohort studies in the adult population have suggested that CRBBB may be associated with cardiovascular mortality (13–15), this relationship appears to be unclear in the pediatric age group. Furthermore, a significant portion of the pediatric studies in the literature are limited to athlete children, those with congenital heart disease, or post-operative patient groups (9,12,16). Large-scale prospective or retrospective data on children with isolated CRBBB and no history of surgery are quite limited both in Türkiye and in the international literature (17).

This is the first retrospective analysis in Türkiye examining pediatric patients with CRBBB without a history of cardiac surgery. The aim of this study was to evaluate patients who met the criteria for CRBBB and had not previously been diagnosed with structural heart disease in a large-scale pediatric ECG screening conducted at a single tertiary healthcare center. To determine the prevalence of CRBBB in

pediatric patients and its role in the diagnostic process, and to discuss its potential clinical and prognostic significance in light of the results.

METHODS

This study was designed as a single-center, retrospective, descriptive, cross-sectional analysis. This retrospective study included 51 cases diagnosed with CRBBB from a total of 45,160 pediatric ECG records evaluated at the Ordu University Training and Research Hospital, Pediatric Cardiology Outpatient Clinic between December 2017 and July 2025. Since this was a retrospective study covering a specific time period (December 2017 – July 2025), all eligible ECGs meeting the inclusion criteria were included, and no prior sample size calculation was performed. A convenience sampling method was applied using the entire available database. The study was approved by the Ordu University Ethics Committee (Decision number: 91120269-800-E.0721087). Due to its retrospective design, informed consent was not obtained. The study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.

Patients aged 0–18 years were included in the study. A non-probability convenience sampling method was used. All pediatric ECGs recorded in our hospital during the study period were screened, and those meetings the CRBBB diagnostic criteria were included. Analyses were performed to cover the entire age range to allow for the examination of age-related distribution. For each case, age, sex, weight, heart rate, CRBBB type on ECG, QRS width, PR interval, modified QT (mQT) and corrected QT (QTc) intervals, P wave axis, QRS axis, and T wave axis were recorded. Furthermore, echocardiography (ECHO) findings for all patients, and when available, 24-hour Holter ECG and exercise stress test results were evaluated retrospectively.

The diagnosis of CRBBB was made based on the QRS duration exceeding the following age-specific threshold values and the presence of typical ECG patterns:

- QRS duration ≥120 ms in adults, >100 ms in children aged 4–16 years, and >90 ms in children under 4 years of age.
- Presence of an rsr′, rsR′, or rSR′ pattern in leads V1 or V2 (with the R′ or r′ deflection typically being wider than the initial R wave).
- Presence of a wide and notched R wave pattern in V1 and/or V2 in some cases.
- In adults, S wave duration being longer than the R wave or >40 ms in leads I and V6.
- Normal R wave peak time in leads V5 and V6, but >50 ms in lead V1 (1).

For diagnosis, the first three of the above criteria were mandatory. If a prominent R wave (notched or otherwise) was present in lead V1, the fulfillment of the 4th criterion was also

required (1). Additionally, in our study, the morphological typing of CRBBB was defined as follows: rsr′: Type 1, rsR′: Type 2, rSR′: Type 3, and the Notched R wave pattern was designated as Type 4.

The study included patients aged 0–18 years who met the diagnostic criteria for CRBBB on electrocardiography and had no previously diagnosed structural heart disease. The ECGs of all cases, recorded in our outpatient clinic within the study dates, were reviewed retrospectively. Patients with a history of cardiac surgery, myocarditis, or acute rheumatic fever, and those with any previously diagnosed congenital heart disease were excluded from the study. Furthermore, to prevent inflation of the case number, recurrent ECG records from the same patient were excluded from the analysis. The primary outcome measures of this study were the prevalence of CRBBB, its morphological types, and the frequency of associated structural heart disease as detected by echocardiography.

Statistical Analysis

All data were analyzed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) for those with normal distribution, and as median (minimum–maximum) values for those without normal distribution. Categorical variables were presented as numbers (n) and percentages (%). For comparisons between groups, one-way analysis of variance (ANOVA) was used for normally distributed continuous variables, and the Kruskal-Wallis test was used for non-normally distributed variables. Pearson's chi-square or Fisher's exact test was applied for the comparison of categorical data. A two-sided p-value of <0.05 was considered statistically significant for all statistical tests.

RESULTS

A total of 45,160 ECGs were evaluated, and CRBBB was detected in only 51 (0.113%) of them. Of the cases, 44 were male (86.3%) and 7 were female (13.7%). Male cases constituted 0.097% of all ECGs, while female cases constituted 0.015%. According to the age distribution, the highest number of cases was in the 4-16 years age group (62.7%), followed by the ≥16 years group (25.5%) and the ≤4 years group (11.8%). While a marked increase in the number of cases was observed with increasing age, the highest proportion of females was detected in the ≤4 years age group (66.7%), and all cases in the ≥16 years group were male. The demographic data of the cases are presented in Table 1.

Table 2 presents the distribution of ECHO, Holter, exercise test, and additional clinical findings for the 51 cases evaluated in our study. Echocardiographic examination revealed normal findings in 76.5% of the cases, while various pathologies were detected in 23.5%. The most common pathological findings were a

combination of mild mitral regurgitation (MR) and mitral valve prolapse (MVP) (7.8%), followed by isolated mild MR (5.9%). Furthermore, a large secundum atrial septal defect (ASD) with right ventricular dilation was found in 3 cases (5.9%), and aortic root dilation was detected in 2 cases (3.9%). On Holter monitoring, the vast majority of cases (94.1%) were in normal rhythm. No pathology was detected in any of the cases who underwent an exercise stress test. The most common additional finding was pectus excavatum.

The 51 cases examined in the study were distributed by RBBB type as follows: 9 cases (17.6%) with Type 1, 15 cases (29.4%) with Type 2, 20 cases (39.2%) with Type 3, and 7 cases (13.7%) with Type 4. When heart rate, PR interval, QRS duration, mQT, QTc, P wave axis, QRS axis, and T wave axis were compared between the groups, no statistically significant difference was found (all $p > 0.05$). These results indicate that there is no significant difference in basic electrocardiographic parameters among the RBBB types. The Mean ± Standard Deviation (SD) Values of ECG Parameters and p-Values for Different RBBB Types are provided in Table 3

Table 1. Demographic Characteristics of Cases and Distribution by Age Groups

Group (n, %)	**Age (years) median (min–max)**	**Body weight (kilograms) median (min–max)**	**Gender n (%)**
All cases (n=51, %100.0)	13.0 (1–18)	46.0 (10–118)	M: 44 (86.3%), F: 7 (13.7%)
≤4 years old (n=6, %11.8)	2.0 (1–3)	13.0 (10–16)	M: 2 (33.3%), F: 4 (66.7%)
Ages 4–16 (n=32, %62.7)	12.0 (4–15)	42.0 (21–90)	M: 29 (90.6%), F: 3 (9.4%)
≥16 years old (n=13, %25.5)	17.0 (16–18)	64.0 (42–118)	M: 13 (100.0%), F: 0 (0.0%)

M:Male, F:Female

Table 2. Distribution of ECHO, HOLTER, EST and Additional Findings

Results (Toplam 51)	**n (%)**
ECHO (n:51)	
- Normal	39 (76.5)
- Secundum ASD (large), RV dilatation	3 (5.9)
- Mild MR	3 (5.9)
- Mild MR + MVP	4 (7.8)
- Aortic root dilatation	2 (3.9)
HOLTER (n:51)	
- Normal	48 (94.1)
- Low atrial ritim	1 (1.96)
- SVT	1 (1.96)
- Frequent SVES	1 (1.96)
EST (n:51)	
- Normal	45 (88.2)
- Untested	6 (11.8)
Additional Findings (n:51)	
- No	46 (90.2)
- Hypothyroidism	1 (2.0)
- Pectus excavatum	3 (5.9)
- Cri du Chat syndrome	1 (1.96)

ECHO: Echocardiography, EST: Exercise stress test, MR: Mitral regurgitation, MVP: Mitral valve prolapse, RV: Right ventricle, ASD: Atrial septal defect, SVT: Supraventricular tachycardia, SVES: Supraventricular premature beat.

Table 3. Mean ± standard deviation (SD) and p-values of ECG parameters in different RBBB types

Variable	Type 1 n = 9 (%17.6)	Type 2 n =15 (%29.4)	Type 3 20 (%39.2)	Type 4 n = 7 (%13.7)	p
Heart rate (beats/min)	81.2 ± 20.8	88.1 ± 24.0	81.2 ± 15.6	83.1 ± 18.2	0.746
PR duration (ms)	132.9 ± 19.6	120.9 ± 36.1	140.5 ± 18.4	141.4 ± 15.4	0.119
QRS duration (ms)	118.6 ± 5.0	121.4 ± 9.4	124.3 ± 6.9	127.1 ± 7.0	0.102
mQT (ms)	356.4 ± 19.4	345.3 ± 29.2	356.6 ± 27.4	362.9 ± 19.7	0.432
QTc (ms)	399.6 ± 16.8	399.1 ± 27.8	405.1 ± 18.2	405.1 ± 14.1	0.805
P Axis (°)	45.2 ± 18.9	64.9 ± 46.0	60.4 ± 45.7	43.1 ± 29.0	0.521
QRS Axis (°)	69.9 ± 32.5	78.8 ± 68.3	81.3 ± 83.9	142.0 ± 41.6	0.154
T Axis (°)	44.8 ± 24.4	51.7 ± 39.6	38.3 ± 19.1	39.6 ± 14.6	0.526

ms: millisecond. Statistical significance level was accepted as $p < 0.05$. rsr′: Type 1, rsR′: Type 2, rSR′: Type 3, and the notched R wave pattern was designated as Type 4.

DISCUSSION

This study is the first large-scale retrospective analysis to evaluate cases of CRBBB without a history of cardiac surgery in the pediatric age group in Türkiye. The obtained results provide significant data regarding both the prevalence of CRBBB in this age group and its clinical characteristics associated with sex, age distribution, and morphological patterns.

A total of 45,160 pediatric ECGs were evaluated, and the prevalence of CRBBB was found to be 0.113%. This rate is similar to the 0.1% prevalence reported in a large-scale study of young individuals in the United Kingdom (18) and is significantly lower than the rates of 0.9–1.7% reported in community-based adult cohorts in China (5,19). One of the most important reasons for this difference is that our study focused solely on the pediatric age group and on cases without a surgical history. The majority of cases (62.7%) were in the 4-16 years age group, suggesting that while CRBBB can occur in childhood, it tends to increase in prevalence with age (20-22).

In our study, the frequency of CRBBB was significantly higher in males (86.3%) than in females (13.7%), and all cases in the ≥16 years age group were male. This sex difference has also been prominently demonstrated in previous epidemiological studies; for instance, the Copenhagen City Heart Study reported a RBBB prevalence of 1.5% in men and 0.7% in women (5), and similar results were obtained in the Health 2000 Survey (20). This finding is attributed to the anatomical structural properties of the right bundle branch, the higher prevalence of cardiovascular risk factors in males (20-22), and the possibility of right ventricular remodeling being more pronounced in male athletes (8,11,22-25).

A Type 3 (rSR′) pattern was detected in 39.2% of the cases, Type 2 (rsR′) in 29.4%, Type 1 (rsr′) in 17.6%, and a Type 4 (notched R) pattern in 13.7%. Data on the distribution of

pediatric CRBBB types in the literature are limited, but varying diagnostic criteria and observer experience can lead to heterogeneity in morphological classification (5,11,18,19,25).

Echocardiography results were normal in 76.5% of the cases, while structural anomalies were detected in 23.5%. The most common pathologies were ASD (5.9%) and mitral valve anomalies (total 13.7%). The association between CRBBB and ASD has been reported numerous times previously (7,9,10,23). In the study by MacLachlan et al., ASD was detected in 57% of young individuals with CRBBB, and it was noted that a wide QRS (≥130 ms) and additional ECG anomalies increased the risk of pathology (18). Although QRS durations did not show a significant difference between groups in our cases, the presence of concomitant right ventricular dilation in all children with ASD is clinically significant.

In the literature, CRBBB can be associated with cardiovascular mortality in adults (10,23,26); however, this association is reported to be less clear in pediatric patients (7,9,23). Our findings indicate that pediatric CRBBB is largely benign in its course, but is associated with structural cardiac pathology in approximately one-quarter of cases. Therefore, echocardiographic evaluation is recommended, especially in the presence of a wide QRS duration, additional ECG anomalies, or clinical suspicion. International criteria for athlete ECGs recommend further evaluation in all individuals with a QRS ≥140 ms (16); it can be considered that this approach may also be valid in the pediatric population, albeit with lower QRS duration thresholds adjusted for age groups.

Our study has a retrospective, single-center design and includes only isolated CRBBB cases without a history of surgery. Therefore, our results cannot be generalized to a more severe clinical spectrum. Furthermore, due to the lack of long-term follow-up data, the potential for CRBBB to progress to more advanced conduction disorders or arrhythmias could not be assessed.

Study Limitations: Since this is a cross-sectional study, no information can be provided regarding the long-term follow-up of the patients and the development of complications. Both the ECG and echocardiographic evaluations were performed by a single pediatric cardiologist, which increases the risk of observer bias.

CONCLUSION

This study demonstrates that the prevalence of pediatric CRBBB is low; however, it is a finding that should not be overlooked clinically. Its higher frequency in males and in the 4-16 years age group, the dominance of the Type 3 pattern, and the detection of a structural anomaly in approximately one-quarter of the cases indicate that this finding warrants support through targeted echocardiographic evaluation. Our findings reveal that pediatric CRBBB

follows a benign course in most cases, but it may be clinically significant in certain subgroups.

Ethics Committee Approval: Approval for this study was obtained from the Ordu University Ethics Committee (Decision number: 91120269-800-E.0721087).

We state that the parents have given their written informed consent to be involved in the study, in accordance with the Declaration of Helsinki.

Peer-review: Externally peer-reviewed

Author Contributions: Concept: TK, Design: TK, EYE, Data Collection and Processing: TK, EYE Analysis and Interpretation: TK, Writing: TK, EYE.

Conflict of Interest: The authors declared no conflict of interest.

Financial Disclosure: The authors declared that this study has not received no financial support.

REFERENCES

1. Surawicz B, Childers R, Deal BJ, Gettes LS, Bailey JJ, Gorgels A, et al. AHA/ACCF/HRS Recommendations for the Standardization and Interpretation of the Electrocardiogram: Part III: Intraventricular Conduction Disturbances. J Am Coll Cardiol. 2009;53(11):976–981.
2. Willems JL, Robles de Medina EO, Bernard R, Coumel P, Fisch C, Krikler D, et al. Criteria for Intraventricular Conduction Disturbances and Pre-excitation. J Am Coll Cardiol. 1985;5(6):1261–1275.
3. Jeong JH, Kim JH, Park YH, Han DC, Hwang KW, Lee DW, et al. Incidence of and Risk Factors for Bundle Branch Block in Adults Older Than 40 Years. Korean J Intern Med. 2004;19:171–178.
4. De Bacquer D, De Backer G, Kornitzer M. Prevalences of ECG Findings in Large Population-Based Samples of Men and Women. Heart. 2000;84:625–633.
5. Bussink BE, Holst AG, Jespersen L, Deckers JW, Jensen GB, Prescott E. Right Bundle Branch Block: Prevalence, Risk Factors, and Outcome in the General Population: Results from the Copenhagen City Heart Study. Eur Heart J. 2013;34(2):138–146.
6. Zhang Z-M, Rautaharju PM, Soliman EZ, Manson JE, Cain ME, Martin LW, et al. Mortality Risk Associated with Bundle Branch Blocks and Related Repolarization Abnormalities (from the Women's Health Initiative [WHI]). Am J Cardiol. 2012;110(10):1489–1495.
7. Garcia G, Abrams D, Alexander ME, Bevilacqua L, Bezzerides V, Mah DY, et al. Utility of incomplete right bundle branch block as an isolated ECG finding in children undergoing initial cardiac evaluation. Int J Pediatr Res. 2023;9:104.

8. Kobza R, Cuculi F, Abächerli R, Toggweiler S, Suter Y, Frey F, et al. Twelve-lead Electrocardiography in the Young: Physiologic and Pathologic Abnormalities. Heart Rhythm. 2012;9(12):2018–2022.

9. Niwa K, Warita N, Sunami Y, Shimura A, Tateno S, Sugita K, et al. Prevalence of Arrhythmias and Conduction Disturbances in Large Population-Based Samples of Children. Cardiol Young. 2004;14(1):68–74.

10. Sharma S, Whyte G, Elliott P, Padula M, Kaushal R, Mahon N, et al. Electrocardiographic Changes in 1000 Highly Trained Junior Elite Athletes. Br J Sports Med. 1999;33(5):319–324.

11. Harbison AL, Hill AC, Motonaga KS, Miyake CY, Dubin AM. Do Pediatric Electrophysiologists Read Pre-Participation Screening Electrocardiograms More Accurately Than General Pediatric Cardiologists? J Pediatr. 2013;163(6):1775–1777.

12. Hill AC, Miyake CY, Grady S, Dubin AM. Accuracy of Interpretation of Pre-Participation Screening Electrocardiograms. J Pediatr. 2011;1(5):783–788.

13. Zhou SH, Liebman J, Dubin AM, Gillette PC, Gregg RE, Helfenbein ED, et al. Using 12-Lead ECG and Synthesized VCG in Detection of Right Ventricular Hypertrophy with Terminal Right Conduction Delay Versus Partial Right Bundle Branch Block in the Pediatric Population. J Electrocardiol. 2001;34(suppl):249–257.

14. Blount SG, Munyan EA, Hoffman MS. Hypertrophy of the Right Ventricular Outflow Tract: A Concept of the Electrocardiographic Findings in Atrial Septal Defect. Am J Med. 1957;22(5):784–790.

15. Matoba M. Management of Incomplete Right Bundle-Branch Block in Heart Disease Screening Program. Jpn J Pediatr. 1987;50:1220–1224.

16. Muta H, Akagi T, Egami K, Furui J, Sugahara Y, İshii M, et al. Incidence and Clinical Features of Asymptomatic Atrial Septal Defect in School Children Diagnosed by Heart Disease Screening. Circ J. 2003;67(2):112–115.

17. Probst V, Allouis M, Sacher F, Pattier S, Babuty D, Mabo P, et al. Progressive Cardiac Conduction Defect Is the Prevailing Phenotype in Carriers of a Brugada Syndrome SCN5A Mutation. J Cardiovasc Electrophysiol. 2006;17(3):270–275.

18. MacLachlan H, Antonakaki A, Bhatia R, Fyyaz S, Chatrath N, Androulakis E, et al. Prevalence and Clinical Significance of Electrocardiographic Complete Right Bundle Branch Block in Young Individuals. Eur J Prev Cardiol. 2024 Feb 27:zwae082. doi:10.1093/eurjpc/zwae082.

19. Nakazawa N, Ishizu T, Sairenchi T, Yamagishi K, Murakoshi N, Nakagawa D, et al. Right bundle branch block and risk of cardiovascular mortality: the Ibaraki prefectural health study. Heart Vessels. 2022;37:609–618.

20. Haataja P, Nikus K, Kahonen M, Huhtala H, Nieminen T, Jula A, et al. Prevalence of ventricular conduction blocks in the resting electrocardiogram in a general population: the Health 2000 Survey. Int J Cardiol. 2013;167:1953–1960.

21. Wang B, Wang Z, Yang X, Han X, Yang Y, Chu H, et al. Prevalence and incidence of intraventricular conduction disturbances among Chinese adults: Results from the Kailuan study. Front Cardiovasc Med. 2022;9:959781.

22. Thrainsdottir IS, Hardarson T, Thorgeirsson G, Sigvaldason H, Sigfusson N, et al. The epidemiology of right bundle branch block and its association with cardiovascular morbidity—the Reykjavik Study. Eur Heart J. 1993;14:1590–1596.

23. Pelliccia A, Culasso F, Di Paolo FM, Accettura D, Cantore R, Castagna W, et al. Prevalence of abnormal electrocardiograms in a large, unselected population undergoing pre-participation cardiovascular screening. Eur Heart J. 2007;28(16):2006–2010.

24. Kim JH, Noseworthy PA, McCarty D, Yared K, Weiner R, Wang F, et al. Significance of electrocardiographic right bundle branch block in trained athletes. Am J Cardiol. 2011;107:1083–1089.

25. Meziab O, Abrams DJ, Alexander ME, Bevilacqua L, Bezzerides V, Mah DY, et al. Utility of incomplete right bundle branch block as an isolated ECG finding in children undergoing initial cardiac evaluation. Congenit Heart Dis. 2018;13(3):419–427.

26. Eriksson P, Hansson PO, Eriksson H, Dellborg M. Bundle-branch block in a general male population: the study of men born 1913. Circulation. 1998;98:2494–2500.