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RESEARCH ARTICLE

ANABOLIC STEROID ABUSE AND CARDIOVASCULAR TOXICITY: CASE REPORT

Oussama Hdioud, Benmessaoudfz MD, Doghmi Nawal MD, Oukerraj Latifa and Mohamed Cherti MD
CardiologyB ,CHUIbnSina Rabat, Faculty of Medicine And Pharmacy, Morocco.

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Abstract

Despite the development of tests for the detection of doping, Anabolic steroids, are still used to increase sports performance. Unfortunately, studies have clearly shown that overdose of anabolic steroids can induce serious cardiovascular complications that can be life-threatening. This implies the determining role of health professionals in informing the general population and athletes in particular about the lethal effect of these substances. We report the case of a young high-level athlete who consults for palpitations and in whom cardiac imaging reveals abnormalities related to chronic consumption of anabolic steroids.

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Introduction:-

The detour of normal use or abuse of pharmacologically active substances has become wide spread among athletes, and in addition to being reprehensible, doping is dangerous for the whole body [1]. Anabolic androgenic steroids, including testosterone and its many modified derivatives, remain the main substances detected in anti-doping tests and are generally used to increase athletic performance [2], an American study indicated that more than one million Americans are users of anabolic steroids [3]. The mechanisms of their cardiovascular complications are multiple: hydrosaline retention; vasoconstriction; blood hyperviscosity; sympathetic stimulation; lipid disorders; myocardial damage, [4,5,6].

We report the case of a young 24 year old high level athlete who consumes anabolic products to increase his athletic performance.

Clinical observation:

We report the observation of a 24-year-old high-level athlete who reported palpitations occurring at rest as well as during exercise and who, on questioning, confessed to consuming androgenic anabolic steroids (testosterone injection).

The patient's clinical examination was unremarkable, the ECG showed right delay-type VSEs, and the transthoracic echocardiography showed a dilated LV end-diastolic diameter of 62 mm, normal left ventricular diastolic function and a left ventricular ejection fraction of 53% SB. A Holter ECG performed in this patient showed low stage IV ventricular hyperexcitability.

An MRI performed to complete the work up revealed on the Tapping sequences an alteration of the intrinsic contractility in the anterolateral wall as well as a late subepicardial enhancement in a band at the level of the septum extended to the anterolateral wall (Figure 1 and 2) revealing myocardial fibrosis.

Corresponding Author:- Oussama Hdioud

Address:- CardiologyB ,CHU IbnSina Rabat, Faculty of Medicine And Pharmacy, Morocco.

At the end of this workup, we put our patient on antiarrhythmic drugs, we recommended stopping sports activities and a rhythmological exploration is scheduled.

Discussion:-

Although the causal link cannot be established, this observation highlights the side effects of excessive use of anabolic steroids.

Anabolic steroids were originally used therapeutically in certain endocrine and neoplastic diseases (6). The detour of their use to improve athletic performance is not without consequences (5). Indeed, several studies have evaluated the cardiovascular complications associated with the use of these substances.

The secondary cardiovascular effects associated with chronic use of androgenic anabolic steroids are numerous:

Left ventricular hypertrophy :

Steroids can cause left ventricular hypertrophy. This is related to the direct effect of testosterone which increases muscle mass (2). This was not noted in our patient, neither on ECG nor on cardiac imaging (TTE and MRI). Nottin S et al also reported the absence of LVH related to the use of anabolic products in 6 high level athletes (7).

Myocardial infarction :

Several cases of myocardial infarction and sudden death in young anabolic steroid users have been reported (8). In some cases, the coronary arteries were free of atherosclerotic plaques (9, 10). The cause is multifactorial, already the increased oxygen demand, caused by hypertrophy of the heart muscle, in addition to presenting an increased risk of vasospasm and a state of hypercoagulability.

Rhythm disorders :

Rhythm disorders at the supraventricular or ventricular level, which can go as far as VF reported by Lichtenfeld (11), which is secondary to the direct toxicity of these doping products on the myocytes (5). These rhythm disorders would be related to myocardial fibrosis. In our patient, the ECG showed several ESVs of the right delay type.

Cardiomyopathies:

Left ventricular dilatation: as demonstrated in the series of Nottin S (7) and Chung T where the LV diameter increased after intramuscular injection of 200 mg testosterone per week for 4 weeks (12). LV dilatation was also noted in our patient.

On the other hand, there is some evidence that athletes who use anabolic steroids are at increase risk of developing systolic and diastolic dysfunction (13). Chung T noted a significant increase in LV filling pressures when comparing a group of patients using testosterone and a group of patients receiving placebo (12). In the same study, LVEF was also significantly impaired in the group of patients receiving testosterone.

In our patient the diastolic function was normal and the LVEF on MRI was estimated at 55% and the MRI showed on the Tapping sequences an alteration of the intrinsic contractility at the anterolateral wall.

Dyslipidemia :

The change in lipid profile in the consumer leads to vascular wall damage by promoting the inflammatory process in the arterial wall. Steroids cause an increase in LDL and a decrease in HDL ranging from 40 to 70% depending on the dose and type of steroid used (14).

Hypercoagulability :

By increasing platelet aggregation, steroids also decrease fibrinolytic activity, inhibit plasminogen activator, and increase antithrombin II and protein S. This increases the risk of thrombosis (14).

Arterial hypertension :

The relationship between steroids and hypertension remains unclear, but studies have shown that steroids cause endothelial dysfunction in the kidney with increased fluid retention.

Conclusion:-

Anabolic steroids can also be used therapeutically as they can be used to enhance athletic performance. However, many studies have shown that overdose has a high toxicity on the cardiovascular system which can be life threatening. Thus, there is a need to increase awareness among the general population about the harmful effect of using these steroids without a medical prescription.

Practical implications :

The critical role of health professionals in informing the general population and athletes in particular about the lethal effects of these substances

Health care professionals treating young patients with cardiovascular problems should always suspect concomitant use of anabolic steroids.

Bibliographies:-

1. Bowers LD. Abuse of performance-enhancing drugs in sport. *Ther Drug Monit.* 2002;24:178-181.
2. Neto WK, Gama EF, Rocha LY, Ramos CC, Taets W, Scapini KB, et al. Effects of testosterone on lean mass gain in elderly men: systematic review with meta-analysis of controlled and randomized studies. *Age (Dordr)* 2015;37:9742. doi: 10.1007/s11357-014-9742-0.
3. Sturmi, J. E. and D. J. Diorio. Anabolic agents. *Sports Pharmacol* 1998. 17:261–282. Google Scholar
4. Sullivan ML, Martinez CM, Gennis P, Gallagher EJ. The cardiac toxicity of anabolic steroids. *Prog Cardiovasc Dis.* 1998;41:1-15.
5. Melchert RB, Welder AA. Cardiovascular effects of androgenic-anabolic steroids. *MedSci Sports Exerc.* 1995;27:1252-1262.
6. Pope HG Jr, Wood RI, Rogol A, Nyberg F, Bowers L, Bhasin S. Adverse health consequences of performance-enhancing drugs: an Endocrine Society scientific statement. *Endocr Rev.* 2014;35(3):341–75.
7. Nottin S, Nguyen LD, Terbah M, Obert P. Cardiovascular effects of androgenic anabolic steroids in male body builders determined by tissue Doppler imaging. *Am J Cardiol* 2006; 97:912–5.
8. Fisher M, Appleby M, Rittoo D, Cotter L. Myocardial infarction with extensive intracoronary thrombus induced by anabolic steroids. *Br J Clin Pract.* 1996;50(4):222-3.
9. Fineschi V, Baroldi G, Monciotti F, Paglicci Reattelli L, Turillazzi E. Anabolic steroid abuse and cardiac sudden death: a pathologic study. *Arch Pathol Lab Med.* 2001;125(2):253–5.
10. Ferencik GS, Adelman S. Myocardial infarction associated with anabolic steroid use in a previously healthy 37-year-old weight lifter. *Am Heart J.* 1992;124(2):507-8.
11. Lichtenfeld J, Deal BJ, Crawford S. Sudden cardiac arrest following ventricular fibrillation attributed to anabolic steroid use in an adolescent. *Cardiol Young.* 2016;26 (5):996-8.
12. Chung T, Kelleher S, Liu PY, Conway AJ, Kritharides L, Handelsman DJ. Effects of testosterone and nandrolone on cardiac function: a randomized, placebo-controlled study. *Clin Endocrinol (Oxf).* 2007 Feb ;66(2):235-45.
13. Achar S, Rostamian A, Narayan SM. Cardiac and metabolic effects of anabolic-androgenic steroid abuse on lipids, blood pressure, left ventricular dimensions, and rhythm. *Am J Cardiol.* 2010;106(6):893-901.
14. Nieschlag E, Vorona E. Doping with anabolic androgenic steroids (AAS): Adverse effects on non-reproductive organs and functions. *Rev Endocr Metab Disord.* 1 sept 2015;16(3):199-21
15. Solakovic S, Totic D, Vukas H, Djedovic M. Hidden Danger of Irrational Abusing Illegal Androgenic-anabolic Steroids in Recreational Athletes Age Under 35 in Bosnia & Herzegovina. *Med Arch Sarajevo Bosnia Herzeg.* 2015;69(3):200-2.