Left bundle branch block and peripartum cardiomyopathy – review of recent evidence

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Abstract

Peripartum cardiomyopathy (PPCM) is a rare, life-threatening heart disease of still unknown cause manifesting in late pregnancy or within 5 months after delivery in women without prior known cardiac pathology. The outcome of PPCM is highly variable, including clinical recovery, rapid deterioration unresponsive to medical treatment requiring mechanical circulatory support, and even death. Early diagnosis allows for standard heart failure treatment respecting contraindications for some drugs in pregnancy. Confirmation requires echocardiography to reveal left ventricular dysfunction. However, variables from electrocardiography (ECG) such as QRS duration are also important in the initial assessment. This paper presents the current state of knowledge of the diagnostic and prognostic role of the occurrence of left bundle branch block (LBBB) in PPCM.

Introduction

Although peripartum cardiomyopathy (PPCM) was first described in 1880, much remains unknown about it[1]. Recently it has been reviewed in ESC Guidelines[2]. Undoubtedly the ongoing prospective, international and multicenter registry which aims to collect information on 1000 patients with PPCM, as part of the EURObservational Research Programme (EORP) and as an initiative of the Study Group on PPCM of the Heart Failure Association, will provide important data on this condition. The analysis of the first 411 patients were presented by Sliwa in 2017[3].

Peripartum cardiomyopathy (PPCM) is characterized by left ventricular ejection fraction reduced to less than 45% near the end of pregnancy or within the first 5 months postpartum[4]. Important predisposing factors include African ethnicity, advanced or teenage age, multiparity, pre-eclampsia, smoking, diabetes and malnutrition[5]. Although the cause of PPCM is still not fully explained, potential etiologies include a complex interaction of genetic and environmental factors contributing to inflammation, endothelial damage and angiogenic imbalance, which may lead to myocardial dysfunction in susceptible women[5,6]. Nowadays studies indicate that the cleavage of prolactin into an angiostatic N-terminal 16 kDa prolactin fragment (16 kDa Prl) and impaired VEGF signaling because of up-regulated sFlt-1 may initiate PPCM [t].

Symptoms are usually typical for chronic or acute heart failure (HF) but sometimes may be confused with signs related to the final stage of pregnancy.

Echocardiography is the imaging modality of choice. The left ventricle (LV) may be non-dilated,

but the EF is usually <45%. Initial EF <30% and LV end-diastolic diameter >6.0 cm and occurrence of RV dysfunction are associated with adverse outcomes[2].

It is recommended to treat women with HF during pregnancy according to current guidelines for non-pregnant patients with special reference to pregnancy and childbirth. Due to the role of prolactin in the pathomechanism of PPCM and the high metabolic demands of lactation, bromocriptine treatment may be considered to stop lactation and enhance recovery and improve function of LV. Bromocriptine therapy must always be accompanied by anticoagulation with heparin, at least in prophylactic dosages[2].

All pregnant women with acute HF require a rapid diagnosis and treatment determined by an interdisciplinary team[2].

In PPCM 6-month mortality ranges from 2.0% in Germany to 12.6% in a large group of 206 patients from South Africa and 24% one-year mortality in Turkey[8,9]. The most common causes of death are thromboembolism, severe heart failure and arrhythmias.

LBBB and electrocardiographic predictors of peripartum cardiomyopathy

Although ECG is widely used in clinical practice, its prognostic value has not been established in PPCM. While the ECG of most women with PPCM is usually abnormal, there are no ECG changes that are sufficiently sensitive or specific for this diagnosis. A recent study found that the majority (96%) of PPCM patients had abnormalities in 12-lead ECGs at presentation, highlighting the usefulness of ECG in screening. Left ventricle hypertrophy (LVH) in ECG was present in 26% of PPCM patients, T wave changes were found in 15% of them, while repolarization changes have been reported in 47% and left bundle branch block in 5% to 10%[10,11].

A case-control study carried out in three hospitals in Kano, Nigeria showed that in women presenting within the first nine months postpartum, among symptoms of HF, a rise in heart rate of one beat/minute increased the risk of PPCM by 6.4% ($p = 0.001$), while the presence of ST-T-wave disturbances increased the odds of PPCM 12.06-fold ($p < 0.001$)[12]. QRS duration lost predictive ability for the occurrence of PPCM in stepwise multivariate regression analyses ($p > 0.05$) but was modestly correlated with left ventricular dimensions and end-systolic volume index ($r = 0.4$; $p < 0.003$).

Nevertheless, the simple and inexpensive ECG test could help to streamline the diagnosis of PPCM prior to confirmatory investigations.

Moreover, ECG changes and QRS duration have been shown to be strongly associated with increased cardiovascular morbidity and mortality in patients with cardiomyopathy[13].

In Hoevelmann's recent study a prolonged QTc and sinus tachycardia at baseline were independent predictors of poor outcome in a cohort of 66 patients with PPCM at 6 months and 1 year respectively[14].

PPCM occurs in women from different ethnic backgrounds globally. Despite marked differences in socio-economic background, presentation and clinical variables such as echocardiographic and electrocardiographic features were quite similar between studied regions in the registry on PPCM from the EURObservational Research Programme and the Heart Failure Association of the European Society of Cardiology[3]. However, QRS duration was longer in ESC countries than in non- ESC countries – mean (SD) 93.8 ms (21.7) vs. 86.8 (20.8) and median (Q1–Q3) 90.0 (80.0–100.0) vs. 80.0 (80.0–90.0), $p<0.001$. LBBB appeared more often – 23/194 (11.9%) in ESC countries vs. 14/204 (6.9%) in non-ESC countries, but without statistical significance, $p=0.086$.

Furthermore, interesting data were obtained from the comparison of electrocardiographic characteristics in PPCM and Hypertensive Heart Failure of Pregnancy (HHFP) patients[11]. First, LVH was found to occur more commonly in HHFP than in PPCM. In turn, atrial fibrillation ($p = 0.028$), QRS abnormalities ($p = 0.001$), left atrial hypertrophy ($p = 0.030$), T wave inversion ($p < 0.001$), longer QRS duration ($p < 0.001$), and left bundle branch block ($p = 0.002$) were detected more often in PPCM than in HHFP patients. Occurrence of LBBB may signify greater myocardial injury in patients with PPCM compared to HHFP. However, no ECG characteristics can differentiate between PPCM and HHFP.

Eventually, approximately 23-41% of women recover completely from PPCM[15]. Labidi's interesting case report reveals that LBBB in pregnancy may be the first sign of developing PPCM but can also be temporary. After the 12-month postpartum intensive heart failure treatment (bromocriptine, ACE inhibitors, diuretics, beta-blockers) the patient showed rapid improvement and normalized cardiac dimension and function and also LBBB had disappeared.

According to the guidelines for severe LV dysfunction during the 6–12 months following the first presentation despite optimal medical therapy for patients with left bundle branch block and QRS >130 ms, implantation of an implantable cardioverter defibrillator and cardiac resynchronization (CRT) therapy are recommended[2,16]. However, mortality reduction in those women with non-ischemic cardiomyopathy is uncertain[2,16].

In the PPCM registry only one woman from the group of ESC countries was qualified for implantation of CRT – 1/410 (0.2%) [3].

Conclusions

Peripartum cardiomyopathy has received increasing awareness and attention in the past decade. Recently published studies have focused on the pathomechanism, presentation and management of PPCM. Despite the increasing number of surveys on this issue, there is a lack of research on diagnostic and prognostic role of electrocardiographic variables such as occurrence of LBBB.

The EURObservational Registry on PPCM and a few ongoing studies will hopefully provide substantial new in-

formation. During that time undoubtedly occurrence of LBBB in a pregnant woman should be taken seriously, as it may be the first symptom of imminent peripartum cardiomyopathy.

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