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CASE REPORT

Steroids, psychosis and poly-substance abuse

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Objective. To review consequences of the changing demographic profile of anabolic-androgenic steroid (AAS) use.

Method. Case report and review of key papers.

Results. We report here a case of a 19-year-old Irish male presenting with both medical and psychiatric side effects of methandrostenolone use. The man had a long-standing history of harmful cannabis use, but had not experienced previous psychotic symptoms. Following use of methandrostenolone, he developed rhabdomyolysis and a psychotic episode with homicidal ideation.

Discussion. Non-medical AAS use is a growing problem associated with medical, psychiatric and forensic risks. The population using these drugs has changed with the result of more frequent poly-substance misuse, potentially exacerbating these risks.

Conclusion. A higher index of suspicion is needed for AAS use. Medical personnel need to be aware of the potential side effects of their use, including the risk of violence. Research is needed to establish the magnitude of the problem in Ireland.

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Key words: Affective disorders, anabolic-androgenic steroids, anabolic steroids, psychoses, rhabdomyolysis.

Background

The medicinal use of testicular extract may date back to ancient Egyptian times (Dotson & Brown, 2007). More recently in 1889, Charles-Édouard Brown-Séquard (after whom the eponymous hemiplegia is named) claimed he had reversed his own ageing by injecting himself with testicular extract (Kuhn, 2002). Extensive research has since been conducted on the effects of steroids in animals and humans. Anabolic-androgenic steroids (AAS) are synthetic steroids with properties similar to the male sex hormone testosterone (Celotti & Negri Cesi, 1992). AAS have long been used to gain competitive advantage in sport (Dotson & Brown, 2007). The use of these drugs is currently topical owing to recent controversies in the sporting world, with many high-profile athletes reporting prior use. The harmful use of AAS is an international problem (Kokkevi *et al.* 2008; Tahtamouni *et al.* 2008; Leifman *et al.* 2011; Andrade *et al.* 2012; Hakansson *et al.* 2012; de Siqueira Nogueira *et al.* 2014; Razavi *et al.* 2014). A review of 18 international studies estimated the prevalence of non-medical anabolic-androgenic steroid (NMAAS) use to be 2% among college students and adolescents and up to 50% in cohorts of body builders (Dodge & Hoagland, 2011). No data currently exists for the prevalence of AAS use in Ireland.

NMAAS have been shown to improve athletic performance; increasing strength and lean muscle mass (Hartgens & Kuipers, 2004). Historically, individuals using AAS were athletes seeking to gain competitive advantage. The current profile of NMAAS users is changing as the motivation for their use has shifted from performance enhancement to aesthetic enhancement; this population is more inclined to engage in poly-substance misuse (Gårevik & Rane, 2010; Petersson *et al.* 2010; Ip *et al.* 2011; Kanayama & Pope, 2012).

The benefits of AAS do not come without a cost; both physical and psychological side effects have been associated with the use of these drugs. The most common side effects reported are increase in sexual drive, acne vulgaris, increased body hair, gynaecomastia, cardiovascular complications and aggressive behaviour (Burnett & Kleiman, 1994; Hartgens & Kuipers, 2004; Achar *et al.* 2010). This aggressive behaviour is sometimes referred to as 'roid rage'. Homicide and homicidal ideation have previously been reported with AAS use (Pope & Katz, 1990), and while causation has not been established, there is an association between AAS and violence (Klötz *et al.* 2006; Lundholm *et al.* 2010; Skårberg *et al.* 2010).

Psychiatric side effects of AAS use are common. Major mood symptoms have been seen in 22–23% of steroid users, whereas 12% experienced psychotic symptoms (Pope & Katz, 1994, 1998). Affective

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symptoms associated with NMAAS included mania, hypomania and depression. Some evidence is emerging for animal models that NMAAS can also lead to neurodegeneration (Scaccianoce *et al.* 2013).

We describe here a patient who presented with both medical and psychiatric complications of methandrostenolone use. His harmful NMAAS use was complicated by cannabis dependence and harmful use of opiates and benzodiazepines.

Case presentation

An 18-year-old Irish male was first seen by psychiatry in October of 2011. At this time he was suffering from post-traumatic stress disorder (PTSD), having witnessed the death of a friend. At that time he also admitted to regular cannabis use, using up to 3 oz. weekly since the age of 16. His pattern of use was consistent with the ICD-10 criteria for active dependence (F12.24). There was a family history of substance misuse problems and aggression, however, there is no family history of affective or psychotic illness. He denied experiencing any psychotic symptoms at that time and none were elicited on mental state examination. He was started on treatment for PTSD, advised to stop using cannabis and discharged to his general practitioner (GP).

In November 2012, he began intensive weight lifting (up to 3 hours a day), and a month after this he started using oral methandrostenolone. He also reported using intramuscular injections on three occasions. He reported that steroid use was common among his peers attending the gym. He initially bought the methandrostenolone from a gym member, but later began to buy it online. After 2 weeks of starting NMAAS he noticed a sense of anxiety and paranoia. He believed people were following him and confronted a stranger about this. After 3 weeks of commencement of steroids he presented to the ED for the first time with pain all over his body, feeling uncomfortable and not being able to exercise. He also admitted active dependence on cannabis, reporting smoking 3 oz./week. At this time no psychiatric symptoms were observed. On examination, his vitals were within normal ranges, he was noted to have a muscular physique, muscle tenderness and diffuse muscle fasciculation over pectoralis major. His creatine kinase (CK) was 13 369 IU/l well above the reference range of 44–272 IU/l. His alanine aminotransferase was also elevated at 123 IU/l. Other blood tests including full blood count, urea and electrolytes, and C-reactive protein were within normal limits. His electrocardiography and tropinins were also normal. The impression was rhabdomyolysis, and he was admitted under the medical team. His CK level rapidly reduced with intravenous fluids. By the following day, his CK was 5432 IU/l. Investigations for autoimmune and rheumatological conditions returned negative. While in hospital two doctors described him as hypomanic. He reported bizarre symptoms; telling the physiotherapist that his hips were decaying and telling his treating doctor that one side of his body was relaxed, whereas the other side was tense. Repeated neurological examinations were inconsistent; 5 days after admission his CK was 466 IU/l and he was discharged.

Three days after discharge he presented for a second time, reporting that his bones were 'reconstructing' and that testosterone was going into his bones. He insisted there was something wrong with his body and he was visibly distressed. He requested to see a counsellor but left against medical advice before seeing a doctor.

Eight days later he presented for a third time. This time he reported sudden onset pain in his left arm, back and testicles. He reported that he had started lifting weights again. He also reported using cannabis and diazepam and his urine toxicology was positive for benzodiazepines, cannabis and opiates. He again left against medical advice 4 hours after presenting. Following his self-discharge, he was arrested after getting into an altercation with the police. He had no prior forensic history. This highlights how uncharacteristic aggression can occur in the context of AAS use (Hartgens & Kuipers, 2004).

Twelve hours later he returned to the ED, this time he was accompanied by his mother who provided a very helpful collateral history. The psychiatry team also saw him directly owing to his multiple presentations. He reported being able to feel energy pulsing through his body and that he could see flashes of lights. He was found to be experiencing features of mania and psychosis. He described his mood as 'fantastic' and rated it as 10/10. Over the preceding week he had excess energy and reduced need for sleep. He reported racing thoughts. He exhibited a preoccupation with superheroes and believed himself to be in the process of divinely acquiring super powers, including the ability to fly and read minds. He said 'there isn't enough testosterone in my body' and believed that when he had enough testosterone in his body he would start murdering criminals. He denied having any weapons or specific plan to harm any identified individuals. He had no suicidal ideation or thoughts of self-harm. He believed that his muscles grew when he was angry. In addition to his grandiose delusions, he believed that there was something wrong with his scrotum and he had been trying to stretch it to correct the abnormality. Psychotic symptoms were never experienced while he was using cannabis alone, strengthening the case that methandrostenolone could be the causative agent.

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His history and mental state examination were consistent with a diagnosis of mixed psychotic disorder owing to multiple drug use (F19.56). He had active dependence on cannabis and harmful use of benzodiazepines and AAS. He denied opiate abuse and could not explain why his drug screen was positive for opiates.

On mental state examination, our patient was a young Caucasian male in good physical shape. He was tattooed. He had a large bruise on his left cheek and a small laceration on his forehead, neither of which had been dressed. He was sitting smiling but agitated and restless. He constantly flexed his muscles. His speech content was increased but his tone was calm and of appropriate volume. His thoughts were objectively and subjectively racing. He had grandiose, somatic and bizarre overvalued ideas and delusions. He expressed homicidal ideation secondary to his grandiose delusions. He was experiencing functional auditory hallucinations of God's voices while listening to music on earphones. He also experienced elemental visual hallucinations, which he interpreted as evidence for his special role. He had poor insight about his symptoms but his cognition appeared grossly intact.

He was admitted to an acute admissions unit where he was treated with olanzapine 10 mg twice daily, occasional haloperidol and gradually reducing doses of diazepam. He was initially held under section 14(2) of the mental health act, but an admission order was not completed and he agreed to stay as a voluntary patient. Investigations carried out during his admission were unremarkable; these included a full blood count, thyroid and liver function tests, urea and electrolytes and bone profile. His one subsequent drug screen conducted after a month of admission was positive for cannabis. His psychotic symptoms and homicidal ideation resolved over the following 2 months at which time he was discharged. He attended out-patients for the following 9 months, and did not experience any further psychotic symptoms; he remained on olanzapine 10 mg twice daily and continued to be actively dependent on cannabis, despite being offered drug counselling. He denied any further abuse of AAS.

Discussion

Methandrostenolone use is a global problem. Although no data exists concerning its use in Ireland, this case highlights the need to be aware of AAS use. This case also demonstrated the easy availability of NMAAS in Ireland through the internet.

Initially, methandrostenolone was a drug abused by elite athletes, this case report highlights how its use is now much more widespread, a trend observed in recent research (Petersson *et al.* 2010). As in the case reported here many users of AAS also abuse other substances (Gårevik & Rane, 2010; Petersson *et al.* 2010; Ip *et al.* 2011; Kanayama & Pope, 2012). Methandrostenolone use is known to be associated with both affective and psychotic symptoms (Pope & Katz, 1994, 1998). This case highlights how these mental health problems and the accompanying homicidal ideation could potentially be exacerbated by concurrent poly-substance misuse.

Substance abuse or dependence has been associated with violence (Friedman, 2006). AAS use has also been associated with violence and this has a plausible biological basis (Klötz *et al.* 2006; Lundholm *et al.* 2010; Skårberg *et al.* 2010). AAS use in the context of poly-substance misuse should therefore be an important indication for comprehensive assessment of risk of violence to self and others.

Conclusions

This case highlights the need for psychiatrists to be aware of the potential harmful use of NMAAS and the potential risks their use can bring. A high index of suspicion for NMAAS use is needed in individuals engaged in regular physical training. It demonstrated the need for comprehensive risk assessment in cases of NMAAS use. Psychiatrists should be aware of the potential medical side effects of AAS, including rhabdomyolysis. GPs and emergency medicine doctors should be aware of their potential psychiatric side effects of these drugs, and should refer to psychiatry if there is suspicion of mental health problems. Research needs to be conducted to assess the extent of the problem in Ireland.

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Consent

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor of this journal.

Conflicts of Interest

Authors have no conflict of interests to declare that are relevant to the content of this submission.

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