Myopericarditis and sudden cardiac death due to physical exercise in male athletes

Duraković, Zijad; Mišigoj Duraković, Marjeta; Škavić, Josip; Tomljenović, Andrea

Source / Izvornik: **Collegium Antropologicum, 2008, 32, 399 - 401**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:105:424646

Coll. Antropol. **32** (2008) 2: 399–401
Original scientific paper

Myopericarditis and Sudden Cardiac Death Due to Physical Exercise in Male Athletes

Zijad Duraković[1], Marjeta Mišigoj Duraković[2], Josip Škavić[3] and Andrea Tomljenović[1]

[1] Institute for Anthropological Research, Zagreb, Croatia
[2] Department of Kinesiological Anthropology, Faculty of Kinesiology, University of Zagreb, Croatia
[3] Department of Forensic Medicine and Criminology, Faculty of Medicine, University of Zagreb, Croatia

A B S T R A C T

In the period 1998-, we registered four sudden and unexpected cardiac deaths in male athletes due to myopericarditis during or after physical exercise. Three of them were professional soccer players and the fourth was engaged in swimming. One aged 29, had symptoms of tiredness, heart enlargement and left ventricular premature beats during training. Three of them, aged 17–18–18, were without symptoms. Three died during training and the fourth died in the hospital after head trauma at training. In the first one, aged 29, forensic autopsy showed chronic myopericarditis, thickening of the left ventricular wall of 15 mm and enlargement of the whole heart. The second one, aged 17, had subacute diffuse myopericarditis, suppurative tonsillitis and narrowed ascending aorta. The third, aged 18, had chronic myopericarditis and cardiac aneurysm of the left ventricle. The fourth, aged 18, had fibrinous pericarditis, thickening of the left ventricle 20 mm, hypoplastic ascending aorta, bilateral bronchopneumonia and cerebral contusion with edema. In Croatia, death rate among athletes, including all its causes, reached 0.15/100,000, in athletes suffering from myopericarditis it was 0.34/100,000, in others who practice exercise recreatively it amounted to 0.57/100,000 ($p=0.0068$), and in all males who practice exercise it measured 0.75/100,000 ($p=0.0014$). Physical exercise has to be contraindicated in cases of myopericarditis for at least six months from the onset of the illness.

Key words: *male athletes, physical exercise, myopericarditis, sudden cardiac death*

Introduction

Regular physical exercise, controlled and adapted to physical condition of the organism, has beneficial effects surpassing hazards[1–14]. In healthy persons health related incidences are rare, as well as sudden death. Persons engaged in recreational physical exercise are protected from various diseases by such regular activities[3,4,6,9,12]. In those under 30 years who have died suddenly during or after physical exercise the most common causes are cardiovascular diseases.

The aim of the study is to analyze different degrees of myopericarditis and their consequences as the cause of sudden death during physical exercise in young persons engaged in sport or recreative physical exercise.

Sample and Methods

The presented data are a part of a large retrospective study analyzing 57 sudden and unexpected deaths in Croatia due to or after sport or recreational exercise in a period of 10 years: from 1998 to 2007[1–5,7,8,10,11], including all ages and both sexes. The data were collected from the whole population consisting of 4,500,000 people. Seven of them were athletes and 50 were exercising recreatively. The deceased persons were found in the registry of the Forensic Medicine Services, the Public Health Registry and sports clubs. In that period, we detected four deaths due to myopericarditis in males aged 17–29. Three of them died suddenly due to physical exercise and one died after physical exercise in a hospital because of complications. One was engaged in swimming and three were pro-

Received for publication April 10, 2008

fessional soccer players. Three of them were symptom free before the last physical exercise.

Statistical difference was calculated by using the chi--square test and Poisson rates.

Results

The data of four cases: three athletes and one included in recreative physical exercise, are presented in Table 1. The first, aged 29, was a professional soccer player who had clinical signs of heart enlargement and frequent left ventricular premature beats. He refused to follow the physicians' advices to stop with competitive matches. During a game, he suddenly felt ill and collapsed. He was resuscitated, transferred to the nearest hospital but died in transit. Forensic autopsy showed chronic myopericarditis, thickening of the left ventricle of 15 mm, and enlargement of the whole heart.

The second, aged 17, was a school boy and professional soccer player with no data of any subjective complaints during physical exercise. He died suddenly during a game. He was unsuccessfully resuscitated at the field. The forensic autopsy finding was subacute diffuse myopericarditis, narrowed ascending aorta (10 mm), and suppurative tonsillitis.

The third one, aged 18, was a school boy with no data of any subjective discomfort during physical exercise. He died suddenly during swimming. Resuscitation was useless. Forensic autopsy showed chronic myopericarditis and cardiac aneurysm of the left ventricle.

The fourth athlete, aged 18, was a school boy and professional soccer player. He did not complain of any troubles during physical exercise. During a soccer game, one player kicked him in the head with a ball. At that moment he felt general weakness with short breath and fell down. He was transferred to the nearest hospital, where he died two days upon admittance in spite of all therapeutic efforts. Forensic autopsy showed fibrinous pericarditis, large bilateral pneumonia, cerebral contusions with edema and pointed bleeding, hypoplastic ascending aorta and biventricular hypertrophy. The left ventricular wall measured 20 mm, indicating hypertrophic cardiomyopathy. The right ventricular wall measured 4 mm. The heart weight was almost double than normal, amounting to 450 g.

Discussion

The article explores the aspects of interrelationship between physical exercise and different types of myopericarditis in young male athletes. In athletes who died suddenly during exercise, the most common causes of such events are cardiomyopathies, coronary anomalies and myocarditis[15]. Sometimes it is not easy to clinically distinguish physiological myocardial hypertrophy from hypertrophic cardiomyopathy. Normal values of ventricular thickness are up to 11 mm, borderline values between 11 and 13 mm, but thickening above 15 mm implies criteria for hypertrophic cardiomyopathy. In the Veneto Region, myocarditis was at the third place as the cause of death in athletes during physical exercise reaching up to 7.5% (12). In our study the rate was 0.34/100,000 compared to 0.15/100,000 in young athletes[5] who died due to all cardiac reasons during exercise. In our general population aged 15–40, who practice recreative physical exercise the death rate reached 0.75/100,000, with statistically significant difference ($p=0.0014$). This means that there is practically no probability for the dif-

TABLE 1
CHARACTERISTICS OF FOUR MALE ATHLETES WITH MYOPERICARDITIS WHO DIED DURING OR AFTER EXERCISE

Case	Age	Physical exercise	Symptoms	Physical finding	Lethal event	Resuscitation	Forensic autopsy
1	29	professional soccer player	tiredness during training	heart enlargement, ventricular premature beats	during a game	yes	chronic myopericarditis, heart enlargement left ventricular wall 15 mm
2	17	professional soccer player	no	no data	during a game	yes	subacute diffuse myopericarditis, suppurative tonsillitis, narrowing of the ascending aorta to 10 mm
3	18	swimming	no	no data	during swimming	yes	chronic myopericarditis, cardiac aneurysm of the left ventricle
4	18	professional soccer player	no	no data	in a hospital 2 days of admission after trauma of the chest	yes	fibrinous pericarditis, hypoplastic ascending aorta, tkickenning of the left ventricle: 20 mm, bilateral broncho--pneumonia, cerebral contusion with edema, ventricles: left 20 mm and right 4 mm, hypoplastic ascending aorta

ference to be caused by chance alone. Athletes obviously are protected from cardiovascular events.

Myopericarditis could lead to malignant ventricular arrhythmia and sudden cardiac death. Acute viral infections of the upper respiratory tract can diminish isometric myocardial strength for 15%[14–15]. In such cases, diminution of enzymatic myocardial activity[16] and abnormality of myocardial structure could be detected by electronic microscopy in samples of repeated myocardial biopsies.

Physical exercise is contraindicated in different types of myopericarditis for at least six months. When to restart training depends on the disappearance of subjective symptoms, on the normalization of clinical state and biochemical parameters, i.e. double viral titers, on the normalization of electrocardiographic finding in a 24-hour electrocardiogram, and on electrocardiographic and echocardiographic scans at rest and during exercise (stress). Sometimes in specific cases other procedures are needed: radionuclide studies, cardiac catheterization and magnetic resonance imaging.

Acknowledgements

This study was supported by the Croatian Ministry of Science, Education and Sport, No. 196-0342282-0291 and 034-0342282-2325.

REFERENCES

1. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, MEDVED R, ŠKAVIĆ J, ČOROVIĆ N. Coll Antropol 26 (2002) 239. — 2. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, ŠKAVIĆ J, Coll Antropol 26 (2002) 509. — 3. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, VUORI I, ČOROVIĆ N, KUVALJA S, KUVALJA D, ŠKAVIĆ J, DEFINIS GOJANOVIĆ M, Coll Antropol, 28 (2004) 271. — 4. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, MEDVED R, ŠKAVIĆ J, Kinesiology, 31 (1999) 68. — 5. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, VUORI I, ŠKAVIĆ J, BELICZA M, J Sports Med Phys Fit, 45 (2005) 532. — 6. PODESWILS LJ, GUALLAR E, Ann Intern Med, 144 (2006) 135. — 7. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, Medix, 35 (2001) 76. — 8. DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, MEDVED R, ŠKAVIĆ J, Physical exercise and cardiovascular risks – sudden death. (Proceedinigs of the European Conference: Health related physical activity and adults. Poreč, Croatia, 2000). — 9. VUORI I, Kinesiology, 2 (2004) 123. — 10. MIŠIGOJ DURAKOVIĆ M, DURAKOVIĆ Z, BARŠIĆ B, Kinesiology, 37 (2005) 5. — 11. MEDVED R, DURAKOVIĆ Z, MIŠIGOJ DURAKOVIĆ M, Liječ Vjesn, 120 (1998) 228. — 12. BASSO C, CORRADO D, THIENE G, Cardiol Rev, 7 (1999) 127. — 13. MARON BJ, N Engl J Med 349 (2003) 1064. — 14. MARON BJ, THOMPSON PD, PUFFER JC, McGREW CA, STRONG WB, DOUGLAS PS, CLARK LT, MITTEN MJ, CRAWFORD MH, ATKINS DL, DRISCOLL DJ, EPSTEIN AE, Circulation, 94 (1996) 850. — 15. FUTTERMAN LG, MYERBURG R, Sports Med, 26 (1998) 335. — 16. ARETZ HT, BILLIGHAM ME, EDWARDS WD, Am J Cardiovasc Pathol, 1 (1987) 3.

Z. Duraković

Institute for Anthropological Research, Zagreb, Ulica Ljudevita Gaja 32, 10000 Zagreb, Croatia
e-mail: zijad.durakovic@inantro.hr

MIOPERIKARDITIS I IZNENADNA SRČANA SMRT U ŠPORTAŠA ZA VRIJEME TJELOVJEŽBE

SAŽETAK

U 10-godišnjem periodu: 1998–2007 dogodila su se četiri nagla i neočekivana smrtna ishoda u športaša za vrijeme ili nakon tjelovježbe. Tri su bila zanimanjem nogometaši, a četvrti se bavio plivanjem. Jedan dobi 29 g. tužio se na umor, imao je povećano srce i česte ventrikulske ekstrasistole iz lijeve klijetke, dok su trojica dobi 17–18–18 g. bili bez simptoma. Trojica su preminula za vrijeme tjelovježbe, a četvrti u bolnici dva dana po prijamu. Sudsko-medicinskom obdukcijom prvi je, u dobi od 29 g., bolovao od kroničnog mioperikarditisa, zadebljanja stjenke lijeve klijetke od 15 mm i povećanog cijelog srca. Drugi, dobi 17 g. bolovao je od subakutnog difuznog mioperikarditisa, gnojnog tonzilitisa i sužene uzlazne aorte, treći, dobi 18 g. bolovao je od kroničnog mioperikarditisa i aneurizmatskog proširenja lijeve klijetke, dok je četvrti, star 18 g. bolovao od fibrinoznog perikarditisa, zadebljanja lijeve klijetke od 20 mm, hipoplastične uzlazne aorte, obostrane bronhopneumonije i kontuzije mozga s edemom. U Hrvatskoj stopa smrtnog ishoda zbog svih razloga u športaša iznosi 0,15/100.000, u športaša zbog mioperikarditisa iznosi 0.34/100.000, u ostalih koji su se bavili rekreacijskom tjelovježbom iznosi 0,57/100.000 (razlika je statistički značajna, p=0.0068), dok u svih koji se bave tjelovježbom iznosi 0,75/100.000 (razlika je značajna, p=0.0014). U osoba koje boluju od mioperikarditisa tjelovježba treba biti kontraindicirana tijekom najmanje 6 mjeseci.