



### E51 Side Effects of Anabolic Androgenic Steroids Abuse: What About Necrotizing Fasciitis?

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The goal of this presentation is to illustrate how widespread Anabolic-Androgenic Steroid (AAS) consumption can lead to the development of a wide spectrum of side effects, including necrotizing fasciitis, even if it is rare. Thus, in suspected cases, an autopsy should be performed with a complete biological sampling because of the substantial role of toxicology to define the cause of death and serve justice.

This presentation will impact the forensic science community by demonstrating the impact of the widespread AAS abuse in the world. This presentation will also stress the importance of developing the knowledge of pathological processes and mechanisms of organ damage related to AAS consumption, which can lead to death. Toxicological investigations can identify AAS use in suspected patients and should be performed routinely. This allows physicians to perform tailored treatments.

Previously used by elite athletes, currently AAS use has developed among the general population. The Centers for Disease Control and Prevention (CDC), in their thirty-third report on the health status of the United States, reported that approximately two million individuals use or have used AASs during their life only in the United States. In Italy, AAS consumption began to affect social sensitivity. Last year in Foggia, the death of a sports figure led police investigations into the requisition of substances in many gyms in town.

This case reports a 31-year-old weightlifter who went to the emergency ward referencing an accidental fall with left thigh trauma. Radiologically, a hematoma was detected at the left thigh level with no fractures. The patient refused further investigation. Two days later, this sports figure went to another emergency ward for lower limb edema and hyperpyrexia (38°C). A new imaging evaluation revealed extended dermal emphysema into the left gluteal. Lab results suggested a diagnosis of Multi-Organ Failure (MOF) and septic shock from traumatic left thigh necrotizing fasciitis. Surgical removal of necrotic tissues and fasciotomy were provided. Although surgery and hyperbaric therapy were performed, the man died.

Before the autopsy was performed, a review of the literature had been conducted: (1) necrotizing fasciitis may develop in the site of skin biopsy, lacerations, insect bites, acupuncture, surgical wounds, skin abscesses, burns, closed bruising trauma, and drug extravasation zones; (2) over the past years, only a few cases of athletes who developed pyomyositis or soft tissue infections were described in association with AAS abuse; (3) during the same period, several studies evidenced a wide range of AAS side effects on organs and systems with supra-physiological doses and immunosuppressive effects; and, (4) in AAS abusers, the use of non-sterile needles or frequent injections has been related to local infections at the injection site.

Thus, the autopsy of the weightlifter was performed with a complete biological sampling for toxicological purposes. Not surprisingly, keratin matrix (hair), approximately 1cm long, showed positivity for propionate testosterone, clenbuterol, stanozolol, trembolone, oxandrolone, and tamoxifen, indicative of the intake of the substances detected over a period of 4-5 to 30 days prior to the date of the autopsy. Serum samples, collected during the second hospitalization, detected positivity for stanozolol and tamoxifen; however, the multi-organ dysfunction made it impossible and difficult to quantify the rate of recruitment due to a slowdown in the metabolism of these substances and a reduction in the elimination rate. Police investigation led to the seizure of six propionate testosterone vials at the man's home; subsequent analysis showed it to be the same molecule as the testosterone keratin sample.

This scenario was reconstructed: positivity in the keratin matrix expressed a chronic use of these substances; and chronic use resulted in a state of immunodeficiency, which favored the development of necrotizing fasciitis, from the site of inoculation of the substances, confirmed by histological examination.

This analysis highlights the narrow relationship between AAS abuse and immunodeficiency and is the basis for further studies; however, it should be taken into account that among all dangerous effects produced by AAS use, necrotizing fasciitis is not an unusual consequence.

#### **AASs, Necrotizing Fasciitis, Toxicological Examinations**