CASE REPORT

Atrial fibrillation due to licorice root syrup

Meyan kökü şerbetine bağlı gelişen atriyum fibrilasyonu

Musluhittin Emre Erkuş, M.D., İbrahim Halil Altıparmak, M.D., Recep Demirbağ, M.D., Özgür Günebakmaz, M.D.

Department of Cardiology, Harran University Faculty of Medicine, Şanlıurfa, Turkey

Summary– While it is known that consumption of licorice may lead to cardiac arrhythmias, there have been no reports of atrial fibrillation resulting from the consumption of licorice root syrup. A 57-year-old male with no prior history of cardiovascular disease was admitted to the emergency department with palpitation. His electrocardiogram showed atrial fibrillation with a moderate to rapid ventricular rate. In laboratory assessment, potassium was 2.0 mmol/L and plasma renin activity and aldosterone level were suppressed (<300 ng/L/hour, 42 ng/L respectively). Volumes of the heart chambers were within normal range and functions and structures of the heart valves were normal in echocardiographic assessment. The arrhythmia was resolved with propafenone infusion.

Özet– Meyan kalp ritim bozukluklarına neden olabilir. Ancak, meyan kökü şerbetinin içiminden kaynaklanan atriyum fibrilasyonu, şu ana kadar bildirilmemiştir. Daha önce kalp ve damar hastalığı bulunmayan 57 yaşında erkek hasta acil servise çarpıntı şikayetiyle başvurdu. Laboratuvar incelemesinde potasyum 2.0 mmol/L olup plazma renin aktivitesi ve aldesteron düzeyi ise baskılanmıştı (<300 ng/L/saat, 42 ng/L, sırayla). Elektrokardiyogramda yüksek ventrikül hızlı atriyum fibrilasyonu görüldü. Yapılan ekokardiyografik incelemede, kalp boşlukları normal sınırlarda olup kalp kapaklarının yapısı ve fonksiyonları da normal olarak değerlendirildi. Hastada bulunan atriyum fibrilasyonu, propafenon infüzyonu ile sinüs ritmine çevrildi.

Licorice is the root of the plant *Glycyrrhiza glabra*, which contains the herbal ingredient, glycyrrhizic acid. It is well known that licorice may induce electrolyte imbalances such as hypokalemia, and may cause ECG changes and ventricular fibrillation.[1] Glycyrrhizin has effects on cardiac repolarization and depolarization through the autonomic nervous system.[2] It is well known that hypokalemia causes a variety of electrocardiographic abnormalities including ST depression, long PR interval, increased amplitude and width of the P wave, T wave flattening and inversion, and prominent U waves confusing with QT prolongation due to fusion of the T and U waves.[3] Previous studies have reported that hypokalemia resulting from licorice usage may be responsible for cardiac arrhythmias.[4,5]

Abbreviation:

AF Atrial fibrillation

However, atrial fibrillation (AF) has not been reported. This report presents a case of AF secondary to daily consumption of licorice root syrup.

CASE REPORT

A 57-year-old male patient presented with recent onset palpitation. He had no history of hypertension, coronary heart disease, hyperlipidemia, diabetes, valvular heart disease, or thyroid disease, and no family history of cardiovascular disease. On physical examination; pulse rate was irregular and 160 bpm/min, blood pressure was 90/60 mmHg, respiratory rate was 21/min, and oxygen saturation was 97%. Cardiac examination revealed no murmurs. Lung and neurologic examinations were normal. Generalized edema was a remarkable finding on physical examination. A baseline 12-lead electrocardiogram showed rapid AF with a heart rate of 180 bpm (Figure 1). Cardiothoracic ratio and lungs fields were normal on chest x-ray. Transthoracic echocardiography (TTE) revealed normal left and right ventricular systolic and diastolic functions, and normal atrial and ventricular chambers as well as normal left- and right-sided valve

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Correspondence: Dr. Musluhittin Emre Erkuş. Şenevler Mahallesi, 6129. Sokak, No: 19/B, D: 5, Karaköprü, Şanlıurfa, Turkey.
Tel: +90 414 - 318 31 59 e-mail: taha14770@gmail.com

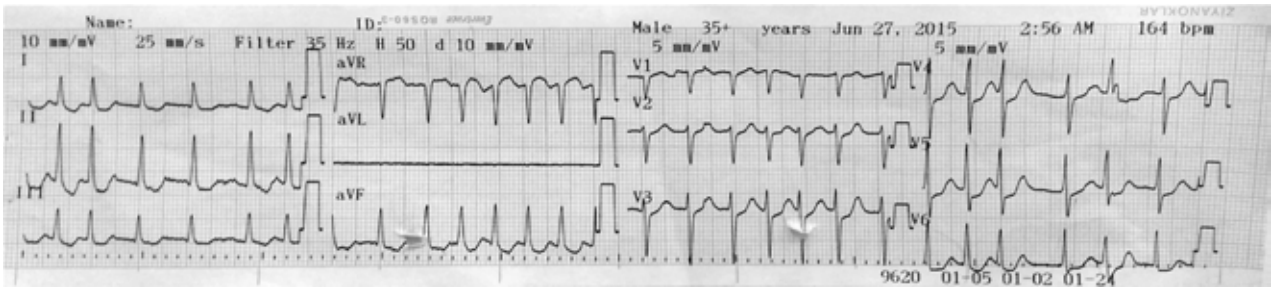

Figure 1. The baseline 12-lead ECG in emergency room showing atrial fibrillation.

functions. Blood cell count, hemoglobin, troponin and thyroid-stimulant hormone level, liver function tests, estimated glomerular filtration rate and coagulation tests were all within normal limits. Electrolytes were normal, with the exception of decreased serum potassium level, which is 2.0 mmol/L (references 3.5-5.1 mmol/L). Other causes of hypokalemia including vomiting, diuretic use, alcohol consumption or laxative use were not present in the patient. Sinus rhythm with heart rate of 60 bpm was achieved with a continuous infusion of propafenone and treatment of hypokalemia with potassium infusion. In sinus rhythm, corrected QT intervals were normal (Figure 2).

Following a detailed medical history, the patient was found to be free of all well-known AF etiologies. However, further tests for the underlying reason for the hypokalemia showed that plasma renin activity was low, <300 ng/L/hour (reference ranged: 500-1900 ng/L/hour), as was plasma aldosterone level 24 ng/L (reference ranged: 29.4–161.5 ng/L), after 15 min. supine bed rest. On repeated inquiry, the cause of the lower aldosterone levels was found to be a history of licorice use. The patient was drinking 4 water glasses of licorice root syrup in daily life throughout the month of Ramadan in order to quench the thirst of Ramadan fasting. Generalized edema and hypokalemia were completely resolved in six days and he was discharged with a recommendation of ceasing licorice intake. At present, more than one month after hospitalization, the patient is free of any cardiac symptoms and signs.

Figure 2. 12-lead ECG after medical cardioversion, demonstrating sinus rhythm with normal QTc interval.

DISCUSSION

Southeast Turkey is one region where licorice root syrup is consumed in warm summer months. Moreover, Muslims consume this drink in much higher quantities in the month of Ramadan, when they fast for periods of 10–14 hours daily for 30 days, since this syrup quenches the thirst after breaking the fast. The consumption of licorice in such quantities may give rise to a clinical scenario such as excess mineralocorticoid activity, leading to symptoms of hypokalemia, hypertension and metabolic alkalosis.[2] However, hypertension has not been observed in all cases similar to the present one.[6] Inhibition of renal 11-B-hydroxysteroid dehydrogenase type 2 activity by glycyrrhizic acid in licorice root syrup may yield enhanced cortisol effect on mineralocorticoid receptors of distal tubuli of the kidneys because this enzyme promotes the conversion of cortisol to cortisone. Ultimately, increased mineralocorticoid activity cause potassium excretion as well as sodium and water retention, thus leading to hypokalemia and edema.[7,8] Negative feedback of renin-angiotensin II suppresses plasma renin and aldosterone, as was found in the present study.

It is well known that AF is the most common cardiac arrhythmia, and related to serum electrolyte im-

balances.[8–10] Magnesium and potassium electrolytes play an important role in regulating and maintaining membrane stability in myocytes. While magnesium levels were normal in this patient, hypokalemia was present. Hypokalemia leads to cellular hyperpolarization, increases resting potential and hastens depolarization.[10] Because myocardiocyte repolarization depends on potassium influx, hypokalemia lengthens the action potential, and hence several ECG changes have been found in electrocardiograms.[10] In the present case, as previously mentioned, there was no abnormality related to hypokalemia. Although several previous studies have shown that low serum potassium levels are associated with development of AF, this is a rare occurrence.[9,11,12] We did not find any potential risk factor related with AF except hypokalemia. We considered AF as provoked by low potassium levels resulting from consumption of licorice root syrup.

This case report suggests a rare complication of licorice root syrup use. Moreover, it emphasizes the importance of repeated history-taking in a patient with AF in order to avoid a further investigation. The consumption of licorice root syrup should be taken into account in patients admitted to the hospital with AF. It may cause cardiac arrhythmia when consumed regularly and in excessive amounts.

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Anahtar sözcükler: Atriyum fibrilasyonu; hipokalemi; meyan,