The ultimate complication to lymphocytic colitis: Cardiac arrest

A case report

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Abstract

Introduction: We present a case report of a cardiac arrest due to hypokalemia caused by lymphocytic colitis.

Case presentation: Four months prior to the cardiac arrest the patient presented with watery diarrhoea and was diagnosed lymphocytic colitis. The patient experienced a witnessed cardiac arrest on the doorstep of his general practitioner. Two physicians and the EMS resuscitated the patient for one hour and four minutes before arriving at a university hospital. The patient was defibrillated 16 times due to the recurrence of ventricular tachyarrhythmias. An arterial blood sample, revealed a potassium level of 2.0 mmol/L. (reference range: 3.5-4.6) and pH 6.86 (reference range: 7.37-7.45). As the potassium level was corrected, the propensity of ventricular tachyarrhythmias ceased. The patient recovered from his cardiac arrest without any neurological deficit. The following tests and examinations revealed no other reason for the cardiac arrest.

Conclusion: Diarrhoea can cause lifetreatening situations due to excretion of potassium ultimately causing cardiac arrest due to hypokalemia. Physicians treating patients with severe diarrhoea should consider monitoring electrolytes.

Keywords: Colitis, cardiac arrest, diarrhoea, hypokalemia, resuscitation
**Introduktion:**

Untreated inflammatory colitis normally present with chronic watery diarrhoea. Potassium is secreted in the colon, and diarrhoea contains potassium therefore profuse diarrhoea can result in hypokalaemia. The myocardium is extremely sensitive to hypokalaemia and alters cardiac tissue excitability and conduction and may induce malignant ventricular arrhythmias resulting in cardiac arrest.

**Case report**

A 69-year-old male experienced a witnessed cardiac arrest on the doorstep of his general practitioner. Two physicians immediately initiated cardiopulmonary resuscitation (CPR) i.e. chest compression and mouth-to-mouth ventilation. The EMS was summoned and an ambulance arrived 8 minutes later. The initial cardiac rhythm was ventricular fibrillation (VF). The patient was defibrillated 10 times. Several times the patient gained an organized rhythm post-defibrillation. The patient was treated with amiodarone, adrenaline, atropine and lidocaine. One hour and four minutes after the first heart rhythm analysis by the EMS personal the patient arrived at a university hospital still in cardiac arrest. Upon arrival mechanical chest compressions using LUCAS™2 Chest Compression System was started and the patient was defibrillated two times. A coronary angiography did not show any signs of coronary artery disease.
Biochemical analysis showed a potassium level of 2.0 mmol/L (reference range: 3.5-4.6) and pH 6.86 (reference range: 7.37-7.45). The patient was admitted to the intensive care unit (ICU) and was further defibrillated four times due to recurrence of ventricular tachyarrhythmias. As the serum potassium level was corrected, the propensity of ventricular tachyarrhythmias ceased. After 24 hours in the ICU the patient was transmitted to the cardic care ward where no arrhythmias were observed the following 24 hours. Subsequently, the patient was transferred to the department of gastroenterology. The patient was assessed by a neurologist three months after the cardiac arrest and found neurologically intact.

Four month prior to the cardiac arrest the patient first presented with chronic watery diarrhoea. The patient initially reported continuous diarrhoea with 4 stools per day without warning symptoms. A colonoscopy showed a macroscopic normal colon. Histological evaluation revealed lymphocytic colitis and the patient started treatment with budesonide. At the time of diagnosis the only medication was Acetylsalicylic acid. The patient was not recommended to stop Acetylsalicylic acid intake, due to a previous history of stroke.

Ten days before suffering from cardiac arrest, the patient consulted the gastroenterology outpatient clinic due to lack of effect of budesonide. The glucocorticoid was discontinued and the patient was recommended Psyllium-seed treatment from which the patient previously had experienced some relief. The potassium level was found normal three times during the first 2½ month with diarrhoea but was not monitored during the last 1½ month prior to the cardiac arrest.
Discussion

Microscopic colitis is characterised by a (near) normal colonoscopy. The diagnosis is established by biopsy of the colonic mucosa. The severity of histological changes are most prominent in the proximal colon and declines distally i.e. biopsies from the right or transverse are optimal. Histopathologically the condition is separated in collagenous colitis and lymphocytic colitis. The mucosal inflammation in lymphocytic colitis is characterised by an increased number of intraepithelial T lymphocytes suggesting an immunological involvement while collagenous colitis characterized by a thickened subepithelial collagen band[1]. It is unknown whether the two subtypes are pathogenetically related. The peak incidence of the disease is in the age 55 to 70 years and occurs predominantly in females (female:male ratio 2-3:1)[2]. Microscopic colitis may be diagnosed in 10-20% of cases investigated for chronic watery diarrhea[3]. The cause is multifactorial and largely unknown[3]. Although most cases are idiopathic certain drugs can induce the condition, particularly Non-Steroid-Anti-Inflamatoric-Drugs (NSAID) but also acetylsalicylic acid[2]. Other drugs include acarbose, ranitidine, sertraline, ticlopidine, flutamide, omeprazole and simvastatine[4]. The clinical manifestation is chronic watery diarrhoea of up to two liters per day (four to nine stools daily; sometimes > 10 stools daily). The mechanism of diarrhoea in collagenous colitis is believed to be a decreased absorption and increased secretion of sodium and chloride ions[5]. The absorptive mechanisms of potassium ions are not disturbed by diarrhea per se, but fecal potassium losses are increased in diarrheal diseases by unabsorbed anions (which obligate potassium), by electrochemical gradients secondary to active chloride secretion, and probably by secondary
hyperaldosteronism[6]. It is likely that the same mechanisms are responsible for watery diarrhoea in lymphocytic colitis.

Potassium is predominantly found intracellularly, only about 2% of the body’s potassium is located extracellularly. The most common causes of low serum potassium are increased potassium loss due to renal loss e.g. diuretics or due to gastrointestinal diseases e.g. diarrhoea[7]. Lymphocytic colitis is a well described cause of chronic watery diarrhoea but it seldom results in life threatening complications. Lymphocytic colitis is complicated by comorbidity e.g. Coeliac disease. It is therefore reasonable to test patients suffering from lymphocytic colitis for coeliac disease and vice versa, especially if diarrhoea persist despite strict gluten-free diet or if diarrhoea is disproportionate to the degree of malabsorption[8]. Other comorbidities include diabetes mellitus, rheumatoid arthritis, thyroid disorders and Sjögren’s syndrome[9].

When the diagnosis of lymphocytic colitis has been confirmed the patient’s use of drugs and dietary factors that may contribute to diarrhea must be evaluated. Drugs associated with lymphocytic colitis should be stopped. Excessive intake of dairy products, caffeine and alcohol should be reduced. Coeliac disease and bile acid malabsorption should be considered and excluded. If symptoms are debilitating, budesonide, a glucocorticoid with low systemic effect due to the substantial elimination by first-pass hepatic metabolism, has been proven effective[10]. The long term prognosis for patients suffering from lymphocytic colitis may be more favourable compared to collagenous colitis; diarrhoea may subside within weeks with or without treatment and histologic findings may normalize.
In our case the patient suffered from cardiac arrest due to hypokalemia. The hypokalemia was caused by diarrhoea as a consequence of lymphocytic colitis. Following successful resuscitation no other cause of cardiac arrest could be proven.

Survival from out-of-hospital cardiac arrest is poor[11]. The interventions linking the victim of cardiac arrest with survival with a good cerebral outcome are known as the Chain of Survival i.e. early recognition of cardiac arrest, early bystander CPR, early defibrillation and early advanced life support including effective post resuscitation care. Especially effective chest compressions with correct chest compression depth and frequency are crucial for successful outcome[11].

The majority of resuscitation attempts do not succeed and a major challenge for healthcare professionals is to decide when to stop further resuscitation. In general resuscitation should be continued as long as a shockable rhythm (i.e. ventricular fibrillation and pulseless ventricular tachycardia) persists. Likewise it is widely acknowledged that resuscitation may be abandoned when asystole has been present for more than 20 minutes in absence of a reversible cause and ongoing advanced life support[12].

This case shows the importance of correcting an underlying cause of cardiac arrest and that survival with a good neurological outcome is possible despite prolonged cardiac arrest.

Conclusion

Lymphocytic colitis with diarrhoea may lead to severe hypokalemia and ultimately cardiac arrest. Monitoring of electrolytes may be considered in patients with
microscopic colitis and diarrhea, especially during changes in symptoms and treatment. During cardiac arrest, treatment of reversally causes are essential. Resuscitation should generally be continued as long as shockable rhythm persists. This case demonstrates that survival with a favorable neurological outcome is possible despite cardiac arrest.

**Consent:**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

**Competing interest:**

None of the authors have competing interest to declared.

**Author’s Contributions:**

KG: Main writing author. JK contributed with expert knowledge on lymphocytic colitis and made proofreading of the report. BL cowriter and contributed with expert knowledge on cardiac arrest and made proofreading of the report.

**Running title:** Lymphocytic colitis and cardiac arrest

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None
Reference List


Timeline

- 4 month -- Debut of diarrhoea
- 3 month -- Colonoscopy: normal
- 2 month -- Budesonide started
- 10 days -- Budesonide discontinued

0
Cardiac arrest, CPR started
8 min
Arrival of EMS
13 min
Arrival of emergency physician
1 hr 4 min
Arrival at university hospital

1 day
Department of cardiology
2 days
Department of gastroenterology
14 days
Discharge from hospital
3 month
Neurological assessment: normal

Figure 1