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Clinical Medicine Insights: Cardiology

Aborted Sudden Cardiac Death and a Mother with Suspected Metabolic Myopathy

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ABSTRACT: Aborted sudden cardiac death (SCD) has not been reported as initial manifestation of cardiac involvement in metabolic myopathy (MM). A 20-year-old female with a previous history of three syncopes, hyperhidrosis, and recurrent tick bites experienced aborted SCD. Her mother presented with MM, and a history of pituitary adenoma, nephroptosis, arterial hypertension, depression, migraine, goiter, pancreatitis, osteoporosis, hyperhidrosis, multiple muscle ruptures, and hyperlipidemia. After a few days of disorientation and amnesia, the young female recovered completely. Clinical neurological examination was noticeable for partial ophthalmoparesis and mild hyperprolactinemia. She received an implantable cardioverter defibrillator, which did not discharge so far. Recurrent syncopes and aborted SCD may be the initial manifestation of MM with multiple organ involvement. The family history is important in cases with aborted SCD to guide the diagnostic work-up. Phenotypic heterogeneity between the family members may be an indicator of MM.

KEYWORDS: metabolic myopathy, genetic defect, sudden cardiac death, ventricular arrhythmia, pituitary adenoma

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Introduction

Affection of the myocardium is a frequent finding in patients with metabolic myopathy (MM). Cardiac manifestations of MM include hypertrophic cardiomyopathy,[1] dilated cardiomyopathy, restrictive cardiomyopathy, noncompaction, and also arrhythmias including sudden cardiac death (SCD).[2–4] Aborted SCD has not been reported as initial manifestation of cardiac involvement in MM.

Case Report

The patient is a 20-year-old Caucasian female, height 172 cm, weight 70 kg, who suddenly became unconscious during an oral presentation at her evening school in Vienna, Austria, in October 2013. Shortly before fainting, she complained about right-sided headache. Return of spontaneous circulation was achieved after 5 minutes. On arrival of the emergency, electrocardiography (ECG) showed ventricular fibrillation. She had already regained sinus rhythm after a single defibrillator shock, but the QT-interval was prolonged to 510 ms. She was intubated and transferred to the intensive care unit. She had a history of three previous syncopes, hyperhidrosis, and recurrent tick bites. Her family history was positive for MM (mother), pituitary adenoma (mother), nephroptosis (mother), arterial hypertension (mother, grandmother from the mother's side), pacemaker (grandmother from the mother's side), pancreas carcinoma (grandfather from the mother's side), and recurrent syncopes (sister [several during her school time], father's sister).

On arrival at the intensive care unit, serum potassium was 3.2 mval/l. pro-brain natriuretic peptide and creatine kinase (CK) were normal, but prolactin was slightly elevated (24.05 and 27.29 ng/ml [n, 4.79–23.3 ng/ml]). CK was increased to 478 and 421 U/l (n, 26–145 U/l), respectively, 1 and 2 days after admission. Transcranial Doppler sonography,

computed tomography (CT) scan of the cerebrum, and CT angiography of the extra- and intracranial arteries were non-informative. Only bedside echocardiography revealed a slightly enlarged right ventricle but pulmonary embolism was excluded upon CT scan of the thorax. One day after admission, she could be extubated without problems. She was disorientated but followed each request correctly. Disorientation disappeared completely within 8 days. Initially, there was also amnesia at the time before and after the event. ECG showed a normal QT-interval this time. An arrhythmogenic right ventricular dysplasia was suspected but cardiac magnetic resonance imaging (MRI) was refused because of claustrophobia. Transthoracic echocardiography 4 days after the event was normal. Thirteen days after the event she received an implantable cardioverter defibrillator, which did not discharge so far. Genetic testing for LQT1, 2, and 3 was negative. Clinical neurological examination revealed partial ophthalmoparesis but was otherwise normal. Cerebral MRI and electroencephalography were non-informative. The patient was discharged 18 days after admission with a therapy of bisoprolol 1.25 mg, sodium substitution, and pantoprazole.

The 56-year-old mother, height 171 cm, weight 62 kg, had a previous history of depression, migraine, pituitary adenoma treated with resection and hydrocortisone, struma, arterial hypertension, pancreatitis (one episode), nephroptosis, osteoporosis, hyperhidrosis, multiple muscle ruptures, and hyperlipidemia. Muscular symptoms (muscle weakness, exercise intolerance) started after general anesthesia in April 2010 after which she was cognitively impaired during 2 days. Clinical neurological examination revealed a borderline muscle force for head anteflexion, wasting of the facial muscles, bilateral distal weakness in the upper limbs (M5-), and bilateral proximal weakness in the lower limbs. Triceps and patella tendon reflexes were bilaterally reduced. There was mild wasting of the distal upper limbs and of the proximal lower limbs. Routine blood investigations were normal. Muscle biopsy from the left lateral vastus muscle, carried out in January 2012 because of suspected polymyositis/dermatomyositis revealed type-2 fiber atrophy, a number of denervated fibers, and glycogen accumulation. Nerve biopsy of the left sural nerve showed focal demyelinating neuropathy with an axonal component. She was regularly taking hydrocortisone and mirtazapine.

Discussion

The case is interesting for aborted SCD in an adolescent female whose mother suffered from primary MM and various other abnormalities. Whether the mother had transmitted her muscle disease to the daughter remains speculative, but there were some indications that the daughter had inherited at least some of her mother's manifestations. The daughter presented with partial ophthalmoparesis, hyperhidrosis, and mild prolactinemia. Most conspicuous, however, was the cardiac disease in the daughter. She obviously had symptomatic arrhythmias but no evident myocardial involvement. Interestingly, the mother did not manifest cardiologically but in the cerebrum (pituitary adenoma, migraine, depression), the endocrine system (osteoporosis, hyperhidrosis, hyperlipidemia), the intestines (pancreatitis), the kidneys (nephroptosis), and the skeletal muscle (myopathy). Assuming that there is a genetic link between the disorders of the two, SCD could be the initial manifestation of cardiac involvement in MM, which was only mildly expressed in the daughter so far. Cardiac involvement in metabolic disorders includes arrhythmias and cardiomyopathy.[5] Most frequently, cardiomyopathy in metabolic disorders comprises hypertrophic or dilative cardiomyopathy. Particularly in mitochondrial disorders, noncompaction can be frequently found.[6] More rarely, restrictive cardiomyopathy or Takotsubo syndrome has been reported. Any type of arrhythmias can be recorded in MM with cardiac disease.[5,6]

Aborted SCD or SCD have been repeatedly reported in patients with MM.[7–10] SCD in these patients occurred with or without previous cardiac disease. The metabolic defect in these patients may reside within the oxidative,[7] fatty acid,[8] or glycogen metabolism.[9] Previous studies have already shown that MM might be associated with pituitary adenoma.[11] Migraine has been also shown in association with MM[12] as well as osteoporosis.[13] Though pancreatitis occurred only once in the mother of the presented patient, it is also an indication for a metabolic defect, since the history was negative for cholecystolithiasis and negative for chronic alcohol consumption and since pancreatitis has been repeatedly reported in association with metabolic defects.[14] Assuming a causal relation, the novel finding in the mother is the association of nephroptosis with MM. The phenotype of the mother and the manifestations of the daughter suggest that the mild general and the severe cardiac abnormalities in the daughter were indeed the initial indications of MM also in the daughter.

This case shows that recurrent syncopes and aborted SCD may be the initial manifestation of a metabolic defect with multiple organ involvement. The family history is important in cases with aborted SCD to guide the diagnostic work-up. Phenotypic heterogeneity between the family members may be an indicator of MM.

Author Contributions

Conceived the concepts: JF, CS, HK. Analyzed the data: JF, CS, HK. Wrote the first draft of the manuscript: JF. Contributed to the writing of the manuscript: JF, CS. Agree with manuscript results and conclusions: JF, CS, HK. Jointly developed the structure and arguments for the paper: JF, CS, HK. Made critical revisions and approved final version: JF, CS. All authors reviewed and approved of the final manuscript.

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