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# Sudden death due to high take-off right coronary artery

**Bülent Eren[1], Nursel Türkmen[2], Ümit Naci Gündoğmuş[3]**

[1] *Council of Forensic Medicine of Turkey, Bursa Morgue Department, Bursa, Turkey.*
[2] *Uludağ University Medical Faculty, Forensic Medicine Department, Council of Forensic Medicine of Turkey, Bursa Morgue Department, Bursa, Turkey.*
[3] *İstanbul University, Forensic Medicine Institute, Council of Forensic Medicine of Turkey, İstanbul, Turkey.*

**SUMMARY**
Reported case was 46-year-old woman found dead at the forest park rest area. Autopsy examination revealed grossly but normal in appearance heart weighed 400 gr. The orifice of right coronary artery round in shape was situated in the ascending aorta; 17 mm above the sinotubular junction, there was a high take-off coronary artery with ectopic localization. Dissection of the artery confirmed that the proximal segment of the right coronary artery passed between the aorta and pulmonary artery, with acute, oblique down-ward angulation. We aimed to present the rare coronary anomaly and discuss the case from medico legal aspect.

**Keywords:** Sudden cardiac death – coronary artery – high take-off – ectopic – autopsy

## Náhlé úmrtí při vysokém odstupu věnčité tepny

**SOUHRN**
Žena 46 roků stará byla nalezena mrtvá v odpočinkové zóně lesoparku. Srdce bylo při pitvě normálního vzhledu váhy 400 g. Kruhovitý odstup pravé věnčité tepny byl ve vzestupné aortě 17 mm nad sinotubulárním přechodem, šlo tedy o vysoký odstup věnčité tepny. Pitva věnčité tepny potvrdila průběh její proximální části mezi aortou a plicnicí s ostrým šikmým ohybem dolů. Tímto sdělením jsme chtěli představit vzácnou koronární anomálii.

**Klíčová slova:** náhlá srdeční smrt – věnčitá tepna – vysoký odstup – pitva

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The incidence of various congenital coronary anomalies was investigated in different angiographic and autopsy studies (1–8). In normal population right coronary artery orifice was detected to be located in the right sinus of Valsalva, but the position of the coronary orifice described in terms of location related to the sinotubular junction, was reported as less frequent variation defined as "high take-off" right coronary artery (3). In Turkish population the isolated anomalous origin of the right coronary artery was described as rare congenital cardiac malformation, where the great number of the patients remains asymptomatic (8). We report interesting case of sudden cardiac death with high take-off right coronary artery.

## CASE REPORT

Reported case was 46-year-old woman found dead at the forest park rest area in her own hut, accompanied by boyfriend. According investigation documents and anamnesis provided by family members and boyfriend, anti-hyperlipidemia medication duration of several years was claimed, her relatives also stated that five days before the death, she applied to the emergency department of the regional public hospital with chest pain and tightness. A complete physical examination was performed. Biochemical analysis was done; blood creatine kinase-MB fraction and troponin T were detected in normal levels, electrocardiogram was examined and considered to be within normal limits, patient was discharged home after eight hours observation status ended. The victim was taken by prosecutor to the Forensic Council Bursa Morgue Department for autopsy examination after crime scene investigation. The case was 160 cm tall and weighed 75 kg. On gross physical examination, there were; needle puncture sites on the left cubital fossa, 2x0,3 cm bruise at the bottom of the left elbow was remarked. In the internal autopsy examination; both lungs showed intensive edema, right lung weighed 440 gr, left lung weighed 400 gr. The pericardium was normal in inspection, the heart weighed 400 gr, grossly but normal in appearance. In the normal position, left coronary artery orifice was observed in left sinus of Valsalva. The orifice of right coronary artery round in shape, measured in 6 mm diameter was situated in the ascending aorta;17 mm above the sinotubular junction, over the right sinus of Valsalva, there was a high take-off coronary artery with ectopic localization (Figure 1). Dissection of the artery was performed and confirmed that the proximal segment of the right coronary artery passed between the aorta and pulmonary artery, with acute, oblique down-ward angulation, which may cause intermittent obstruction to right coronary blood flow during dilatation of aorta and pulmonary trunk. Eleven sections from the heart were evaluated;histopathological investigation did not exposed acute and chronic myocardial ischemia, but hypertrophy and congestion were observed. Organ specimen, blo-

✉ ***Correspondence address:***
*Bülent Eren, M.D.*
*Council of Forensic Medicine of Turkey*
*Bursa Morgue Department*
*16010, Bursa, Turkey.*
*tel.: +90 224 222 03 47; fax: +090 224 225 51 70*
*e-mail: drbulenteren@gmail.com*

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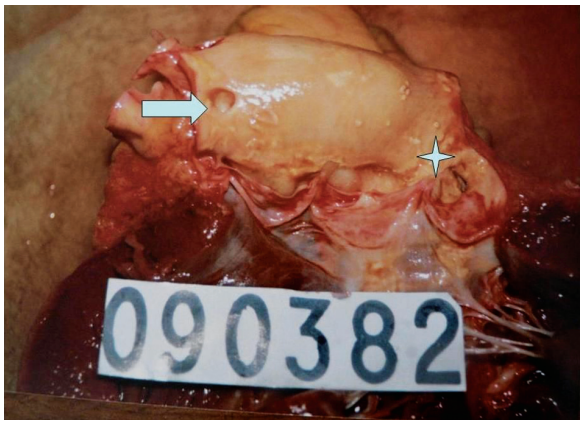



**Fig 1.** An arrow pointing pointing the orifice of the high take-off right coronary artery, a star pointing to the orifice of the left coronary artery.

od and urine investigation revealed none of the substances screened for in systematic toxicological analysis.

## DISCUSSION

The incidence of different congenital coronary anomalies varied between 0,95–1,34 % in different angiographic and autopsy researches (1–8). Right coronary artery orifice was detected to be located in the posterior two-thirds of right coronary sinus of Valsalva in great percent of the normal cases, but according to the position of the coronary orifices described in terms of their relation to the sinotubular junction, as less frequent variation was reported a "high take-off" right coronary artery orifice with low left orifice in review study of Villaronga (3). In the study of Ayalp et al in adult Turkish population incidence of isolated anomalous origin of the right coronary artery was reported as 0,09 % (8). Some authors stressed regional and ethnic differences in the frequency of coronary artery abnormalities of ectopic localization in angiographic studies (1,2), it was investigated an infant with high take-off of the right coronary artery with coexisting ventricular septal defect (9), also association with bicuspid aortic valve was reported (10). In the medical literature there was not established consensus on definition high take off, ectopic coronary artery. In different studies researches inspected and defined coronary arteries with orifices localized 5–20 mm above the sinotubular rim of aortic valve as high take-off, ectopic coronary arteries (3–7). In the presented case right coronary artery was detected in extreme high localization of 17 mm, above the sinotubular junction in the ascending aorta, assembling the case reported by Thakur et al, in which right coronary artery orifice was observed on distance of 20 mm above the sinotubular rim (10). While patients with coronary artery anomalies were reported to carry a disproportionately high risk for sudden death during exertion activities (4–7), in the presented case, there was hospital application story with chest pain complaints, despite there was no effort-exercise information before death. Researches proposed that slit-like origin of the right coronary artery and the oblique insertion like in presented case may cause intermittent obstruction, (11), besides in different study it was proclaimed that compression of the coronary artery particularly when the aorta and pulmonary trunk dilate can lead to decrease of right coronary blood flow (5).There were studies indicating decrease in regional myocardial perfusion (4,5,6,7,8), on the other hand in coronary angiography study the anomalous origin of the right coronary artery was described as rare congenital cardiac malformation, where the great number of the patients remained asymptomatic. In reported case there was no evidence of myocardial ischemia only cardiac congestion was observed in histopatologic investigation. Garg et al (1) proclaimed that investigation of coronary anomalies was significant in patients undergoing coronary arteriography, coronary interventions and cardiac surgery, also underlined that variations in the frequency of primary congenital coronary anomalies were associated with a genetic background.

We also state that clinical history details in this case are in concert with the hypothesis that acute myocardial ischemia can induce malignant ventricular arrhythmia in the right coronary artery region in the presence of this anomaly similar to the case observed by Cox et al (11).

Investigation of coronary artery anomalies is significant for determination of sudden cardiac death cases and anatomical classification of the coronary artery variations.

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