Sudden death of a young female patient

A case of arrhythmogenic right ventricular dysplasia

Esra Ozkara, MD, Selim Ozkok, MD, Nil Culhaci, MD, Ibrahim Meteoglu, MD, Zehra K. Erkul, MD.

ABSTRACT

Arrhythmogenic right ventricular dysplasia (ARVD) is a disorder which is characterized by replacement of right ventricular myocardium by fat and fibrous tissue. Although it generally causes arrhythmias originating from the right ventricle, sudden deaths might be seen. A 30-year-old woman with no previous symptoms of a particular disorder was found dead in her house. The organs of her body were sent to the pathology department after the autopsy was carried out by the Department of Forensic Medicine of Adnan Menderes University, Aydin, Turkey. Grossly, the heart weight was within the normal limits. Nonetheless, it was detected that the right ventricle wall was thinned remarkably and had yellow color. In the microscopic examination, it was observed that myocardium was replaced mostly by fat and fibrous tissue. The other sections of heart were normal. This lesion was diagnosed as ARVD and suggested as the cause of death.

Saudi Med J 2006; Vol. 27 (6): 878-880

Arrhythmogenic right ventricular dysplasia (ARVD) or cardiomyopathy is a heart muscle disease in which the right ventricle myocardium is replaced by fat and fibrous tissue. It may be familial, but its etiopathogenesis has not yet been identified.[1-3] Although its frequency is reported as 6 in 10000, with respect to the difficulties of diagnosis, it cannot be known exactly.[2] The clinical diagnosis of ARVD is based on the presence of major and minor criteria that encompass genetic, electrocardiographic, physiologic and histopathologic findings.[1,3] Nonetheless, it is one of the important diseases that we should consider while studying sudden deaths of young adults.[2,4,5] In addition, it may masquerade as other diseases.[6] It is necessary to carry out autopsy in the sudden deaths of young individuals with no previous disease. We present here an ARVD, which was detected in a female patient who had sudden death arousing suspicion.

Case Report. A 30-year-old female was found dead in her own house. The competent judicial authority submitted a formal request to the Department of Forensic Medicine for autopsy. It was reported that the woman was found dead in her bed, and no abnormal findings were detected around. It was ascertained that she was married with one child. She had no well-known disease, and no psychological problems. In addition, there was no history of sudden death in her family. There were no special findings on external examination. She was 158 cm tall and approximately 50 kgs of weight. There were no traumatic findings on internal examination. The following organs were then sent to the Pathology Department for pathological examination: Brain, cerebellum, heart, lungs, spleen, kidneys, uterus and ovaries. In addition, blood and organ samples were taken for toxicological examination. Grossly, the

From the Department of Forensic (Ozkok) and the Department of Pathology (Ozkara, Culhaci, Meteoglu, Erkul), Medical Faculty, Adnan Menderes University, Aydin, *Turkey.*

Received 25th September 2005. Accepted for publication in final form 4th January 2006.

Address correspondence and reprint request to: Dr. Esra Ozkara, Department of Pathology, Medical Faculty, Adnan Menderes University, 09100, Aydin, *Turkey*. Tel. +90 (256) 4441256. Fax. +90 (256) 2148395. E-mail: eozkara@adu.edu.tr

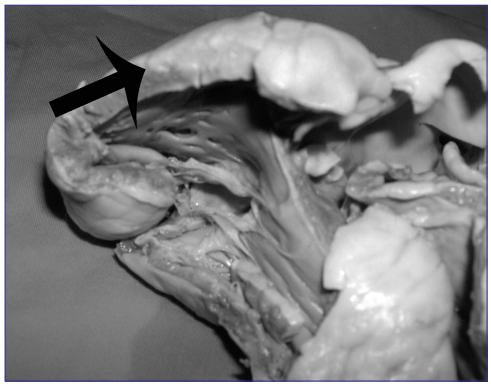

Figure 1 - Right ventricle wall is thin, and grey-yellow in gross examination (arrow).

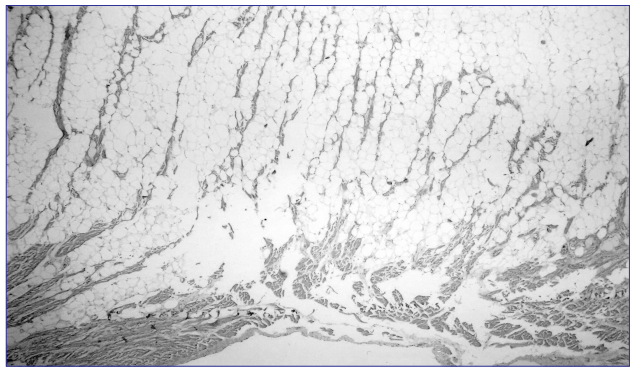

Figure 2 - Most of the myocardial tissue of right ventricle was displaced with mature fatty issue (Hematoxylin and Eosin x 100).

heart was 339 grams (normal range: 275±75 gms in women) in weight and its size was 13 x 10 x 6 cm. When the heart was opened, no valvular or arterial abnormality was observed. The appearance of the left ventricle was natural; the wall thickness was measured as 9 mm (normal: 8-15 mm). However, the thickness of the right ventricle wall was measured as 2-3 mm. (normal: 4-5 mm) and the colour was grey-yellow (**Figure 1**). No pathology was observed on the gross examination of other organs. No pathology was detected in the sections taken from the left ventricle on microscopic examination. Most of the myocardial tissue of the right ventricle was displaced with mature fat and degenerated myositis could be seen in focal regions (**Figure 2**). Occasional fibrous tissues were observed. No pathology, except for prominent congestion, was seen in the other organs. The findings were assessed as ARVD. The blood samples indicated no findings to clarify the cause of death. In light of this information, it was concluded that ARVD was the probable cause of death.

Discussion. Arrhythmogenic right ventricular dysplasia is a heart muscle disease characterized by the structural and functional impairment of the right ventricle. In 30-50% of the cases, there is a familial history and autosomal dominant transition is frequently identified.[1,5] It is reported that genetic anomalies identified for the dominant form are localized at chromosomes 1, 2, 3 and 14.[1,4,5] The recessive form, which is seen more rarely, is localized at chromosome 17 and named Naxos Disease.[1,5] Three mechanisms were brought forward in the etiopathogenesis of the disease. One of them is apoptosis, the other one is the claim that this disease may be a progressive inflammatory heart disease. Another mechanism that is suggested is myocardial dystrophy connected with genetic atrophy, which develops on its own, free from myocarditis. Although the frequency of ARVD cannot be determined exactly, it is believed to be an important cause of death in people under 30. It is reported that it causes sudden death in approximately 20% of young people.[7,8] In several reports, it is stated that this disorder may be as prevalent as one in 5000 to 6 in 10000 people.[9,10] In Gulmen's autopsy study,[11] ARVD was found as a frequent disease in our country. Furthermore, pathognomonic findings of ARVD can also be seen in the normal population. It is the second most frequent cause of death after hypertrophic cardiomyopathy.[5] The diagnosis of ARVD is difficult for forensic medicine workers. There are no obvious symptoms, especially in the young population, and sudden death may be the first presenting sign of the disease. In these cases, the diagnosis of ARVD should be based on clinical and pathologic findings. In the present case, the diagnosis of ARVD was found by pathological examination following autopsy of a woman who did not have a common disease. Although the clinical diagnosis of ARVD is hard to implement, major and minor criteria's, depending on histological, structural, electrocardiographic, arrhythmic, and genetic traits are used.[1,12] With respect to this, necropsy, depolarization anomalies (epsilon waves) in ECG; evident dilatation in right ventricle aneurysm, indication that fibroadipose tissue supersedes muscle in the endomyocardial biopsy sample taken, are all among the major the criteria.[1,12] Minor criteria include the presence of sudden death family history before the age of 35, reverse T waves in the right ventricle on ECG, the presence of arrhythmia displayed on ECG or Holter monitoring, or frequently developed ventricular extrasystole, minimal right ventricular dilatation or right ventricular regional hypokinesia.[1,12] The diagnosis of ARVD is made in patients who have 2 major; 1 major and 2 minor or 4 minor criteria. Some studies found MRI the best diagnostic technique

for detection and follow-up of clinically suspected ARVD.[3,9,13] Although the sensitivity of endomyocardial biopsy is low, it is used in the histological diagnosis of ARVD. Tissue diagnosis is carried out mainly after autopsy on the necropsy material. Under the normal conditions, epicardial fat rate increases with age both in the ventricles and atriums. Although there are no definite criteria for this, it is related to the fat rate of the body. Generally, it forms 20% of heart weight. In ARVD, fat infiltration is clear in the right ventricle, the left ventricle is generally protected. Moreover, this accumulation is more than epicardial, it supersedes the heart muscle.[14] Owing to these ambiguities, ARVD may be easily missed in routine autopsies,[1,14] hence, the importance of pathological studies of the heart. Histopathologically, segmental or diffuse fat and fibrous tissue infiltration is seen at the right ventricle free wall. In the presenting case, the right ventricle free wall was all replaced mainly by fatty tissue and the right ventricle free wall was obviously thinned. In some of the cases, inflammatory infiltration, constituting mainly lymphocytes, can be accompanied due to myocyte death.[1,14] Over time, fat infiltration may reach the left ventricle and this enhances the death risk.[15] Although the left ventricle was free of disease in the presenting case, it has been accepted that the death was due to ARVD. All examinations supported this diagnosis. There was no family history, and there were no findings on toxicologic examination, and histopathologic findings were typical.

In conclusion, ARVD is a well-known disease that may lead to death with no symptoms, particularly in young people, especially after exercise, and the diagnosis may be problematic. Therefore, it should be considered as the cause of sudden death in young healthy looking individuals.

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