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Electrocardiogram findings in Pediatric Patients with Myocarditis

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Introduction and Objectives

Acute myocarditis (AM) is an inflammatory illness caused by a myocardium infectious process and/or immune response. Electrocardiograms (ECG) abnormalities are common in patients with AM and some of them have been reported as predictors of poor clinical outcome in adults.

The objective of this study was to describe initial ECG abnormalities of pediatric patients with AM, and its relationship with clinical outcome.

Methods

We analyzed the initial ECG of all pediatric patients (0-16 years) with AM (diagnosed by endomyocardial biopsy (EMB) or cardiac magnetic resonance (CRM)) who were admitted in our hospital from April 2007 to December 2018. ECG values were compared with normal reference values for group age.

The association between ECG changes left ventricular ejection fraction (LVEF) < 35%, presentation of cardiogenic shock, need for ECMO, transplant and mortality, was analyzed.

Results

41 patients with 42 myocarditis episodes were included. 68% males, with a median age of 25 months (7 days to 16 years). The diagnosis was made by EMB in 14 and by CRM in 28 patients.

ECG at admission was abnormal in all the patients. Abnormalities included: repolarization anomalies with T wave inversion (46%), widening of QRS (41%), wide QRS-T angle (greater than 100°) (36%), reduced voltage (35%), pathological ST elevation (32.5%), prolonged QTc (10%), presence of pathological Q waves (7.5%).

ECG findings associated with cardiogenic shock were the presence of pathological Q waves (100% vs 37%; $p=0.03$) and wide QRS (62% vs 30% $p=0.047$). The rest of the abnormalities did not have any statistically significant association. Patients with pathological ST elevation without Q waves had a more benign clinical course with a higher LVEF and a complete recovery in 100% of the cases.

Conclusion

All pediatric patients with AM had ECG abnormalities at admission, therefore, the finding of a normal ECG nearly rules out myocarditis as a diagnosis.

The presence of pathological Q waves and widening of QRS was associated with a more severe clinical presentation.

Wide QRS-T angle, described in adults as poor prognosis predictor, did not correlate with cardiogenic shock, lower LVEF, higher mortality or transplantation.

Patients with pathological ST elevation without Q waves had an excellent prognosis.